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November 16, 2018

**BY ELECTRONIC FILING**

Kathleen H. Burgess
Secretary
New York Public Service Commission
Three Empire State Plaza
Albany, NY 12223

Re: **Case No. 18-C-0396, Joint Petition of T-Mobile USA, Inc. and Sprint Communications Company L.P. Concerning an Indirect Transfer of Control**

Dear Ms. Burgess:

DISH Network Corporation ("DISH") submits this letter and the enclosed materials in response to the Notice inviting comments in the above-referenced proceeding.

Enclosed are the public, redacted versions of DISH's Petition to Deny and Reply filings as submitted to the Federal Communications Commission. The Highly Confidential Information of Sprint and T-Mobile is redacted pursuant to the FCC's protective orders in its transaction review proceeding.[1]

Please contact me with any questions.

Respectfully submitted,

Andrew Golodny
*Counsel to DISH Network Corporation*

Enclosures

[1] *See* Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *Protective Order*, WT Docket 18-197, DA 18-624 (June 15, 2018); Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *NRUF/LNP Protective Order*, WT Docket 18-197, DA 18-777 (July 26, 2018).

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**REDACTED—FOR PUBLIC INSPECTION**

August 27, 2018

***BY ECFS***

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

**Re: Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197**

Dear Ms. Dortch:

In accordance with the *Protective Order* and *NRUF/LNP Protective Order* in the above-captioned proceeding,[1] DISH Network Corporation ("DISH") submits the enclosed public, redacted version of its Petition to Deny, including supporting exhibits. DISH has denoted with **{{BEGIN HCI  END HCI}}** and **{{BEGIN NRUF/LNP HCI  END NRUF/LNP HCI}}** where Highly Confidential Information has been redacted. A Highly Confidential version of this filing is being simultaneously filed with the Commission and will be made available pursuant to the terms of the *Protective Order* and the *NRUF/LNP Protective Order*.

Please contact me with any questions.

Respectfully submitted,

Pantelis Michalopoulos
Christopher Bjornson
*Counsel for DISH Network Corporation*

Enclosure

[1] Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *Protective Order*, WT Docket No. 18-197, DA 18-624 (June 15, 2018) ("*Protective Order*"); Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *NRUF/LNP Protective Order*, WT Docket No. 18-197, DA 18-777 (July 26, 2018) ("*NRUF/LNP Protective Order*").

**REDACTED—FOR PUBLIC INSPECTION**

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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# PETITION TO DENY OF DISH NETWORK CORPORATION


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August 27, 2018

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## PETITION TO DENY OF DISH NETWORK CORPORATION

DISH Network Corporation ("DISH")[1] respectfully petitions the Commission to deny the proposed merger of T-Mobile US, Inc. ("T-Mobile") and Sprint Corporation ("Sprint") (together, the "Applicants") as currently constructed.[2] The transaction will create a four-to-three national mobile voice/broadband market, lead to excessive concentration in other relevant markets, and likely increase prices for consumers. The Applicants have not yet demonstrated that the merger, as currently proposed, would serve the public interest.

[1] Subsidiaries of DISH include entities that hold licenses suitable for the provision of commercial wireless service, including AWS-4, AWS H Block, Lower 700 MHz E Block, and 600 MHz licenses. DISH's subsidiaries also include a multichannel video programming distributor and an online video distributor, both of which compete with T-Mobile, which recently purchased Layer 3. For these and other reasons described herein, DISH is a party in interest under Section 309(d)(l) of the Communications Act. *See* 47 U.S.C. § 309(d)(l).

[2] *See* Public Notice, WT Docket No. 18-197, T-Mobile US, Inc., and Sprint Corporation Seek FCC Consent to the Transfer of Control of the Licenses, Authorizations, and Spectrum Leases Held by Sprint Corporation and Its Subsidiaries to T-Mobile US, Inc., and the *Pro Forma* Transfer of Control of the Licenses, Authorizations, and Spectrum Leases Held by T-Mobile US, Inc., and Its Subsidiaries, DA 18-740 (July 18, 2018).

## I. INTRODUCTION AND SUMMARY

The Applicants seek to consolidate the national mobile voice/broadband market from four to three players. Economic analysis and empirical evidence demonstrate that, instead of enhancing competition, such consolidation is apt to thwart it. In seeking approval for this transaction, the Applicants must show that the proposed merger will not have anti-competitive effects, or that any such effects will be more than offset by the public benefits that it will produce. But, Sprint and T-Mobile have not yet met this burden, and much work needs to be done for them to carry it.

The Applicants appear to overstate the merger's impact on 5G deployment and in turn, its public interest benefits.[3] The Applicants have also failed to provide evidence regarding the merger's unilateral effects on competition. Among other outcomes, the transaction will likely result in estimated consumer price increases of 2.8-15.5%, or weighted average price increases of 4.2-10.4%. In other countries where the mobile voice/broadband market has experienced a four-to-three reduction, consumers have seen price increases of 14-20%. On top of these likely price increases, the transaction would also increase the risk of coordination in the industry, likely resulting in another 15-21% in post-merger price increases.

*Claimed Benefits*. The Applicants frame the merger as producing one primary public interest benefit: 5G deployment. They appear to argue that, without the merger, Sprint or T-Mobile would not be able to deploy a "world-leading" 5G network, and that "neither T-Mobile

[3] DISH welcomes the FCC's detailed document requests to the Applicants, which will permit a more thorough review. *See* Letter from Donald K. Stockdale, Chief, Wireless Telecommunications Bureau, to Kathleen O'Brien Ham, T-Mobile US, Inc., WT Docket No. 18-197 (Aug. 15, 2018); Letter from Donald K. Stockdale, Chief, Wireless Telecommunications Bureau, to Vonya B. McCann, Sprint Corp., WT Docket No. 18-197 (Aug. 15, 2018).

nor Sprint can win [the race to 5G] on its own."[4] They add that, by making 5G possible for the combined company ("New T-Mobile"), the merger will trigger a chain reaction that will in turn unleash 5G deployments by New T-Mobile's competitors, Verizon and AT&T.[5] According to the Applicants' formulation, the case for approval of the merger largely disappears if that "cause-and-effect" link is not true—i.e., if the merger is not necessary for Sprint or T-Mobile to achieve a nationwide 5G network, and if AT&T and Verizon plan to deploy 5G regardless of the outcome of this transaction.

The Applicants' claims in support of this merger and its chief supposed public interest benefit—the deployment of 5G—seem to be at odds with the pre-merger statements made by each company indicating that 5G deployment is both possible and anticipated, including:

- December 2017: "[T-Mobile] will be the only ones on the fast-track toward a real, mobile nationwide 5G network in 2020 – and have already started deploying 5G ready equipment."[6]
- March 2018: "[Sprint has] the BEST spectrum and assets to build an incredible nationwide #5G network that our customers will love."[7]

And, the facts on the ground suggest that each Applicant has the capability to deploy 5G on a standalone basis. Among other things:

- The Applicants acknowledge that they will not use the combined spectrum and cell sites of both companies. Rather, they say that New T-Mobile will have the option to use cell sites from each company, and that it will "retain[] a number of Sprint cell sites."[8]

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[4] Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197, at 16 (June 18, 2018) ("Application").

[5] *Id.* at 16-18.

[6] John Legere, *The Revolution Continues…*, T-Mobile Blog (Dec. 27, 2017), https://www.t-mobile.com/news/legere-2018-predictions.

[7] Marcelo Claure (@marcelclaure), Twitter (Mar. 9, 2018 12:24 PM), https://twitter.com/marceloclaure/status/972206391858483201.

[8] Application at 29-31 & n.87.

- Each Applicant has reserves of spectrum today, including much of Sprint's 2.5 GHz spectrum.
- The Applicants have not yet shown that the merger will be necessary for the transition to 5G. According to the Applicants, the merger will make possible the beginning of 5G services on some spectrum while legacy subscribers continue receiving LTE service on other spectrum.[9] But:
  - A transition is by definition transitory and any temporary needs likely could be covered by less restrictive alternatives than a merger.
  - Each company appears to be able to achieve such a transition, even assuming that simultaneous LTE and 5G services are necessary, standing alone by utilizing its unused spectrum.
  - The Applicants have failed to relate the 5G service they plan to provide to the spectrum they claim they need for such service. Among the three pillars that define 5G, only one, enhanced mobile broadband, requires large swaths of spectrum. The other two, ultra-reliable low-latency communications and massive machine type communications, are less spectrum-intensive.

In addition, the merger could likely produce harms associated with the complex integration of two large networks, including their underlying operations, and introduce the potential for degradation in the user experience. These risks dwarf those of the prior T-Mobile/MetroPCS consolidation. One unintended consequence could be delays in New T-Mobile's 5G roll-out compared to the Applicants' standalone plans.

The Applicants claim that the merger will *accelerate* 5G deployment by both New T-Mobile and its remaining competitors, AT&T and Verizon.[10] But, this claim ignores the competitive pressure that both companies are applying to the incumbents today. And, it undercuts the core justification for the merger, because it means that 5G deployment is possible even without this transaction. It also means that Dr. Evans' calculation of the price decrease that

[9] *Id.* at 36-39.

[10] *Id.* at 17.

the merger is likely to produce is flawed. Dr. Evans' analysis—which is based on the premise that the merger is *necessary* to make 5G possible at all—is not supportable:

- Dr. Evans does not analyze the transaction's unilateral effects on competition. He assumes that the average revenue per unit ("ARPU") will remain the same between 2017 and 2024, "consistent with T-Mobile's business plans."[11] But his assumption begs the core question to be answered: whether the increase in concentration brought about by the merger will lead to higher prices and therefore higher ARPU. Dr. Evans assumes no.

- The analysis echoes the Applicants' cost-savings estimates without any verification. Dr. Evans simply takes the cost synergies given to him by the Applicants and translates them into purported price declines.

- Most of the price decrease estimated by Dr. Evans comes not out of the prices of the merged companies, but rather out of the prices of AT&T and Verizon, which would supposedly be spurred on to compete by the 5G deployment made possible by the merger. But Dr. Evans' premise is that the progress achieved by Verizon and AT&T towards 5G to date is "tepid."[12] That premise appears to be inaccurate. This inaccuracy in turn overstates the claimed benefits.

- DISH retained Professor David Sappington, Eminent Scholar, Department of Economics, University of Florida, and the Chief Economist of the FCC under Chairman Michael Powell. Professor Sappington demonstrates that any gains the merger might achieve are severely diminished if the merger merely accelerates a benefit, rather than serves as the only means for achieving it. He demonstrates, for example, that if the merger accelerates a benefit by five years, the gain from the merger is less than 10% of the corresponding gain the merger would deliver if it were the sole means of achieving the benefit.

The Applicants also highlight the merger's impact on 5G deployment in rural areas. By utilizing Sprint's 2.5 GHz spectrum, the Applicants' claim that "small towns and rural communities will experience greater coverage and quality of service, increased capacity, and faster speeds."[13] Elsewhere, however, Sprint and T-Mobile argue that, because of the

[11] Declaration of David Evans ¶ 236 (June 18, 2018) ("Evans Declaration") (attached as Exhibit G to Application).

[12] *Id.* ¶ 197.

[13] Application at 65.

propagation limitations of 2.5 GHz spectrum, without the merger, Sprint will "not be a major competitor in most of rural America in the foreseeable future."[14] The Applicants have failed to explain this apparent contradiction: on the one hand, they note that 2.5 GHz spectrum will enhance rural deployment for New T-Mobile, while at the same time arguing that such spectrum inhibits 5G deployment for Sprint in those same parts of the country. It is therefore unclear from the Application how rural deployment can be credited as a benefit that would flow from this transaction.

*Market Definition.* Instead of directly addressing the unilateral effects that would likely result from the four-to-three market consolidation, the Applicants create an overly broad product market definition. They cite competition by mobile virtual network operators ("MVNOs") as relevant players in the market.[15] But MVNOs are likely not effective competitors to facilities-based carriers in light of these operators' dependence on their landlord carriers' consent; indeed, they have proven inadequate in many other countries. Compared to the Big-4 providers' national footprint, MVNOs also tend to be regionally focused (e.g., Comcast and Charter) or confined to a particular product sub-market (e.g. TracFone).

The Applicants also rely on the idea of converging broadband markets, even though they do not claim that landline ISPs will constrain the behavior of mobile carriers.[16] And, they make much of competition from Comcast and Charter, two essentially virtual carriers with modest offerings and nascent subscriber bases.[17]

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[14] *Id.* at 96.

[15] *Id.* at 114-16.

[16] *Id.* at 58-64.

[17] *Id.* at 105-11.

Finally, the Applicants cite to DISH's prospective wireless entry.[18] But, DISH will only be a competitor in the Internet of Things ("IoT") market in the first phase of its network deployment. The Phase 1 network is expected to be deployed, and IoT service to commence, by March 2020. While DISH plans to aggressively upgrade and expand that network to full 5G in the future, the timing of the transition will crucially depend on, among other things, scarce inputs (e.g., radios, devices and chipsets) that the merger could make scarcer still.

*Competitive Effects.* Economic analysis and empirical data demonstrate that the increase in concentration to be produced by the merger will likely result in significant price increases. Professor Joseph Harrington, the Business Economics and Public Policy Department Chair at the University of Pennsylvania's Wharton School, and the Brattle Group have calculated the county-specific spectrum concentration increases that would result from this deal. They conclude that New T-Mobile will be over the FCC's spectrum screen in 1,996 of the nation's 3,221 counties. Brattle also computed the Herfindahl-Hirschman Index ("HHI") increases that would result from the merger at the national level. The findings? Before the merger, the HHI is 2,814, already in the "highly concentrated" category under the Horizontal Merger Guidelines (the "Merger Guidelines"). The post-merger HHI would increase 451 points to 3,265, creating a presumption that the merger is "likely to enhance market power" under the Merger Guidelines. Depending on the method used, the merger is estimated to produce price increases to each company's prices ranging between 2.8% and 15.5% or weighted average increases to both companies' prices ranging between 4.2% and 10.4%.

Empirical data from other countries that have experienced four-to-three reductions in the number of mobile carriers also confirm the likelihood of price increases. An econometric study

[18] *Id.* at 112-14.

of 25 countries found that "removing a disruptive player from a four-player market could increase prices by between 17.2% and 20.5% on average."[19] Another study examining 33 countries found that an average four-to-three merger would lead to an "increase in the bill of end users by 16.3% when compared with a situation in which no merger had occurred."[20] The Austrian competition regulator found that the four-to-three merger of Mobile Network Operators ("MNOs") Orange Austria and H3G Austria resulted in inflation-adjusted price increases of 14 to 20% on average (and of 20 to 30% for prepaid plans).[21] A second study examining the same Austrian merger found as much as 90% price increases for some users.[22] Similarly, a study examining the four-to-three merger of T-Mobile and Orange in the Netherlands found the merger resulted in price increases between 10% and 17% compared to control countries.[23]

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[19] Ofcom, *A Cross-Country Econometric Analysis of the Effect of Disruptive Firms on Mobile Pricing* (Feb. 2016), https://www.ofcom.org.uk/research-and-data/multi-sector-research/general-communications/disruptive-firms-econometrics.

[20] Centre on Regulation in Europe, *Evaluating Market Consolidation in Mobile Communications* at 5-6 (Sept. 2015), http://cerre.eu/sites/cerre/files/150915_CERRE_Mobile_Consolidation_Report_Final.pdf. ("CERRE Mobile Consolidation Report").

[21] Bundeswettbewerbsbehörde, *The Austrian Market for Mobile Telecommunication Services to Private Customers: An Ex-post Evaluation of the Mergers H3G/Orange and TA/Yesss!*, Sectoral Inquiry BWB/AW-393, Final Report at 3 (March 2016) https://www.bwb.gv.at/fileadmin/user_upload/PDFs/BWB2016-summary-Ex-post_evaluation_of_the_mobile_telecommunications_market.pdf ("Bundeswettbewerbsbehörde Report").

[22] RTR, *Ex-post analysis of the merger between H3G Austria and Orange Austria* (March 2016) https://www.rtr.at/en/inf/Analysis_merger_H3G_Orange/Ex_post_analysis_merger_H3G_Orange_RTR.pdf.

[23] European Commission, *Ex-post analysis of two mobile telecom mergers: T-Mobile/tele.ring in Austria and T-Mobile/Orange in the Netherlands* at 68 (2015) https://www.rtr.at/de/inf/Analysis_mobile_mergers/Ex-post_analysis_of_two_mobile_telecom_mergers.pdf ("European Commission Ex-Post Analysis of Mergers in Austria and the Netherlands").

The merger would also increase the risk of coordination among the remaining players in the mobile voice/broadband market. While the Applicants do supply testimony on coordinated effects, they confine themselves to citing basic theoretical factors counseling against coordination—primarily the difficulty of detecting cheating. Professor Harrington and the Brattle Group have applied economic theory to the facts in this case. The mobile voice/broadband market is suitable for tacit collusion already, because of factors such as transparent pricing, lack of buyer power, lack of long-term contracts, and high barriers to entry. Nevertheless, tacit collusion remains difficult in today's market, primarily because of the disparate market shares of the four players. In such an "asymmetrical market," collusion is not in the smaller firms' interests.

But the merger would result in a New T-Mobile with a market share comparable to that of AT&T and Verizon. New T-Mobile would therefore be much more aligned with the pricing incentives of these incumbents than it would be with T-Mobile or Sprint as standalone companies. This was exactly the concern articulated by the Italian regulator when the third and fourth largest carriers in that country (H3G and WIND) sought to merge.[24] For similar reasons, New T-Mobile likely will see its incentive to be a maverick reduced after the merger. In fact, the Applicants have noted that aggressive pricing has not resulted in a substantive decrease in the market share of AT&T and Verizon.[25] Therefore, instead of the "un-carrier," New T-Mobile might act as an incumbent. DISH's economists have also applied the model developed by the Applicants' own economists to this transaction, and conclude that the Coordinated Price Pressure

[24] European Commission, Case M.7758 Hutchison 3G Italy/Wind JV, Commission Decision ¶ 971 (Jan. 9, 2016), http://ec.europa.eu/competition/mergers/cases/decisions/m7758_2937_3.pdf.

[25] Application at iii.

Index (the maximum increase that any two companies are willing to initiate and match) will likely increase by 15-21%, depending on the company.

## II. STANDARD OF REVIEW

Under Section 310(d) of the Communications Act ("the Act"), the Commission must determine whether the proposed transaction will serve "the public interest, convenience, and necessity."[26] In considering whether the Applicants have met this standard, the Commission first considers whether the transaction complies with specific provisions of the Act, other applicable statutes, and the Commission's regulations. If so, then the Commission "considers whether the transaction could result in public interest harms by substantially frustrating or impairing the objectives or implementation of the Act or related statutes."[27] In doing so, the Commission considers the evidence provided by the parties, Commission records, and third parties to the proceeding.[28]

As part of this assessment, the Commission takes a close look at the proposed transaction's effect on competition. This analysis is informed by, but not limited to, traditional antitrust principles.[29] If the Commission identifies competitive harms that would be produced by

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[26] 47 U.S.C. § 310(d); *see also* Applications of Comcast Corporation, General Electric Company and NBC Universal, Inc. for Consent to Assign Licenses and Transfer Control of Licensees, *Memorandum Opinion and Order*, 26 FCC Rcd. 4238, 4247 ¶ 22 (2011) ("*Comcast/NBCU Order*").

[27] Applications of Level 3 Communications Inc. and CenturyLink for Consent to Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 32 FCC Rcd. 9581, 9585 ¶ 9 (2017) ("*CenturyLink-Level 3 Order*").

[28] Applications of Charter Communications, Inc., Time Warner Cable Inc., and Advance/Newhouse Partnership for Consent to Assign or Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 31 FCC Rcd. 6327, 6329 ¶ 2 (2016) ("*Charter/TWC Order*") ("Our consent to the transfer of these licenses is based on a careful review of the economic, documentary, and other record evidence.").

[29] *CenturyLink-Level 3 Order* at 9585 ¶ 9.

a merger, then the Commission considers whether such harms can be addressed by appropriate conditions on the transaction.[30] The Commission does not even consider the potential benefits unless it has already found that any harms can be ameliorated through merger-specific conditions.[31]

These public interest benefits are drawn from the "broad aims of the Communications Act,"[32] which include a "deeply rooted preference for preserving and enhancing competition in relevant markets, accelerating private-sector deployment of advanced services, [and] ensuring a diversity of information sources and services to the public."[33] And because the Commission must find that a transaction affirmatively serves the public interest, it must determine "whether a transaction would enhance, rather than merely preserve, existing competition."[34] Importantly, all public interest benefits must be:

1. transaction specific—likely to occur as a result of the transaction but unlikely to be realized by other practical means having fewer anti-competitive effects;[35]
2. verifiable—both in likelihood and magnitude;[36] and

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[30] *Id.*

[31] *Id.* at 9586 ¶ 10. ("If the Commission has determined that a transaction raises no public interest harms or any such harms have been ameliorated by narrowly tailored conditions, the Commission next considers a transaction's public interest benefits.").

[32] *Comcast-NBCU Order*, 26 FCC Rcd. at 4248 ¶ 23

[33] *Id.* at 4248 ¶ 23.

[34] *Charter/TWC Order*, 31 FCC Rcd. at 6338 ¶ 29.

[35] Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations, *Order*, 26 FCC Rcd. 16184, 16247 ¶ 124 (2011) ("AT&T/T-Mobile Staff Report") ("Efficiencies that can be achieved through means less harmful to competition than the proposed merger . . . cannot be considered to be true pro-competitive benefits of the merger.").

[36] *See Comcast-NBCU Order*, 26 FCC Rcd. at 4331 ¶ 226 ("The Applicants . . . are required to provide sufficient supporting evidence to permit us to verify the likelihood and magnitude of each claimed benefit. Benefits expected to occur only in the distant future are inherently more speculative than more immediate benefits.").

3. for the benefit of consumers, and not solely for the benefit of the Applicants.[37]

The Applicants have not yet made this public interest benefit showing.

## III. BOTH SPRINT AND T-MOBILE ARE POTENTIAL 5G COMPETITORS THAT LIKELY CAN SUCCEED WITHOUT MERGING

### A. T-Mobile Likely Does Not Need to Merge with a Competitor to Continue Its Outstanding Market Performance

T-Mobile bears no signs of a company that needs a market-consolidating merger to succeed. If anything, T-Mobile's performance in the years since its failed merger with AT&T demonstrates why a diverse mobile voice/broadband market with many players is good for consumers. T-Mobile stock is up, its customers are delighted, the incumbents have been forced to lower their prices due to T-Mobile's market disruptions, and it is investing in the technologies of the future.

*The un-carrier:* T-Mobile's "un-carrier" strategy has been widely successful and represented a complete turnaround for the company under CEO John Legere. In 2017, Legere celebrated five years as CEO and released a blog post to reflect on how much the company had changed. As Mr. Legere observed, when he first arrived, T-Mobile "didn't have much to celebrate. The AT&T merger had just collapsed, we were losing customers right and left, we had no iPhone, no LTE and we were ranked number 4 (out of 4) in customer service and market share."[38] But because T-Mobile had a "team passionate about their customers and committed to their values," the un-carrier movement "turned [the] company around and changed the wireless industry for good."[39]

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[37] *See id.*

[38] John Legere, *Un-Carrier is From the Inside Out!*, T-Mobile Blog (Sept. 26, 2017), https://www.t-mobile.com/news/un-carrier-is-from-the-inside-out.

[39] *Id.*

As a result of T-Mobile's focused approach to challenging the incumbents, the successes began to stack up. T-Mobile more than doubled its customer base (from 33 million at the end of 2012 to 76 million as of August 2018);[40] deployed a nationwide 4G LTE network; fielded "[m]ore than 600 million calls [] from our care organization as they reclaimed our reputation as the best in the business;" doubled its branded distribution and boasted 17,000 branded retail locations by the end of 2017; "[f]orced the industry to get rid of 2-year service contracts – now 170 million customers are free;" "[r]id the industry of $1.6 billion [in] switching fees – making it easier to change carriers;" and "[g]ot rid of data buckets – now everyone can get an unlimited plan – thanks to T-Mobile."[41] This is a lot to be proud of, and nothing in the Application explains why T-Mobile needs a merger to continue this impressive track record of success.

*Stock performance and profit:* T-Mobile was able to realize its un-carrier vision and rack up all the successes listed above while earning a profit and growing its stock price. The headline on the press release announcing T-Mobile's first quarter 2018 financial results says it all: "T-Mobile Celebrates 5 Years as a Public Company with Record-Low Churn, Industry-Leading Customer Growth, and Strong Profitability."[42] Its second quarter 2018 earnings release touted: "T-Mobile Delivers its Best Q2 Ever."[43] T-Mobile reported 1.6 million total net additions,

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[40] Press Release, T-Mobile, *T-Mobile Delivers Its Best Q2 Ever* (Aug. 1, 2018), http://investor.t-mobile.com/Cache/1001240724.PDF?O=PDF&T=&Y=&D=&FID=1001240724&iid=4091145. ("T-Mobile Aug. 1, 2018 Press Release"). This number includes the Metro PCS acquisition in late 2012, which had 8.9 million subscribers at the time.

[41] *Id.*

[42] Press Release, T-Mobile, *T-Mobile Celebrates 5 Years as a Public Company with Record-Low Churn, Industry-Leading Customer Growth, and Strong Profitability*, (May 1, 2018), https://www.t-mobile.com/news/q1-2018-earnings.

[43] T-Mobile Aug. 1, 2018 Press Release.

representing the 21st consecutive quarter with more than 1 million net additions.[44] T-Mobile's growing customer base enjoys a 4G LTE network that covers 323 million people, with a target of 325 million people by year-end 2018.[45] Notably, the company's "relentless focus on customer experience through increased investment in customer care, distribution expansion, and digital initiatives has strengthened [T-Mobile's] customer growth and increased customer retention and satisfaction."[46]

And, regardless of the merger, T-Mobile plans an "[a]ggressive deployment of 600 MHz in Q2 2018, augmenting existing low-band capabilities on 700 MHz," and reported "17 quarters in a row with the fastest LTE network."[47] T-Mobile has been able to acquire customers and expand its network while posting strong financial results. Among other things, it most recently reported "record-high" service revenues (up 7% to $7.9 billion), increased total revenues ($10.6 billion), and free cash of $774 million.[48] Over a five-year period, T-Mobile's stock has performed admirably, rising from approximately $23 in July 2013 to over $65 in August 2018—a gain of 182%.[49]

This is not a company that is afraid for its future or lacks a plan to continue its success.

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[44] *Id.*

[45] *Id.*

[46] T-Mobile US, Inc., Annual Report (Form 10-K), at 4 (Feb. 8, 2018) .

[47] T-Mobile Aug. 1, 2018 Press Release.

[48] *Id.*

[49] *See* Stock Chart, T-Mobile Investor Relations, http://investor.t-mobile.com/Stock-Chart (last visited Aug. 26, 2018).

### B. Sprint Has Plenty of Spectrum and Expertise to Challenge T-Mobile and the Other Incumbents as a Standalone Competitor

While Sprint has not enjoyed the impressive rise that T-Mobile has, nothing in the Application proves that a market-consolidating merger is the only way, or even the best way, for Sprint to realize its potential. Sprint is already a healthy company, according to its most recent financial disclosures. Among other measures, Sprint touted 12 consecutive quarters of growth in postpaid customers, the lowest prepaid churn in more than three years, and adjusted EBITDA of $3.3 billion—the highest in more than 11 years.[50]

In addition, Sprint has a treasure trove of spectrum that is highly suitable for 5G, and it could choose to build that spectrum out on its own. Sprint's 2.5 GHz holdings in particular have become strategically important for 5G success[51] And, Sprint has noted that its "densification and optimization efforts are expected to continue to enhance the customer experience by adding data capacity, increasing the wireless data speeds available to our customers, and improving network performance for both voice and data services."[52]

It is also far from clear that Sprint needs this merger to transition its network to 5G. Earlier in 2018, before announcing plans to merge with T-Mobile, Sprint aspired to lead the race to 5G in the United States, expecting "to launch mobile 5G, a true 5G mobile network in

[50] *See* Sprint Corporation, FY Q1 2018 Results (Aug 1, 2018), http://s21.q4cdn.com/487940486/files/doc_financials/quarterly/2018/Q1/02_1QFY18-Slides_Final.pdf.

[51] Sprint Corp., Q3 2017 Earnings Call Transcript, Fair Disclosure Wire (Feb. 2, 2018) (Maurice Claure, CEO: "I am very confident in Sprint's future based on the competitive advantage that we will have with the deployment of 5G on our 2.5 spectrum.").

[52] Sprint Corp., Annual Report (Form 10-K), at 26 (May 26, 2017) ("Sprint 2017 Annual Report").

2019."[53] Although the Applicants claim they can get to 5G faster and better if they do it together, a merger is not Sprint's only option.

Sprint has also found success growing its subscriber base. Just a year ago, Sprint reported a "big step forward in the second year of [its] turnaround plan," [54] with 42,000 new postpaid phone customers in the first quarter of 2017 and an impressive *doubling* of its postpaid subscriber growth in fiscal year 2016, with 930,000 more phone subscribers.[55] For the same quarter, Sprint announced that net operating revenues returned to growth and cost reductions accelerated, "leading to the highest operating income in a decade and a return to positive adjusted free cash flow."[56] Here again, Sprint, backed by the resources of its parent SoftBank (which has assets exceeding 31 trillion yen or $279 billion),[57] has not shown that it needs a merger to continue its track record of growth and reach its 5G aspirations.

### C. Merging T-Mobile and Sprint Means Customers Lose Out on Years of the Two Companies Competing Head-to-Head with Each Other and the Incumbents

As discussed above, Sprint and T-Mobile have proven themselves to be strong, independent wireless competitors over the last five years, particularly regarding price and plan

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[53] Sprint Corp., Q3 2017 Earnings Call Transcript, Fair Disclosure Wire (Feb. 2, 2018)

[54] Press Release, Sprint, *Sprint Returns to Net Operating Revenue Growth, Near-Record Operating Income, and Positive Adjusted Free Cash Flow With Fiscal Year 2016 Results* (May 3, 2017), http://investors.sprint.com/news-and-events/press-releases/press-release-details/2017/Sprint-Returns-to-Net-Operating-Revenue-Growth-Near-Record-Operating-Income-and-Positive-Adjusted-Free-Cash-Flow-with-Fiscal-Year-2016-Results/default.aspx.

[55] *Id.*

[56] *Id.*

[57] Softank Group, Financial Position, https://www.softbank.jp/en/corp/irinfo/financials/results/highlights (data for FY 2017).

features.[58] For its part, T-Mobile has touted its position as the "un-carrier" by providing competitive offerings, including domestic and international unlimited data, talk, and text plans,[59] and Binge On, which provides unlimited video streaming for participating services.[60] Sprint has similarly disrupted the market with innovative offerings. For example, in January 2014, Sprint launched the "Framily Plan" which allowed consumers to choose up to 10 phone lines to add to a group plan, with unique incentives and billing for each participant.[61] T-Mobile and Sprint have promoted themselves as low-cost providers and currently offer the cheapest unlimited data plans of the four nationwide wireless carriers.[62]

*Sprint and T-Mobile compete against each other*. Among other factors, Sprint and T-Mobile's strength as independent companies comes from their efforts to attract and retain customers by competing head-to-head.[63] Their relationship has been characterized as one of

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[58] *See e.g.* Karissa Bell, *Say Goodbye to the Epic Twitter Feud Between T-Mobile, Sprint*, Mashable (Apr. 30, 2018), https://mashable.com/2018/04/30/sprint-tmobile-merger-ceo-twitter-beef/#hNtDsbUJusqP (describing and cataloging tweets from 2013 through 2018 that T-Mobile Chief Executive Officer John Legere wrote comparing Sprint and T-Mobile's customer satisfaction, marketing promotions, network speed, and network reliability).

[59] *See* T-Mobile, *One Plan to Rule Them All.*, https://www.t-mobile.com/our-story/un-carrier-history (last visited Aug. 26, 2018); *Unlimited Video Streaming with Binge On*, T-Mobile, https://www.t-mobile.com/offers/binge-on-streaming-video (last visited Aug. 26, 2018).

[60] *Unlimited Video Streaming with Binge On*, T-Mobile, https://www.t-mobile.com/offers/binge-on-streaming-video (last visited Aug. 26, 2018).

[61] *See* Press Release, Sprint, *Sprint Redefines the Wireless Family with the New Sprint Framily Plan* (Jan. 7, 2014), http://newsroom.sprint.com/sprint-redefines-the-wireless-family-with-the-new-sprint-framily-plan.htm.

[62] *See* Patrick Holland, *T-Mobile, Verizon, AT&T, and Sprint Unlimited Plans Compared*, CNET (Aug. 9, 2018) https://www.cnet.com/news/verizon-att-sprint-t-mobile-unlimited-data-plan-compared (last visited Aug. 26, 2018).

[63] *See* Dan Frommer, *Blocking T-Mobile's Last Big Merger Turned out Great for U.S. Consumers. So What's Different Now?*, Recode (Apr. 30, 2018), https://www.recode.net/2018/4/30/17302426/tmobile-sprint-merger-regulatory-approval-

"largely competing against each other . . . since both are trying to lure customers away from the two giants of the industry"[64] Observers have noted that "when either drops the price of plans, or includes extra 4G data, the other matches the plans or betters them."[65] As the Commission has recognized, consumers have directly benefitted from this competition in the form of lower prices and innovative offerings provided by the two carriers.[66] The following are just some examples of Sprint and T-Mobile competing for market share by changing services or products in response to each other's offerings:

- On the same day in August 2016 that T-Mobile announced T-Mobile ONE, its unlimited plan,[67] Sprint announced the launch of its Unlimited Freedom plan.[68] Both plans offer unlimited video, gaming, and music streaming, as well as "unlimited nationwide 4G LTE data for most everything else[.]"[69]
- In August 2017, T-Mobile announced a new unlimited plan, which offers consumers aged 55 years and older two lines of unlimited talk, text, and 4G LTE

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competition ("T-Mobile and Sprint have been wasting a lot of money stealing customers from each other.").

[64] Chris Morris, *What Would a T-Mobile Sprint Merger Mean for Customers*, Fortune (Sept. 22, 2017), http://fortune.com/2017/09/22/t-mobile-sprint-merger-customers.

[65] Joseph Hanlon, *5 Reasons to Choose T-Mobile Over Sprint*, WhistleOut (Nov. 5, 2015), https://www.whistleout.com/CellPhones/Guides/reasons-to-choose-tmobile-over-sprint.

[66] AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16198-16201 ¶¶ 21-25; Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, *Twentieth Report*, 32 FCC Rcd. 8968, 9002-04 ¶¶ 50-52 (2017) ("20th Mobile Wireless Competition Report").

[67] *See* Press Release, T-Mobile, *Hello Un-carrier 12 … R.I.P. Data Plans T-Mobile Goes All in on Unlimited*, (Aug. 18, 2016), https://www.t-mobile.com/news/rip-data-plans ("T-Mobile Aug. 18, 2016 Press Release").

[68] Press Release, Sprint, *Sprint Launches Unlimited Freedom: Two Lines of Unlimited Talk, Text and Data for Just $100– All on a Great Network – and the Best Price among All National Carriers*, (Aug. 18, 2016), http://newsroom.sprint.com/sprint-launches-unlimited-freedom-two-lines-of-unlimited-talk-text-and-data-for-just-100-all-on-a-great-network-and-the-best-price-among-all-national-carriers.htm.

[69] T-Mobile Aug. 18, 2016 Press Release.

data for $60.[70] In May 2018, Sprint announced an unlimited plan that offers consumers 55 years and older two lines of unlimited data, talk, text, and mobile hotspot data for $70.[71]

- In Febuary 2017, less than a week after T-Mobile announced that T-Mobile ONE would include HD video and 10 GB of high-speed hotspot data, [72] Sprint launched an unlimited plan with HD-quality video and a 10 GB mobile hotspot at a discounted rate.[73]
- In April 2018, T-Mobile launched T-Mobile ONE Military, which offers U.S. military, veterans, their families, and their small businesses "20% off the first line and [h]alf [o]ff up to five additional voice lines[,]" in addition to standard T-Mobile ONE features.[74] Three months later, Sprint launched its Unlimited Military plan, which offers veterans, active duty, and reserves of the U.S. armed forces "50 percent off family lines[.]"[75]
- In April 2018, soon after Sprint announced that its prepaid brand Boost was offering new customers a month of free unlimited data service,[76] T-Mobile

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[70] *See* Press Release, T-Mobile, *A New Reason to Get a Fake ID: Introducing T-Mobile ONE Unlimited 55+* (Aug. 6, 2017), https://www.t-mobile.com/news/unlimited-55.

[71] *See* Press Release, Sprint, *55+ Reasons to Switch to Sprint Now!* (May 17, 2018), http://investors.sprint.com/news-and-events/press-releases/press-release-details/2018/55-Reasons-to-Switch-to-Sprint-Now/default.aspx.

[72] *See* Diana Goovaerts, *T-Mobile Parries Verizon's Unlimited Move with HD Video Upgrade, 2 Line Promo*, Wireless Week (Feb. 13, 2017), https://www.wirelessweek.com/blog/2017/02/t-mobile-parries-verizons-unlimited-move-hd-video-upgrade-2-line-promo.

[73] *See* Diana Goovaerts, *Following Verizon and T-Mobile, Sprint Springs for HD Video in Unlimited Plan Upgrade*, Wireless Week (Feb. 16, 2017), https://www.wirelessweek.com/news/2017/02/following-verizon-and-t-mobile-sprint-springs-hd-video-unlimited-plan-upgrade.

[74] Press Release, T-Mobile, *You've Got Our Backs, So We've Got Yours. T-Mobile Launches Extensive Military Support Initiative* (Apr. 18, 2018), https://www.t-mobile.com/news/t-mobile-one-military ("T-Mobile Apr. 18, 2018 Press Release").

[75] Press Release, Sprint, *Sprint's Industry-Leading Unlimited Plans Just Got Even Better! New Unlimited Plans Include Features Customers Love for the Best Price* (July 12, 2018), http://newsroom.sprint.com/sprints-industry-leading-unlimited-plans-just-got-even-better-new-unlimited-plans-include-features-customers-love-for-best-price.htm ("Sprint July 12, 2018 Press Release").

[76] *See* Zach Epstein, *Sprint Is Giving Away a Month of Unlimited Prepaid Service – So Now T-Mobile Is Giving Away 2 Months*, BGR (Apr. 14, 2018), https://bgr.com/2018/04/14/t-mobile-unlimited-plan-price-free-metropcs-offer.

announced that its prepaid MetroPCS brand would offer two months of free unlimited service and a MetroPCS phone to new customers.[77]

- In July 2018, Sprint debuted two tiers of unlimited plans: Unlimited Basic and Unlimited Plus. Unlimited Basic includes unlimited talk, text, and data as well as Hulu and a 500 MB mobile hotspot, while Unlimited Plus includes a premium Tidal subscription, 15 GB of 4G LTE mobile hotspot data, 10 GB of 4G LTE data in Canada and Mexico, and full HD video streaming on Sprint's 4G LTE network.[78] Two years earlier, in 2016, T-Mobile launched its own two-tier unlimited offerings: T-Mobile ONE, which offers unlimited talk, text, and high-speed data[79] and as of September 2017, Netflix,[80] and T-Mobile ONE Plus, which offers 20 GB of 4G LTE mobile hotspot data, unlimited HD streaming, and unlimited data abroad at double the speed of T-Mobile ONE.[81]

Consumers and the industry as a whole have benefitted from the direct competition between T-Mobile and Sprint.

Importantly, the companies' efforts have also forced AT&T and Verizon to respond with lower prices and more attractive offers. In 2008, Verizon's decision to introduce an unlimited wireless plan was spurred by Sprint's imminent announcement of its own unlimited wireless offer, which was then matched by AT&T within days.[82] In 2010, Sprint released the first 4G

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[77] *See* Press Release, T-Mobile, *Switch to MetroPCS Today and Get TWO Months Unlimited Data Free* (Apr. 12, 2018), https://www.t-mobile.com/news/metropcs-two-months-free.

[78] *See* Sprint July 12, 2018 Press Release.

[79] *See* T-Mobile Aug. 18, 2016 Press Release.

[80] *See* Press Release, *America's Best Unlimited Just Got Even Better – T-Mobile Now Includes Netflix on Us*, (Sept. 5, 2017), https://www.t-mobile.com/news/tmobile-uncarrier-netflix.

[81] *See* Amp Up T-Mobile ONE, T-Mobile, https://www.t-mobile.com/cell-phone-plans?icid=WMM_TM_Q117TMO1PL_H85BRNKTDO37510 (last visited Aug. 26, 2018); Press Release, T-Mobile, *T-Mobile Shakes Things Up with T-Mobile ONE Plus* (Dec. 20, 2016), https://www.t-mobile.com/news/t-mobile-shakes-things-up-with-t-mobile-one-plus (introducing T-Mobile ONE Plus in December 2016).

[82] Saul Hansell, *Verizon Stabs Sprint With Unlimited Wireless Plan* (Feb. 19, 2008), https://bits.blogs.nytimes.com/2008/02/19/verizon-stabs-sprint-with-unlimited-wireless-plan.

phone in the United States, leading Verizon to respond with the Droid X.[83] More recently, AT&T matched Sprint's offer of a $500 credit for customers buying the Galaxy S9.[84] The response to T-Mobile's consumer-friendly policies is similarly well-known. After dropping unlimited data plans three years earlier, "[in] response to T-Mobile's One plan, Verizon, AT&T, and Sprint all introduced or improved their unlimited data offerings."[85] And, since T-Mobile began introducing competitive no-contract plans in 2013, the "overall cost of wireless service has come down 19%."[86] Additional examples of Verizon's and AT&T's responses to T-Mobile's maverick behavior abound:

- *Military discounts:* In April 2018, T-Mobile offered the "biggest military discount in wireless," with 20% off a first line and 50% off additional lines.[87] In June 2018, Verizon followed with its own stepped-up military discount, offering its Go Unlimited plan "for $30 per month per line for four lines—a savings of $40 per month."[88]

- *Buy-One-Get-One-Free offers:* In January 2018, T-Mobile announced a buy-one-get-one free deal for major smartphone brands when a line is switched to T-Mobile.[89] In May

[83] Jane McEntegart, *Droid X is Verizon's Answer to Sprint's EVO 4G* (June 16, 2010), https://www.tomsguide.com/us/Droid-x-Verizon-Sprint-EVO-4G,news-7088.html ("Verizon's answer to [Sprint's] HTC Evo 4G").

[84] Eric Zeman, PhoneScoop, *AT&T Matches Sprint's Samsung Galaxy S9 Offer* (Mar. 2, 2018), https://www.phonescoop.com/articles/article.php?a=20293.

[85] Chris Mills, *Everyone Loves Their Unlimited Data Plans*, BGR (Jan 22, 2018), https://bgr.com/2018/01/22/best-unlimited-plan-verizon-vs-t-mobile-att.

[86] Danielle Wiener-Bronner, *What T-Mobile-Sprint Deal Could Mean for Wireless Prices*, CNN (Apr. 30, 2018), https://money.cnn.com/2018/04/30/technology/business/tmobile-sprint-wireless-rates/index.html.

[87] T-Mobile Apr. 18, 2018 Press Release.

[88] Press Release, Verizon, Now Military Families Can Save Even More with Verizon Unlimited, (June 28, 2018), https://www.verizon.com/about/news/now-military-families-can-save-even-more-verizon-unlimited.

[89] Press Release, T-Mobile, T-Mobile Unveils Major Smartphone Deals to Start the New Year Right (Jan. 10, 2018), https://www.t-mobile.com/news/bogo-offers.

2018, Verizon introduced its own buy-one-get-one-free deal.[90] In June, T-Mobile added the LG G7 to its buy-one-get-one-free deal.[91] One week later, Verizon matched T-Mobile's offer and added LG G7 to its deal.[92]

- *Senior discounts:* In August 2017, T-Mobile introduced an unlimited plan for consumers over the age of 55, offering two lines for $60/month.[93] Verizon later matched T-Mobile's offer with its own plan for customers 55 years and older in Florida, offering an unlimited line for $60/month and two unlimited lines for $80/month.[94]

Without the presence of both companies as independent players in the market, consumers stand to lose out on the innovative offerings and lower prices that have resulted from this head-to-head competition.

## IV. THE APPLICANTS HAVE NOT YET MET THE BURDEN OF PROVING THE TRANSACTION WILL PRODUCE PUBLIC BENEFITS THAT OUTWEIGH THE LIKELY HARMS

### A. 5G Deployment Likely Would Happen With or Without the Proposed Transaction, and Should Not Be Credited as the Transaction's But/For Benefit

Each of the Applicants have claimed that they will deploy 5G networks as standalone companies. Indeed, both T-Mobile and Sprint have shown a commitment to being first to market

[90] Chris Mills, *Verizon's New iPhone BOGO Deal Has Shockingly Little Fine Print*, BGR (May 7, 2018), https://bgr.com/2018/05/07/verizon-iphone-deal-buy-one-get-one.

[91] Chris Mills, *The LG G7 Isn't Even on Sale Yet, But T-Mobile Already Has a Buy-One-Get-One-Free Deal*, BGR (May 30, 2018), https://bgr.com/2018/05/30/the-lg-g7-release-date-deals-t-mobile-vs-sprint-verizon.

[92] Chris Mills, *Verizon is Matching T-Mobile's iPhone and Android Buy-One-Get-One-Free Deal Almost Exactly*, BGR (June 7, 2018), https://bgr.com/2018/06/07/t-mobile-phones-deals-2018-vs-verizon.

[93] T-Mobile Aug. 6, 2017 Press Release.

[94] Mike Dano, *Verizon Offers Response to T-Mobile's Unlimited Plan for Customers Over 55 Years of Age*, Fierce Wireless (Feb. 23, 2018), https://www.fiercewireless.com/wireless/verizon-tests-response-to-t-mobile-s-unlimited-plan-for-customers-over-55-years-old.

with this next generation technology, a commitment that is consistent with both Applicants' positions as disruptors in the market.[95]

Before the merger, T-Mobile stated that it "will be the first to give customers the truly transformative, nationwide 5G network they deserve[.]"[96] It also announced it would "accelerate our 600 megahertz rollout in 2018, while laying the foundation for the country's first nationwide 5G network by 2020."[97] In its annual 10-K filing for 2017, the company explained that it is "rapidly preparing for the next generation of 5G services" by creating a "network that will allow us to deliver innovative new products and services with the same customer focused and industry disrupting mentality that has redefined wireless service in the United States."[98]

Sprint, for its part, believes it has "the BEST spectrum and assets to build an incredible nationwide #5G network that our customers will love."[99] And Sprint said pre-merger that "I

[95] *See e.g.*, T-Mobile US, Inc., Q4 2017 Earnings Call Transcript (Feb. 8, 2018), https://seekingalpha.com/article/4145138-t-mobile-uss-tmus-ceo-john-legere-q4-2017-results-earnings-call-transcript ("[A] blazing fast 4G LTE industry leader with a commitment on the books to launch the first nationwide 5G summary -- network.") ("T-Mobile Q4 2017 Earnings Call"); Press Release, Sprint, News From Sprint at Mobile World Congress 2018, (Feb. 22, 2018), http://newsroom.sprint.com/sprint-news-at-mobile-world-congress-2018.htm ("Sprint MWC 2018 Announcement") ("Sprint has boldly stated its commitment to building the nation's first 5G mobile network in the first half of 2019[.]") ("Sprint MWC 2018 Announcement").

[96] *See* Alex Scroxton, MWC 2018: 5G Collaboration Dominates Agenda at Annual Mobile Fair, Computer Weekly.com (Feb. 28, 2018), https://www.computerweekly.com/news/252435888/MWC-2018-5G-collaboration-dominates-agenda-at-annual-mobile-fair (T-Mobile Chief Technology Officer Neville Ray).

[97] T-Mobile Q4 2017 Earnings Call.

[98] T-Mobile US, Inc., Annual Report (Form 10-K) at 4 (Feb. 8, 2018).

[99] Marcelo Claure (@marcelclaure), Twitter (Mar. 9, 2018 12:24 PM), https://twitter.com/marceloclaure/status/972206391858483201.

have never seen a company with such a rich spectrum which is a sweet spot for 5G, I guess that gives us a tremendous opportunity for the years to come."[100]

Before the merger, the Applicants also backed up their promises of 5G deployment with aggressive and independent capital buildout plans. T-Mobile announced plans to spend $25.9 billion in CapEx through 2022,[101] and noted that its expenditures for 5G deployment in 2018 are "now expect[ed] to come in at the high end" of its estimated range of $4.9 to $5.3 billion.[102] Sprint indicated that it planned to spend between $5 and $6 billion on 5G in fiscal year 2018.[103] Sprint's April 2018 network plan, as approved by its Board of Directors, **{{BEGIN HCI**

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[100] Transcript, *Sprint's Management Presents at Deutsche Bank 2018 Media, Telecom & Business Services Conference* (Mar. 7, 2018), https://seekingalpha.com/article/4154284-sprints-s-management-presents-deutsche-bank-2018-media-telecom-and-business-services?page=2 (comments of Sprint President and Chief Financial Officer Michel Combes).

[101] Application at 4.

[102] Declaration of Neville Ray ¶ 8 (June 18, 2018) ("Ray Declaration") (attached as Appendix B to the Application); T-Mobile Q2 2018 Earnings Call Transcript (Aug. 1, 2018), https://seekingalpha.com/article/4193405-t-mobile-us-inc-tmus-ceo-john-legere-q2-2018-results-earnings-call-transcript?page=2.

[103] Sprint Corp., Q1 2018 Earnings Call Transcript (Aug. 1, 2018), https://seekingalpha.com/article/4193250-sprint-s-q1-2018-results-earnings-call-transcript ("Sprint Q1 2018 Earnings Call").

[104] *See* Letter from Regina M. Keeney, Counsel for Sprint Corporation, to Marlene Dortch, Attachment 1, WT Docket No. 18-197 (July 31, 2018).

These pre-merger plans, backed by the companies' respective spectrum holdings, and the realities of what 5G entails, demonstrate that both companies appear to have the spectrum assets and resources to deploy 5G networks on their own today, and any purported acceleration in network deployment or enhancement to network quality has not yet been proven by the Applicants. The burden is on the Applicants to show that their claimed benefits are both real and transaction-specific. To date, the Applicants have not done so, but DISH looks forward to the Applicants' response to the FCC's detailed document requests on these and other issues.

*Financing.* The first reason given by the Applicants regarding the 5G benefits of the merger is the supposed $43.6 billion in synergies to be supposedly produced by their consolidation and subequent investment in 5G deployments. But both Sprint and T-Mobile each have already committed to invest $5-6 billion *annually* until 2020 into their respective 5G deployments. So the Applicants' projected combined spend appears to be merely the sum of what each intended to spend on its own. The Applicants do not show whether or how they will monetize these claimed synergies.

*Spectrum holdings*. 5G is meant to be a paradigm shift that includes more than just an increase in broadband speeds (which requires larger swaths of spectrum). The 5G concept also includes supporting vertical markets and other requirements that do not necessarily rely on more spectrum. An increase in broadband speeds alone does not necessarily require a 5G network and can be realized in other ways, as explained below.

Each of Sprint and T-Mobile appear to have access to enough spectrum—in quantity and in kind—to deploy 5G networks today. First, as demonstrated below, both companies hold significant amounts of nationwide or near-nationwide spectrum.

## National Average Spectrum Holdings by Carrier

| | Sprint | T-Mobile | New T-Mobile |
|---|---|---|---|
| 600 MHz | 0.0 | 30.8 | 30.8 |
| 700 MHz | 0.0 | 10.1 | 10.1 |
| SMR | 13.8 | 0.0 | 13.8 |
| PCS | 37.9 | 28.9 | 66.8 |
| AWS-1 | 0.0 | 36.8 | 36.8 |
| AWS-3 | 0.0 | 3.3 | 3.3 |
| BRS/EBS | 134.7 | 0.0 | 134.7 |
| **Total** | **186.4** | **109.8** | **296.2** |

Note: New T-Mobile spectrum holdings assume no divestitures

Source: Spectrum holdings are Brattle estimates. Spectrum holdings are as of August 2018 and are based on data from the FCC Universal Licensing System.

T-Mobile has described its nationwide 600 MHz holdings as "staggering,"[105] and its "volume of mid-band spectrum" as "impressive."[106] As the Applicants acknowledge, "in most markets, T-Mobile has 200 MHz, but in others the company has as much as 800 megahertz" of millimeter wave spectrum.[107] Together, these holdings "position[] T-Mobile to deliver a 5G network that offers BOTH breadth and depth nationwide."[108] Sprint has also lauded its spectrum reserves, touting that it has "more spectrum deployed on LTE per consumer than any other carrier today" and is in "an enviable position with the best spectrum" that gives Sprint "a capital

[105] Press Release, T-Mobile, T-Mobile's New 600 MHz Network Rollout Begins This Summer, (Jun. 14, 2017), https://www.t-mobile.com/news/t-mobiles-new-600-mhz-network-rollout-begins-this-summer ("[T-Mobile] now officially possesses a staggering average of 31 MHz of 600 MHz spectrum licenses across the nation,…[this] gives the Un-carrier a massive volume of premium airwaves to meet customers' growing demand for mobile data[.]").

[106] Neville Ray, *Setting the 5G Record Straight: Announcing Plans for Nationwide 5G from T-Mobile*, T-Mobile Blog (May 1, 2017), https://www.t-mobile.com/news/nationwide-5g-blog.

[107] Application at 21 n.63.

[108] *Id.*

intensity and capacity advantage relative to other players in the industry."[109] In fact, Sprint has stated that it has the most spectrum bar none: "Sprint has more spectrum capacity than Verizon, AT&T and T-Mobile. We're confident in our ability to serve our customers now and in the future, because we hold more spectrum capacity than any other carrier in the U.S. A lot more."[110] In particular, Sprint has noted that its 2.5 GHz band spectrum "carries the highest percentage of Sprint's LTE data traffic." According to Sprint, the company has "significant additional capacity to grow the use of our 2.5 GHz spectrum holdings into the future," and is therefore "well-positioned with spectrum holdings of more than 160 MHz of 2.5 GHz spectrum in the top 100 markets in the U.S."[111]

Given these spectrum holdings, neither company appears to need all of its current spectrum to serve existing customer requirements. Each has fewer subscribers per MHz and fewer subscribers per cell site (and per MHz per cell site) than either of AT&T or Verizon:

[109] Sprint Corp., Q1 2016 Earnings Call Transcript, Fair Disclosure Wire (July 25, 2016) (Marcelo Claure, Sprint President and CEO); Sprint Corp., Q2 2016 Earnings Call Transcript, Fair Disclosure Wire (Oct. 25, 2016) (Tarek Robbiati, Sprint CFO).

[110] John Saw, *In the Land of Unlimited Wireless, Spectrum is King*, Sprint Blog (Feb. 15, 2017), http://newsroom.sprint.com/in-land-wireless-spectrum-is-king.htm.

[111] Sprint 2017 Annual Report at 26.

## Table 1: Major Carriers' Wireless Networks

| Carrier [1] | | Population-Weighted Average MHz Holdings [2] | Percentage of Big Four Population Weighted Average MHz Holdings [3] | Cell Sites [4] | Total Subscriber Connections (thousands) [5] | Subscribers per MHz [6] | Subscribers / Cell Site [7] | Subscribers / MHz / Cell Site [8] |
|---|---|---|---|---|---|---|---|---|
| AT&T | [A] | 152.0 | 26.9% | 67,000 | 134,875 | 887,139 | 2,013 | 13.2 |
| Sprint | [B] | 186.4 | 33.0% | 50,000 | 59,515 | 319,298 | 1,190 | 6.4 |
| T-Mobile | [C] | 109.8 | 19.4% | 59,417 | 71,455 | 650,790 | 1,203 | 11.0 |
| Verizon | [D] | 116.4 | 20.6% | 58,300 | 145,859 | 1,253,549 | 2,502 | 21.5 |
| **With Spectrum Cap** | | | | | | | | |
| New T-Mobile - All Cell Sites | [E] | 238.5 | 42.2% | 109,417 | 130,970 | 549,140 | 1,197 | 5.0 |
| New T-Mobile - 11,000 Retained Cell Sites | [F] | 238.5 | 42.2% | 70,417 | 130,970 | 549,140 | 1,860 | 7.8 |
| **Without Spectrum Cap** | | | | | | | | |
| New T-Mobile - All Cell Sites | [G] | 296.2 | 52.5% | 109,417 | 130,970 | 442,182 | 1,197 | 4.0 |
| New T-Mobile - 11,000 Retained Cell Sites | [H] | 296.2 | 52.5% | 70,417 | 130,970 | 442,182 | 1,860 | 6.3 |

The following bands are included in this table: 600 MHz, 700 MHZ, Cellular, SMR, PCS, H Block, AWS-1, AWS-3, AWS-4, WCS, BRS, and EBS. Small cells are not captured in the above chart.[112]

What does this mean? Each of Sprint and T-Mobile today likely can deploy 5G using a significant chunk of its spectrum while reserving enough of it for supporting their legacy 4G subscribers.

*Current Capacity*. As explained in the Harrington/Brattle Declaration, the Applicants seem to overstate the improvement in capacity that the merger will produce. **{{BEGIN HCI**

[112] Source: 20th Mobile Wireless Competition Report, Table II.B.1 and Table II.F.i; Declaration of Neville R. Ray, ¶ 31. Spectrum holdings are Brattle estimates. Spectrum holdings are as of August 2018 and are based on data from the FCC Universal Licensing System.

**END HCI}}**[113] And the coverage and capacity enhancements that will result from massive MIMO technology could allow the Applicants to deploy 5G systems on a stand-alone basis.

*The transition to 5G.* There is no "secret sauce" from the merger that will facilitate 5G deployment for either company. 5G mobile broadband networks require a combination of low-band and mid-band spectrum. Millimeter wave spectrum can also be used to augment capacity in high density zones. Importantly, the Applicants have failed to define which 5G service they are referring to for each benefit they claim the merger will bring. 5G includes a wide number of services with different spectrum requirements. Not all of these services require massive amounts of spectrum and speed. Many of the massive machine-type communications ("mMTC") and ultra-reliable low-latency communications ("URLLC") services envisioned as part of 5G can likely be supported through the use of low-and mid-band spectrum owned by T-Mobile and Sprint.

For example, T-Mobile could potentially combine its 600 MHz spectrum with its mid-band and millimeter wave holdings to reach a national subscriber base with a next generation network. The company already has plans to do precisely that: "The best way to launch a new technology is new, clear spectrum like 600 MHz, then re-use other spectrum bands for 5G over time. We are in a best position to execute on this strategy, and will drive the network evolution

[113] *See* Joint Declaration of Joseph Harrington and The Brattle Group at 17-18 (attached as Exhibit B) ("Harrington/Brattle Declaration").

to 5G."[114] As T-Mobile has acknowledged, the company can also augment network capacity by leveraging its 28/39 GHz holdings in urban areas to increase network capacity.[115] If T-Mobile feels the need for more capacity in regions beyond the large metropolitan areas in which it already holds millimeter wave spectrum, the company can always acquire additional millimeter wave, CBRS, and/or other spectrum rights from future spectrum auctions or the secondary markets. To this end, T-Mobile has indicated its intent to participate in the FCC's upcoming auction of millimeter-wave spectrum for 5G deployment, and T-Mobile signed a $3.5 billion deal with Nokia for end-to-end 5G solutions.[116] T-Mobile has also been active in the Commission's rulemaking for CBRS and has indicated interest in that spectrum.[117]

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[114] Neville Ray, *5G Reality vs 5G Hype: The Un-Carrier vs the Carriers*, T-Mobile Blog (Jan. 16, 2018), https://www.t-mobile.com/news/5g-ces-wrap-up.

[115] T-Mobile Q2 2016 Investor Call Transcript, Fair Disclosure Wire (Aug. 18, 2016) ("And as you know, we have a swath of 28 GHz spectrum, which has already been tagged by the FCC for 5G use. So 5G is going to be, as you close out this decade, is going to be the major path for increasing material capacity on these networks.") (Neville Ray, T-Mobile CTO); Karri Kuoppamaki, T-Mobile VP, Radio Network Technology, Remarks at Wells Fargo Securities 5G Forum (June 22, 2017) ("Spectrum is . . . not the only way to add capacity into the network. . . . [W]e have . . . 200 megahertz of 28 and 39 gigahertz spectrum covering about 100 million covered POPs, 7 out of the top 10 markets in the U.S. So that's a good starting point for 5G as well when it comes to millimeter wave capability.").

[116] Letter from Nancy Victory to Marlene Dortch, AU Docket No. 18-85, at 3 (July 23, 2018) (urging the FCC to allow T-Mobile to participate in the upcoming auction despite its pending merger with Sprint); Press Release, *T-Mobile and Nokia Ink $3.5 Billion, Multi-year 5G Network Agreement* (July 30, 2018), https://www.t-mobile.com/news/nokia-5g-agreement.

[117] Kaleigh Rogers, *At the Behest of T-Mobile, the FCC Is Undoing Rules That Make it Easier for Small ISPs to Compete With Big Telecom* Motherboard (Jan 11, 2018), https://motherboard.vice.com/en_us/article/ev5mm7/at-the-behest-of-t-mobile-the-fcc-is-undoing-rules-that-make-it-easier-for-small-isps-to-compete-with-big-telecom; T-Mobile US, Inc., Q2 2018 Earnings Call Transcript (Aug. 1, 2018), https://seekingalpha.com/article/4193405-t-mobile-us-inc-tmus-ceo-john-legere-q2-2018-results-earnings-call-transcript ("We're very encouraged by the actions of the FCC on millimeter wave, their efforts and work on mid-band spectrum, be that CBRS or the C-band . . . And yes, for sure, we have material interest in participating in those auctions . . . It's something that's of keen interest to us at T-Mobile.").

Sprint, too, appears to have what it needs in hand for 5G. The carrier has exclusive licenses or leases for almost the entirety of the 2.5 GHz band. A white paper commissioned by Sprint to explain Sprint's 5G spectrum position noted that Sprint "offers more nationwide population-weighted average spectrum capacity than AT&T, Verizon, and T-Mobile including more than 160 MHz of 2.5 GHz spectrum in the top 100 U.S. markets."[118] Sprint can also use carrier aggregation technologies and the beamforming capabilities of the massive MIMO technology to combine its PCS and 2.5 GHz spectrum to extend the reach of its 5G network even further.

Specifically, "massive MIMO technology" can "deliver 4G LTE and 5G both separately and simultaneously on one radio."[119] It can achieve not only capacity enhancements,[120] but also coverage enhancements.[121] The Sprint 5G white paper found that "massive MIMO could be a

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[118] Moor Insights & Strategy, *Sprint 5G: The Power to Enable Business Transformation* at 9 (April 2018), https://business.sprint.com/wp-content/uploads/sites/2/2018/04/Sprint-5G-The-Power-to-Enable-Business-Transformation-Final-V4.13.2018....pdf ("Sprint 5G White Paper").

[119] Declaration of John C. Saw Declaration ¶ 20 (June 18, 2018) (attached as Appendix E to Appliction) ("Saw Declaration"). *See also* Sprint Q1 2018 Earnings Call ("Massive MIMO radios are software upgradable to 5G NR, allowing us to fully utilize our spectrum for both LTE and 5G simultaneously, while we enhance capacity even further with 5G and begin to support new 5G used cases").

[120] Sean Kinney, *Sprint CTO: Massive MIMO 'Secret Weapon' in 4G and 5G Plans*, RCR Wireless News (March 5, 2018), https://www.rcrwireless.com/20180305/carriers/sprint-cto-massive-mimo-secret-weapon-tag17 ("Massive MIMO capabilities will be available to Sprint customers using a phone with 2.5 GHz (Band 41) support, and the carrier is working with Qualcomm Technologies and device manufacturers on 5G NR support for 2.5 GHz targeted at the first half of 2019. Qualcomm's new Snapdragon X50 includes Band 41 5G NR support. Sprint is working with multiple vendors on its massive MIMO activation. Last year the carrier worked with Samsung to test the equipment including a trial in Suwon, South Korea. Results saw an increase in channel capacity by some 300% and a boost in cell edge performance by 200%, according to the operator.").

[121] Di Yong, *Massive MIMO is the Future of Wireless Networks* (June 21, 2017), https://www.huawei.com/en/about-huawei/publications/winwin-magazine/28/massive-mimo-

key differentiator for Sprint relative to other tier one carriers in the United States because it can be easily deployed on high-band spectrum such as Sprint's 2.5 GHz spectrum."[122]

Finally, Sprint can similarly augment its existing spectrum holdings by acquiring millimeter wave spectrum that it has stated "is an important part of its strategy going forward."[123] In fact, Sprint has expressed an active interest in the 24-28 GHz band.[124] It can also take advantage of unlicensed bands as T-Mobile is doing.[125]

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2016 ("Massive MIMO's 3D beamforming increases horizontal and vertical coverage capabilities. Previously, coverage in high-rise buildings required dedicated indoor networks. But now, Massive MIMO covers both high and low floors and can easily penetrate two walls.").

[122] Sprint 5G White Paper at 9.

[123] Sprint Corp., Q4 2017 Earnings Call Transcript, Fair Disclosure Wire (May 2, 2018) (Sprint CEO Marcelo Claure: "[W]hat everybody needs to be aware is we plan to continue to operate 100% as stand-alone, and a millimeter wave spectrum is an important part of our strategy going forward." Sprint CTO John Saw: "Millimeter wave, it provides a lot of bandwidth . . . It can provide therefore, a lot of capacity, and it complements our 2.5 GHz, sub-6 [GHz] 5G solution really well in areas where you need a lot of capacity, in hot zones and hotspots. I think it's very hard to build a 5G network on millimeter wave alone because that would drive a lot of capex in a lot of sites, but we view millimeter wave as something that we can add on as an overlay to 2.5 for hot zone purposes and hotspot purposes.").

[124] *See* Sprint Corp., Petition for Expedited Declaratory Ruling or Waiver Regarding Joint Bidding and Request for Limited Waiver of Auction Form Rules, AU Docket No. 18-85, at 1-2 (Aug. 6, 2018) (requesting approval to participate in the 24 and 28 GHz auctions).

[125] *See* Press Release, Ericsson, *T-Mobile, Ericsson Exceed 1 Gbps With LAA Demo* (Dec. 5, 2017), http://news.cision.com/ericsson/r/t-mobile--ericsson-exceed-1-gbps-with-laa-demo,c2408121 ("T-Mobile and Ericsson are first in the world to demonstrate speeds exceeding 1 Gbps using 12-layer Licensed Assisted Access technology . . . Neville Ray, Chief Technology Officer for T-Mobile, says: "T-Mobile has built the nation's fastest LTE network by innovating and bringing new technologies to market for our customers. This LAA technology builds upon our deployments of 4x4 MIMO and 256 QAM and will give customers even greater access to near gigabit speeds in 2018."); Monica Alleven, *Sprint Achieves 120-140 Mbps in LAA Deployment with SpiderCloud, Says LAA on Long-Term Road Map*, Fierce Wireless (Dec. 8, 2017), https://www.fiercewireless.com/wireless/sprint-achieves-120-140-mbps-laa-deployment-spidercloud-says-laa-long-term-roadmap ("Sprint's been pretty quiet about its use of LAA or any unlicensed spectrum for that matter, but that appears to be changing as Sprint's chief operating officer for technology, Günther Ottendorfer, tweeted that Sprint has successfully implemented LAA, achieving 120-140 Mpbs. 'We successfully implemented LAA (LicensedAssisted Access)

There are also less restrictive 5G buildout alternatives to the merger. Alternative options include joint 5G network buildout strategies (e.g., a common RF base station grid and sharing of backhaul) and the use of technologies like Multi-Operator Core Network ("MOCN"). Sprint could negotiate and enter into leasing arrangements with T-Mobile and other parties in areas where it is not contemplating building out its 2.5 GHz spectrum for 5G, and T-Mobile could do the same where the demand exceeds the capacity supply of its 5G network. The Applicants could also enter into roaming and sharing arrangements, which could be either transitional or long-term, and which would maximize the use of the total capacity offered across the two networks.

But, what is most relevant here is what the Applicants do not say. They do not say that the spectrum and cell sites of both companies are necessary to deploy 5G. In fact, they admit the opposite—that not all of these resources will be necessary. They say that New T-Mobile will "have the option to use cell sites from each company," and that it will "retain[] a number of Sprint cell sites." Indeed, they invoke the excess capacity to be created by the merger as a reason why they will be under pressure to lower prices.

*Post-merger integration*. The Applicants' estimated synergies and cost savings also rely on the successful integration strategy that T-Mobile implemented for MetroPCS. However, MetroPCS's coverage was strictly regional. MetroPCS had only 22 MHz of combined downlink and uplink PCS and AWS spectrum in operating markets.[126] The impact of integrating up to 11 MHz of downlink spectrum into existing radio heads in terms of additional power and frequency

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with only 5 Mhz licensed spectrum & we achieved 120-140 Mpbs!,' Ottendorfer tweeted today.").

[126] MetroPCS, Investor Presentation (March 2013), http://investor.t-mobile.com/Cache/1001182677.PDF?O=PDF&T=&Y=&D=&FID=1001182677&iid=4091145.

was small, and could be accommodated with T-Mobile's then-existing LTE infrastructure. In contrast, for both Sprint's 2.5 GHz and PCS bands, T-Mobile will need additional equipment for each of its projected 61,000 sites covering 300 million POPs nationwide. Given that T-Mobile does not own many of its towers, the need to undertake structural analysis of each tower based on existing equipment may limit actual deployment. At worst, deployment may not be possible; in other cases, structural enhancements to some of the towers will be required, resulting in delays and reduced synergies. Any reduction in synergies would likely translate into a lower investment in 5G than anticipated.

The Applicants have also not demonstrated how they will avoid adverse effects on the user experience during the integration of the two networks (covering low-band, mid-band and high frequency spectrum bands). Sprint's tale of integrating these bands into its own network is a cautionary one.[127]

*Other claims of data rate improvements and spectrum efficiencies*. The claimed gains in speed and capacity seem to be based on the premise that Sprint's 2.5 GHz spectrum will be deployed on all T-Mobile sites (61,000 as of 2017)[128] and T-Mobile's AWS-3 spectrum will be deployed on all retained Sprint sites (11,000) (out of Sprint's existing 46,000 sites) by 2021.[129] This appears speculative, given the significant integration challenges that history teaches occur when two large operators merge. Additionally, the Applicants present numbers for data rates, not necessarily for user experience. These latter numbers could be significantly different, especially when simultaneous users are active. It is also unclear what kind of device penetration

[127] Saw Declaration ¶ 15.

[128] Ray Declaration ¶ 5 (attached as Appendix B to Application).

[129] Application at 29; Declaration of Michael Sievert ¶ 14 (attached as Appendix C to Application).

is likely by the end of 2021, as mass availability of 5G devices in 2021 is unknown. Finally, the Applicants' technical declarations contain any number of assumptions that raise questions as to whether the spectrum efficiencies can actually be achieved.[130]

### B. Dr. Evans' Analysis Is Flawed

The Application seems to oscillate between a claim that the merger is *necessary* for any 5G deployment and the more modest argument that the combined company can deploy 5G more quickly and efficiently.[131] But the problem is that the Applicants' quantification of the merger benefits assumes the more aggressive claim—that no merger means no 5G for either company—and credits the transaction with the entire benefit of nationwide 5G deployment by New T-Mobile and the response to it by Verizon and AT&T. In the face of the Applicants' apparent concession that 5G likely would happen sooner or later, Dr. Evans' postulated consumer price decrease evaporates.

Dr. Evans does nothing more than take the cost synergies given to him by the Applicants and translate them into price declines. As DISH's expert, Professor Sappington, states in his Declaration, Dr. Evans adopts "without question the company's projections of its post-merger capacity."[132] In Professor Sappington's words, Dr. Evans' "unquestioning adoption of

[130] Declaration of Stephen Wilkus (attached as Exhibit C).

[131] *Compare* Application at 18-19 and Application at 29-30 *with* Application at 48 ("Neither T-Mobile Nor Sprint Can Develop a Robust, Nationwide 5G Network on a Standalone Basis . . . [B]eyond the simple increase in capacity, New T-Mobile will be able to deploy a multi-faceted 5G network that combines T-Mobile low- and high-band spectrum with Sprint mid-band spectrum to provide the full array of features and improvements that the new 5G standard promises across the country.").

[132] Declaration of David Sappington at 9 (attached as Exhibit A) ("Sappington Declaration").

predictions of large capacity increases for New T-Mobile" leads him to make "rosy predictions about the impact of the merger on the price of wireless data in 2024."[133]

Dr. Evans has assumed ARPU will remain the same between 2017 and 2024, "consistent with T-Mobile's business plans."[134] But his assumption begs the core question to be answered: whether the increase in concentration brought about by the merger will lead to higher prices and therefore higher ARPU. Dr. Evans assumes no. Professor Sappington finds that "this assumption completely ignores the upward pressure on industry prices that increased concentration exerts,"[135] and that Dr. Evans fails "to account for the fact that a substantial increase in industry concentration is highly likely to place upward pressure on the price of wireless data."[136] Most of the price decrease estimated by Dr. Evans comes not out of the prices of New T-Mobile, but rather out of the prices of AT&T and Verizon, which would supposedly be spurred on to compete by the 5G deployment made possible by the merger. Dr. Evans's premise is that the progress achieved by Verizon and AT&T towards 5G to date is "tepid."[137] That premise is likely inaccurate. This inaccuracy, in turn, overstates the claimed benefits to be provided by the merger.

Verizon and AT&T would of course deny that their 5G plans are "tepid," as they are indeed aggressively touting their deployment plans. Verizon has indicated that "it is leading the race to deploy 5G technology in the United States – with plans to be first to market with both

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[133] *Id.*

[134] Evans Declaration ¶ 236.

[135] Sappington Declaration at 5.

[136] *Id.* at 3. *See also id.* at 4-5 ("[I]t would strain credibility to suggest that the proposed merger would reduce industry prices.").

[137] Evans Declaration ¶ 197; Application at 49.

fixed and mobile versions of 5G technology."[138] Verizon will begin rolling out its 5G fixed residential broadband network in Sacramento, Los Angeles, Indianapolis, and Houston in the second half of 2018.[139] Verizon has also indicated its intent to deploy mobile 5G in "early 2019."[140] Earlier this year, AT&T touted its "commitment to launching 5G and bringing massive broadband capacity online for mobile subscribers."[141] AT&T has stated that it is planning a broad 5G deployment using its WCS, AWS-3 and the public safety 700 MHz spectrum.[142] To that end, AT&T has already announced that it will introduce mobile 5G to customers in a dozen cities (both large and small) this year, including Charlotte, Raleigh, Oklahoma City, Dallas, Atlanta and Waco.[143] AT&T will thus be the first carrier to launch mobile 5G in the United States, without the purported competitive pressure from a New T-Mobile.[144]

Dr. Evans' analysis misses the mark for one more reason: the 2003-2017 capital expenditures boost that he claims the merger will *replicate* actually occurred in the midst of

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[138] Comments of Verizon, WT Docket No. 18-203, at 28 (July 26, 2018).

[139] Press Release, Verizon. *Verizon 5G Home Internet Service Coming to Indianapolis* (Aug. 14, 2018), https://www.verizon.com/about/news/verizon-5g-home-internet-service-coming-indianapolis. Verizon plans to include free YouTube TV and Apple 4K TV with the initial 5G residential broadband service in those cities.

[140] *Id.*

[141] Comments of AT&T Services, Inc., AU Docket No. 18-85, at 2-3 (May 9, 2018).

[142] Dan Jones, *For AT&T, 5G is a City Kitty, Not a Residential Fat Pipe*, LightReading (Aug. 8, 2018), https://www.lightreading.com/mobile/5g/for-atandt-5g-is-a-city-kitty-not-a-residential-fat-pipe-/d/d-id/745211.

[143] Press Release, *AT&T Bringing 5G to More U.S. Cities in 2018* (July 20, 2018), http://about.att.com/story/5g_to_launch_in_more_us_cities_in_2018.html.

[144] *See* Comments of AT&T Services, Inc., WT Docket No. 18-203, at 14-15 (July 26, 2018) ("AT&T's initial build-out will rely on 39 GHz millimeter wave spectrum that AT&T purchased from FiberTower in February, 2018. Moreover, AT&T is expanding its deployment of software-defined networking and related elements like white box and Network AI, which will support the massive data use 5G will bring.").

competition that this merger likely will *eliminate*. Dr. Evans may be correct that these investments "led to the dramatic expansion in network capacity and decline in the price per GB of data."[145] But competition was the spur: during the first part of 2003-13, there were five national carriers in existence. Capital expenditures by AT&T, Sprint, T-Mobile and Verizon actually peaked in 2013, the year that T-Mobile merged with MetroPCS.[146]

Professor Sappington calculates the adjustment to the Evans study that is warranted if the merger accelerates a benefit (e.g., a reduction in the price of wireless data), but is not the prerequisite to achieving that benefit. Professor Sappington demonstrates, for example, that if the merger simply accelerates a benefit by five years, the gain from the merger is less than 10% of the corresponding gain the merger would deliver if it were the sole means for achieving that benefit. This substantially discounted potential gain from the merger would then need to be weighed against its substantial likely harms.

### C. The Other Synergies and Benefits Claimed by the Applicants Are Speculative, Unsupported, and Not Merger-Specific

In addition to the benefit claims related to 5G, the Applicants claim other synergies and benefits. They claim that the merger will provide an in-home wireless broadband solution.[147] They claim it will bring broadband to rural America.[148] They assert that the combined company will finally be able to enter the enterprise market in a significant way, including creating the opportunity for offering a range of commercial IoT applications.[149] The Applicants promise that

[145] Evans Declaration ¶ 137.

[146] *Id.* at Exhibit 9, U.S. Wireless Carrier Capital Expenditures 2007-2017.

[147] Application at 58-64.

[148] *Id.* at 64-69.

[149] *Id.* at 71-76.

New T-Mobile will bring disruption to the video marketplace.[150] Finally, the Applicants claim that New T-Mobile will create thousands of new jobs.[151]

But to date, these claims are speculative, unsupported, and not merger-specific. They are speculative in that they rely on the notion that scale is the only thing that has been missing in allowing the Applicants to achieve these results on their own. They are unsupported because the Applicants provide only conjecture instead of any factual basis that New T-Mobile will actually achieve its promised results. And they are not merger-specific because these purported benefits are happening now in the marketplace, will likely happen anyway with the advent of 5G, or could be realized with the Applicants taking appropriate action on their own.

The Applicants assert that New T-Mobile's 5G deployment will spur the creation of a mobile substitute for in-home non-wireless fixed broadband service.[152] But the Commission has found that mobile broadband is not a substitute for fixed broadband.[153] And even as mobile broadband speeds improve, so too will those of fixed broadband, which likely will maintain the imbalance between the two. The Applicants give no indication that their new *mobile wireless* (as

[150] *Id.* at 76-80.

[151] *Id.* at 80-84.

[152] *Id.* at 58-64.

[153] *2018 Broadband Deployment Report*, 33 FCC Rcd. 1660, 1666 ¶ 18 ("[The Commission] disagrees with those that argue that mobile services are currently full substitutes for fixed service" because "there are salient differences between the two technologies."); *19th Wireless Competition Report*, 31 FCC Rcd. at 10625 ¶ 133 ("[W]hile fixed and mobile broadband services may provide some overlapping capabilities, each service also has unique capabilities. It is also sometimes the case that mobile services and fixed services enhance the quality of one another. In fact, residential and business consumers alike often use mobile and fixed services in concert to, for example, off load reliance from cellular networks to Wi-Fi systems that are connected to the internet via a fixed service."); *Id.* at 10625 ¶ 133 n.418 ("The *2016 Broadband Progress Report* concluded that fixed and mobile broadband are often used in conjunction with one another and, as such, are not functional substitutes: each service offers different capabilities to consumers, the services are marketed differently, and most consumers with the financial means choose to purchase both.").

opposed to fixed) network will be able to support the speeds needed for in-home applications in the future, or not exceed monthly data caps. And even if the Applicants' claim were true, it would be a generalized 5G benefit, not a merger-specific one. Further, this claim is unsupported and unverifiable because the Applicants provide no detail on the business plan for rolling out the service, the costs involved, or the time frame for doing so.

The Applicants also claim that the transaction holds great promise for rural America. Again, the Applicants have not yet provided support for how they will make this happen—no business plan, no timetable, no budget. The Applicants also lapse into an apparent contradiction for this claim: on the one hand, they claim that 2.5 GHz spectrum will enhance rural deployment for New T-Mobile;[154] on the other, they argue that Sprint's 2.5 GHz spectrum is inadequate and that Sprint, standing alone, will "not be a major competitor in most of rural America in the foreseeable future."[155] It is therefore unclear from the Application how rural deployment can be credited as a benefit that would flow from this transaction.

The Applicants also assert that post-merger they will finally be able to enter the enterprise market due to New T-Mobile's scale and the 5G services it will offer.[156] But this is not merger-specific. Both T-Mobile and Sprint are starting to make inroads into that market today without the merger.[157] For example, T-Mobile is already using its millimeter wave and

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[154] Application at 65.

[155] *Id.* at 96.

[156] *Id.* at 71-76.

[157] *See* Kelly Hill, *T-Mobile US Keeps Cranking, Makes Enterprise Inroads*, RCR Wireless News (July 20, 2017), https://www.rcrwireless.com/20170720/carriers/t-mobile-us-results-keeps-cranking-tag6; James Anderson, *Sprint's Zscaler Partnership: What's the Carrier's Enterprise Play?*, Channel Partners (Feb. 26, 2018), https://www.channelpartnersonline.com/2018/02/26/sprints-zscaler-partnership-whats-the-carriers-enterprise-play; Edward Gately, *Sprint Ramps up Push into Federal, Public Sector*

unlicensed spectrum and related technologies like Licensed Assisted Access ("LAA") to compete in the enterprise market.[158] And the scale argument is speculative as scale does not address the likely reasons AT&T and Verizon have dominated the enterprise markets (i.e., their legacy wireline systems).[159]

The Applicants' assertion that New T-Mobile will be able to become a significant player in the IoT market so that "everything in the house can be connected" is also unsupported. Many of the new use cases the Applicants cite, like connected drones, IoT services, and smart cities, do not necessarily or solely require large amounts of bandwidth and therefore a large amount of spectrum. Both Sprint and T-Mobile likely can offer these services on a stand-alone basis using their existing networks, or through aggregation with other spectrum allocated for specific services.

The Applicants further claim that they will disrupt the video distribution market. But this prospect is not merger-specific. T-Mobile already purchased Layer 3 in December 2017. In its words, Layer 3 is the "TV tech pioneer" that will "fuel" the "next phase in the un-carrier's

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*Markets*, Channel Partners (Feb. 8, 2018), https://www.channelpartnersonline.com/2018/02/08/sprint-ramps-up-push-into-federal-public-sector-markets.

[158] Monica Alleven, *T-Mobile to Foucs on LAA Rollout in Q1 of 2018*, Fierce Wireless (Nov. 13, 2017), https://www.fiercewireless.com/wireless/t-mobile-to-accelerate-rollout-laa-q1-2018.

[159] Sean Buckley, *VSG: AT&T, Verizon, Sepctrum Enterprise Take Dominant Spots in On-Net Fiber Business Connections*, Fierce Telecom (Aug. 2, 2017), https://www.fiercetelecom.com/telecom/vsg-at-t-verizon-spectrum-enterprise-take-dominant-spots-net-fiber-business-connections (reporting AT&T and Verizon as #1 and #2 provider of fiber for business services at the end of 2016 and noting the industry trend that "having a large arsenal of fiber is important to compete for business services.").

mobile video strategy."[160] And, T-Mobile already plans to formally launch its video product later this year.[161]

The Applicants' assertion that the merger will create jobs appears unrealistic. The parties are merging to achieve efficiencies and synergies, an endeaveor that typically equates to job losses. To permit evaluation of their job creation claim, the Applicants need to produce business plan data showing what their planned headcounts as standalone companies will be if there is no merger. Otherwise, the benefit is unverifiable and cannot be viewed as a reason to support the transaction.

In any case, the Applicants' analysis in support of their job creation claim is likely flawed. The main methodological error of Dr. Eisenach's new jobs estimate echoes that of Professor Evans' reduced price estimate: they both assume no 5G deployment by either company without the merger. Thus, Dr. Eisenach credits the merger with all of the jobs to be created by 5G. And, Dr. Eisenbach does not balance jobs *lost* against jobs gained. Indeed, there is analysis showing that this merger will cost tens of thousands of jobs, undermining the claims of the Applicants and Dr. Eisenach. Specifically, the Communications Workers of America has estimated that the merger will cost at least 30,000 jobs due to the closure of retail stores and the elimination of staff from the two headquarters.[162] The Applicants would likely close 2,300

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[160] Press Release, T-Mobile, *T-Mobile is Going to Un-carrier Your TV* (Dec. 13, 2017), https://www.t-mobile.com/news/tmobile-uncarrier-tv.

[161] Daniel Frankel, *T-Mobile's Binder: Video Service to Launch 'This Year,' Will Be Very, Very Disruptive*, Fierce Video (May 15, 2018), https://www.fiercevideo.com/cable/t-mobile-video-service-to-launch-year-will-be-very-very-disruptive.

[162] Press Release, Communications Workers of America, CWA Analysis Shows Sprint-T-Mobile Merger Could Cause Massive Job Loss of More than 30,000 Jobs (June 26, 2018), https://www.cwa-union.org/news/releases/cwa-calls-on-sprint-and-t-mobile-make-binding-commitments-address-potential-job-loss.

overlapping Sprint/T-Mobile stores and 2,750 prepaid stores.[163] Even assuming that Dr. Eisenach's new jobs estimate is correct, that would still leave the merger with a net loss of over 6,000 jobs. New Street Research has likewise estimated 30,000 jobs lost as a result of the merger.[164] This analysis includes the jobs that will likely be lost from secondary cuts, such as suppliers and vendors who would no longer supply two independent companies.[165]

## V. THE APPLICANTS DEFINE THE RELEVANT MARKETS TOO BROADLY

*Product Market.* The Applicants identify a broad single product market for the Commission to review: "a combined 'mobile telephony/broadband services' product market" that includes, without differentiation, both facilities-based and non-facilities-based carriers and resellers.[166] They then attempt to broaden that market still further by identifying a "converging broadband" market.[167] The Applicants' formulations of the market ignore the differences between the four large facilities-based carriers and MVNOs—differences that have led the Commission not to consider MVNOs in its relevant precedent.

As for the Applicants' reliance on "convergence," if wireless carriers are ever capable of introducing competition to in-home, landline Internet Service Providers, that prospect is both too remote in time and irrelevant even when and if it comes to fruition. Similarly, the future entry by entities such as Comcast/Charter or DISH should not be credited as current competition against the Applicants. The time-frame for evaluating the unilateral effects of horizontal mergers is

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[163] *Id.*

[164] Mark Davis, *Could a Sprint Merger with T-Mobile Kill More Jobs than Sprint Has?*, Chicago Tribune (Oct. 10, 2017), http://www.chicagotribune.com/business/ct-biz-sprint-t-mobile-merger-jobs-20171010-story.html.

[165] *Id.*

[166] Application at 11.

[167] *Id.* at 12.

generally two years.[168] While this is not a hard-and-fast rule, the hope that potential entry will come one day is certainly not enough. DISH, for its part, does plan to compete against the Applicants in the provision of 5G technologies, but the timing is uncertain, and DISH's ability to do so could be adversely impacted by the merger, as explained below.

The relevant product markets not only include the mobile voice/broadband market that the Applicants suggest, but also include distinct markets for facilities-based *prepaid* mobile broadband and voice services, as well as the markets for *wholesale* services provided by one carrier to another. Each of these services constitutes a separate product market, one in which there is even less competition than among the four large carriers in the facilities-based mobile voice/broadband market.

[168] U.S. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines §3.2 (1997) ("The Agency generally will consider timely only those committed entry alternatives that can be achieved within two years from initial planning to significant market impact."); U.S. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines § 9.1 (2010) ("In order to deter the competitive effects of concern, entry must be rapid enough to make unprofitable overall the actions causing those effects and thus leading to entry, even though those actions would be profitable until entry takes effect."); *see also See F.T.C. v. Staples, Inc.*, 190 F. Supp. 3d 100, 133 (D.D.C. 2016) ("The relevant time frame for consideration in this forward looking exercise is two to three years."); *United States v. Bazaarvoice, Inc.*, No. 13-cv-00133-WHO, 2014 WL 203966, at *70 n.19 (N.D. Cal. Jan. 8, 2014) ("The Court agrees that two years is an appropriate time-frame in this case. Entry within two years is likely to undo the anticompetitive effects created by the merger such that the merger would be unprofitable, whereas entry beyond two years is not."); *United States v. H & R Block, Inc.*, 833 F. Supp. 2d 36, 73 n.28 (D.D.C. 2011) ("For entry to be considered timely, it typically must occur within approximately two years post-merger."); *F.T.C. v. ProMedica Health Sys., Inc.*, No. 3:11 CV 47, 2011 WL 1219281, at *31 (N.D. Ohio Mar. 29, 2011) (noting that entry was not timely where "[i]t would take significantly longer than the two-year timeframe prescribed by the [2010] *Merger Guidelines*" to build a new hospital).

*Geographic Market.* The Applicants are correct that the Commission needs to take into account more than just the discrete local markets where the Applicants hold licenses and "consider the effect of [the] transaction at the national level."[169]

*Roaming and Wholesale Markets.* National wireless carriers offer network access via roaming and wholesale agreements, which operate with an additional factor not present in retail markets: buyers depend on the sellers, often for crucial inputs, even as they try to compete against the sellers. These markets thus must be included in the Commission's transaction review.

### A. Only Facilities-Based Carriers Discipline Competition

The national market for mobile voice/broadband services consists solely of nationwide, facilities-based competitors—AT&T, Verizon, T-Mobile, and Sprint. The Commission has reiterated this finding repeatedly, and with good reason.[170] Non-facilities-based operators are only as effective as their facilities-based landlords choose to let them be. Only facilities-based providers, who have both access to spectrum and the infrastructure to use it, can create capacity,

[169] Application at 12 (citing Application of AT&T Inc. and Qualcomm Inc., *Order*, 26 FCC Rcd. 17589, 17605 ¶ 37 (2011)).

[170] *See* Applications of Deutsche Telekom AG, T-Mobile USA, Inc. and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licenses and Authorizations, *Memorandum Opinion and Order and Declaratory Ruling*, 28 FCC Rcd. 2322, 2334-35 ¶ 37 (2013) ("*T-Mobile/MetroPCS Order*") ("As in previous transactions, we exclude MVNOs and resellers from consideration when computing initial concentration measures, although we acknowledge that non-facilities-based service options may have an impact in the marketplace and in some instances may provide additional constraints against anticompetitive behavior."); *see also* Applications of AT&T Inc. and Centennial Communications Corp., for Consent to Transfer Control of Licenses, Authorizations, and Spectrum Leasing Arrangements, *Memorandum Opinion and Order*, 24 FCC Rcd. 13915, 13936 ¶ 45 (2009).

upgrade networks, or extend their network coverage.[171] And regional carriers cannot create the type of scale that allows their service offerings to influence the national consumer market in the way that the nationwide carriers can.[172]

Relying on one sentence in the Commission's decision in the AT&T/Leap Wireless merger, the Applicants attempt to expand the definition of the product market to include MVNOs.[173] But in the *AT&T/Leap Order* the Commission was considering a merger between one of the big four national carriers (AT&T) and a regional facilities-based carrier that had a national reach only when its MVNO service was considered (Leap).[174] The Commission never determined, as the Applicants suggest, that MVNOs on their own can be a significant competitor or check on the four nationwide, facilities-based competitors. Indeed, the Commission has found exactly the opposite.[175]

The Applicants' attempt to expand the field of competitors from four to nine is similarly unavailing. As discussed further below, none of the named "competitors" (TracFone, Comcast,

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[171] *See 19th Wireless Competition Report*, 31 FCC Rcd. 10534, 10540 ¶ 9 (2016) ("Unlike facilities-based service providers, MVNOs do not engage in non-price rivalry by creating capacity through network investments, network upgrades, or network coverage.").

[172] *See* Kevin Flitchard, *Squeezed by Wireless Giants, Have the Regional Mobile Carriers Just Given Up?*, Gigaom (July 30, 2013), https://gigaom.com/2013/07/30/squeezed-by-wireless-giants-have-the-regional-mobile-carriers-just-given-up ("Make of it what you will, but this is the mobile industry we're getting stuck with: A mobile landscape divided between urban and rural with nationwide megacarriers dominating the cities and tiny regional providers surviving only in the towns and communities in between.").

[173] Application at 11-12.

[174] Applications of Cricket License Company, LLC et al., Leap Wireless International, Inc., and AT&T Inc., for Consent to Transfer Control of Authorizations, Application of Cricket License Company, LLC and Leap License Co. for Consent to Assignment of Authorization, *Memorandum Opinion and Order*, 29 FCC Rcd. 2735, 2738 ¶ 6, 2749 ¶ 31 (2014) ("*AT&T/Leap Order*").

[175] *See AT&T/Centennial Order*, 24 FCC Rcd. at 13936 ¶ 45.

Charter, DISH, and Google)[176] is a current facilities-based carrier, or even positioned to offer such competition in the near future.

### 1. TracFone

The Applicants cite TracFone as a source of competitive pressure post-merger. But while TracFone has had success as an MVNO, recently expanding through the acquisition of other prepaid MVNOs,[177] it has shown no desire to transform into a facilities-based provider. It holds no spectrum of note, nor seems inclined to do so.[178] Instead, TracFone leases capacity from Verizon, AT&T, Sprint, and T-Mobile.[179] If TracFone was a threat to facilities-based providers,

[176] While not explicitly listing these companies in the product market section of the Application (*see* Section II-B), because precedent would not support their inclusion, they instead claim that these companies have "increasing competitive relevance." Application at 102.

[177] Narayan Ammachchi, *America Movil Rebrands Telmex USA as Claro, Vows to Widen US Footprint*, Nearshore Analysis (June 8, 2018), https://www.nearshoreamericas.com/america-movil-rebrands-telmex-usa-as-claro-vowing-to-widen-us-footprint ("Two years ago, TracFone acquired Walmart Family Mobile business from T-Mobile. In addition, America Movil operates a number of similar prepaid brands in the United States, including Safelink, Straight Talk, and Total Wireless.").

[178] TracFone recently asked the FCC not to ban MVNOs from Lifeline subsidies—hardly indicating an intent to upgrade its status. *See* Mike Dano, *Sprint, Tracfone, Others Implore Regulators Not to Ban MVNOs and Other Resellers from Lifeline*, Fierce Wireless (Feb. 23, 2018), https://www.fiercewireless.com/wireless/sprint-tracfone-others-implore-regulators-not-to-band-mvnos-and-other-resellers-from.

[179] America Movil SAB de CV, Q4 2014 Earnings Call Transcript, Fair Disclosure Wire (Feb. 11, 2015) (Daniel Hajj, CEO: "And what we have been doing for the last years is we are committing traffic to the one that give us the better rates, and I think it's more or less what we are going to do in the future. If it's AT&T the one that give us good rates, it could be AT&T. If it's Verizon, it's Verizon. I think today the traffic is with the three operators; it's with Verizon, with AT&T, and with T-Mobile. So, those are the three big ones that where we have the traffic, and we're going to -- I think what's going to be the most convenient for TracFone is what we're going to do. We don't have any change on that."); America Movil SAB Q1 2013 Earnings Call Transcript (April 19, 2013), ("We are working with a lot of the carriers. We are working with AT&T, with Verizon, T-Mobile, and Sprint.").

those providers could increase the cost of wholesale capacity to TracFone, or stop selling it at all.[180]

The Applicants also do not explain what would it take to migrate MVNO and prepaid customers from T-Mobile to the New T-Mobile network, as they have proposed for the twenty million plus MVNO customers on Sprint's network. The Applicants also have not quantified either the impact on the experience of these users when 2.5 GHz is used only for 5G from 2021 onwards or the cost to the consumer in terms of handset exchange. Devices supporting new technologies are generally classified as high-tier devices and are generally not targeted towards prepaid or MVNO customers.

### 2. Comcast and Charter

Comcast Xfinity Mobile, launched in May 2017, is not an independent facilities-based wireless service comparable to what is offered by Verizon, AT&T, Sprint, and T-Mobile. Instead, Comcast mostly operates as an MVNO in partnership with Verizon. While it uses its own Xfinity WiFi hotspots when available, the service largely relies on Verizon's network.[181]

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[180] Roger Linguist, Chairman and CEO, MetroPCS Communications Inc., Remarks at the Sanford C. Bernstein Strategic Decisions Conference (June 4, 2010) ("Being a reseller hasn't changed, I don't think, over the past several decades or, at least, two decades. There's -- you're completely at the mercy of the carrier that's selling you the bits and the -- or the bytes and the minutes. So I think it's really the question about what the – it's not a question of what TracFone does, it's a question of what does Verizon, AT&T, and T-Mobile and Sprint do. And that question can only be answered by how many degrees of separation do they want so that the cannibalization of their more treasured contract business doesn't get impacted by what they end up doing selling minutes and bytes to the -- to these resellers. So I really think it's a carrier question, not a TracFone question, and their margins will continue to be pressed, I believe. Because I think as this industry gets more competitive, that it's not something that they, themselves, can control.").

[181] *See* Comcast Corp., *XFINITY Mobile Broadband Disclosures*, https://www.xfinity.com/mobile/policies/broadband-disclosures (last visited Aug 26, 2018).

Further, it is only available to existing Comcast internet customers.[182] This means that it is not available in 64.8% of the U.S. where Comcast does not offer internet service.[183] Nor does the service appear to be faring particularly well: Xfinity Mobile lost $480 million in 2017 and $374 million in the first half of 2018 alone.[184] The Applicants point to a report showing that 27% of Xfinity Mobile customers have switched from Verizon,[185] suggesting that "Comcast already is having a competitive impact on the leading wireless incumbents."[186] But since Comcast pays Verizon for wholesale access to the latter's network, this can hardly be seen as a competitive

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[182] *See* Comcast Corp., *The Xfinity Mobile Plan*, https://www.xfinity.com/mobile, (last visited Aug 26, 2018).

[183] *See* Service Provider Details, Provider Coverage Overlap and Population Coverage - Comcast Corporation, https://broadbandmap.fcc.gov/#/provider-detail?hoconums=130317&direction=d (data as of December 2016).

[184] Comcast Corp., Q4 2017 Earnings Call Transcript (Jan. 24, 2018), https://www.cmcsa.com/static-files/80bfd80b-e421-43d8-b28b-1be5f1b871d8 ("Financially, we had a $480 million EBITDA loss [in Xfinity Mobile] for 2017. And in 2018, wireless EBITDA losses could be a couple of hundred million dollars higher. . . ."); Comcast Corp., Q1 2018 Earnings Call Transcript (April 25, 2018), https://www.cmcsa.com/static-files/fdafc0ba-9422-4659-ac3b-898fdaf1115c ("An EBITDA loss of $189 million associated with our newly launched wireless business."); Comcast Corp. Q2 2018 Earnings Call Transcript (July 26, 2018), https://www.cmcsa.com/static-files/f38b1112-4194-4a04-9975-30a367015ac5 ("The corporate and other segment results included an EBITDA loss of $185 million for Xfinity Mobile.). In the Q4 2017 earnings call, Comcast indicated that it expects the losses on Xfinity Mobile to be "a couple of hundred million dollars higher" in 2018. Financial analysts are also singularly unimpressed by Xfinity Mobile's performance. An industry analyst at BTIG wrote that, "we estimate Comcast's cumulative Cash EBITDA losses from its wireless business have topped $1.2 billion since the launch in May of last year, while subscriber growth has stagnated at 200,000 per quarter . . . Comcast's subscriber growth once again fell well short of the 325,000 bogey we previously set as a level that would concern the wireless industry." Mike Dano, *Comcast's Xfinity Mobile Begins to Accelerate, but Analysts Remain Wary*, FierceWireless, (July 26, 2018), https://www.fiercewireless.com/wireless/comcast-s-xfinity-mobile-begins-to-accelerate.

[185] *See* Phil Britt, *Report Declares Comcast Quad Play 'Firmly Rooted,' With Verizon Being the Biggest Loser*, Telecompetitor (May 2, 2018), https://www.telecompetitor.com/report-declares-comcast-quad-play-firmly-rooted-with-verizon-being-the-biggest-loser. The same study also finds that "T-Mobile appears impacted the least, with 6% of Xfinity Mobile subscribers identifying them as their previous carrier."

[186] Application at 110.

threat to Verizon.[187] In the words of Verizon's Chief Financial Officer: "That contract [with Comcast and Charter] … when you look at that contract in its entirety, absolutely, you go ahead and do that again. We think it's a great contract."[188]

Charter launched its own service, called Spectrum Mobile, only very recently (as of June 30, 2018), operating as an MVNO in partnership with Verizon.[189] Just like Xfinity Mobile, Spectrum Mobile is only available to Charter internet customers, meaning it is unavailable to 67.6% of the United States.[190]

Of course, before the Applicants asked the Commission for permission to merge, T-Mobile recognized the reality of these services and dismissed any putative competitive threat from cable companies. Shortly after Comcast first announced Xfinity Mobile, T-Mobile called it "the biggest non-announcement ever in the history of the wireless industry."[191] They also called Xfinity Mobile "very irrelevant" and Charter "irrelevant squared."[192]

The lack of concern for the entry of Comcast and Charter is not surprising. Comcast recently announced that it would lower the speed of its hotspots for customers on the "unlimited"

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[187] *See* Fran Shammo, Executive Vice President and Chief Financial Officier, Verizon Communications Inc., Remarks at the Bank of America Merrill Lynch Global Telecom & Media Conference, Fair Disclosure Wire (June 7, 2016) ("From Verizon Wireless's perspective I'm perfectly fine with the MVNO [Comcast]."); Transcript, Verizon Communications Inc at UBS Global Media and Communications Conference, Fair Disclosure Wire (Dec. 5, 2017).

[188] Transcript, Verizon Communications Inc. at UBS Global Media and Communications Conference, Fair Disclosure Wire (Dec. 5, 2017).

[189] Press Release, Charter Communications, *Introducing Spectrum Mobile* (June 30, 2018), https://newsroom.charter.com/news-views/introducing-spectrum-mobile.

[190] *See* Service Provider Details, Provider Coverage Overlap and Population Coverage - Charter Communications, https://broadbandmap.fcc.gov/#/provider-detail?hoconums=130235&direction=d (data as of December 2016) (last visited Aug. 26, 2018).

[191] T-Mobile Q1 2017 Earnings Call Transcript (April 24, 2017). (John Legere, CEO: "[Xfinity Mobile] is confusing. It's expensive. Nobody understands what it is.").

[192] T-Mobile Q4 2017 Earnings Call.

plan to 600 kbps.[193] Charter's new plan is subject to the same limitation.[194] The Applicants highlight the fact that Comcast and Charter "formed a wireless cooperative agreement to compete together in wireless."[195] This agreement, which ensures that both offerings remain geographically limited, can more accurately be characterized as an agreement for the two companies not to invade each other's territory and is hardly promising for competition.[196] In addition to being subject to the same technical limitations, the two companies' wireless plans are also priced identically.

### 3. DISH

The Applicants also name DISH as a competitor in the mobile voice/broadband market.[197] But while DISH is building a nationwide wireless network, the first phase of that network's deployment will be devoted to narrowband IoT ("NB-IoT"). Specifically, DISH plans to deploy a NB-IoT network by March 2020 as Phase 1 of its wireless plans.[198] DISH's planned

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[193] *See* Mike Dano, *Comcast's Xfinity Mobile to Slow Video Streams, Hotspot Connection Speed*, FierceWireless, (July 2, 2018), https://www.fiercewireless.com/wireless/confirmed-comcast-s-xfinity-mobile-to-slow-video-streams-hotspot-connection-speed. Previously, Xfinity Mobile customers had access to 4G hotspots and 720p video resolution.

[194] *See* Chris Mills, *Spectrum Mobile's Cheap Unlimited Plans Are Here, With A Lot of Fine Print*, BGR (July 5, 2018), https://bgr.com/2018/07/05/spectrum-mobile-cheap-unlimited-plan-vs-verizon.

[195] Application at 111.

[196] *See* Jon Brodkin, *Comcast and Charter Agree not to Compete Against Each Other in Wireless*, Ars Technica, (May 8, 2017) https://arstechnica.com/information-technology/2017/05/comcast-and-charter-agree-not-to-compete-against-each-other-in-wireless.

[197] Application at 112.

[198] *See* American H Block Wireless L.L.C., Interim Construction Notification for H Block Licenses (May 14, 2018); Letter from Jeffrey Blum, Senior Vice President and Deputy General Counsel, DISH, to Marlene Dortch, Federal Communications Commission, GN Docket No. 17-183, at 2 (May 24, 2017); DBSD Service Limited, Gamma Acquisition L.L.C., and Manifest Wireless L.L.C.'s Consolidated Interim Construction Notification for AWS-4 and Lower 700 MHz E Block Licenses (Mar. 8, 2017).

NB-IoT network presents the most efficient and promising technology to fulfill a growing demand for IoT connectivity in the near term and serve as a bridge to 5G in a future Phase 2, in part because NB-IoT is being considered as the 3GPP candidate for the massive connectivity requirement of 5G.[199]

In Phase 2, which DISH anticipates will follow after 3GPP Release 16 is standardized (expected in December 2019), and as DISH's plans for its other spectrum holdings develop (including the full clearing of its 600 MHz licenses, which the broadcasters are required to vacate by July 2020), DISH plans to upgrade and expand its network to support new use cases made possible through 5G technology. DISH believes that this approach will accommodate new partnerships and sharing models, including the potential to serve as a highly secure neutral host network to support industry verticals, including but not limited to logistics, healthcare, agriculture, and other connectivity use cases.

Not only is DISH not a current or near-term competitor to the facilities-based carriers, but this merger could adversely affect DISH's ability to enter the 5G mobile voice/broadband market. To offer a nationwide 5G service, DISH needs access to essential inputs, including radios, chipsets, devices, towers, crews, and backhaul. Among other things, New T-Mobile will likely be spending billions of dollars on radios, chipsets and devices, making it possible for it to use its new-found market power to customize radio solutions that would be less than ideal for DISH, or cause a delay in the DISH 5G solution. For example, DISH's solution for 600 MHz 5G is based on a standalone 5G NR solution, while the Applicants have said that New T-Mobile plans to deploy both LTE and 5G in 600 MHz. DISH is already facing challenges to prioritize a

[199] In addition to other things, an important factor in DISH's technology selection for Phase 1 was the amount of nationwide uplink that it has available at this time to deploy – only 5 MHz at 1915-1920 MHz (H Block).

flavor of 5G that is suitable for a new-entrant against existing larger carriers with legacy deployments such as AT&T and Verizon; with New T-Mobile's potential future influence, the headwinds could become stronger.

#### 4. Google

Google's Project Fi can hardly be called a competitor to T-Mobile and Sprint, as it is an MVNO using Sprint and T-Mobile themselves to provide its cellular network coverage.[200] Indeed, T-Mobile has declared that Project Fi has been "highly profitable" for T-Mobile.[201]

### B. Prepaid Voice and Broadband Is a Separate Market

Within the mobile voice/broadband market, prepaid and postpaid services constitute separate product sub-markets. They have differentiated customer bases and distinct service offerings. T-Mobile recognizes this. It not only markets its pre- and post-paid services as distinct offerings, but services and support for such offerings are distinct as well. For example, T-Mobile recently announced a new customer service model, a "team of experts" designed to "take aim at the biggest pain point yet – the old, broken customer care model that has frustrated Americans for decades."[202] That model, however, is only available for postpaid customers.[203] The reason for this differentiation is simple: postpaid services, even those that contain fixed-

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[200] Google Inc., *Project Fi Top Questions*, https://fi.google.com/about/faq/#network-and-coverage-2 ("Project Fi has partnered with Sprint, T-Mobile, and U.S. Cellular, three of the leading carriers in the US, to provide our service.") (last visited Aug. 26, 2018).

[201] Kif Leswing, *T-Mobile CEO John Legere: Google's Project Fi Is 'Highly Profitable for Us,'* International Business Times (July 9, 2015), https://www.ibtimes.com/t-mobile-ceo-john-legere-googles-project-fi-highly-profitable-us-2001631.

[202] Press Release, *T-Mobile's Latest Un-carrier Move: Real People, Not Robots Introducing T-Mobile Team of Experts* (Aug. 15, 2018) https://www.t-mobile.com/news/introducing-tex.

[203] *Id.* ("Team of Experts is for our postpaid wireless customers.").

price plans (whether unlimited or capped), are not an adequate alternative to prepaid plans for low-income, low-credit consumers.[204]

The prepaid market has been important in facilitating mobile wireless adoption among low-income and price sensitive consumers and seniors.[205] The variety of prepaid plans that are available as a result of competition and the targeted branding strategies the carriers employ give these consumer groups choice in finding a low-cost plan suitable for their needs.[206]

But, the prepaid market has witnessed significant consolidation in the last decade, with the acquisition of MetroPCS by T-Mobile and Cricket by AT&T.[207] It consists largely of three facilities-based carriers: AT&T, T-Mobile, and Sprint. While Verizon does offer some prepaid services, it does not have a significant prepaid presence.[208] In 2017, Verizon had 5.4 million

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[204] *See* Joint Declaration of Charles River Associates, Attachment A to Sprint Petition to Deny, WT Docket No. 11-65, at 22-23 (May 31, 2011) ("Prepaid and postpaid services tend to appeal to a different demographic segment. Prepaid users tend to be younger and have lower incomes. Because they do not require a credit check, prepaid plans may enable less credit-worthy consumers who do not qualify for postpaid plans to obtain wireless service.").

[205] Marc Lifsher, *More Cellphone Users Switch to Prepaid Plans*, Los Angeles Times (Feb. 19, 2013), http://articles.latimes.com/2013/feb/19/business/la-fi-0220-prepaid-cellphone-boom-20130220 (discussing the importance of prepaid service plans for price sensitive consumers); Jim Miller, *Low-Cost and Free Cell Phone Options for Seniors*, Huffington Post (July 10, 2014), https://www.huffingtonpost.com/entry/low-cost-and-free-cell-ph_b_5575971 (discussing prepaid plans available for seniors who are cost conscious and only need a cell phone for emergencies and occasional phone calls).

[206] Philip Michaels, *No-Contract and Prepaid Phone Plan Guide: What You Need to Know*, Tom's Guide (July 6, 2018), https://www.tomsguide.com/us/no-contract-phone-plans,review-2489.html (reviewing the various prepaid options available to American consumers and discussing the benefits of prepaid v. postpaid for consumers).

[207] Applications of Deutsche Telekom AG, T-Mobile USA, Inc. and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licenses and Authorizations, Memorandum Opinion and Order and Declaratory Ruling, 28 FCC Rcd. 2322, (2013) ("*T-Mobile/MetroPCS Order*"); *AT&T/Leap Order*.

[208] Verizon's former CFO admitted that Verizon is "really not competitive in that [prepaid] environment." Verizon Communications, Inc., Q1 2016 Earnings Call, Fair Disclosure Wire (April 21, 2016).

prepaid subscribers, compared to 9.0 million for Sprint, 15.3 million for AT&T and 20.7 million for T-Mobile. While Tracfone currently serves 23.1 million subscribers, its subscriber base in 2017 was reduced by more than 3 million from 2016—a four-year low. In addition, Tracfone cannot be considered an adequate alternative to the facilities-based carriers for the reasons described above. T-Mobile has dismissed TracFone as a competitor and any real threat to its prepaid service offerings, calling out another facilities-based provider, Sprint, as the competitive threat.[209]

The proposed transaction would thus result in an even greater increase in concentration in the prepaid, facilities-based market than in the mobile voice/broadband market, because of the large share of T-Mobile and the small share of Verizon in that market. Through this transaction the number one carrier would acquire the number three carrier (i.e. a 3 to 2 merger). But the Applicants say nothing about the merger's competitive effects on prepaid services or about the potential harms to the low-income, low-credit consumers who rely on these services. And, the Applicants remain silent on the consumer impact of the migration of Sprint prepaid customers to

[209] Braxton Carter, CFO, T-Mobile US, Remarks at UBS Global Media and Communications Conference (Dec. 5, 2016) ("You look at the MVNO space, very, very challenged. We all have visibility with TracFone being part of a public-reporting company and growth has completely stagnated there. And part of the issue is a true prepaid product, the economics don't support deploying higher-end handsets. The return isn't there to subsidize and the wherewithal to pay more for those handsets is not what other parts of the marketplace is. And as a result, they are becoming less and less relevant and more and more stressed from a pricing standpoint. We started last year doing a complete de-emphasizing of wireless wholesale activity with MVNOs. Not that we still don't do some business there, but a completely derisking. One of the issues you are seeing go through the industry right now is significant changes coming to the government-subsidized prepaid offerings, which was driving a lot of the prepaid. And I did just read that Sprint is going to double down in that area going forward. Now, they are the only player out there that has owner economics and that is doing lifeline directly, but maybe that will help with their trajectory. But it is challenged, unless you have a model like a MetroPCS that is really what consumers want.").

T-Mobile's network. How will such a process work – and will consumers ultimately bear the expense or inconvenience?

Naturally, three-to-two mergers are disfavored. For example, in approving the AT&T/Dobson merger, the Commission required divestitures in "all the markets in which the acquisition will reduce the number of fully constructed operators from three to two" because "in any market in which the merger would reduce the number of competitors to two or fewer, a market with this degree of concentration presents a significant likelihood of successful unilateral effects and/or coordinated interaction even if the merged entity's market share is not especially high."[210]

The same is true across other industries. The D.C. Circuit upheld the FTC's injunction blocking the merger of Heinz and Beech-Nut as it would have reduced the baby food market from three to two firms: "the anticompetitive effect of the merger is further enhanced by high barriers to market entry. The district court found that . . . new entry was 'difficult and improbable.' This finding largely eliminates the possibility that the reduced competition caused by the merger will be ameliorated by new competition from outsiders . . . As far as we can determine, no court has ever approved a merger to duopoly under similar circumstances."[211] A court enjoined the proposed merger between Staples and Office Depot when it would have reduced the number of office superstores from three to two in 27 markets: "the merger would eliminate significant head-to-head competition between the two lowest cost and lowest priced

[210] Applications of AT&T Inc. & Dobson Communications Corp., *Memorandum Opinion and Order*, 22 FCC Rcd. 20295, 20323 ¶ 56 (2007).

[211] *FTC v. H.J. Heinz Co.*, 246 F.3d 708, 717 (D.C. Cir. 2001).

firms in the superstore market [and] would result in the elimination of a particularly aggressive competitor in a highly concentrated market."[212]

### C. The Commission Should Analyze the Markets for Roaming and Wholesale Services

National wireless carriers offer network access at wholesale rates in two primary segments: MVNOs and wireless operators seeking additional network capacity or geographic coverage (roaming). The wholesale wireless market accounts for 20% of total mobile wireless connections.[213] In the roaming market, a carrier buys wholesale voice or data services from another to fill coverage gaps. MVNOs, as discussed above, purchase capacity from facilities-based carriers and re-sell mobile services to consumers. The relevant geographic markets for wholesale services are national and local.

The Commission should undertake a rigorous examination of the roaming and wholesale segments at issue in this transaction and determine whether consolidation is in the public interest. In doing so, the Commission should take into account an additional factor not present in the retail markets: the buyers depend on the sellers, often for crucial inputs, even as they try to compete against the sellers.

Only four providers currently provide any significant wholesale services, and post-merger, New T-Mobile will account for more than 60% of wholesale connections.[214] Roaming is an essential input for a potential entrant's ability to compete in the mobile voice/broadband market. Therefore, an increase in concentration in that market is likely to raise the prices of these services, thereby raising the costs of additional market entry and reducing its likelihood.

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[212] *FTC. v. Staples, Inc.*, 970 F. Supp. 1066, 1083 (D.D.C. 1997).

[213] *20th Mobile Wireless Competition Report*, 32 FCC Rcd. 8968, 8978 ¶ 19 (2017).

[214] Harrington/Brattle Declaration at 41.

## VI. THE DEAL WILL RESULT IN EXCESSIVE INCREASES IN CONCENTRATION IN THE RELEVANT MARKETS

### A. The Mobile Broadband Industry Has Reached a Tipping Point in Concentration

In 2003, there were eight major national wireless carriers. If this merger is approved, only three will remain, leaving each of the remaining three carriers with more market share than even the *largest* carrier possessed in 2003:

**National Wireless Carriers, 2003**[215]

| Carrier | Number of Subscribers | Market Share |
|---|---|---|
| Verizon | 37.52 million | 23.4% |
| Cingular | 24.03 million | 15% |
| AT&T | 21.98 million | 13.7% |
| Sprint | 15.9 million | 10% |
| T-Mobile | 13.13 million | 8.2% |
| Nextel | 12.88 million | 8% |
| Alltel | 8.02 million | 5% |
| Metro PCS[216] | 977,000 | .06% |

**National Wireless Carriers, 2018 (showing in parentheses the carriers acquired)**[217]

| Carrier | Number of Subscribers | Market Share |
|---|---|---|
| Verizon (Alltel) | 151.48 million | 35.3% |
| AT&T (Cingular) | 143.83 million | 33.5% |
| T-Mobile (MetroPCS) | 74.02 million | 17.3% |
| Sprint (Nextel) | 53.6 million | 12.5% |

[215] Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Ninth Report*, 19 FCC Rcd. 20597, 20601 ¶ 5 & A-8 (2004) (reporting subscriber counts for top mobile operators and total US subscribers by year end 2003).

[216] While MetroPCS was not a national carrier in 2003, it became one by the time it merged with T-Mobile in March 2013 as the 5th largest wireless provider in the US. *See T-Mobile/MetroPCS Order*, 28 FCC Rcd. at 2324 ¶ 5.

[217] Mike Dano, *How Verizon, AT&T, T-Mobile, Sprint and More Stacked up in Q1 2018: The Top 7 Carriers*, FierceWireless (May 11, 2018), https://www.fiercewireless.com/wireless/how-verizon-at-t-t-mobile-sprint-and-more-stacked-up-q1-2018-top-7-carriers.

**National Wireless Carriers, 2018 (with T-Mobile/Sprint combined)**

| Carrier | Number of Subscribers | Market Share |
|---|---|---|
| Verizon (Alltel) | 151.48 million | 35.3% |
| AT&T (Cingular) | 143.83 million | 33.5% |
| T-Mobile/Sprint | 127 million | 29.8% |

Even with four national carriers, the mobile wireless industry is already a highly concentrated market.[218] The FCC recognized this when it approved the five-to-four Sprint/Nextel merger in 2005 and expressed skepticism about any further reduction among competitors in the wireless sector, explaining: "clearly, there is a point beyond which further consolidation would not be in the public interest."[219]

### B. Four-to-Three Mergers Are Disfavored at Home and Abroad

Competition authorities in the United States and abroad routinely step in to prevent four-to-three mergers because of the threats they pose to competition. The Commission and DOJ recognized these threats when they rejected the proposed AT&T/T-Mobile merger, finding it likely that the transaction, if consummated, would lead, among other things, to coordination among the remaining three wireless carriers.[220]

The Applicants try to differentiate the proposed merger from AT&T's attempted purchase of T-Mobile in 2011. But, while AT&T is certainly larger than Sprint, the two

[218] Jonathan Baker & Carl Shapiro, *Reinvigorating Horizontal Merger Enforcement*, AEI-Brookings Joint Center for Regulatory Studies, 45 & n.150 (June 2007), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1089198 ("Baker and Shapiro") ("[I]f the merger reduces the number of significant firms from, say, four to three, three to two, or two to one, that change in market structure alone may alone be enough to create a presumption that the merger would make coordination more likely or more effective. . . . A four-to-three merger is a natural break point for creating a presumption of harm to competition from coordinated effects based solely on the number of firms.").

[219] *Sprint/Nextel Order* at 14035 ¶ 185.

[220] Applications of AT&T Inc. and Deutsche Telekom AG, 26 FCC Rcd. 16184, 16227 ¶ (2011); *United States v. AT&T et al.*, Complaint, 1:11-cv-01560 ¶ 36 (D.D.C. Aug. 31, 2011) ("DOJ AT&T/T-Mobile Complaint").

transactions have much in common. Both the Commission and the DOJ highlighted two aspects of the mobile voice/broadband market that posed substantial threats to competition: (1) the high barriers to entry, and (2) the elimination of a disruptive and value-driven carrier from the market.[221] The DOJ's Horizontal Merger Guidelines recognize that the type of merger most likely to enhance coordination is one that eliminates a disruptive player.[222]

It is little or no different this time around. A New T-Mobile likely would be less disciplined by competitive forces and better able to coordinate with the remaining industry players, likely leading to higher prices and less choice for consumers.[223] And, the harm here

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[221] *AT&T/T-Mobile Staff Report*, 26 FCC Rcd. at 16227 ¶ 76 ("The retail mobile wireless services market would be more vulnerable to coordination post-transaction. Features of this market make it likely that the remaining three nationwide providers would be able to reach a consensus on the terms of coordination (by identifying a mutually agreeable coordinated price), deter cheating on that consensus (by undercutting the coordinated price to steal high-margin business from its rivals), and prevent new competition in this market. Because these providers offer the same plans and charge the same prices nationwide, increased coordination would most likely take the form of raising the level of prices."); DOJ AT&T/T-Mobile Complaint ¶ 36 ("The substantial increase in concentration that would result from this merger, and the reduction in the number of nationwide providers from four to three, likely will lead to lessened competition due to an enhanced risk of anticompetitive coordination. Certain aspects of mobile wireless telecommunications services markets, including transparent pricing, little buyer-side market power, and high barriers to entry and expansion, make them particularly conducive to coordination. Any anti-competitive coordination at a national level would result in higher nationwide prices (or other nationwide harm) by the remaining national providers, Verizon, Sprint, and the merged entity. Such harm would affect consumers all across the nation, including those in rural areas with limited T-Mobile presence. Furthermore, the potential for competitive harm is heightened given T-Mobile's recent decision to grow its market share via a 'challenger' strategy.").

[222] *See* DOJ Horizontal Merger Guidelines § 2.1.5 (consideration of whether a merger may lessen competition by eliminating a maverick firm); *see also* Baker and Shapiro ("[I]f the merger reduces the number of significant firms from, say, four to three, three to two, or two to one, that change in market structure alone may alone be enough to create a presumption that the merger would make coordination more likely or more effective. . . . A four-to-three merger is a natural break point for creating a presumption of harm to competition from coordinated effects based solely on the number of firms.").

[223] *Hospital Corp. of America v. FTC*, 807 F.2d 1381, 1387 (1986) ("The reduction in the number of competitors is significant in assessing the competitive vitality of the [relevant] market.

could be even greater in one key respect: the AT&T/T-Mobile deal would have produced asymmetrical market shares, which can be a deterrent to coordination in a three-player market, as the interests of the three remaining carriers are misaligned.[224] By contrast, the current transaction will result in roughly comparable market shares among the three remaining carriers.

### 1. DOJ in AT&T/T-Mobile

The DOJ filed suit to enjoin the proposed merger of AT&T and T-Mobile on the grounds that the merger would substantially lessen competition.[225] Seven states joined the DOJ in the lawsuit. In its complaint, the DOJ was concerned that the merger would reduce the number of national carriers from four to three and eliminate competition between the two merging carriers. In the words of the complaint:

- Eliminating "one of the four national competitors" would result "in a significant loss of competition."[226]
- The disappearance of an independent fourth competitor would eliminate "important price, quality, product variety, and innovation competition" in the marketplace.[227]
- "Where there is significant substitution between the merging firms by a substantial share of consumers, anticompetitive effects are likely to result."[228]
- Actual and potential competition between AT&T and T-Mobile would be eliminated.
- The acquisition would preempt a "disruptive" carrier that had been a clear threat to its larger rivals.[229]

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The fewer competitors there are in a market, the easier it is for them to coordinate their pricing without committing detectable violations of section 1 of the Sherman Act, which forbids price fixing.")

[224] *See supra* Section VIII.B.

[225] *See* DOJ AT&T/T-Mobile Complaint.

[226] *Id.* ¶ 35.

[227] *Id.* ¶ 33.

[228] *Id.* ¶ 37.

As a result, the DOJ found that prices would be higher and quantity of services would be lower, and innovation and product discovery would likewise suffer.

This transaction raises comparable concerns: it will likewise leave three national carriers in the market. It will also eliminate the now existing competition between T-Mobile and Sprint. The Applicants have not yet disclosed diversion rates, and thus it is unknown to what extent the diversion rates from Sprint to T-Mobile and vice-versa are proportionally greater than their respective market shares. But all public indications show that the competition between the two is robust[230] and suggest that it is even more intense than that between either carrier and the two larger market players. Finally, as discussed below, the transaction may mean that a maverick strategy is no longer in New T-Mobile's interests, and could result in incumbent-like conduct akin to what T-Mobile's affiliates exhibit in other three-player markets.

### 2. FCC in AT&T/T-Mobile

The FCC was also skeptical of the four-to-three market consolidation that the AT&T/T-Mobile transaction would have created. The Wireless Bureau recommended to the full Commission that the applications be designated for a hearing, a conclusion the full Commission did not have to make because the parties withdrew the applicaitons before a full agency vote. But the FCC released the Wireless Bureau's Staff Report. The Staff Report found, among other things, that:

- AT&T and T-Mobile "ignore[d] several potential competitive harms, ma[de] overly simplistic assumptions about the structure and conduct of the wireless industry, [and] overestimate[d] the benefits that would be passed onto consumers."[231]

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[229] *Id.* ¶ 32.

[230] *See supra* Section III.

[231] *AT&T/T-Mobile Staff Report*, 26 FCC Rcd. at 16194 ¶ 13.

- The loss of competitive alternatives would give the merged company "a unilateral incentive to raise price on non-merging rivals, including Verizon Wireless and Sprint,"[232] and that the "GUPPI values for both AT&T and T-Mobile are above the level at which unilateral effects concerns are triggered by the antitrust authorities."[233]

- The transaction raised the potential for coordination, noting that even tacit coordination must be avoided because "tacit coordination is feared by antitrust policy even more than express collusion as it is harder to detect and to prevent."[234]

These quotes provide an accurate description of the possible impact of this merger, too. As explained below, it will likely increase the Gross Upward Pricing Pressure Index ("GUPPI") measure of upward price pressure above the threshold level of concern and result in price increases. It also increases the risk of coordination.

### 3. Sprint in AT&T/T-Mobile

Sprint was the fiercest opponent of the proposed AT&T/T-Mobile merger, filing both a Petition to Deny at the Commission and its own antitrust complaint in federal court.

Sprint's filings explained that "competition among wireless providers takes place on a national level."[235] Specifically, Sprint noted that "AT&T, Verizon, Sprint, and T-Mobile are distinguished from other wireless carriers by the nationwide service that their networks and spectrum assets allow them to provide to their subscribers. These four providers all have wireless networks that cover about 90 percent or more of the U.S. population."[236]

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[232] *Id.* at 16212 ¶ 48.

[233] *Id.* at 16218 ¶ 56.

[234] *Id.* at 16226 ¶ 74.

[235] Petition to Deny of Sprint Nextel Corp., WT Docket No. 11-65 at ii (May 31, 2011) ("Sprint Petition to Deny AT&T/T-Mobile").

[236] Complaint, *Sprint Nextel Corp. v. AT&T, Inc.*, No. 1:11-cv-01600 ¶ 98 (Sept. 6, 2011) ("Sprint AT&T/T-Mobile Complaint").

Sprint admitted that it "closely monitors the prices offered by Verizon, AT&T, and T-Mobile for their postpaid plans, but does not consider prices offered by smaller carriers in evaluating its own pricing plans. Verizon, AT&T, and T-Mobile demonstrate the same focus in their pricing behavior for postpaid plans."[237] Sprint debunked the assertion that smaller carriers could compete effectively, noting that the "Application maintains that post-merger AT&T will face strong competition from small regional carriers and companies such as LightSquared, but the small carriers serve less than 3 percent of all post-paid subscribers and LightSquared offers no service today."[238] Sprint also provided evidence that the market was limited to those four carriers because of targeted national advertising aimed by each of the carriers at the other three,[239] and the "four national carriers" control of "innovation in the wireless market … with a national focus."[240] Other market forces limiting competition to the four nationwide, facilities-based carriers included the pricing of "services and equipment on a national basis;" development, procurement, and offering of handsets nationally; national advertising; plan distribution through national chains; and national promotion campaigns.[241] Sprint also pointed to consumer demand as another reason: because "it is this nationwide service that consumers want and that wireless carriers strive to offer."[242]

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[237] *Id.* ¶ 99.

[238] Sprint Petition to Deny AT&T/T-Mobile at 6.

[239] Sprint AT&T/T-Mobile Complaint ¶ 103.

[240] *Id.* ¶ 104.

[241] Sprint Petition to Deny AT&T/T-Mobile at 21.

[242] *Id.* at 20.

### 4. Other Domestic Transactions

Four-to-three mergers are also disfavored in other industries. The FTC found that the four-to-three merger of rental car companies Hertz and Dollar Thrifty would permit the combined company to unilaterally exercise market power, increase the likelihood of coordinated interaction, and increase consumer prices.[243] The FTC only allowed the merger to proceed after mandating extensive divestitures, including requiring Hertz to sell its entire Advantage Rent-A-Car business and 29 additional airport locations.[244] The goal of the divestiture was to "replace the current and future competition that otherwise would have been lost as a result of the deal, while also eliminating the likelihood of coordinated interaction post-acquisition" by "enabl[ing] Advantage to become the fourth-largest car rental competitor in the United States."[245]

Additional examples abound:

- *Anthem/Cigna* & *Aetna/Humana*: the DOJ sued to stop two proposed mergers in the health insurance industry that would otherwise have consolidated the "Big Five" health insurers in the United States to three.[246]

- *Alcan/Pechiney*: the DOJ opposed the merger: "by reducing the number of major North American producers of brazing sheet from four to three, this acquisition would substantially increase the likelihood that the combined firm will unilaterally increase, or that it and the other major competitor will tacitly or explicitly cooperate to

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[243] Hertz Global Holdings, Inc., *Complaint*, Docket No. C-4376, 2012 WL 5879801 *1, *3 (Nov. 15, 2012).

[244] Hertz Global Holdings, Inc., *Decision and Order*, Docket No. C-4376, 2013 WL 3756606 *1, *10 (July 10, 2013); Press Release, Federal Trade Commission, *FTC Requires Divestitures for Hertz's Proposed $2.3 Billion Acquisition of Dollar Thrifty to Preserve Competition in Airport Car Rental Markets* (Nov. 15, 2012), https://www.ftc.gov/news-events/press-releases/2012/11/ftc-requires-divestitures-hertzs-proposed-23-billion-acquisition ("FTC Press Release").

[245] *Id*.

[246] *See* Remarks of Attorney General Loretta Lynch (July 21, 2016) https://www.justice.gov/opa/speech/attorney-general-loretta-e-lynch-delivers-remarks-press-conference-announcing-justice.

> increase, prices of brazing sheet to the detriment of consumers."[247] The DOJ thus required divestiture of either Alcan or Pechiney's brazing sheet business, thus maintaining a fourth competitor.

- *Koninklijke Ahold/Delhaize Group*: the DOJ found this merger to be presumptively unlawful, as it would reduce the number of meaningful supermarket competitors from four to three in 18 geographic markets.

#### 5. International Regulators

Nor are the regulators' concerns about four-to-three consolidations unique to the United States. The European Commission ("EC") blocked what would have been a four-to-three merger in the United Kingdom between the mobile operators O2 and Three.[248] The EC found that "the merged entity's incentives to compete aggressively are likely to be significantly weaker than those of Three and O2 pre-Transaction."[249] The EC linked the lack of competition post-merger specifically to the decline from four to three carriers:

> the Transaction is likely to give rise to non-coordinated anti-competitive effects on the retail market for mobile telecommunications services in the United Kingdom. The anti-competitive effects would arise from a reduction of the number of MNOs from four to three and the elimination of the important competitive constraints that the Parties previously exercised upon each other and a reduction of competitive pressure on the remaining players on the market.[250]

Denmark mobile carriers TeliaSonera and Telenor were likewise forced to abandon their merger, which would have reduced the number of facilities-based carriers in Denmark from four

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[247] *United States v. Alcan, Inc., Alcan Aluminum Corp., Pechiney, S.A., and Pechiney Rolled Products, LLC*, Complaint, 1:03-CV02012, ¶ 3 (D.D.C. Sept. 29, 2003).

[248] European Commission, Case M.7612 – Hutchison 3G UK/Telefonica UK (Nov. 5, 2016), http://ec.europa.eu/competition/mergers/cases/decisions/m7612_6555_3.pdf. Telefonica UK Ltd. is known as O2.

[249] *Id.* ¶ 906.

[250] *Id.* ¶ 1226. The EC also concluded that moving from four to three would have anti-competitive effects on the wholesale market. *Id.* ¶ 2313.

to three, after the EC expressed competition concerns.[251] The EC found that in another four-to-three merger (between Italian mobile carriers H3G Italy and Wind/JV), "the reduction in the number of MNOs from four to three as a result of the Transaction is likely to contribute to facilitating and incentivising coordination."[252] The EC only approved this transaction after the parties agreed to facilitate the entry of Iliad, a French facilities-based carrier, into the Italian market: "[this commitment,] which is structural in nature, . . . could create a fourth MNO capable of compensating for the loss of competition deriving from the Transaction (namely the elimination of H3G as an independent competitor) both in the retail and in the wholesale markets."[253]

Similarly, in December 2012, the EC imposed facilities-based entry as a condition to approving the merger of Orange Austria and H3G, which would have left three carriers in Austria, including T-Mobile Austria: "a structural commitment is necessary to make up for the loss of competition, which would result from the Proposed Transaction . . . the right commitment should allow a new MNO entrant to acquire the divestment spectrum and be able to roll out LTE

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[251] *See* Press Release, European Commission, Statement by Commissioner Vestager on Announcement by Telenor and TeliaSonera to Withdraw from Proposed Merger (Sept. 11, 2015) http://europa.eu/rapid/press-release_STATEMENT-15-5627_en.htm ("Based on the Commission's in-depth analysis and evidence gathered, we are convinced that the significant competition concerns required an equally significant remedy. This means the creation of a fourth mobile network operator.").

[252] European Commission, Case M.7758 Hutchison 3G Italy/Wind JV, Commission Decision ¶ 971 (Jan. 9, 2016), http://ec.europa.eu/competition/mergers/cases/decisions/m7758_2937_3.pdf. The EC also found that "the reduction of competition resulting from the Transaction in this already concentrated market, with high barriers to entry, may make it even more difficult than it already is today for MVNOs to obtain wholesale access on commercially attractive terms." *Id.* ¶ 1343.

[253] *Id.* ¶ 1696. This was effectuated by substantial spectrum divestitures, a national roaming agreement, access to network sites, and an option to provide backhaul and interconnection during the transitional period, among other requirements. *See Id.* ¶ 1720-38.

in competition with the remaining MNOs."[254] Notably, entry from a new MVNO was not deemed sufficient, even though MVNOs typically have greater rights in Europe than in the United States.[255]

### C. The Merger Will Result in Spectrum Holdings Substantially in Excess of the Spectrum Screen

Spectrum is the core asset for a mobile broadband business.[256] Indeed, the Commission has found that "for there to be robust competition, multiple competing service providers must have access to or hold sufficient spectrum to be able to enter a marketplace or expand output rapidly in response to any price increase or reduction in quality, or other change that would harm consumer welfare."[257] But the amount of spectrum available at any given time for such applications is finite. As a result, the Commission applies a spectrum "screen" to proposed

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[254] European Commission, Case No M.6497 Hutchison 3G Austria/Orange Austria ¶ 481 (Dec. 12, 2012), http://ec.europa.eu/competition/mergers/cases/decisions/m6497_20121212_20600_3210969_EN.pdf. The divestiture spectrum was reserved for a new entrant, under the condition that if no new entrant bid on the spectrum, the divested spectrum would revert to H3G. *Id.*at ¶ 526. Only the three incumbent providers participated in Austria's 2013 spectrum auction, leaving Austria with three MNOs. RTR, Multiband Auction 2013: Comments on Essential Points of Criticism Addressed in the High-Court Proceedings, 1 (Dec. 18, 2014), https://www.rtr.at/en/inf/Stellungnahme_Multiband_Auktion/Multiband_Auction_2013_Comments.pdf. As explained below, the result has been significant price increases.

[255] *See* OECD, *Wireless Market Structures and Network Sharing*, OECD Digital Economy Papers, No. 243, at 72-73 (2014), https://www.oecd-ilibrary.org/wireless-market-structures-and-network-sharing_5jxt46dzl9r2.pdf?itemId=%2Fcontent%2Fpaper%2F5jxt46dzl9r2-en&mimeType=pdf (discussing regulatory tools that have been deployed in European countries to facilitate MVNO market entry and growth, including mandatory wholesale access to MNO facilities as a condition of a merger or spectrum license, and finding that in the United States, "MVNOs are not viewed as providing robust competition to MNOs . . . they do not provide an effective competitive restraint on the four nationwide carriers.").

[256] *See 19th Wireless Competition Report*, 31 FCC Rcd. at 10572 ¶ 49 ("Spectrum is a critical input in the provision of mobile wireless services and affects if and when existing service providers and potential entrants will be able to expand capacity or deploy networks").

[257] Policies Regarding Mobile Spectrum Holdings, *Report and Order*, 29 FCC Rcd. 6133, 6144 ¶ 17 (June 2014) ("*Mobile Spectrum Holdings Report and Order*").

transactions to "ensur[e] that sufficient spectrum is available for multiple existing mobile service providers as well as potential entrants," finding that such balance "is crucial to promoting consumer choice and competition throughout the country."[258]

The Commission's "screen" tests for whether an entity would hold one-third or more of the total spectrum that is available for the provision of mobile voice/broadband services post-transaction.[259] The screen is applied on a market-by-market basis; spectrum in excess of the screen is indicative of potential competitive harm.[260] The Commission has also cautioned, however, that "it is a screen, not a safe harbor," and therefore does "not limit its consideration of potential competitive harms solely to markets identified by its initial screen if it encounters other factors that may bear on the public interest inquiry."[261] The denominator for the one-third calculation includes the following bands, appropriately weighted in accordance with the Commission's methodology: 600 MHz, 700 MHz, Cellular, SMR, Broadband PCS, AWS-1, AWS-3, AWS-4, H Block, WCS, BRS, and EBS.[262]

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[258] *Id.*

[259] *Id.* at 6222 ¶ 227.

[260] The Commission has applied this screen since the proposed Cingular Wireless and AT&T Wireless merger in 2004. *See* Applications of AT&T Wireless Inc. and Cingular Wireless Corporation For Consent To Transfer of Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 19 FCC Rcd. 21522, 21525 ¶ 4 (2004).

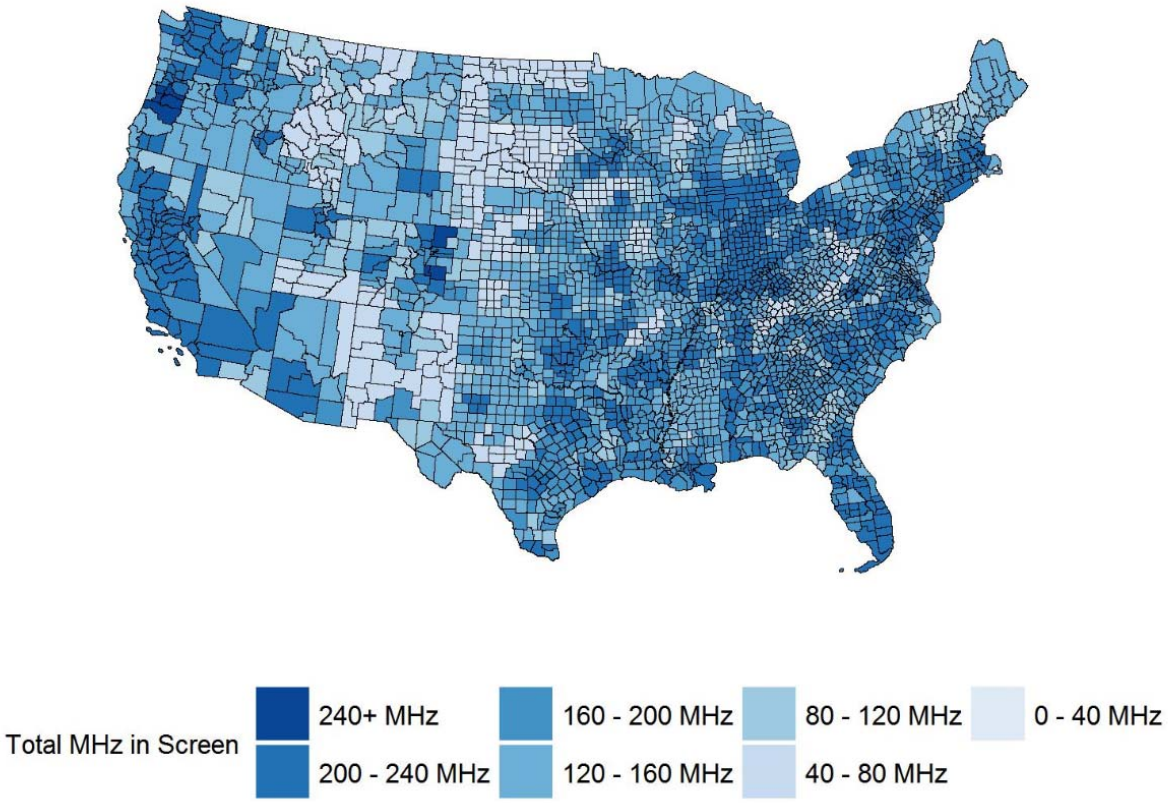
[261] *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd. at 6237 ¶ 277, 6229 ¶ 252. These factors can include the total number of rival service providers; the number of rival firms that can offer competitive nationwide service plans; the coverage by technology of the firms' respective networks; the rival firms' market shares; the combined entity's post-transaction market share and how that share changes as a result of the transaction; the amount of spectrum suitable for the provision of mobile telephony/broadband services controlled by the combined entity; and the spectrum holdings of each of the rival service providers. *Id.* at 6238 ¶ 280.

[262] *See* Harrington/Brattle Declaration at 94-97.

The Brattle Group has conducted a granular county-by-county analysis of spectrum holdings. First of all, Sprint holds the most spectrum of all carriers in a number of counties and is the only carrier to hold more than 240 MHz in any county.[263]

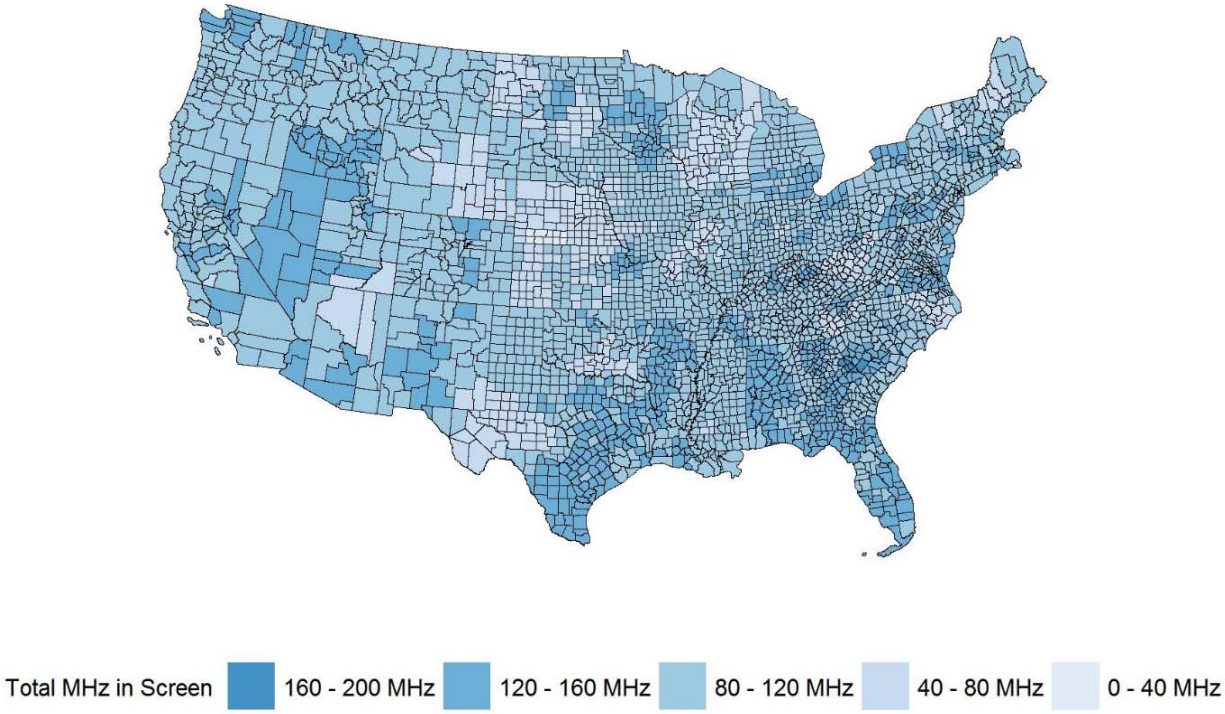
The following maps show Sprint and T-Mobile's standalone spectrum holdings:

**Sprint Spectrum Holdings in Screen**




[263] *See id.* at 102.

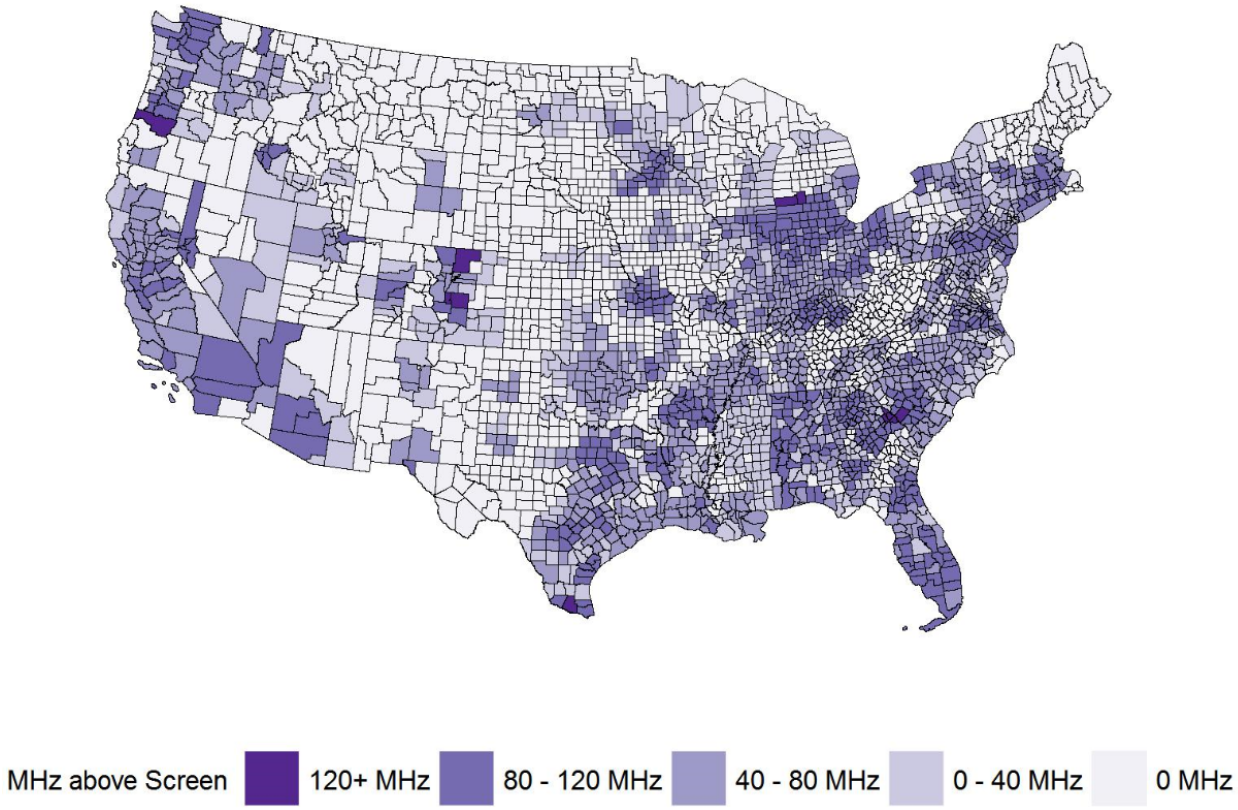
**T-Mobile Spectrum Holdings in Screen**



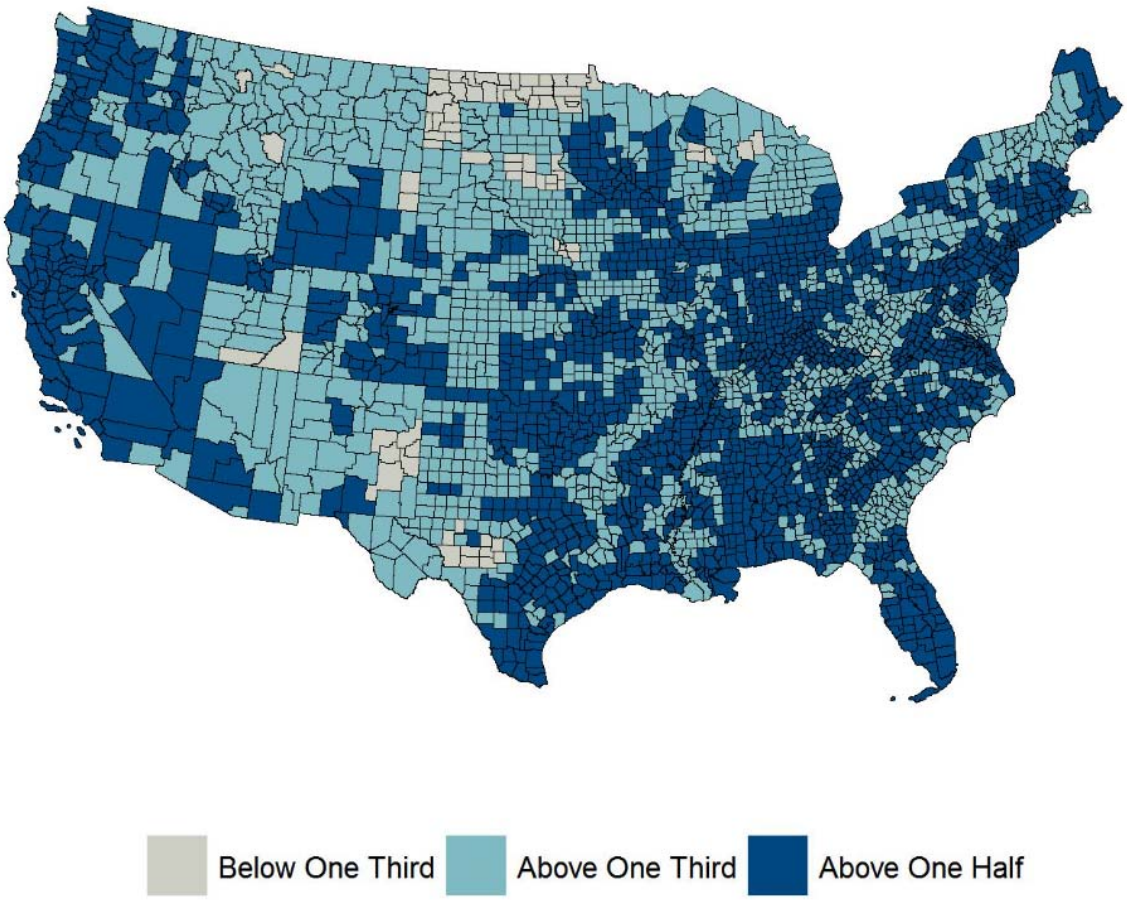

Second, Brattle finds that New T-Mobile would be over the screen threshold in 1,996 out of the nation's 3,221 counties, or in 532 CMAs, covering all of the top 100 markets. By comparison, the rejected AT&T/T-Mobile merger would have caused AT&T to exceed the screen in 274 CMAs.[264] New T-Mobile would be over the screen across 90.2% of the country's population and almost half of its land area.

[264] AT&T/T-Mobile Staff Report, 26 FCC Rcd at 16211 ¶ 45.

The following map shows where New T-Mobile spectrum holdings would be above the screen nationwide (*i.e.* the amount of spectrum that New T-Mobile would need to divest to stay below the screen):




The spectrum holdings share of New T-Mobile would of course be even greater when only the spectrum holdings of the Big 4 facilities-based carriers are considered. New T-Mobile would hold more than a third of that spectrum in 3,142 counties, and more than half in 1,712 counties, as shown in the following map:




In sum, New T-Mobile would trigger the spectrum screen in 532 CMAs, and exceed the screen by a population-weighted average of 67 megahertz per market. It would exceed the spectrum screen by at least 50 MHz in 315 CMAs, and by 100 MHz in 31 CMAs.

The Applicants seem to suggest that it would be inappropriate to include 2.5 GHz spectrum in the screen.[265] Sprint previously made this argument in the Mobile Spectrum Holdings proceeding, but it was rejected by the Commission.[266] The Applicants note that Sprint's 2.5 GHz holdings would be redeployed as part of New T-Mobile's 5G network. But the

[265] Application, Appendix J at 5.

[266] *Mobile Spectrum Report and Order*, 29 FCC Rcd. at 6184 ¶ 118 ("We will update the spectrum screen to *increase* the amount of 2.5 GHz spectrum.") (emphasis added).

fact that 5G networks will use mid-band (as well as low-band) spectrum does not exempt these frequencies from a spectrum concentration analysis. The 2.5 GHz spectrum is still usable in 4G networks, **{{BEGIN HCI**

**END HCI}}**[267] Since the 2.5 GHz frequencies are substitutable for the rest of the frequencies included in the spectrum screen, there is no basis for excluding them or any other frequencies in the current spectrum screen from an analysis of concentration of spectrum holdings.

### D. The Merger Triggers a Dramatic Increase in HHI, Indicating Significant Threats to Competition

The wireless industry has become increasingly concentrated over the past eight years. Today, the four national network operators have a combined market share of 99%. DISH's expert economists, Professor Harrington and the Brattle Group, have applied the well-known HHI to the mobile broadband industry today, and the industry after the proposed merger. The results mirror those of the spectrum screen analysis. Even before the merger, the HHI for the industry as a whole is *already at 2,814*, in the "highly concentrated" category under the Merger Guidelines. The post-merger HHI would *increase to 3,265*, an increase of *451 points*. This increase is more than twice the level that creates a presumption that the merger is "likely to enhance market power" under the Guidelines. More specifically, in the Guidelines' words:

> Mergers resulting in a post-merger HHI between 1,500 and 2,500 (moderately concentrated) that involve an increase in the HHI of more than 100 points "potentially raise significant competitive concerns and often warrant scrutiny;
>
> Mergers resulting in a post-merger HHI above 2,500 (highly concentrated) a) "potentially raise significant competitive concerns and often warrant scrutiny" if they involve an increase in the HHI of between 100 points and 200 points, and b) "will be presumed to be likely to enhance market power" if they involve an increase in the HHI of more than 200

[267] *See* Harrington/Brattle Declaration at 17-18.

points. This presumption may be rebutted with persuasive evidence demonstrating that the proposed merger "is unlikely to enhance market power.[268]

Table 2 presents estimates of the concentration in the national mobile telephony/broadband markets before and after a potential Sprint/T-Mobile merger.

**Table 2: Herfindahl-Hirschman Index (HHI) Comparison for Potential Merger**

| | All Connections | | Postpaid Connections | | Prepaid Connections | |
|---|---|---|---|---|---|---|
| Provider | Connections (millions) | Share | Connections (millions) | Share | Connections (millions) | Share |
| AT&T | 141.6 | 33.8% | 77.9 | 30.0% | 24.7 | 26.4% |
| Verizon | 145.3 | 34.7% | 110.9 | 42.8% | 11.0 | 11.8% |
| Sprint | 54.6 | 13.0% | 31.9 | 12.3% | 22.6 | 24.2% |
| T-Mobile | 72.6 | 17.3% | 34.1 | 13.2% | 34.6 | 37.0% |
| U.S. Cellular | 5.0 | 1.2% | 4.5 | 1.7% | 0.5 | 0.6% |
| **Total** | **419.1** | **100.0%** | **259.3** | **100.0%** | **93.5** | **100.0%** |
| **New T-Mobile** | **127** | **30.3%** | **66** | **25.5%** | **57** | **61.2%** |
| **Pre-Merger HHI** | **2,814** | | **3,057** | | **2,793** | |
| **Post-Merger HHI** | **3,265** | | **3,381** | | **4,585** | |
| **Delta HHI** | **451** | | **324** | | **1,792** | |

Sources: Carrier annual reports and Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

Notes: Total retail connections are estimated total retail connections for publicly traded facilities–based mobile wireless service providers (in thousands). Connections counts are for end of the year December 31. HHI is calculated as the sum of the squares of each firm's market share.

Prepaid connections attribute MVNO connections to their host networks based on the number of wholesale connections estimated for each MNO.

The merger will produce an even larger concentration increase in the market to supply facilities-based service for prepaid connections. Specifically, Brattle estimates that the resulting HHI in that market will be 4,585, and the HHI change would be 1,792. And, in light of Verizon's limited presence and interest in that market, the merger would all but create a facilities-based duopoly between New T-Mobile and AT&T. Indeed, New T-Mobile would dominate the market, as it would supply over 60% of connections (after accounting for the large

[268] DOJ Horizontal Merger Guidelines § 5.3.

number of MVNO connections that are hosted by the Applicants). The next largest supplier would be AT&T, at 26%, and together these two firms would account for more than 87% of all prepaid connections.

## VII. THE LIKELY OUTCOME OF THE MERGER IS HIGHER PRICES

New T-Mobile would have lower incentives to engage in price and non-price competition. Antitrust authorities and economists use a set of standard tools to evaluate a merger's likely unilateral effect on the merged company's prices, including simple price pressure screens and more complex merger simulations.[269] DISH's economic experts have done what the Applicants have not and applied these tools to the proposed transaction. The results provide evidence that, even setting aside the increased risk of coordination, the most likely outcome of this proposed merger is unilateral price increases.[270]

### A. The Price Pressure Test Shows New T-Mobile Would Likely Increase Prices

Pricing pressure screens, such as the GUPPI, provide a reliable indicator of the merging firms' incentive to raise prices following a merger. The GUPPI measures the value of sales that are diverted to one firm (or brand) measured in proportion to the lost revenues attributable to the reduction in unit sales resulting from the price increase by another firm (or brand). This ratio provides a metric for scoring the "upward pricing pressure" from the unilateral effects of a merger.

Professor Harrington and the Brattle Group calculated the results of the GUPPI test for Sprint and T-Mobile. The GUPPI scores for both Sprint (9.9%) and T-Mobile (9.2%) for retail

[269] Harrington/Brattle Declaration at 41-54.

[270] *Id.* at 54.

postpaid services suggest that the merger would create significant upward pricing pressure, as both measures are well above the levels that are a reason for concern.[271]

### B. Merger Simulations Demonstrate New T-Mobile Would Likely Increase Prices

Merger simulation models provide a quantitative assessment of the merger's unilateral effects on prices, market shares, and consumer welfare. Relative to simple concentration ratios and price pressure tests, merger simulation models involving a structural model of demand and supply have the advantage of taking into account realistic substitution patterns and competitors' responses to the price increase.

Professor Harrington and the Brattle Group conducted two merger simulations using the Antitrust Logit Model ("ALM" or "logit") and the proportionally calibrated Almost Ideal Demand System ("PC-AIDS"), two of the most commonly used calibrated demand models.[272] Both models share the same input requirements and assumptions about strategic behavior that are required to identify the initial pre-merger own-price and cross-price elasticities.

For each of the four carriers, the logit simulation reports pre-merger and post-merger volume market shares and monthly ARPU, along with the percentage changes in each.[273] The logit merger simulation results indicate that New T-Mobile will increase Sprint's prices by 5% for post-paid services and 7.3% for prepaid services, while T-Mobile prices would increase by somewhat lower percentages. The weighted average price increase for Sprint and T-Mobile combined would be 4.8% for post-paid services and 4.2% for prepaid services.[274] These price

[271] *Id.* at 46.

[272] *Id.* at 49-55.

[273] *Id.* at 50-51.

[274] *Id.* at 51-53, Tables 21 and 22.

increases are expected to be accompanied by corresponding, albeit lower, price increases by AT&T and Verizon, as a result of the reduction in pricing pressure from the merged firm. In total, the price increases predicted by the model would *reduce consumer surplus* across the two retail segments by approximately *$2.7 billion annually*.

DISH's expert economists also evaluated the proposed merger using the PC-AIDS merger simulation, which computes pre-merger and post-merger revenue market shares and monthly ARPU, along with the percentage changes in each.[275] The PC-AIDS merger simulation results indicate that the merging entities would increase Sprint's prices by 9.1% for post-paid service and 15.5% for prepaid services. T-Mobile prices would likely rise 8.5% and 8.2% for these services, respectively. The weighted average price increase for Sprint and T-Mobile combined would be 8.8% for post-paid services and 10.4% for prepaid services.[276]

### C. The Economic Predictions Are in Sync with Empirical Evidence of Other Four-to-Three Mergers in the Mobile Voice/Broadband Market

In addition to econometric predictions, the Commission here has a test bed at its disposal—other countries that have seen the number of their facilities-based carriers reduced from four-to-three. An econometric study of 25 countries found that "removing a disruptive player from a four player market could increase prices by between 17.2% and 20.5% on average."[277] Another study examining 33 countries found that an average four-to-three merger in

[275] *Id.* at 52-53.

[276] *Id.* at 10, Table 1.

[277] Ofcom, *A Cross-Country Econometric Analysis of the Effect of Disruptive Firms on Mobile Pricing* at 17 (March 2016), https://www.ofcom.org.uk/research-and-data/multi-sector-research/general-communications/disruptive-firms-econometrics.

the space would lead to an "increase in the bill of end users by 16.3% when compared with a situation in which no merger had occurred."[278]

Austria is a case in point. While the EC had imposed a condition of facilities-based entry to mitigate the effects of the four-to-three merger of MNOs Orange Austria and H3G Austria, that condition did not materialize, as the spectrum earmarked for it reverted to H3G. The result? According to the Austrian competition regulator, inflation-adjusted price increases of 14% to 20% on average (and of 20% to 30% for prepaid plans).[279] The merger reversed a trend: before the merger, "prices for mobile telecommunication services had been falling for several consecutive years and were relatively low compared to other European countries."[280] A second study examining the same Austrian merger found that "the merger had a significant and strong price increasing effect for smartphone users as well as for traditional users," with prices increasing as much as 90% for some users.[281] The Austrian example is especially instructive for

[278] Centre on Regulation in Europe Market Consolidation in Mobile Communications Report at 5-6. The study also found that mobile operators increased their investments post-merger by 19.3% after a four-to-three merger. *Id.* at 45. *See also* Directorate for Science, Technology and Innovation Committee on Digital Economic Policy, *Wireless Market Structures and Network Sharing*, OECD Digital Economy Papers, No. 243 at 17 (Jan. 2015), https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/CISP(2014)2/FINAL&docLanguage=En ("Competition in mobile markets benefits consumers by offering them better services, quality and price discipline. Particularly in countries with four or more mobile operators these benefits are visible through more competitive and more inclusive offers and services that are generally not available in countries with three mobile operators.").

[279] Bundeswettbewerbsbehörde Report at 3.

[280] *Id.*

[281] RTR, *Ex-post Aanalysis of the Merger Between H3G Austria and Orange Austria* (March 2016) https://www.rtr.at/en/inf/Analysis_merger_H3G_Orange/Ex_post_analysis_merger_H3G_Orange_RTR.pdf.

an additional reason: one of the three remaining players was T-Mobile's affiliate, T-Mobile Austria.[282]

A T-Mobile affiliate was also a party to another four-to-three merger, this one in the Netherlands. A study examining the four-to-three merger of T-Mobile Nederland and Orange in that country found the merger resulted in price increases of between 10% and 17% compared to control countries.[283] Like T-Mobile US and T-Mobile Austria, T-Mobile Nederland is controlled by Deutsche Telekom.

Canada, too, is a cautionary tale. Canada is served by three national wireless providers, Rogers, Telus, and Bell Mobility.[284] Rogers has a 33% market share, and Telus and Bell both have a 28% market share.[285] These three companies control 89% of wireless subscribers and 91% of all wireless revenue in Canada as of 2016.[286] Canada's telecom regulator (the CRTC) found that those limited urban areas with at least four wireless providers "generally had the

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[282] T-Mobile Austria is a wholly owned subsidiary of Deutsche Telekom AG, the largest shareholder of T-Mobile US. .*Deutsche Telekom in Austria*, Deutsche Telekom https://www.telekom.com/en/company/worldwide/profile/deutsche-telekom-in-austria-355854 (last visited Aug. 26, 2018).

[283] European Commission, *Ex-post Analysis of Two Mobile Telecom Mergers: T-Mobile/tele.ring in Austria and T-Mobile/Orange in the Netherlands* at 68 (2015), https://www.rtr.at/de/inf/Analysis_mobile_mergers/Ex-post_analysis_of_two_mobile_telecom_mergers.pdf.

[284] Canada Radio Television and Communications Commission, *Communications Monitoring Report* at 301 (2017), https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2017/index.htm.

[285] *Id.* Market share data as of 2016. New entrants' penetration was only at 4% in 2012 and 5% in 2016. *Id.* at 329 ("Canada's wireless service market is dominated by established carriers. These companies offer significantly more coverage and achieve higher subscriber penetration rates than the new entrants.").

[286] *Id.* at 301-02.

largest variance between the lowest and highest prices reported, as well as the lowest prices."[287] Another study commissioned by the Canadian government found that Canada had the highest mobile broadband prices (for a plan of 2 GB to 5 GB) compared to the USA, Australia, France, Italy, UK, Germany and Japan.[288]

## VIII. THE TRANSACTION WILL SIGNIFICANTLY INCREASE THE RISK OF COORDINATION

As discussed above, the network operators remaining after the proposed merger (AT&T, Verizon, and New T-Mobile) would each have the incentive to raise prices individually (or "unilaterally"). However, the merger will also substantially increase the maximum price increase that carriers will be willing to initiate and match, hence increasing the risk of tacit collusion/coordination. It is well recognized that a "merger may diminish competition by enabling or encouraging post-merger coordinated interaction among firms."[289] And this coordination need not be explicit to be harmful. Professor Harrington and the Brattle Group find that the merger would "substantively increase the likelihood of tacit collusion" among the remaining three carriers post-merger.

But, the Applicants' experts, Professors Salop and Sarafidis, largely confine themselves to the theoretical proposition that the difficulty of detecting non-compliance deters cartel agreements in general. They have done little or no analysis as to whether and how this well-known theory applies to this transaction. The failure to engage in this analysis is all the more surprising because Salop and Sarafidis authored a paper that sets forth an econometric method

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[287] *Id.* at 314.

[288] Nordicity Group Ltd., *Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions* at 9 (Oct. 5, 2017), https://www.ic.gc.ca/eic/site/693.nsf/vwapj/Nordicity2017EN.pdf/$file/Nordicity2017EN.pdf.

[289] Horizontal Merger Guidelines § 7.

for estimating the increase in coordination risk of a merger. While this method is subject to a number of criticisms, it is important to note that here Salop and Sarafidis do not apply their own method. DISH's economic experts have done so, and the results are not favorable for the Applicants. Indeed, Salop and Sarafidis' own model shows the likelihood of increased coordinated effects post-merger.

### A. The Industry Is Suitable for Tacit Collusion, but Collusion Remains Difficult in the Current Market

The mobile voice/broadband market is generally suitable for tacit collusion: prices are public and the carriers' plans are similar; buyers—the individual consumers—lack power, and the barriers to entry are high. Nevertheless, coordination in the current four-player market is difficult, especially because the market shares and interests of the four players are misaligned. Specifically, as shown in the table below, each of AT&T and Verizon has a significantly higher share than each of T-Mobile and Sprint.

**Table 3: 2016 U.S. Wireless Provider Comparison**

| Provider | 2016 Market Share | Share of Total U.S. Population Covered | Share of Total U.S. Square Miles Covered | Total 5 Year Capital Investment | Total 10 Year Capital Investment | Average Monthly Churn | Average Subscription Life (Years) |
|---|---|---|---|---|---|---|---|
| [A] | [B] | [C] | [D] | [E] | [F] | [G] | [H] |
| AT&T | 32.4% | 99.3% | 71.7% | $ 52,519,000,000 | $ 86,954,000,000 | 1.5% | 6.1 |
| Verizon Wireless | 35.0% | 97.3% | 66.3% | $ 51,762,000,000 | $ 89,273,000,000 | 1.2% | 7.3 |
| Sprint | 14.3% | 92.0% | 27.5% | $ 22,426,000,000 | $ 34,885,000,000 | 2.2% | 4.3 |
| T-Mobile | 17.1% | 95.1% | 47.7% | $ 20,885,000,000 | $ 36,333,000,000 | 1.7% | 5.3 |

Sources: Estimated total connections, coverage data, and capital expenditure data from 2010 through 2016 from the Twentieth Mobile Wireless Competition Report, pp. 15, 48, and 80. Capital expenditure data from 2005 through 2009 from the Fifteenth Mobile Wireless Competition Report, p. 132. Churn data from UBS Wireless 411, p. 19.

Notes:

[B]: Market share based on estimated total connections as reported in the 20th Mobile Wireless Competition Report.

[C]: Share of total U.S. population covered by provider as reported in the 20th Mobile Wireless Competition Report.

[D]: Share of total U.S. square miles covered by provider as reported in the 20th Mobile Wireless Competition Report.

[E]: Sum of capital expenditures for each provider from 2012 through 2016 as reported in the 20th Mobile Wireless Competition Report.

[F]: Sum of capital expenditures for each provider from 2007 through 2016 as reported in the 15th Mobile Wireless Competition Report and the 20th Mobile Wireless Competition Report. Capital expenditures from 2005 through 2009 are estimated based on Chart 30 in the 15th Mobile Wireless Competition Report.

[G]: Average monthly churn calculated as the geometric mean of monthly churn rates as reported in UBS Wireless 411.

[H]: Average subscription life, calculated as 1 / average monthly churn. Figures based on monthly churn rates reported in UBS Wireless 411.

Given these positions, collusion is unlikely to be effective unless both AT&T and Verizon were to participate. Thus, the possible collusive arrangements in the pre-merger market are: (1) AT&T and Verizon colluding by themselves (i.e., without Sprint and T-Mobile), (2) AT&T and Verizon colluding with either Sprint or T-Mobile (but not both), or (3) AT&T and Verizon colluding with both Sprint and T-Mobile. We address each of these scenarios in turn.

First, collusion by AT&T and Verizon without Sprint and T-Mobile is likely to break down not long after it begins. This is because Sprint and T-Mobile typically sell at a discount compared to AT&T and Verizon. A coordinated price increase by AT&T and Verizon would provide a golden opportunity for T-Mobile and Sprint to further expand, and at even higher profit margins than in the past.

Second, collusion by AT&T, Verizon, and either Sprint or T-Mobile (but not both) suffers from a similar infirmity. For example, if Sprint colluded with AT&T and Verizon to raise prices, T-Mobile could then either maintain its price or increase its price by less than the rise in the prices by the other three network operators, resulting in a rise in T-Mobile's sales and market share because of the discount it would offer relative to the three other companies. Thus, the risk of mis-coordination is heightened in the current four-player market because of the uncertainty regarding whether Sprint or T-Mobile would participate.

Third, collusion among all four current network operators is unlikely because T-Mobile and Sprint are unlikely to participate in a collusive arrangement that would require freezing their market share. Even if T-Mobile were willing to participate, it is difficult for four firms to

coordinate without express communication. For example, if Sprint were willing to participate if the other three network operators were to do so, it may still not follow a price increase by Verizon or AT&T because it would be unsure that T-Mobile would follow. Even if all four network operators did want to participate in a collusive arrangement and were able to coordinate, such an arrangement would be highly unstable. Sprint or T-Mobile would be tempted to undercut Verizon or AT&T to increase market share, hoping that the three remaining firms would continue to collude. Sprint and T-Mobile's recent attempts to increase their market shares show that they are not content with their current market positions.

### B. The Merger Will Make Tacit Collusion Easier

In the post-merger environment, however, tacit collusion would be easier. Professor Harrington and the Brattle Group find that the "merger would not only make tacit collusion significantly more likely, but that there would be a serious risk of tacit collusion in the post-merger market."[290] The merger would likely lead to such coordinated effects because: (1) New T-Mobile would be more willing to collude with AT&T and Verizon than either standalone Sprint or T-Mobile; and (2) it would be less difficult for AT&T, Verizon, and New T-Mobile to coordinate than any grouping of the current four incumbents.

*T-Mobile would also have fewer incentives for maverick behavior*. As demonstrated in the above scenarios, one of the main obstacles to collusion in the pre-merger market is T-Mobile's maverick behavior. As described above and by Professor Harrington and the Brattle Group, T-Mobile has adopted a maverick strategy by foregoing short-term profits to gain more subscribers, market share, and profitability in the long run: "a maverick strategy is an investment where the cost of investment is lower short-run profit in the short term due to lower

[290] Harrington/Brattle Declaration at 74.

revenues or higher costs, and the benefit of the investment is higher future profit from a large customer base."[291] As explained in the Harrington/Brattle Declaration, "the future return from building a customer base is only realized when the firm starts charging higher prices to those locked-in customers."[292] This rationale behind the maverick strategy explains why mavericks are rarely, if ever, market leaders but instead tend to be smaller firms.[293]

Merging with Sprint would largely eliminate the rationale for T-Mobile's maverick behavior. Once it has obtained through the merger the higher market share that it has previously used competition to obtain, there would be little need for New T-Mobile to continue acting as a maverick. Indeed, with its larger customer base, it would be even more costly for New T-Mobile to be a maverick, because low prices would be more costly in terms of foregone lost profits on the larger customer base. It would instead be more rational for New T-Mobile to reap larger profits from those customers, rather than continue trying to gain market share.[294] New T-Mobile would likely act to increase its margins, by among other methods, engaging in tacit collusion with AT&T and Verizon.

### C. Salop and Sarafidis' Own Model Shows an Increase of About 20% in the Risk of Coordinated Effects

The Applicants' own experts, Professors Salop and Sarafidis, have developed an index called the Coordinated Price Pressure Index ("CPPI") to evaluate the proposed AT&T and T-

[291] Harrington/Brattle Declaration at 68.

[292] *Id.*

[293] *Id.* at 69.

[294] *See id.* ("[A] maverick strategy of aggressive pricing is less attractive when a firm has a higher market share, as would be the case with New T-Mobile.").

Mobile merger.[295] The CPPI measures the maximum common price increase that a pair of firms are willing to initiate or match, holding the prices of all the other firms constant.

The following table shows the pre-merger and post-merger CPPI between the merging firms and the other national carriers.

**Table 4: The Coordinated Price Pressure Test**

| Pre-Merger Coalition [A] | Pre-Merger CPPI [B] | Post-Merger CPPI [C] | Delta CPPI [D] |
|---|---|---|---|
| T-Mobile - Verizon | 6.8% | 21.9% | 15.1% |
| T-Mobile - AT&T | 8.8% | 29.3% | 20.5% |
| Sprint - Verizon | 6.8% | 21.9% | 15.1% |
| Sprint - AT&T | 8.8% | 29.3% | 20.5% |

Sources: 20th Mobile Wireless Competition Report and UBS Wireless Telecommunications report released February 22nd, 2017. Company Annual Reports.

Notes:

[A]: Two-firm coalition.

[B]: CPPI for listed firm pair before Sprint/T-Mobile merger.

[C]: CPPI for listed firm pair after Sprint/T-Mobile merger.

[D]: Change in CPPI for listed firm pair due to Sprint/T-Mobile merger.

As shown in the table, the CPPI will increase by 15 to 21% depending on the company. In all cases, the post-merger CPPI is higher than the pre-merger CPPI, showing that the merger would increase the incentives to engage in tacit collusion.

## IX. CONCLUSION

For the foregoing reasons, the Commission should deny the transaction as currently proposed.

[295] Serge Moresi, David Reitman, Steven Salop, & Yianis Sarafidis, *Gauging Parallel Accommodating Conduct Concerns with the CPPI* (2011), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1924516.

Respectfully submitted,

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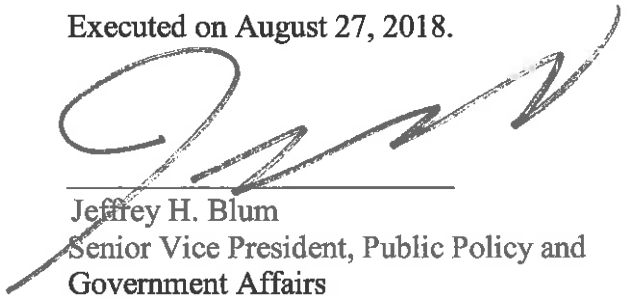
*Counsel for DISH Network Corporation*

August 27, 2018

## DECLARATION

The foregoing has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing, except for those facts for which official notice may be taken and those that other parties have submitted to the Federal Communications Commission confidentially under the protection of the *Protective Order* in WT Docket No. 18-197, or otherwise, is true and correct to the best of my information, knowledge and belief.

Executed on August 27, 2018.



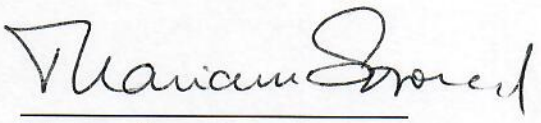
Jeffrey H. Blum
Senior Vice President, Public Policy and Government Affairs
**DISH Network Corporation**

**REDACTED—FOR PUBLIC INSPECTION**

## DECLARATION

The technical material discussed in the foregoing Petition to Deny has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing Petition to Deny, except for those facts for which official notice may be taken and those that other parties have submitted to the Federal Communications Commission confidentially under the protection of the *Protective Order* in WT Docket No. 18-197, or otherwise, is true and correct to the best of my information, knowledge and belief.

Executed on August 27, 2018.



Mariam Sorond
Vice President, Technology Development
**DISH Network Corporation**

# Exhibit A

# Declaration of David E.M. Sappington

**REDACTED—FOR PUBLIC INSPECTION**

# Declaration of David E. M. Sappington

## I. Qualifications

My name is David Sappington. I hold the titles of Eminent Scholar and Director of the Public Policy Research Center, both at the University of Florida. Since earning my Ph.D. in economics from Princeton University in 1980, I have served on the faculties of the University of Michigan and the University of Pennsylvania and on the technical staff of Bell Communications Research. I have also served as the Chief Economist for the Federal Communications Commission and as the President of the Industrial Organization Society. I presently hold positions on the editorial boards of six major journals, including the *Journal of Regulatory Economics,* the *Rand Journal of Economics,* and the *Review of Industrial Organization*.

My research analyzes a broad range of issues in the field of industrial organization, with a focus on the design and implementation of regulatory policy. I have published more than one hundred and fifty articles in leading journals in the profession and have coauthored a book on *Designing Incentive Regulation for the Telecommunications Industry*. My curriculum vitae appears as an attachment to this report.

## II. Purpose, Primary Conclusions, and Outline of this Report

T-Mobile and Sprint propose to merge. The parties have hired Dr. David Evans in part to provide an estimate of how the merger would affect the price of wireless data in 2024.[1] The primary purpose of this report is to explain why Dr. Evans' study is incomplete and biased, and to identify some of the unsupported assumptions that underlie the study.

The study is incomplete because it fails to account for the well-documented and widely-accepted economic reality that a substantial increase in industry concentration generally leads to higher industry prices. Failure to account for this reality gives rise to predictions that are unduly rosy.

Dr. Evans' study is biased because its methodology predicts the proposed merger between T-Mobile and Sprint would substantially reduce the price of wireless data in the U.S. even if the merger did not increase the combined capacity of T-Mobile and Sprint, change the number of

[1] Declaration of David S. Evans, Appendix G in *Description of Transaction, Public Interest Statement, and Related Demonstrations*, filed June 18, 2018 ("Evans Report").

smartphone subscribers that any carrier serves, or change the industry-wide average revenue per smartphone subscriber. This flaw in the study undermines its utility.

Dr. Evans' study is further undermined by unsupported assumptions. For example, the study adopts without question projections that T-Mobile formulated for its proposed merger with Sprint. The study also relies upon unsubstantiated assumptions about the extent to which AT&T Wireless ("AT&T") and Verizon Wireless ("Verizon") will match the 5G investments of T-Mobile and, if the merger occurs, the resulting New T-Mobile.

The present report proceeds as follows. Section III reviews the methodology in Dr. Evans' study. Section IV explains why the study is incomplete. Section V identifies the bias in the study. Section VI reviews some of the unsupported assumptions in the study. Section VII concludes.

## III. The Basic Calculation in Dr. Evans' Study

The analysis in Dr. Evans' study essentially proceeds as follows.[2] First, industry practical capacity in 2024 is predicted,[3] both in the presence of the proposed merger and in its absence. Second, the number of wireless data subscribers in 2024 is estimated. Third, industry practical capacity per subscriber ($k$) is calculated as the ratio of the predicted industry practical capacity to the estimated number of wireless data subscribers. Fourth, an industry-wide data average revenue per user ($ARPU^d$) is estimated as a proxy for the predicted price of wireless data service in 2024 (and is assumed to be the same with and without the merger). Fifth, the ratio of data average revenue per user to capacity per subscriber ($ARPU^d/k$) is calculated. Under the assumption that practical capacity is always fully utilized, the difference between $ARPU^d/k$ without the merger and $ARPU^d/k$ with the merger provides an estimate of the extent to which the merger will cause the industry-wide unit price of wireless data to decline (even though, by construction, industry subscribers, $ARPU^d$, and revenue do not change).

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2 Appendix A to this report provides additional detail.

3 Dr. Evans states that practical capacity is a measure of "the amount of data that a cellular network provides to users as a proportion of its . . . total capacity, given the engineering and business practicalities of running the network" (Evans Report, ¶ 209).

## IV. Dr. Evans' Study is Incomplete

A credible estimate of the impact of the proposed merger on the price of wireless data must account for all of the likely major effects of the merger. The estimate that Dr. Evans provides in his declaration ("the Evans Report") violates this important principle. It does so by failing to account for the fact that a substantial increase in industry concentration is likely to place upward pressure on the price of wireless data.

The proposed merger would substantially increase concentration in an industry that is already highly concentrated. The four major wireless carriers in the United States (AT&T, Verizon, T-Mobile, and Sprint) presently account for more than 98% of retail connections.[4] The corresponding Herfindahl-Hirschman Index of market concentration ("the HHI") is 2,814,[5] which exceeds the 2,500 threshold that delineates a highly concentrated market.[6] The proposed merger is projected to increase the HHI to 3,266.[7] This increase of nearly 451 points (from 2,814 to 3,265) more than doubles the 100–200 point increase that "potentially raise[s] significant competitive concerns."[8]

A well-regarded and widely-accepted principle of industrial organization is that a substantial increase in industry concentration typically leads to higher industry prices. As a classic textbook in industrial organization concludes: "Any realistic theory of oligopoly must take as a point of departure the fact that when market concentration is high, the pricing decisions of sellers are interdependent, and the firms involved can scarcely avoid recognizing their mutual interdependence. … [W]e should expect oligopolistic industries to exhibit a tendency toward the maximization of collective profits, perhaps even approaching the pricing outcome associated with pure monopoly."[9]

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4 Declaration of Joseph Harrington, Coleman Bazelon, and Jeremy Verlinda ("Brattle Declaration"), Table 17.

5 *Ibid*.

6 U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, Issued August 19, 2010, § 5.3.

7 Brattle Declaration, Table 17.

8 *Horizontal Merger Guidelines*, § 5.3.

9 F. M. Scherer, *Industrial Market Structure and Economic Performance*. Second Edition. Boston, MA: Houghton Mifflin Company, 1980, p. 168.

Empirical evidence confirms that increased industry concentration leads to higher industry prices in practice. In a recent comprehensive review of mergers in many industries, Professor John Kwoka concludes that increased industry concentration is associated with significantly higher prices whenever there are fewer than five major competitors.[10]

Increased industry concentration also is often associated with diminished industry innovation, both in general and in the wireless communications sector in particular. To illustrate, a study by the Organisation for Economic Co-operation and Development (OECD) observes that "in countries where there are a larger number of MNOs [mobile network operators], there is a higher likelihood of more competitive and innovative services being introduced and maintained. Particularly, a larger number of MNOs is often the source for innovative offers that challenge existing market wisdom and practices and a driver for the entire market to become more competitive."[11] In particular, the OECD Report notes that innovation "is more likely in a market with at least four" mobile network operators.[12]

Antitrust authorities are well aware that increased industry concentration will often elevate prices and stifle innovation. Indeed, the authorities recognize that the anticompetitive effects of increased industry concentration can outweigh any efficiencies that a merger might foster. Specifically, the U.S. *Horizontal Merger Guidelines* state: "Even when efficiencies generated through a merger enhance a firm's ability to compete, … a merger may have other effects that may lessen competition and make the merger anticompetitive."[13]

In light of the widespread recognition that mergers that substantially increase industry concentration are likely to place upward pressure on industry prices, it would strain credibility to suggest that the merger of T-Mobile and Sprint would reduce industry prices. Consequently, Dr. Evans adopts the most favorable assumption subject to this constraint. He assumes that the industry-wide $ARPU$ will be the same in 2024 as it was in 2017 ($43.93), regardless of whether the merger is

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[10] John Kwoka, "The Structural Presumption and the Safe Harbor in Merger Review: False Positives or Unwarranted Concerns?" Northeastern University discussion paper, February 2017 (forthcoming in the *Antitrust Law Journal*) ("the vast majority of mergers resulting in five or fewer significant competitors … have anticompetitive consequences," p. 47).

[11] OECD, "Wireless Market Structures and Network Sharing", *OECD Digital Economy Papers*, No. 243, Paris: OECD Publishing, 2014 (http://dx.doi.org/10.1787/5jxt46dzl9r2-en) ("OECD Report"), p. 5.

[12] *Ibid*, p. 8.

[13] *Horizontal Merger Guidelines*, §10.

permitted or precluded. This assumption completely ignores the upward pressure on industry prices that increased concentration exerts. This failure to account for well-recognized and well-documented economic forces renders the Evans Report seriously incomplete.

Dr. Evans recognizes that his analysis is incomplete, but declines to conduct a more complete analysis. He acknowledges that "I have not … offered any opinion concerning the static unilateral effects of the Transaction resulting from the elimination of a competitor, nor have I conducted any analysis of the effect of the Transaction on static competition."[14] This shortcoming of the analysis is of crucial importance, given the primacy of competitive effects relative to alleged efficiencies. As the *Horizontal Merger Guidelines* state, U.S. antitrust authorities "are mindful that the antitrust laws give competition, not internal operational efficiency, primacy in protecting customers."[15]

Evidence submitted in the present merger proceeding indicates that Dr. Evans' decision not to consider either the potential unilateral effects or the potential coordinated effects of the proposed merger constitutes an important omission.[16] The Brattle Declaration demonstrates that the proposed merger is likely to raise industry prices and reduce consumer welfare by billions of dollars even if all industry suppliers were to act independently following the merger. The Brattle Declaration further explains why the merger would enhance both the ability and the incentive of industry suppliers to coordinate their actions and thereby further increase industry prices and impose even greater harm on consumers.

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14 Evans Report, ¶ 169.

15 *Horizontal Merger Guidelines*, §10.

16 The unilateral effects of a merger pertain to the effects (e.g., price increases) that can arise because of the increased industry concentration even if all industry suppliers act independently. The coordinated effects of a merger pertain to the effects that stem from increased tacit or explicit coordination among industry suppliers following the merger. See the Brattle Declaration for additional explanation and discussion.

## V. Dr. Evans' Study Is Biased

Although the Evans Report relies upon questionable assumptions, the basic logic it employs is relatively straightforward. The Report posits that the merger of T-Mobile and Sprint would increase their combined capacity which, in turn, would compel AT&T and Verizon to expand their capacities. Consequently, as long as the increased industry concentration caused by the merger does not place any upward pressure on the price of wireless data or reduce the carriers' incentives to fully deploy their expanded capacities, industry capacity necessarily increases, and the unit price of wireless data declines.

Given this basic logic, one would expect the methodology employed in the Evans Report ("the Evans methodology") to predict that the merger would have no impact on the unit price of wireless data if the merger did not increase the combined practical capacity of T-Mobile and Sprint. However, the Evans methodology provides a very different prediction under this "no merger efficiency" condition. Specifically, the methodology predicts the merger often will reduce the industry-wide unit price of wireless data even when this condition prevails.

This concerning feature of the Evans Report is recorded formally in the following proposition, which is proved in Appendix B to this report.

**Proposition.** Suppose the proposed merger of T-Mobile and Sprint would not change their combined practical capacity. Then the Evans methodology predicts that the merger would nevertheless reduce the industry-wide unit price of wireless data whenever Sprint's practical capacity per subscriber exceeds T-Mobile's practical capacity per subscriber.

The troubling conclusion in the proposition reflects the manner in which the Evans methodology estimates the practical capacities of AT&T and Verizon. For brevity, consider how the estimation proceeds for Verizon.[17] To estimate Verizon's practical capacity, the Evans Report first assumes that Verizon matches the practical capacity per subscriber of: (i) T-Mobile in the absence of the merger; and (ii) New T-Mobile in the presence of the merger. The Report then calculates Verizon's total practical capacity to be the product of the relevant practical capacity per subscriber (of either T-Mobile or New T-Mobile) and the number of smartphone subscribers that Verizon

[17] The estimation for AT&T is analogous.

serves.

This procedure implies that the Evans methodology will predict different levels of industry practical capacity (and thus a different price for wireless data) whenever T-Mobile's projected practical capacity per subscriber ($k^T$) differs from New T-Mobile's projected practical capacity per subscriber ($k_m^{TS}$).[18] I now show that these two projections generally will differ even when the merger does not affect the combined practical capacity of T-Mobile and Sprint.

To do so, observe that T-Mobile's projected practical capacity per subscriber ($k^T$) is the ratio of its practical capacity ($K^T$) to the number of subscribers it serves ($s^T$), so $k^T = \frac{K^T}{s^T}$. Similarly, when the practical capacity of New T-Mobile is simply the sum of the individual practical capacities of T-Mobile ($K^T$) and Sprint ($K^S$), New T-Mobile's projected practical capacity per subscriber ($k_m^{TS}$) is the ratio of $K^T + K^S$ to the sum of the numbers of subscribers that T-Mobile ($s^T$) and Sprint ($s^S$) serve.[19] Formally, $k_m^{TS} = \frac{K^T + K^S}{s^T + s^S}$. Now, to prove that $k_m^{TS}$ generally differs from $k^T$ even when the merger does not affect the combined practical capacity of T-Mobile and Sprint, observe that:

$$k_m^{TS} > k^T \iff^{20} \frac{K^T + K^S}{s^T + s^S} > \frac{K^T}{s^T} \iff s^T[K^T + K^S] > K^T[s^T + s^S]$$

$$\iff s^T K^S > s^S K^T \iff \frac{K^S}{s^S} > \frac{K^T}{s^T}.$$

This analysis establishes that New T-Mobile's projected practical capacity per subscriber exceeds T-Mobile's projected practical capacity per subscriber even when the "no merger efficiency" condition holds if Sprint's practical capacity per subscriber ($\frac{K^S}{s^S}$) exceeds T-Mobile's practical capacity per subscriber ($\frac{K^T}{s^T}$). Averaging the larger Sprint capacity measure with the lower T-Mobile capacity measure produces a larger projected practical capacity per subscriber for New T-

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[18] The subscript "$m$" on $k_m^{TS}$ indicates that the merger has taken place. The superscript "$TS$" denotes the combined operations of T-Mobile and Sprint.

[19] $s^T$ is the number of subscribers that T-Mobile serves. $s^S$ is the number of subscribers that Sprint serves. I follow the Evans Report here in assuming that New T-Mobile serves $s^T + s^S$ subscribers.

[20] This symbol denotes "equivalence," indicating that the relationship that precedes the symbol is true if and only if the relationship that follows the symbol is true.

Mobile than for T-Mobile. Thus, the Evans methodology predicts the merger will induce AT&T and Verizon to increase their practical capacities per subscriber (in order to match the extent to which New T-Mobile's capacity per subscriber exceeds T-Mobile's capacity per subscriber) even when the merger does not increase the combined practical capacity of T-Mobile and Sprint. This prediction is driven entirely by the assumption that AT&T and Verizon follow T-Mobile or New T-Mobile (and ignore Sprint) when determining their per-subscriber network capacities.[21]

This questionable assumption leads the Evans methodology to predict that the proposed merger of T-Mobile and Sprint will reduce the unit price of wireless data even when the merger has no impact whatsoever on the combined practical capacities of T-Mobile and Sprint. Thus, the Evans methodology delivers a conclusion that is favorable to T-Mobile and Sprint even when the parties' alleged rationale for the conclusion does not hold.

It is concerning that the assumptions employed in the Evans Report, coupled with the bias in the Evans methodology, give rise to a prediction bias of substantial magnitude. This magnitude is characterized in the following Observation, which is proved formally in Appendix B to this report.

**Observation**. Given the assumptions employed in the Evans Report, the Evans methodology predicts that under the "no merger efficiency" condition specified in the Proposition, the merger would cause the industry-wide unit price of wireless data to decline by nearly **{{BEGIN HCI END HCI}}** percent.

Dr. Evans might try to suggest that the Observation demonstrates the proposed merger would deliver benefits even if it does not increase the combined practical capacity of T-Mobile and Sprint. However, the Evans Report provides no hard evidence to support this suggestion. The Report focuses on how the proposed merger would substantially increase the combined capacity of T-Mobile and Sprint, and thereby (allegedly) compel AT&T and Verizon to match the greatly enhanced capacity of New T-Mobile. The Evans Report does not explain how a merger that has no impact whatsoever on the combined capacity of T-Mobile and Sprint would somehow compel AT&T and Verizon to increase their network capacities, as the Evans methodology predicts. In fact, the Evans Report acknowledges that AT&T and Verizon are unlikely to respond to relatively minor improvements to New T-Mobile's operations that it might secure from the merger. Specifically, the Report notes that "Verizon and AT&T give little attention to others' investments aimed at 'catching

[21] The discussion in Section VI.A below explains why this assumption is highly questionable.

up'."[22]

Given the prediction bias identified in the Observation, Dr. Evans' presumption that the merger would not increase the average revenue per subscriber in the wireless industry, and his unquestioning adoption of predictions of large capacity increases for New T-Mobile, it is not surprising that the Evans Report provides rosy predictions about the impact of the merger on the price of wireless data in 2024.

## VI. Other Elements of Dr. Evans' Study are Not Fully Supported

The rosy predictions in the Evans Report reflect in part the incomplete and biased nature of the Report. The predictions also reflect questionable assumptions about the capacities of the nation's wireless carriers and the extent to which these capacities will be utilized.

### A. The Report's Estimate of Industry Capacity Absent a Merger is Questionable

As explained in Section V above, the Evans Report is biased because it assumes that in the absence of the proposed merger, AT&T and Verizon will match the practical capacity per subscriber of T-Mobile. The rationale for this assumption is far from apparent.

The Evans Report observes that in recent years, T-Mobile's subscribers have consumed **{{BEGIN HCI END HCI}}** percent of the carrier's total capacity. The Report further asserts that T-Mobile provided to its subscribers "as much national total capacity as possible given the engineering and business practicalities of running the network."[23] The Evans Report employs these observations to assume that T-Mobile's practical capacity is **{{BEGIN HCI END HCI}}** percent of its total capacity.

In practice, the fraction of a carrier's total capacity that is actually used by subscribers depends on many factors. Relevant factors include the number of subscribers the carrier serves, subscriber data usage patterns, the carrier's pricing policies, network service quality, and the carrier's efficiency in deploying its resources. The nation's wireless carriers differ on all of these dimensions. The Brattle Declaration documents the different numbers of subscribers the carriers serve and the different prices they charge.[24] The Declaration also reports that AT&T and (especially) Verizon presently employ their spectrum more intensively than T-Mobile does.

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[22] Evans Report, ¶ 230.

[23] *Ibid*, ¶ 223.

[24] Brattle Declaration, § IV.A.1.

Specifically, the Declaration identifies the number of subscribers that each of the major wireless carriers serves per MHz of spectrum it owns, after accounting for spectrum re-use, as measured by the number of towers deployed. Verizon is found to use its spectrum most intensively, serving 21.8 customers per MHz per cell site. The corresponding measure of intensity of spectrum use is 13.6 for AT&T, 11.0 for T-Mobile, and 6.3 for Sprint.[25]

In light of these differences among carriers and others, it is by no means apparent that AT&T and Verizon are likely to operate with precisely the same practical capacity per subscriber as T-Mobile if the merger does not occur.

### B. The Report's Estimate of Industry Capacity Post-Merger Is Questionable

As explained in Section III above, Dr. Evans' estimate of the unit price of wireless data in 2024 is effectively the ratio of average revenue per subscriber (which is assumed to be unchanged by the merger) to predicted industry practical capacity per subscriber. Therefore, by construction, Dr. Evans' estimate of the post-merger unit price of wireless data declines as predicted industry practical capacity per subscriber increases.

Dr. Evans secures a high estimate of industry practical capacity in part by assuming that if the proposed merger is consummated, AT&T and Verizon will expand their network capacities to ensure that they operate with the same practical capacity per subscriber as New T-Mobile. Dr. Evans provides limited justification for this assumption.

As explained in Section VI.A above, the Brattle Declaration finds that AT&T and Verizon presently employ their spectrum more intensively than T-Mobile does. The Declaration further observes that New T-Mobile is projected to employ its spectrum even less intensively than T-Mobile presently employs its spectrum. This is the case even if New T-Mobile manages the cell sites of Sprint and T-Mobile as the parties predict and even if the carriers divest their spectrum holdings that exceed relevant spectrum screens.[26] Thus, Dr. Evans appears to suggest that following the merger of T-Mobile and Sprint, AT&T and Verizon will employ their spectrum less intensively than they do presently. The rationale for this assumption is not apparent.

Dr. Evans' own observations also raise doubts about his assumption that AT&T and Verizon will expand their capacities to secure the same practical capacity per subscriber as New T-Mobile.

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[25] *Ibid*, Table 28.

[26] The Brattle Declaration (Table 28) reports that even under these favorable conditions, New T-Mobile would serve only 7.8 subscribers per MHz of spectrum per cell site.

Dr. Evans acknowledges that "Verizon and AT&T have often ignored investments from T-Mobile and Sprint."[27] He further notes that Verizon has announced a "slow deployment plan" for 5G.[28] Dr. Evans also reports that analysts believe that AT&T's roll-out of 5G "will really be comprised of an enhanced 4.5G LTE and only later deploy a mobile network that meets 5G NR standards."[29] In addition, Dr. Evans claims that "AT&T and Verizon do not have plans to deploy a strong 5G as rapidly as New T-Mobile would do so based on their public announcements."[30]

Dr. Evans suggests that AT&T and Verizon may react aggressively to New T-Mobile's (alleged) increase in network capacity because they may have, on occasion, responded to T-Mobile's actions in the past. However, as noted above, Dr. Evans fails to consider the reduced competitive intensity fostered by increased industry concentration. Just as reduced competitive intensity can promote higher prices, it can also dull incentives for innovation and investment.[31]

### C. The Report's Estimate of New T-Mobile Capacity Is Questionable

Dr. Evans secures a high estimate of New T-Mobile's practical capacity in 2024 by adopting without question the company's projections of its post-merger capacity. These projections were likely formulated knowing that they would be reviewed by the Department of Justice and the Federal Communications Commission in the present proceeding. Consequently, it would not be surprising if the projections were unduly optimistic.

Indeed, the Brattle Declaration observes that T-Mobile's projections may exaggerate substantially the extent to which a merger of T-Mobile and Sprint would increase their combined practical capacity. The declaration explains that T-Mobile's projections only consider **{{BEGIN HCI**

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[27] Evans Report, ¶ 229.

[28] *Ibid,* ¶ 193.

[29] *Ibid,* ¶ 194.

[30] *Ibid,* ¶ 231. The accuracy of all of these claims merits further investigation.

[31] *See*, for example Marc Ivaldi, Bruno Jullien, Patrick Rey, Paul Seabright, and Jean Tirole, *The Economics of Tacit Collusion*, Final Report for DG Competition, European Commission, March 2003 ("the EC Report"), §IV.2.

**END HCI}}**.[32] Thus, once one accounts more fully for the ways in which T-Mobile and Sprint can increase their practical capacity per subscriber other than through merger, the increase attributed to the merger declines significantly.

The projections of New T-Mobile's capacity that Dr. Evans relies upon also may overstate actual capacity in 2024 by failing to account fully for unforeseen complications. If the proposed merger is consummated, Sprint and T-Mobile may well encounter unexpected difficulties in integrating their operations. It is notoriously difficult, if not impossible, for any company to anticipate every possible problem that could arise during a multi-year planning horizon.[33] Consequently, even unbiased long-term forecasts can be inaccurate.

Antitrust officials are well aware of the shortcomings of analyses that reflect potentially self-serving or even unbiased long-term forecasts. The *Horizontal Merger Guidelines* note: "Efficiencies are difficult to verify and quantify, in part because much of the information relating to efficiencies is uniquely in the possession of the merging firms. Moreover, efficiencies projected reasonably and in good faith by the merging firms may not be realized."[34]

### D. The Assumption that Available Capacity Will be Fully Utilized Is Questionable

Under the Evans methodology, a smaller level of utilized capacity translates into a higher estimate of the price of wireless data in 2024.[35] There are at least three reasons why the Evans Report may exaggerate post-merger capacity utilization in the nation's wireless sector.

First, as explained in sections VI.A and VI.B above, the Brattle Declaration reveals that the nation's wireless carriers presently operate under widely varying conditions, including very different levels of intensity of spectrum use. Consequently, it is not apparent why all carriers should

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[32] Brattle Declaration, § III.

[33] *See*, for example, Herbert A. Simon, *Models of Bounded Rationality, Volume 3: Empirically Grounded Economic Reason*, Cambridge, MA: The MIT Press, 1997.

[34] *Horizontal Merger Guidelines*, §10.

[35] As noted in Section III above, Dr. Evans assumes that available capacity is fully utilized to provide service to wireless subscribers. If available capacity is not fully utilized, then the predicted price of wireless data (estimated as the ratio of data ARPU to utilized industry capacity per subscriber) increases.

necessarily be expected to fully employ all available practical capacity to serve customers if the merger is consummated.

Second, even if New T-Mobile somehow managed by 2024 to fully develop and implement the industry-leading service envisioned in the parties' Application,[36] consumers might take considerably longer to recognize T-Mobile's improved service. Consequently, New T-Mobile's capacity may not be fully utilized.[37]

Third, carriers may also strategically hold a portion of their network capacity in reserve in case it is needed to discipline deviations from collusive agreements. A carrier may be tempted to defect from a collusive agreement in order to attract more than the share of industry subscribers it has been assigned under the agreement. To punish such a defector, the non-defectors may implement promotions that attract back both the defector's newly-acquired subscribers and a substantial number of the defector's assigned subscribers.[38] To implement such punishment, the non-defectors must have on hand more capacity than is required to serve their assigned subscribers. Thus, carriers may rationally hold excess capacity rather than fully employ all of their available capacity, as Dr. Evans assumes.

For these reasons, among others, industry capacity may not be fully utilized. If post-merger practical capacity is not fully utilized, then the Evans methodology will exaggerate the extent to which the merger exerts downward pressure on the price of wireless data. This exaggeration in turn compounds the exaggeration that arises from Dr. Evans' assumption that the merger will not place any upward pressure on prices (as explained in Section IV).

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[36] *Description of Transaction, Public Interest Statement, and Related Demonstrations*, filed June 18, 2018.

[37] Such lags in consumer recognition could also dampen the perceived need of rivals to enhance their network capacity to match New T-Mobile's capacity.

[38] *See*, for example, the EC Report (§III.10) and Edward Green and Robert Porter, "Non-Cooperative Collusion under Imperfect Price Information," *Econometrica*, 52(1), January 1984, 87-100

## E. Merger Gains May Only Be Incremental

The Evans Report estimates the impact of the proposed merger on the price of wireless data in 2024. This focus on a particular point in time abstracts from the possibility that the merger might simply accelerate a reduction in the price of wireless data rather than constitute the only means to achieve the reduction.[39] The gains from a merger can be relatively small if the merger accelerates the arrival of a benefit, but the benefit will ultimately arrive in the absence of the merger.

To illustrate this conclusion, suppose initially that a merger is, in fact, the only way to achieve a perpetual annual benefit of magnitude $B$ beginning $t$ years from the present. In particular, if the merger is not permitted, then this benefit is never realized. Let $r$ denote the relevant annual interest rate. Then the *exclusive* gain from the merger ($E$) in this setting can be measured as the present discounted value of the perpetual annual benefit $B$ beginning in $t$ years. Formally:

$$E = \sum_{i=t}^{\infty} \frac{B}{[1+r]^i}.$$

Now suppose the merger merely accelerates the arrival of the perpetual annual benefit $B$. Specifically, suppose that if the merger does not occur, the perpetual annual benefit $B$ begins $t + d$ years from the present (so the arrival of the annual benefit is delayed by $d$ years relative to the outcome when the merger is consummated). The *non-merger* gain in this setting can be measured as the present discounted value of the (delayed) perpetual annual benefit $B$. Formally:

$$N = \sum_{i=t+d}^{\infty} \frac{B}{[1+r]^i}.$$

Define the *incremental* gain from the merger ($I$) to be the difference between the exclusive gain from the merger and the non-merger gain. Formally:

$$I = E - N = \sum_{i=t}^{\infty} \frac{B}{[1+r]^i} - \sum_{i=t+d}^{\infty} \frac{B}{[1+r]^i} = \sum_{i=t}^{t+d-1} \frac{B}{[1+r]^i}.$$

The ratio of the incremental gain from the merger to the exclusive gain from the merger ($f_d$) is:

$$f_d = \frac{I}{E} = \frac{\sum_{i=t}^{t+d-1} \frac{1}{[1+r]^i}}{\sum_{i=t}^{\infty} \frac{1}{[1+r]^i}}.$$

[39] It bears repeating that the predicted reduction in the price of wireless data ignores the widely-accepted economic principle that a substantial increase in industry concentration typically leads to higher industry prices.

$f_d$ can be viewed as the fraction of the claimed benefit from a merger that can truly be attributed to the merger when, instead of being the sole cause of a perpetual annual benefit (as claimed), the merger simply accelerates the arrival of this benefit by $d$ years.

Table 1 illustrates how $f_d$ varies with $d$ when the annual interest rate is 2 percent and when the merger ensures that a perpetual annual benefit of 100 begins in 2024.[40] To interpret the table, suppose the merger is claimed to be the only means to achieve this perpetual annual benefit. Further suppose that, in fact, the merger merely accelerates the arrival of this benefit by five years (so the perpetual annual benefit begins in 2029 if the merger does not occur). Then the actual (incremental) gain from the merger is only 9.43 percent of the claimed (exclusive) gain from the merger.[41]

**Table 1. Non-Merger ($N$) and Exclusive ($E$) and Incremental ($I$) Merger Gains.**[42]

| $d$ | $E$ | $N$ | $I$ | $f_d = I/E$ |
|---|---|---|---|---|
| 1 | 4,529 | 4,440 | 89 | 1.96% |
| 2 | 4,529 | 4,353 | 176 | 3.88% |
| 3 | 4,529 | 4,267 | 261 | 5.77% |
| 4 | 4,529 | 4,184 | 345 | 7.62% |
| 5 | 4,529 | 4,102 | 427 | 9.43% |
| 6 | 4,529 | 4,021 | 507 | 11.20% |
| 7 | 4,529 | 3,942 | 586 | 12.94% |
| 8 | 4,529 | 3,865 | 663 | 14.65% |
| 9 | 4,529 | 3,789 | 739 | 16.32% |
| 10 | 4,529 | 3,715 | 814 | 17.97% |

[40] The Evans Report (Table 20, p. 150) employs a 2 percent interest rate to calculate present discounted values.

[41] As the expression for $f_d$ indicates, the value of $f_d$ reported in Table 1 would not change if the presumed magnitude of $B$ were changed.

[42] The entries for $E$, $N$, and $I$ in Table 1 are rounded to the nearest whole number. Consequently, the value for $I$ in the table is not always precisely the difference between $E$ and $N$.

## VII. Conclusions

In summary, the Evans Report is incomplete and biased, and employs assumptions that are not fully supported. The Report is incomplete because it fails to take any account of the well-documented and widely-accepted economic reality that a substantial increase in industry concentration generally promotes higher industry prices. The Report is biased because it predicts that the proposed merger of T-Mobile and Sprint would substantially reduce the price of wireless data in the U.S. even if the merger did not increase the combined practical capacity of T-Mobile and Sprint. The Evans Report also adopts without question projections provided by T-Mobile and Sprint and relies upon assumptions about industry investment that are not fully supported.

Finally, it should be noted that even if Dr. Evans' predicted decline in the price of wireless data somehow materialized, the decline would not be fully realized until 2024. In contrast, increased industry concentration threatens to increase industry prices immediately following the consummation of the merger. As the Evans Report implicitly acknowledges,[43] distant benefits can be outweighed by comparable (and even smaller) present harms.

[43] Evans Report, ¶ 248, Table 20.

## APPENDIX A

This Appendix provides a more detailed summary of the calculations in the Evans Report. The calculations entail the following ten steps.

1. Estimate Total Capacity for T-Mobile and Sprint.[44]

   A. Without the merger.
   T-Mobile's total capacity: **{{BEGIN HCI END HCI}}**[45]
   Sprint's total capacity: **{{BEGIN HCI END HCI}}**

   B. With the merger.
   New T-Mobile's total capacity: **{{BEGIN HCI END HCI}}**

2. Specify a Practical Capacity Utilization Rate ($u$).

   $u$ is assumed to be **{{BEGIN HCI END HCI}}** both with and without the merger.

3. Estimate Practical Capacity for T-Mobile and Sprint.

   Estimated practical capacity is the product of estimated total capacity and the practical capacity utilization rate.

   A. Without the merger.
   T-Mobile's practical capacity: **{{BEGIN HCI END HCI}}**[46]
   Sprint's practical capacity: **{{BEGIN HCI END HCI}}**

   B. With the merger.
   New T-Mobile's practical capacity: **{{BEGIN HCI END HCI}}**

4. Estimate the Number of Smartphone Subscribers.

   Dr. Evans projects future growth in wireless subscriptions and smartphone penetration rates, and assumes that present market shares will not change over time. The resulting estimated number of smartphone subscribers by company are:

   A. Without the merger.

   **{{BEGIN HCI**

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[44] These estimates reflect T-Mobile's projections.

[45] EB denotes exabytes. One exabyte is one quintillion ($10^{18}$) bytes.

[46] This number is reported as **{{BEGIN HCI END HCI}}** in Exhibit 14B in the Evans Report, apparently in error.

**END HCI}}**

B. With the merger.

**{{BEGIN HCI**

**END HCI}}**

5. Estimate Practical Capacity Per Subscriber.

Practical capacity per subscriber ($k$) is the ratio of practical capacity to the number of smartphone subscribers, converted to gigabytes (GB) per month.

Dr. Evans assumes that AT&T and Verizon will match T-Mobile's practical capacity per subscriber.

A. Without the merger.[48]

**{{BEGIN HCI**

**END HCI}}**

B. With the merger.

**{{BEGIN HCI**

**END HCI}}**

[47] This number reflects a rounding approximation that appears in the Evans Report.

[48] The numbers that follow reflect rounding that is adopted to match the numbers reported in the Evans Report.

[49] $\delta = 10^9$ is the factor that converts EB to GB.

6. Estimate Practical Capacity for AT&T and Verizon.

   The practical capacity for these companies is estimated to be the product of their estimated practical capacity per subscriber and their estimated number of smartphone subscribers.

   A. Without the merger.
   **{{BEGIN HCI**

   **END HCI}}**

   B. With the merger.
   **{{BEGIN HCI**

   **END HCI}}**

7. Calculate Industry Practical Capacity.

   Industry practical capacity is the sum of the practical capacities of the industry suppliers.

   A. Without the merger.
   {{**BEGIN HCI**
   **END HCI}}**

   B. With the merger.
   {{**BEGIN HCI**
   **END HCI}}**

8. Calculate Industry Practical Capacity per Smartphone Subscriber.

   Industry Practical Capacity per Smartphone Subscriber ($k$) is the ratio of industry practical capacity to the total number of smartphone subscribers.

   A. Without the merger.
   **{{BEGIN HCI**

   **END HCI}}**

   B. With the merger.
   **{{BEGIN HCI**

   **END HCI}}**

9. Estimate Industry Data Average Revenue per User ($ARPU^d$).

   Industry Data Average Revenue per User is the product of estimated industry wireless ARPU and 0.90, the estimated fraction of time using a smartphone that is spent online.

   Industry wireless ARPU both with and without the merger is assumed to be **{{BEGIN HCI END HCI}}** the industry wireless ARPU in 2017.

   {{**BEGIN HCI** **END HCI}}**

10. Estimate the Price per GB of Mobile Data.

    This estimate assumes that all practical capacity is used to serve subscribers.

    A. Without the merger.

**{{BEGIN HCI**

**END HCI}}**

    B. With the merger.

**{{BEGIN HCI**

**END HCI}}**

## APPENDIX B

This Appendix provides a formal proof of the Proposition and the Observation stated in Section V above. The Proposition and the Observation are restated here for convenience.

**Proposition.** Suppose the proposed merger of T-Mobile and Sprint would not change their combined practical capacity. Then the Evans methodology predicts that the merger would nevertheless reduce the industry-wide unit price of wireless data whenever Sprint's practical capacity per subscriber exceeds T-Mobile's practical capacity per subscriber.

Proof. The proof proceeds employing the notation developed in Appendix A. Recall the following:

$K^A$, $K^V$, $K^T$, and $K^S$, respectively, are the practical capacities of AT&T, Verizon, T-Mobile, and Sprint in the absence of a merger.

$K_m^A$, $K_m^V$, and $K_m^{TS}$, respectively, are the practical capacities of AT&T, Verizon, and New T-Mobile following the merger of T-Mobile and Sprint to form New T-Mobile.

$k^A$, $k^V$, $k^T$, and $k^S$, respectively, are the practical capacities per subscriber of AT&T, Verizon, T-Mobile, and Sprint in the absence of the merger.

$k_m^A$, $k_m^V$, and $k_m^{TS}$, respectively, are the practical capacities per subscriber of AT&T, Verizon, and New T-Mobile following the merger.

$s^A$, $s^V$, $s^T$, and $s^S$, respectively, are the number of smartphone subscribers for AT&T, Verizon, T-Mobile, and Sprint in the absence of a merger.

$s^A$, $s^V$, and $s^{TS}$, respectively, are the number of smartphone subscribers for AT&T, Verizon, and New T-Mobile in the presence of the merger.

The analysis in the Evans Report begins by specifying estimates for $K^T$, $K^S$, $K_m^{TS}$, $s^T$, and $s^S$. These estimates are then employed to estimate practical capacities per subscriber for T-Mobile, Sprint, and New T-Mobile:

$$k^T = \frac{K^T}{s^T}, \quad k^S = \frac{K^S}{s^S}, \text{ and } \quad k_m^{TS} = \frac{K_m^{TS}}{s^{TS}}. \tag{1}$$

The Evans Report then assumes that: (i) if the merger does not occur, AT&T and Verizon will adopt the same practical capacity per subscriber that T-Mobile implements; and (ii) if the merger does occur, AT&T and Verizon will adopt the same practical capacity per subscriber that New T-Mobile implements. Formally:

$$k^A = k^V = k^T \text{ and } k_m^A = k_m^V = k_m^{TS}. \tag{2}$$

Next, the Evans Report estimates the practical capacity of AT&T and Verizon to be the product of its practical capacity per subscriber and the number of its smartphone subscribers. Formally:

$$K^A = k^A s^A = k^T s^A = \frac{K^T}{s^T} s^A = \frac{s^A}{s^T} K^T ; \quad (3)$$

$$K^V = k^V s^V = k^T s^V = \frac{K^T}{s^T} s^V = \frac{s^V}{s^T} K^T ; \quad (4)$$

$$K_m^A = k_m^A s^A = k_m^T s^A = \frac{K_m^{TS}}{s^{TS}} s^A = \frac{s^A}{s^{TS}} K_m^{TS} ; \text{ and} \quad (5)$$

$$K_m^V = k_m^V s^V = k_m^T s^V = \frac{K_m^{TS}}{s^{TS}} s^V = \frac{s^V}{s^{TS}} K_m^{TS} . \quad (6)$$

The second equality in each of equations (3) – (6) reflects equation (2). The third equality in each of equations (3) – (6) reflects equation (1).

The Evans Report then employs equations (3) – (6) to calculate industry practical capacity in the absence of the merger ($K^I$) and industry practical capacity in the presence of the merger ($K_m^I$). Formally:

$$K^I = K^T + K^S + K^A + K^V = K^T + K^S + \left[\frac{s^A + s^V}{s^T}\right] K^T, \text{ and} \quad (7)$$

$$K_m^I = K_m^{TS} + K_m^A + K_m^V = K_m^{TS} + \left[\frac{s^A + s^V}{s^{TS}}\right] K_m^{TS} . \quad (8)$$

The Evans Report assumes that the industry-wide data average revenue per user ($ARPU^d$) is the same in the presence of the merger and in its absence. The Report also assumes that all practical capacity is utilized to serve subscribers, so the industry unit price of data is the ratio of $ARPU^d$ to the industry capacity per subscriber. This industry capacity per subscriber is the ratio of industry capacity to the total number of smartphone subscribers ($s^I = s^A + s^V + s^T + s^S$). Therefore, the Report estimates the industry unit price of data in the absence of the merger ($P$) and the industry unit price of data in the presence of the merger ($P_m$), respectively, to be:

$$P = \frac{ARPU^d}{\frac{K^I}{s^I}} \text{ and } P_m = \frac{ARPU^d}{\frac{K_m^I}{s^I}} . \quad (9)$$

Equation (9) implies that the Evans methodology predicts that the merger will reduce the price of wireless data if:

$$P_m < P \iff \frac{ARPU^d}{\frac{K_m^I}{s^I}} < \frac{ARPU^d}{\frac{K^I}{s^I}} \iff \frac{1}{K_m^I} < \frac{1}{K^I} \iff K_m^I > K^I . \quad (10)$$

In words, equation (10) states that the Evans methodology predicts the merger will reduce the unit price of wireless data if the merger increases industry practical capacity.

Now consider the maintained hypothesis that the merger does not affect the combined practical capacity of T-Mobile and Sprint, so:

$$K_m^{TS} = K^T + K^S . \quad (11)$$

Equations (7), (8), (10), and (11) imply that under the specified "no merger efficiency" condition, the merger will reduce the unit price of wireless data even when it does not increase the combined practical capacity of T-Mobile and Sprint if:

$$K_m^I > K^I \iff K_m^{TS} + \left[\frac{s^A+s^V}{s^{TS}}\right] K_m^{TS} > K^T + K^S + \left[\frac{s^A+s^V}{s^T}\right] K^T \quad (12)$$

$$\iff \left[\frac{s^A+s^V}{s^{TS}}\right] K_m^{TS} > \left[\frac{s^A+s^V}{s^T}\right] K^T \iff \left[\frac{1}{s^{TS}}\right] K_m^{TS} > \left[\frac{1}{s^T}\right] K^T \quad (13)$$

$$\iff \left[\frac{1}{s^T+s^S}\right] [K^T + K^S] > \left[\frac{1}{s^T}\right] K^T \iff s^T [K^T + K^S] > [s^T + s^S] K^T \quad (14)$$

$$\iff s^T K^S > s^S K^T \iff \frac{K^S}{s^S} > \frac{K^T}{s^T}. \quad (15)$$

The first equivalence in expression (13) reflects equations (7) and (8). Expressions (13) and (14) reflect the maintained hypothesis that $K_m^{TS} = K^T + K^S$, as specified in equation (11).

Expression (15) implies that the Evans methodology predicts the merger will reduce the unit price of wireless data even under the "no merger efficiency" condition if Sprint's practical capacity per subscriber ($\frac{K^S}{s^S}$) exceeds T-Mobile's practical capacity per subscriber ($\frac{K^T}{}$). The Evans Report estimates that **{{BEGIN HCI**

**END HCI}}** (16)

Expressions (15) and (16) demonstrate that the Evans methodology predicts the merger will reduce the unit price of wireless data even when the merger does not increase the combined capacity of T-Mobile and Sprint. ■

**Observation**. Given the assumptions employed in the Evans Report, the Evans methodology predicts that under the "no merger efficiency" condition specified in the Proposition, the merger would cause the industry-wide unit price of wireless data to decline by nearly **{{BEGIN HCI END HCI}}** percent.

Proof. From equation (9), the ratio of the unit price of wireless data in the presence of the merger ($P_m$) to the corresponding price in the absence of the merger ($P$) is:

$$\frac{P_m}{P} = \frac{\frac{ARPU^d}{\frac{K_m^I}{S^I}}}{\frac{ARPU^d}{\frac{K^I}{S^I}}} = \frac{K^I}{K_m^I}. \quad (17)$$

From equations (7) and (8):

$$\frac{K^I}{K_m^I} = \frac{K^T + K^S + \left[\frac{S^A + S^V}{S^T}\right] K^T}{K_m^{TS} + \left[\frac{S^A + S^V}{S^{TS}}\right] K_m^{TS}}. \quad (18)$$

$K_m^{TS} = K^T + K^S$ and $S^{TS} = S^T + S^S$ under the "no merger impact" conditions specified in the Proposition. Therefore, equation (18) implies that under these conditions:

$$\frac{K^I}{K_m^I} = \frac{1 + \left[\frac{S^A + S^V}{S^T}\right] \frac{K^T}{K^T + K^S}}{1 + \frac{S^A + S^V}{S^T + S^S}}. \quad (19)$$

The Evans Report assumes **{{BEGIN HCI**

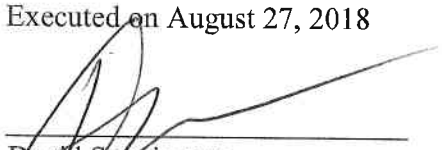
**END HCI}}** (21)

Equation (21) implies that under the "no merger efficiency" condition specified in the Proposition, the Evans Report predicts that the merger would cause the industry-wide unit price of wireless data to decline by approximately **{{BEGIN HCI END HCI}}**. ■

*  *  *  *

The foregoing declaration has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing is true and correct to the best of my current information, knowledge, and belief.

Executed on August 27, 2018



David Sappington
Director, Robert F. Lanzillotti Public Policy Research Center
University of Florida

# EXHIBIT B

## Declaration of

**Joseph Harrington**
The Wharton School, University of Pennsylvania

**Coleman Bazelon**
Principal, The Brattle Group

**Jeremy Verlinda**
Principal, The Brattle Group

**and**

**William Zarakas**
Principal, The Brattle Group

# Table of Contents

# I. Introduction and Overview of Declaration

## A. Qualifications

**Professor Joseph Harrington** is the Patrick T. Harker Professor and chair of the Department of Business Economics and Public Policy at the Wharton School of the University of Pennsylvania. He has published more than 80 articles and his research has appeared in many leading journals including the *American Economic Review*, *Journal of Political Economy*, *Econometrica*, and *Management Science*.

Professor Harrington's research focuses on collusion and cartels, with the objectives of understanding collusive practices and designing competition policy to detect and deter collusion. This research has regularly been funded by the National Science Foundation. As this research resides at the interface of theory and practice, Professor Harrington has presented before more than a dozen competition authorities including those of Chile, the European Union, Japan, South Africa, and the U.S. He regularly gives short courses on collusion to practitioners in such venues as the CRESSE competition policy summer school, ICN, and at competition authorities.

Professor Harrington has given many keynote addresses on the topic of collusion and cartels including the Bayard Wickliffe Heath Memorial Lecture at the U. of Florida Levin College of Law, the Conference Policy Lecture at the European Conference in Competition & Regulation, and plenary talks at the annual meetings of the European Association for Industrial Economics (EARIE), Chilean Economics Association, and the German Economics Association. He has performed extensive service on editorial boards in the field of industrial organization including co-editor at the *RAND Journal of Economics* and the *International Journal of Industrial Organization*, and he is currently an editor at *Economics Letters* and associate editor at the *Journal of Industrial Economics* and the *Review of Industrial Organization*. Professor Harrington is also a previous President of the Industrial Organization Society (IOS). He has published two textbooks: *Economics of Regulation and Antitrust* (5th edition, MIT Press, 2018) with David Sappington and W. Kip Viscusi, and *Games, Strategies, and Decision Making* (2nd edition, Worth Publishers, 2015); and a recent monograph, *The Theory of Collusion and Competition Policy* (MIT Press, 2017). Professor Harrington's curriculum vitae is incorporated by reference.[1]

[1] See https://joeharrington5201922.github.io/pdf/Harrington-cv.pdf.

**Dr. Coleman Bazelon** is a Principal in the Washington, D.C. office of The Brattle Group, Inc. ("Brattle"). Brattle is an economic consulting firm providing expertise in a range of economic, litigation, and regulatory matters. He leads the Telecommunications, Internet, Media, Entertainment and Sports practice.

Dr. Bazelon has expertise in the areas of regulation and business strategies in the wireless, wireline, and video industry sectors. Much of his practice involves valuation of complex telecommunications assets. He has consulted and testified on behalf of clients in numerous telecommunications, Internet and media matters, ranging from wireless license auctions, spectrum management, and competition policy, to patent infringement and intellectual property valuation, video programming and distribution valuation, and broadband deployment. He also frequently advises regulatory and legislative bodies, including the U.S. Federal Communications Commission ("FCC" or "Commission") and the U.S. Congress.

Prior to joining Brattle, Dr. Bazelon served as a Vice President with the Analysis Group, an economic and strategy consulting firm. He has also served as a Principal Analyst in the Microeconomic and Financial Studies Division of the Congressional Budget Office ("CBO") where he researched reforms of radio spectrum management, estimated the budgetary and private sector impacts of spectrum-related legislative proposals, and advised on spectrum and other auction design and privatization issues for all research at the CBO.

Dr. Bazelon received his Ph.D. and M.S. in Agricultural and Resource Economics from the University of California at Berkeley. He also holds a Diploma in Economics from the London School of Economics and Political Science and a B.A. from Wesleyan University. His curricula vitae is incorporated by reference.[2]

**Dr. Jeremy Verlinda** is a Principal in the Washington, D.C. office of Brattle. He specializes in competition issues in both antitrust and regulatory contexts. He has provided and supported testimony in competition matters before U.S. district courts, federal regulatory agencies, and various state public utilities commissions, as well as before competition and regulatory agencies in Canada and Australia. He has particular expertise in network industries, including

[2] See http://files.brattle.com/files/14309_bazelon_brattle_cv_august_2018.pdf.

telecommunications, media markets, energy markets, transportation, financial markets, health care, and advertising.

Dr. Verlinda has provided direct consulting services to firms around the world regarding antitrust risks associated with planned or potential acquisitions and also has assisted them with subsequent merger proceedings in front of the reviewing agencies. Dr. Verlinda has prepared white papers on vertical integration risk and co-authored a series of reports evaluating the competitiveness of the Canadian wireless telecommunications industry in joint filings with the Canadian Competition Bureau before the Canadian Radio-television and Telecommunications Commission.

Prior to joining The Brattle Group, Dr. Verlinda spent 8 years at the Antitrust Division of the U.S. Department of Justice, where his casework focused on monopolization claims in the payments and electricity industries, criminal price fixing in air cargo and financial markets, and merger analysis in the consumer goods, airlines, entertainment, and electricity industries. In electricity markets, Dr. Verlinda has particular expertise in merger simulation, including incorporation of system dispatch accounting for transmission grid and plant operating characteristics.

Dr. Verlinda received his Ph.D. in Economics from the University of California – Irvine. His curriculum vitae is incorporated by reference.[3]

Mr. William Zarakas is a Principal with The Brattle Group, an economics consulting firm, and is an expert on economic and regulatory matters in the telecommunications, media, and energy industries. He holds leadership positions in Brattle's practices in telecommunications and energy.

Mr. Zarakas has provided expert reports and testimony before FCC with respect to: the economics and feasibility of deploying broadband networks; competitive analysis, notably concerning the market for business service data ("BDS"); analysis of network access and regulatory pricing; and pole attachments matters. He has also applied market share and churn analysis, cost models, horizontal and vertical foreclosure analyses, and bargaining modeling to

[3] See http://www.brattle.com/experts/jeremy-a-verlinda.

telecom and media mergers, and has worked extensively on matters concerning the markets for and value of wireless spectrum.

Mr. Zarakas also leads Brattle's work in the regulation of energy utilities, and has presented and testified on matters concerning regulatory frameworks, incentive and performance based regulation, and evolving utility platform and business models. In addition to his testimonies before the FCC, he has testified before the Federal Energy Regulatory Commission ("FERC"), the Securities and Exchange Commission ("SEC"), the Copyright Royalty Judges, the U.S. Congress, state regulatory agencies, arbitration panels, foreign governments, and courts of law.

Prior to joining The Brattle Group, Mr. Zarakas held senior positions at economic consulting firms and was an economist for the New York Power Authority. He holds masters and bachelors of arts degrees in economics from New York University and the State University of New York, respectively. His curriculum vitae is incorporated by reference.[4]

## B. Assignment

We have been asked by counsel for DISH to review the capacity projections for standalone Sprint and T-Mobile and for the post-merger entity ("New T-Mobile"), as provided by Neville Ray. In particular, we have been asked to assess the reasonableness of the projections and of the increase in projected capacity claimed as a result of the merger.

We have also been asked to evaluate the unilateral effects (i.e., the non-cooperative effects) that a merger between T-Mobile and Sprint, two of the four primary mobile network operators ("MNOs"), would likely have on the market for mobile voice/broadband services.[5] This analysis examines how the proposed merger would affect competition and therefore consumers based on the extent to which New T-Mobile may be able to profitably raise both its downstream, retail prices to subscribers as well as the wholesale prices that it charges to mobile virtual network operators ("MVNOs").

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[4] See http://www.brattle.com/experts/william-p-zarakas.

[5] Following Commission precedent, we define the relevant product market as retail mobile voice/broadband services. At times, we employ the term "wireless" as shorthand.

In addition to assessing the potential unilateral effects of the merger, we have been asked by DISH to evaluate the declaration of Professor Steven C. Salop and Dr. Yianis Sarafidis ("Salop/Sarafidis Declaration"), which provides Professor Salop and Dr. Sarafidis' conclusions on whether the proposed transaction between T-Mobile and Sprint, if consummated, would lead to increased concerns about coordinated effects among the remaining cellular carriers. We also have been asked to provide our own analysis to determine whether the transaction may increase the likelihood of coordinated effects among the remaining carriers.

Finally, DISH has asked us to examine the Commission's spectrum screen to identify markets in which New T-Mobile's spectrum holdings would exceed the screen.

In performing these assignments, Dr. Harrington led the efforts on coordinated effects, Dr. Bazelon led the efforts on capacity projections and the spectrum screen and Dr. Verlinda led the efforts on unilateral effects.

## C. Summary of Findings

### 1. The Applicants' Claims of Improvement in 5G Capacity Appear to be Overstated

In his Declaration, T-Mobile's Chief of Technology Officer Neville Ray projects a significant increase in 5G network capacity as a result of the merger. New T-Mobile is projected to provide {{BEGIN HCI

END HCI}} projected to be provided by standalone Sprint and T-Mobile. This projected increase appears to be significantly overstated because {{BEGIN HCI

END HCI}}

## 2. Unilateral Incentives Arising from the Merger Will Likely Increase Wireless Prices

Unilateral effects concern the incentive for New T-Mobile to impose post-transaction price increases independent of a coordinated response from other mobile voice/broadband providers.[6] The merger would likely increase the profitability of a unilateral price increase strategy by eliminating Sprint and T-Mobile as an independent competitors for mobile voice/broadband subscribers. The incentives for New T-Mobile to unilaterally increase prices exist in each of the three segments we considered: retail postpaid wireless, retail prepaid wireless, and wholesale sales to downstream MVNOs who compete against Sprint and T-Mobile in the downstream retail segments.

We find that the merger will significantly consolidate the market to supply facilities-based mobile voice/broadband connections, both for the prepaid and postpaid segments as well as across all connections. The Herfindahl-Hirschman Index ("HHI") is a widely accepted measure of industry concentration.[7] The current, pre-merger, HHI across all connections is already 2,814, which antitrust authorities regard as "Highly Concentrated." If the Applicants merge, the HHI would become 3,265, an increase of 451 points. Both the concentration level and the increase due to the merger signify a merger that is presumptively likely to raise anticompetitive concerns.[8]

In addition to the assessment of concentration, we have examined the merger's likely retail price effects using price screening tools designed to identify mergers that are likely to create significant

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[6] Such effects may account for the possibility of strategic responses by rival carriers, but they do not address so-called "coordinated effects", i.e., the possibility that coordinated behavior among firms may become more sustainable post-merger, or that the prices achievable under coordinated behavior may be higher as a result of the merger.

[7] The HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. The HHI takes into account the relative size distribution of the firms in a market. It approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 points in a monopoly.

[8] See U.S. Department of Justice & the Federal Trade Commission, Horizontal Merger Guidelines, § 5.2 (2010) ("Horizontal Merger Guidelines").

upward pressure on prices.[9] The gross upward pricing pressure index ("GUPPI") screen measures the degree to which a merger creates upward pressure on the Applicants' prices.

We also consider structural simulation models, which are designed to directly estimate the price increases resulting from the merger, accounting for strategic (unilateral) responses of rival carriers.[10] For the merger simulations we consider two possible demand systems for sensitivity: the Antitrust Logit Model ("ALM" or "logit"), and the Proportionally Calibrated Almost Ideal Demand System ("PC-AIDS"). The results of the price screens and merger simulations, summarized in Table 1 below, each indicate that a merger between T-Mobile and Sprint would likely result in higher retail prices in both the postpaid and prepaid segments.

**Table 1: Predicted Price Pressure Screens and Price Effects of the T-Mobile/Sprint Merger, by Segment**

| | GUPPI | ALM | PC-AIDS |
|---|---|---|---|
| **Postpaid** | | | |
| Sprint | 9.9% | 5.0% | 9.1% |
| T-Mobile | 9.2% | 4.6% | 8.5% |
| **Combined** | | **4.8%** | **8.8%** |
| **Prepaid** | | | |
| Sprint | 7.6% | 7.3% | 15.5% |
| T-Mobile | 4.4% | 2.8% | 8.2% |
| **Combined** | | **4.2%** | **10.4%** |

Sources: Twentieth Report, In the Matter of Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 17-69, FCC, September 27, 2017, p. 28 at footnote 130, http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0927/FCC-17-126A1.pdf, accessed August 23, 2018 (20th Mobile Wireless Competition Report.). John C. Hodulik, Batya Levi, Christopher Schoell, and Lisa L. Friedman, "Wireless 411: A difficult market asking for repair?" UBS, February 22, 2017 (UBS Wireless Report.). 2017 Company Annual Reports.

[9] See Farrell, Joseph, and Carl Shapiro. "Antitrust evaluation of horizontal mergers: An economic alternative to market definition." *The BE Journal of Theoretical Economics* 10, no. 1 (2010); Werden, Gregory J. "Unilateral competitive effects of horizontal mergers I: Basic concepts and models." (2010).

[10] See Werden, Gregory J., and Luke M. Froeb. "The effect of mergers in differentiated products industries: Logit demand and merger policy." JL Econ. & Org. 10 (1994): 407; Epstein, Roy J., and Daniel L. Rubinfeld. "Merger simulation: A simplified approach with new applications." *Antitrust LJ* 69 (2001): 883.

Notes: "Combined" numbers are calculated as the subscriber-weighted average across Sprint and T-Mobile.

GUPPI denotes the "gross upward pricing pressure index." ALM denotes the "antitrust logit model" and PC-AIDS denotes the "proportionally-calibrated almost ideal demand system".

The retail GUPPI screen indicates that the merger would likely create significant upward pressure on New T-Mobile's postpaid and prepaid prices.

We have also examined the price pressure screens for the overall market to supply network connections, using number porting data to inform the diversion rates from and to each of the two networks relative to other networks in response to a price change. We find that the GUPPI for all connections is about {{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}} for both the Sprint and T-Mobile networks, further supporting the HHI evidence that the increased concentration in this market is likely to be anticompetitive.[11]

The structural simulations for the retail segments quantify the likely price effects of the merger. These simulations predict that the merger would allow New T-Mobile to profitably increase its postpaid prices on average across the brands in the range of 4.8% to 8.8% and its prepaid retail prices in the range of 4.2% to 10.4%, with increases to each of Sprint's and T-Mobile's prices ranging from 2.8% to 15.5%. In general, Sprint-brand subscribers would be expected to see larger prices increases than T-Mobile-brand subscribers.

We have also examined the provision of wholesale wireless services to MVNOs. Consistent with the relatively less-constrained capacity (relative to AT&T and Verizon) of their networks,[12] T-Mobile and Sprint are important sellers of wholesale wireless services. We estimate that they provide network service for more than 60% of MVNOs' subscribers through the wholesale network hosting contracts between the MVNOs and the merging firms.

As a consequence of T-Mobile and Sprint's significant role in providing wholesale service as well as their share of the prepaid wireless segment, New T-Mobile will have significantly increased incentives to increase wholesale prices for MVNOs. We calculate increases in vertical "upward

[11] See Table 20.

[12] See Table 28.

pricing pressure" index values of 22.7% for T-Mobile's current wholesale contracts and 48.0% for Sprint's current wholesale contracts.[13]

### 3. The Merger Is Likely to Increase the Incentive and Ability for Coordinated Behavior

The analysis in Section III provides evidence that a merger between the Applicants is likely to harm consumers because the network operators in the post-merger market—AT&T, Verizon, and New T-Mobile—would have the incentive to raise prices ("unilateral effects"). These estimated price effects assume that the network operators would independently choose prices to maximize their individual profits. There is the possibility, however, that prices may increase even more because the merger results in firms coordinating their prices, rather than choosing them independently. These "coordinated effects" are described in the Horizontal Merger Guidelines ("Merger Guidelines") as the potential diminution of competition by "enabling or encouraging post-merger coordinated interaction among firms."[14] Prices are higher because each firm acts in a less competitive manner with the anticipation that other firms will act similarly.

Our coordinated effects analysis of a merger between the Applicants is composed of three parts. The first part examines the suitability of the mobile voice/broadband market for tacit collusion.[15] A hospitable market for tacit collusion is a necessary condition for a merger to have coordinated effects. We find that the postpaid and prepaid retail segments are suitable for supporting tacit collusion and, therefore, tacit collusion could emerge under the right circumstances. In contrast, tacit collusion in the enterprise (corporations and governments) and wholesale markets is less likely.

T-Mobile has been widely recognized as a maverick in the mobile voice/broadband market, as reflected in aggressive pricing, innovative plan features, and the adoption of new technologies. The second part of our coordinated effects analysis examines the incentives for the merged firm to continue using a maverick strategy. We find that, under the merger as proposed, it likely

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[13] Both firms today have vertical upward pricing pressure in their wholesale contracts with MVNOs. The calculations here incorporate the increased incentives to raise prices arising from cross-brand recapture of retail prepaid subscribers that arise from the merger. See Table 25.

[14] Horizontal Merger Guidelines, p. 24. Section 7 covers "Coordinated Effects."

[15] Explicit collusion, which is per se unlawful, is not considered here.

would be in the best interests of the merged firm to forego its maverick status and adopt a less aggressive strategy.

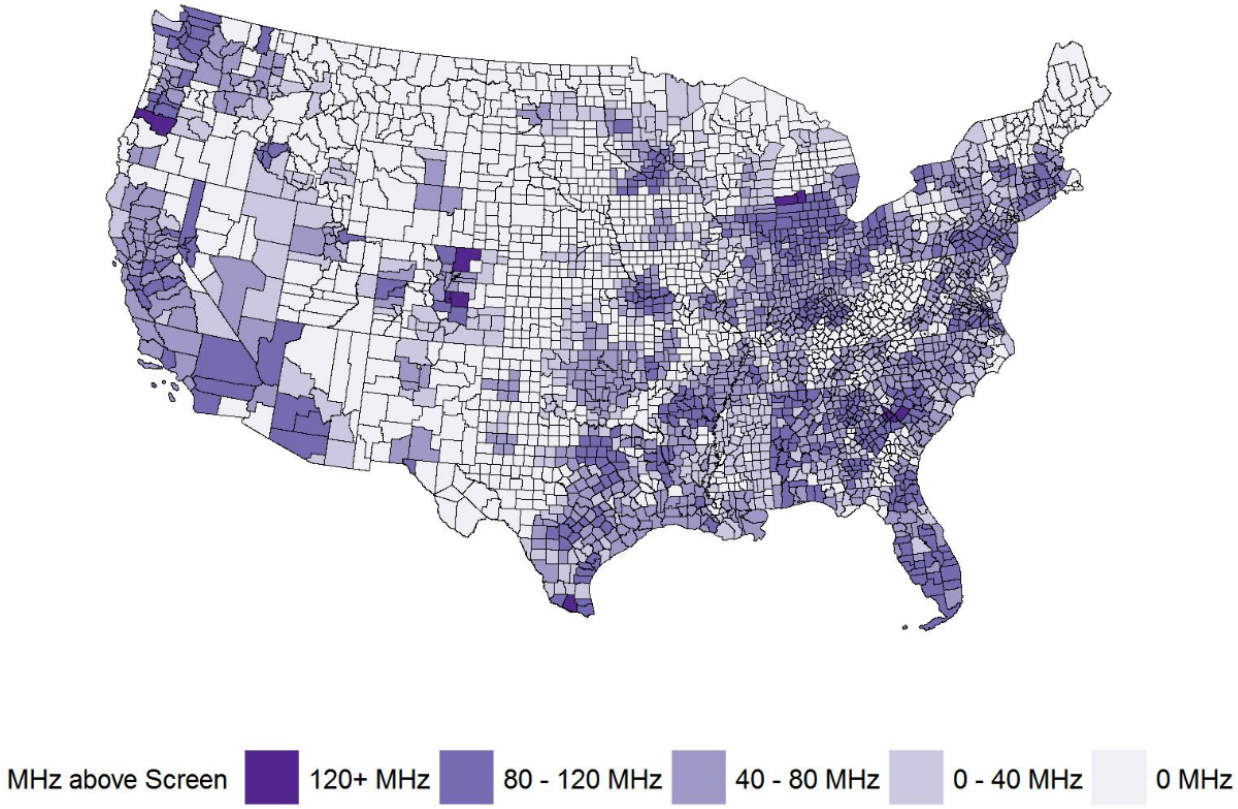
Having established that the retail segments of the mobile voice/broadband market are suitable for tacit collusion and that the merged firm is unlikely to continue with a maverick strategy, the third part of the coordinated effects analysis evaluates whether the merger would make tacit collusion significantly more likely. We find that while the current (pre-merger) market is suitable for tacit collusion already, such collusion is now unlikely due to certain obstacles, and that the merger alleviates those obstacles. Hence, a merger between the Applicants would be expected to have coordinated effects; that is, it would substantively increase the likelihood of tacit collusion. The merger not only makes tacit collusion substantively more likely, but there would be a serious risk of tacit collusion in the post-merger market.

### 4. The Merger Triggers the FCC's Spectrum Screens in the Majority of Local Geographic Markets

In its competitive analysis of proposed secondary-market spectrum transactions, including proposed mergers, the FCC applies a spectrum screen to identify the local geographic markets in which carriers' spectrum holdings would potentially result in anticompetitive harm. The FCC has applied this screen since the proposed Cingular Wireless and AT&T Wireless merger in 2004.

New T-Mobile would significantly exceed the spectrum screen, particularly for mid-band spectrum. Figure 1 presents a heat-map of the amount of spectrum that New T-Mobile would have to divest to stay within the current spectrum screen limits. The affected areas include over 60% of counties in the U.S., home to more than 90% of the population.

**Figure 1: Depth of New T-Mobile's Spectrum Holdings above Spectrum Screen**




## D. Overview of Declaration

Section II of our declaration presents our analysis of the Applicants' claims regarding the increase in 5G capacity resulting from the merger. Section III provides the details of our unilateral effects analysis. Section III.A provides an overview of the retail and wholesale markets for mobile voice/broadband services. Section III.B presents the results of standard market concentration screening. Section III.C describes our unilateral effects analysis of the retail postpaid and prepaid segments, while Section III.D discusses increases in unilateral incentives to raise prices in the wholesale market. Appendix A shows our calculations of network marginal costs and provides backup information on MVNO and host-network relationships.

Section IV provides the details of our coordinated effects analysis. Section IV.A assesses the suitability of the mobile voice/broadband market for tacit collusion. Section IV.B explores whether New T-Mobile would continue the maverick strategies that have been historically attributed to T-Mobile based on the merger as currently proposed. Section IV.C estimates the degree to which tacit coordination would be affected by the merger.

Section V provides the details of our spectrum screen analysis. Section V.A describes the history and current implementation of the spectrum screen policy, including the type and amount of spectrum included in the screen. Section V.C describes the detailed holdings of major MNOs. Section V.D applies the screen to these MNOs' current holdings and analyzes the implications of the Applicants' proposed merger.

# II. Claims of Improved 5G Capacity

The central benefit claimed from the merger of T-Mobile and Sprint is related to the *increase* in projected 5G capacity that will be provided by New T-Mobile over what would be provided without the merger. The claimed benefit from the forecasted increase in capacity has two parts. First, New T-Mobile is projected to provide significantly more 5G capacity than the sum of T-Mobile and Sprint would provide as independent companies. Second, the industry (Verizon and AT&T) is projected to respond to this increased capacity by providing significantly more 5G capacity than they apparently currently plan to. In fact, the claimed benefits of the merger turn on the accuracy and reliability of the forecasted *increase* in 5G capacity.

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[16] See Table 6.

[17] Mike Dano, "T-Mobile says it won't team with Sprint to bid in mmWave spectrum auction," FierceWireless, July 25, 2018, available https://www.fiercewireless.com/wireless/t-mobile-says-it-won-t-team-sprint-to-bid-mmwave-spectrum-auction, accessed August 20, 2018.

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## A. The 5G Network Models

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## B. Spectrum in the 5G Network Model

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[18] 5G Engineering Models for New T-Mobile, T-Mobile, and Sprint.

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[20] {{BEGIN HCI END HCI}}

END HCI}} Table 2 shows the total of existing spectrum holdings of Sprint and T-Mobile as well as the sum of those holdings if no divestitures were required.

**Table 2: Average Population Weighted Spectrum Holdings by Band**

| | Sprint | T-Mobile | New T-Mobile |
|---|---|---|---|
| 600 MHz | 0.0 | 30.8 | 30.8 |
| 700 MHz | 0.0 | 10.1 | 10.1 |
| SMR | 13.8 | 0.0 | 13.8 |
| PCS | 37.9 | 28.9 | 66.8 |
| AWS-1 | 0.0 | 36.8 | 36.8 |
| AWS-3 | 0.0 | 3.3 | 3.3 |
| BRS/EBS | 134.7 | 0.0 | 134.7 |
| **Total** | **186.4** | **109.8** | **296.2** |

Note: New T-Mobile spectrum holdings assume no divestitures.

Source: Spectrum holdings are estimates. Spectrum holdings are as of August 2018 and are based on data from the FCC Universal Licensing System, http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly.

The Applicants claim that New T-Mobile should have more spectrum available for 5G than Sprint and T-Mobile separately because New T-Mobile would be able to combine legacy customers onto a single legacy-serving network instead of having to provide two independent networks to serve the legacy customers. This can be seen in the following table. {{BEGIN HCI

[21] 5G Engineering Models and see, for instance, Ray Declaration, Table 2.

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## C. Breakdown of Gains from New T-Mobile

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[23] {{BEGIN HCI
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[24] We are able to replicate the numbers reported in the Ray Declaration from the network model files provided.

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[27] {{BEGIN HCI END HCI}}

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## D. Relying on Currently Licensed Spectrum

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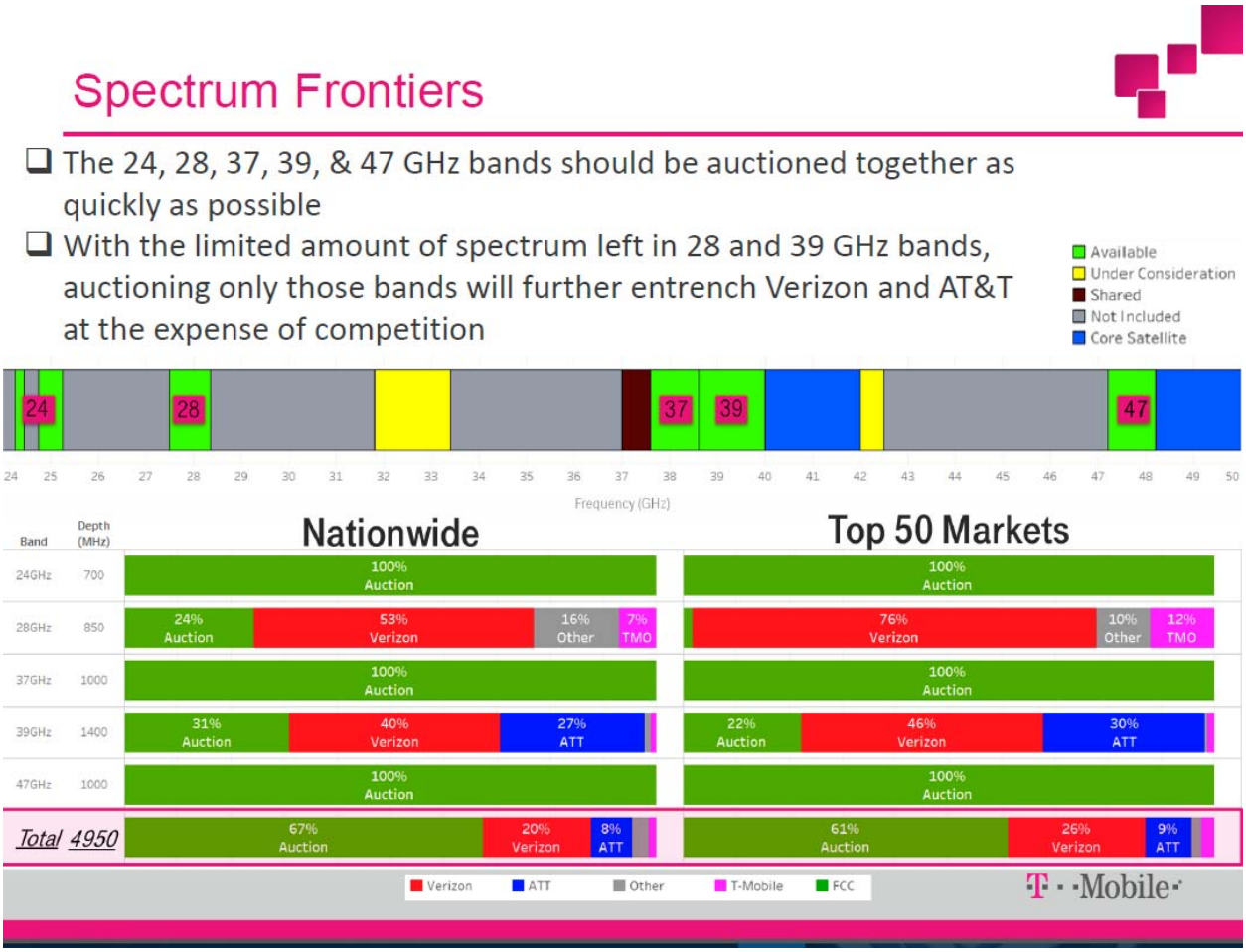
[29] See Table 5

**Figure 2: 5G Spectrum Ownership and Availability**




Source: T-Mobile Ex Parte, page 7, April 3, 2018, https://ecfsapi.fcc.gov/file/10403720515355/T-Mobile%20Ex%20Parte%2004032018.pdf, accessed August 21, 2018.

**Figure 3: T-Mobile's MmWave Holdings, 28 GHz and 39 GHz**

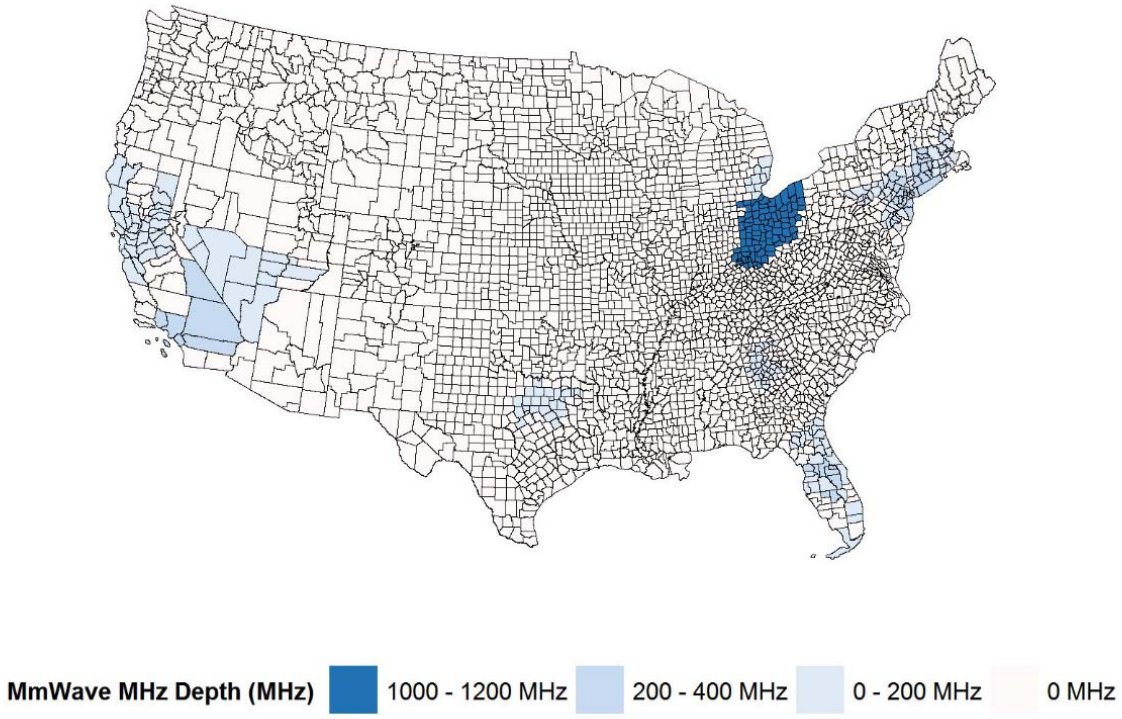



**Table 5: Average Population Weighted MmWave Holdings**

| | T-Mobile | Sprint | AT&T | Verizon |
|---|---|---|---|---|
| MmWave | 114.4 | 1.1 | 296.0 | 1299.1 |

Source: Spectrum holdings are Brattle estimates. Spectrum holdings are as of August 2018 and are based on data from the FCC Universal Licensing System, http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly.

Notes: All holdings are radio service codes LD and UU. Average population weighted holdings reflect average depth of holdings across all counties. AT&T holdings may be understated because licenses with undefined markets are dropped.

There are active, public discussions about whether or not Sprint and T-Mobile can bid in the upcoming millimeter wave auctions – FCC Auction #101 (28 GHz) and #102 (24 GHz) – later this

year as one bidder or two.[30] Both companies are planning to expand their millimeter wave holdings making a network projection based on only existing holdings unrealistic.

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END HCI}} The following table lists the mid- and high-band spectrum that is currently expected to be auctioned by the Commission. It seems unlikely after advocating for these bands that New T-Mobile, much less standalone Sprint and T-Mobile, would forgo adding any of these frequencies to their networks.[31]

[30] See, e.g., Sprint Corp., Petition for Expedited Declaratory Ruling or Waiver Regarding Joint Bidding and Request for Limited Waiver of Auction Form Rules, AU Docket No. 18-85, at 4 (Aug. 6, 2018) (requesting clarification that Sprint's merger agreement with T-Mobile is not considered a joint bidding arrangement for purposes of the upcoming millimeter wave auctions); Letter from Nancy Victory, Counsel to T-Mobile, to Marlene Dortch, FCC, AU Docket No. 18-85, at 4-5 (Aug. 6, 2018) (requesting confirmation, or alternatively a waiver, that T-Mobile's merger agreement with Sprint does not bar T-Mobile from participating independently in the upcoming millimeter wave auctions).

[31] For instance, see Peter Rysavy, "Industry Voices—Rysavy: Midband spectrum for 5G is needed now," FierceWireless, August 13, 2018, available https://www.fiercewireless.com/5g/industry-voices-rysavy-mid-band-spectrum-for-5g-needed-now, accessed August 20, 2018; Scott Bergmann, "The Growing Need for Mid-Band Spectrum," CTIA, June 15, 2018, available https://www.ctia.org/news/the-growing-need-for-mid-band-spectrum, accessed August 20, 2018.

**Table 6: Spectrum Pipeline**

| Band<br>[1] | Frequencies<br>[2] | Quantity<br>[3] | Auction Date<br>[4] |
|---|---|---|---|
| Mid-Band Spectrum | | | |
| 3.5 GHz CBRS | 3550 - 3700 MHz | Max 70 MHz licensed | Est. Late 2019 - Beyond |
| 2.5 GHz EBS | 2496 - 2690 MHz | 18-114 MHz | Est. 2020 - Beyond |
| 3.5 GHz | 3450 - 3550 MHz | 100 MHz | Est. 2020 - Beyond |
| C Band | 3700 - 4200 MHz | 100+ MHz | Est. 2021 |
| NOAA Meteorological Spectrum | 1675 - 1680 MHz | 5 MHz | Beyond 2020 |
| *Sub-total Mid-Band Spectrum* | | 293-389 MHz | |
| High-Band Spectrum | | | |
| 28 GHz Band | 27.5 - 28.35 GHz | 850 MHz | November 2018 |
| 24 GHz Band | 24.25 - 24.45 GHz<br>24.75 - 25.25 GHz | 700 MHz | Est. Late 1Q 2019/2Q 2019 |
| 37 GHz Band | 37.6 - 38.6 GHz | 1,000 MHz | Est. Late 2019 - Beyond |
| 47 GHz Band | 47.2 - 48.2 GHz | 1,000 MHz | Est. Late 2019 - Beyond |
| 39 GHz Band | 38.6 - 40.0 GHz | 1,400 MHz | Est. 2020 - Beyond |
| 42 GHz Band | 42.0- 42.5 GHz | 500 MHz | Est. 2020 - Beyond |
| *Sub-total High-Band Spectrum* | | 5,450 MHz | |

Source: Robert Kaminski, "Spectrum Auction Tracker," Capital Alpha, June 6, 2018; Report and Order, In the Matter of Policies Regarding Mobile Spectrum Holdings and Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, WT Docket No. 12-269 and Docket No. 12-268, FCC, June 2, 2014, ¶¶ 122-125, available https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-63A1_Rcd.pdf, accessed August 23, 2018.

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# III. Unilateral Effects

## A. Overview of Retail and Wholesale Mobile Voice/Broadband Markets

Mobile voice/broadband services consists of voice, text, and data communication services (such as broadband Internet access) using radio-frequency transmissions which allow consumers to communicate without being in a fixed location. Mobile voice/broadband services are offered today on a variety of devices, including smartphones, mobile hotspots, tablets and e-readers.

"Facilities-based" service providers offer mobile voice/broadband services using their own network facilities. To offer services, these providers must acquire radio spectrum licenses from the FCC and deploy a network of radio transmitters and receivers over telecommunications towers and smaller sites. Facilities-based providers also need to provide "backhaul" from each site to the rest of the network and interconnect with the networks of other carriers through wired connections. Facilities-based providers may operate throughout the nation, or operate as a multi-regional, regional, or local network supplementing their coverage areas through roaming agreements with other service providers. Below, we use the terms MNO and "service provider" interchangeably to refer to facilities-based service providers.

In addition to MNOs, a number of MVNOs purchase wireless services from network operators in a wholesale market and resell these services to consumers.

Table 7 provides a summary of the estimated total number of connections across segments of the mobile voice/broadband market.

**Table 7: U.S. Wireless Connections by Segment, 2014-2017**

| | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **Connections (millions)** | | | | |
| Postpaid | 237.9 | 248.3 | 254.1 | 259.3 |
| Prepaid (including MVNO) | 88.4 | 93.3 | 96.7 | 93.5 |
| Connected Devices | 37.9 | 51.5 | 63.1 | 66.4 |
| **Total Connections** | **364.1** | **393.1** | **413.9** | **419.1** |
| **Year-Over-Year Growth** | | | | |
| Postpaid | | 4.4% | 2.3% | 2.1% |
| Prepaid (including MVNO) | | 5.5% | 3.7% | -3.3% |
| Connected Devices | | 36.0% | 22.5% | 5.1% |
| **Total Year-Over-Year Growth** | | **8.0%** | **5.3%** | **1.3%** |
| **Segment Share** | | | | |
| Postpaid | 65.3% | 63.2% | 61.4% | 61.9% |
| Prepaid (including MVNO) | 24.3% | 23.7% | 23.4% | 22.3% |
| Connected Devices | 10.4% | 13.1% | 15.3% | 15.8% |
| **Total Segment Share** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

Sources: 2014 - 2017 Company Annual Reports; Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2016 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 14, 2017, available https://www.prepaidphonenews.com/2017/02/fourth-quarter-2016-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2015 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 17, 2016, available https://www.prepaidphonenews.com/2016/02/fourth-quarter-2015-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2014 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2015, available https://www.prepaidphonenews.com/2015/02/fouth-quarter-2014-prepaid-mobile.html, accessed August 15, 2018.

Notes: Connection counts are end of the year December 31. 2014 – 2016 Sprint and T-Mobile Prepaid (including MVNO) connection counts were adjusted to not include Lifeline connections.

Assumed that Sprint and T-Mobile had a constant ratio of Lifeline customers between 2014 and 2016.

Total wireless connections in the U.S. have increased by 1% to 8% annually between 2014 and 2017, to approximately 419 million connections in 2017. In 2017, 62% of connections were postpaid subscription plans, 22% were prepaid connections (including MVNO subscribers), and connected devices—connections that are not associated with a consumer or business phone

account—accounted for the remaining 16%.[32] Non-phone devices such as tablets and mobile hotspots for which customers purchase wireless service directly from the wireless carriers appear to be included in postpaid and prepaid rather than connected devices.[33]

### 1. The Retail Market

Retail mobile voice/broadband services may be broadly divided into postpaid and prepaid wireless services. With a postpaid contract, the carrier checks the subscriber's credit record and generally bills the subscriber on a monthly basis, with fees assessed in the event of late payment. Unlike a postpaid plan, prepaid subscribers do not undergo a credit check. Instead, with prepaid plans the subscriber must "recharge" the account before using it. Recharges come in a range of prices with varying inclusions, and the subscriber is free to switch plans with each repurchase. While the FCC in previous merger reviews has considered a combined **product market** of retail wireless services that includes both postpaid and prepaid plans, this declaration also separately examines the prepaid and postpaid segments within the retail mobile voice/broadband product market.[34]

With respect to the delineation of relevant **geographic markets**, our analysis focuses on a broad national market. In its recent review of the proposed AT&T/T-Mobile merger, Commission staff concluded that, while local markets may be relevant, it is also appropriate to consider a relevant

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[32] As we discuss below, connected devices include session-based tablets, internet-connected cars, and other non-phone devices which access mobile wireless networks without a phone number attached to it. Eighteenth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 15-125, FCC, December 23, 2015, pp. 10-11, available https://docs.fcc.gov/public/attachments/DA-15-1487A1.pdf, accessed August 23, 2018

[33] T-Mobile US, Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 33; AT&T Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 6; Verizon Communications, Inc., Form 10-K for the Fiscal Year Ended December 31, 201;, "Management's Discussion and Analysis of Financial Condition and Results of Operation." Sprint Corp., Form 10-K for the Fiscal Year Ended March 31, 2017, p. 36.

[34] FCC's Staff Analysis and Findings, *In the Matter of Applications of AT&T Inc. and Deutsche Telkom AG For Consent To Assign or Transfer Control of Licenses and Authorizations*, WT Docket No. 11-65, FCC, November 29, 2011, ¶30-41, available https://apps.fcc.gov/edocs_public/attachmatch/DA-11-1955A2.pdf, accessed August 6, 2018 (FCC Staff Report.).

geographic market that is national in scope.[35] In support of that conclusion, FCC staff noted that prices and service plan offerings "do not vary for most providers across most geographic markets where they sell services. In particular, the four nationwide facilities-based providers of retail wireless services (AT&T, Verizon Wireless, Sprint, and T-Mobile) set the same rates for a given plan wherever they sell service and do not alter the plans they offer depending on the location."[36]

### a. Postpaid Wireless Service

The four national wireless carriers dominate the postpaid wireless service segment. Table 8 shows the number of postpaid wireless subscribers and the corresponding shares among the national carriers, annually from 2014 to 2017.

**Table 8: Postpaid Subscribers and Segment Share, 2014 - 2017**

| | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **Postpaid Subscribers (millions)** | | | | |
| AT&T | 75.8 | 77.1 | 77.8 | 77.9 |
| Verizon | 102.1 | 106.5 | 108.8 | 110.9 |
| Sprint | 29.9 | 30.9 | 31.7 | 31.9 |
| T-Mobile | 25.8 | 29.4 | 31.3 | 34.1 |
| U.S. Cellular | 4.3 | 4.4 | 4.5 | 4.5 |
| **Total** | **237.9** | **248.3** | **254.1** | **259.3** |
| **Postpaid Market Share (%)** | | | | |
| AT&T | 31.9% | 31.1% | 30.6% | 30.0% |
| Verizon | 42.9% | 42.9% | 42.8% | 42.8% |
| Sprint | 12.6% | 12.4% | 12.5% | 12.3% |
| T-Mobile | 10.9% | 11.8% | 12.3% | 13.2% |
| U.S. Cellular | 1.8% | 1.8% | 1.8% | 1.7% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

Sources: 2014 - 2017 Company Annual Reports

Notes: Subscriber counts are end of the year December 31.

As shown in Table 8 and Table 13, AT&T and Verizon are the two largest carriers—accounting for roughly 73% of 2017 postpaid subscribers—while Sprint and T-Mobile have nearly identical

[35] *Id*, ¶¶33-34.

[36] *Id*, ¶41.

numbers of postpaid subscribers and combined account for roughly 26% of 2017 postpaid subscribers.

### *(1) Pricing*

Service offerings and pricing are two critical dimensions along which network operators compete to retain their existing customers and attract new customers. All four national wireless carriers currently offer plans that provide unlimited talk, text, and data. Verizon, AT&T, and Sprint continue to offer plans with mobile data limits, while T-Mobile offers only unlimited data plans.

It is standard in the wireless industry to summarize pricing based on ARPU. This number reflects the blend of individual subscriber prices paid, averaged across all of the carrier's subscribers in the segment. We rely on ARPU as the primary measure of pricing.

Table 9 presents postpaid ARPUs from company annual filings and earnings reports.[37] As shown in the table, the ARPU for Sprint and T-Mobile is currently similar for postpaid wireless services ($46.14 and $46.97, respectively), while AT&T is higher at $52.51 and Verizon slightly lower, at $43.45.[38]

**Table 9: Postpaid Average Revenue per Unit, 2014 - 2017**

| Provider | | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| AT&T | [1] | $60.60 | $56.88 | $54.57 | $52.51 |
| Verizon | [2] | $55.70 | $51.22 | $47.01 | $43.45 |
| Sprint | [3] | $60.18 | $53.86 | $50.59 | $46.14 |
| T-Mobile | [4] | $49.44 | $47.68 | $47.47 | $46.97 |
| U.S. Cellular | [5] | $56.75 | $54.50 | $46.96 | $44.38 |

[37] Some carriers include more than one ARPU measure, where a distinction is drawn in billings that include collections for phone payment plans versus the portion of billings that relates just to the wireless service. The ARPU values shown in this declaration are based on the service portion of billings.

[38] In AT&T's quarterly earnings statements for 2018, it provides an overall postpaid ARPU, which it had not included in earlier statements (and has not provided retroactively). In Q1 2018 this value was $47.79. Based on our understanding of the ARPU figures presented for the other carriers in Table 9, this postpaid ARPU for AT&T may be more directly comparable. Our merger simulation analyses rely on this Q1 2018 postpaid ARPU figure for AT&T.

Source: 2014 - 2017 Company Annual Reports; 2015 and 2017 AT&T Financial and Operation Results.

Notes: Verizon Postpaid ARPU is calculated by dividing Average Revenue Per Account, not including recurring device payment billings, (ARPA) by retail Postpaid connections per account. T-Mobile and U.S. Cellular ARPU calculated by dividing postpaid revenues by number of months in the given period (12). AT&T values are based on its quarterly earnings statements based on reported values for "Postpaid ARPU (Historical Accounting Method)". Sprint values are based on its quarterly earnings statements based on reported values for "Nine Months Ended December 31, Postpaid ARPU".

Table 10 presents the current pricing for standard unlimited data postpaid plans for each of the national carriers. Pricing for single-line plans is equivalent for Sprint and AT&T, with Verizon charging the highest price and T-Mobile charging the lowest price. For multiple-line plans, T-Mobile's prices are lower than the other three national carriers.[39]

**Table 10: Adjusted Current Unlimited (Postpaid) Plan Pricing per Line for National Wireless Providers**

| | | One Line | Two Lines | Three Lines | Four Lines |
|---|---|---|---|---|---|
| AT&T | [1] | $70 | $63 | $49 | $40 |
| Verizon | [2] | $75 | $65 | $50 | $40 |
| Sprint | [3] | $70 | $60 | $50 | $45 |
| T-Mobile | [4] | $59 | $51 | $40 | $34 |

Sources: Websites for Verizon, AT&T, T-Mobile, and Sprint; Scott Mackey, Joseph Bishop-Henchman, and Scott Drenkard, "Wireless Taxes and Fees in 2017," Tax Foundation, November 2017, p. 3 at Table 1, available https://files.taxfoundation.org/20171108112327/Tax-Foundation-FF567.pdf, accessed August 23, 2018.

Notes: Includes "autopay" discounts, and excludes taxes, and fees. Prices as of August 17, 2018.

[1] - [2]: Prices for standard-level unlimited plan.

[3]: Prices for only unlimited plan. Lower price for three and four line plans includes temporary promotional discount.

[4]: Prices for only unlimited plan, less average wireless taxes and fees of 18.46% per Tax Foundation. As advertised, T-Mobile plan prices include taxes and fees.

### *(2) Incremental Costs and Profitability*

[39] Prices for AT&T and Verizon are for standard unlimited plans; top-level unlimited plans have higher prices. Prices for Sprint are for an "Unlimited Plus" plan which offers comparable service to the other three carriers; Sprint also offers an "Unlimited Basic" plan which is less expensive than the "Unlimited Plus" plan.

A review of the four MNOs' financial reports indicates that AT&T and Verizon have higher EBITDA margins than do Sprint and T-Mobile. However, the fact that Verizon and AT&T face lower costs *on average* does not imply that they also face lower *marginal* costs. That Verizon and AT&T have lower average costs may reflect the fact that the two carriers have used up much of their spectrum and cell site capacity, so that their marginal cost to meet additional demand may be higher than either Sprint or T-Mobile. For example, Verizon and AT&T serve significantly more subscribers on any given cell than do Sprint or T-Mobile.[40] As a consequence, unless they acquire more spectrum, when adding capacity to their networks, they would have to rely more heavily on cell splitting—deploying additional cell sites to increase the reuse of their existing spectrum—than Sprint and T-Mobile who likely have greater flexibility to deploy spectrum to add capacity.

We have calculated the incremental costs necessary to add one million new subscribers, while keeping the quality of the service unaltered. These calculations also account for the observation that Sprint and T-Mobile have more unused spectrum than AT&T and Verizon.[41]

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[40] See Table 28.

[41] Table 28 shows that AT&T and Verizon have substantially more subscribers per MHz of owned spectrum compared to Sprint and T-Mobile.

**Table 11: Estimated Marginal Capital Costs of Adding One Million Subscribers, by Network**

| | | AT&T | Verizon Wireless | Sprint | T-Mobile |
|---|---|---|---|---|---|
| Share of Subscribers added by Building Towers | [1] | 80% | 80% | 20% | 20% |
| Share of Subscribers added by Deploying Radios | [2] | 20% | 20% | 80% | 80% |
| **Tower Costs** | | | | | |
| Subscribers Added by Building New Towers | [3] | 800,000 | 800,000 | 200,000 | 200,000 |
| Maximum Population Per Cell Site | [4] | 4,756 | 5,473 | 5,787 | 5,250 |
| Additional Towers | [5] | 168 | 146 | 35 | 38 |
| Cost Per Tower | [6] | $500,000 | $500,000 | $500,000 | $500,000 |
| Marginal Cost of Additional Towers | [7] | $84,112,782 | $73,091,500 | $17,281,599 | $19,046,095 |
| **Radio Costs** | | | | | |
| Subscribers Added by Adding New Radios | [8] | 200,000 | 200,000 | 800,000 | 800,000 |
| Maximum Population Per Cell | [9] | 4,756 | 5,473 | 5,787 | 5,250 |
| LTE Channels | [10] | 4 | 4 | 2 | 2 |
| Population Per Radio Channel | [11] | 1,189 | 1,368 | 2,893 | 2,625 |
| Market Share by Service Revenue | [12] | 33% | 37% | 14% | 16% |
| Subscribers Per Radio Channel | [13] | 395 | 507 | 410 | 408 |
| Additional Radios | [14] | 507 | 394 | 1,950 | 1,959 |
| Cost of Adding a Radio | [15] | $20,000 | $20,000 | $20,000 | $20,000 |
| Marginal Cost of Additional Radios | [16] | $10,139,141 | $7,884,436 | $39,008,528 | $39,173,065 |
| **Total** | | | | | |
| Marginal Capital Cost of Adding One Million Subscribers | [17] | $94,251,923 | $80,975,936 | $56,290,127 | $58,219,159 |

Sources & Notes: Note that Verizon is even more spectrum-constrained than AT&T. For simplicity, we have assumed that the two are equally spectrum constrained.

[1], [2], [6], [10], 15]: Assumption.

[3]: [1] x 1,000,000.

[4], [9]: Calibrated using the share of U.S. land area covered by each carrier, the cell radius of a 700 MHz cell site, and each carrier's total cell sites. Note that Sprint does not have 700 MHz spectrum. 20th Mobile Wireless Competition Report, p. 74 and 80; Tony Melone, "Wells Fargo Securities: Technology, Media &Telecom Conference," Verizon, November 10, 2010, accessed September 26, 2013; Colin Chandler, "CDMA 2000 and CDMA 450", ITU, December 3, 2003, available https://www.itu.int/ITU-D/tech/events/2003/slovenia2003/Presentations/Day%203/3.3.1_Chandler.pdf, accessed August 23, 2018; Census Bureau, "National Counties Gazetteer File,"" United States Department of Commerce, available http://www.census.gov/geo/maps-data/data/gazetteer2010.html, accessed August 23, 2018.

[5]: [3] / [4].

[7]: [5] x [6].

[8]: [2] x 1,000,000.

[11]: [9] / [10].

[12]: 2016 wireless total service revenue as reported in company filings. AT&T, Verizon, Sprint, and T-Mobile assumed to make up the entire market.

[13]: [11] x [12].

[14]: [8] / [13].

[16]: [14] x [15].

[17]: [7] + [16].

As the table shows, the marginal capital costs for Sprint and T-Mobile are significantly lower than those for AT&T and Verizon. Sprint's and T-Mobile's ability to build out their networks mostly by adding radios rather than by building new towers leads to a majority of their marginal

capital costs accruing through less expensive radio additions that put to use unused spectrum. At the individual level, these calculations suggest that Sprint and T-Mobile have a marginal capital cost of $59 dollars per subscriber, compared with $81 and $94 for Verizon and AT&T.[42]

In addition to the marginal capital costs of expanding its network, a carrier adding one million subscribers would incur additional operating costs, costs to acquire those subscribers and replace subscribers who leave through normal churn, and increased general and overhead costs. Table 12 presents the incremental costs of acquiring and serving one million additional subscribers for each of the national carriers.

**Table 12: Long-Run Incremental Costs, Margins, and Implied Elasticities by Wireless Provider, 2017**

| Wireless Providers | Monthly Marginal Cost | ARPU | Margin | Implied Elasticity |
|---|---|---|---|---|
| [A] | [B] | [C] | [D] | [E] |
| AT&T | $18.01 | $52.51 | 66% | -1.52 |
| Verizon | $19.07 | $43.45 | 56% | -1.78 |
| Sprint | $23.49 | $46.14 | 49% | -2.04 |
| T-Mobile | $21.16 | $46.97 | 55% | -1.82 |

Sources & Notes:

[B]: Present value of the incremental costs per connection of adding one million connections. See Appendix A.

[C]: Verizon Postpaid ARPU is calculated by dividing Average Revenue Per Account, not including recurring device payment billings (ARPA) by retail Postpaid connections per account. T-Mobile and U.S. Cellular ARPU calculated by dividing postpaid revenues by number of months in the given period (12). AT&T ARPU is based on its quarterly earnings statements based on reported values for "Postpaid ARPU (Historical Accounting Method)". Sprint value is based on its quarterly earnings statements based on reported values for "Nine Months Ended December 31, Postpaid ARPU".

[D]: ([C] - [B]) / [C].

[E]: -1 / [D].

[42] Calculated by dividing the marginal capital cost by 1,000,000 subscribers. In Appendix A, we calculate the amortized cost of maintaining network quality for the added subscribers over the period 2017 to 2031. On a monthly basis, the marginal capital cost portion of the amortized incremental cost of a single subscriber ranges from $1 to $2 across the four MNOs.

Because carriers incur marginal capital costs to grow the network to accommodate incremental customers for many years, it is appropriate to amortize the capital costs and calculate the discounted incremental cost per customer. The resulting all-in incremental cost varies by approximately 20%, ranging from $23.49 per month for Sprint to $18.01 per month for AT&T. Details on the full model are presented in Appendix A.

When compared with the monthly ARPU, Sprint has the lowest margin, at 49%, while AT&T has the highest margin, at 66%.[43] Verizon and T-Mobile currently have similar estimated margins, at 56% and 55% respectively. The calculated margins can be used to infer the own-price elasticities of demand for each provider based on the Lerner Index, which links the elasticity of demand for a profit maximizing firm to the inverse of the mark-up of price over marginal cost.[44] The implied elasticities in Table 12 range from -1.52 for AT&T to -2.04 for Sprint. These own-price elasticities are in line with the limited evidence in the literature.[45]

### *b. Prepaid Wireless Service*

The offering of both postpaid and prepaid plans is one way in which wireless carriers may be able to target different customer segments that have differing preferences for pricing, phone options, and contract types within the broader retail mobile voice/broadband market. Prepaid service plans allow customers to avoid the credit checks required for postpaid plans and to purchase fixed calling and data plan amounts such that when the number of calls or amount of data purchases is reached, the service becomes unavailable until the customer purchases more calling minutes or data.[46]

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[43] Under the alternative AT&T ARPU of $47.79 (see footnote 38), AT&T's margin would still be highest among the MNOs, at approximately 62%.

[44] A firm's own-price demand elasticity measures the percentage change in the quantity demanded for that firm "caused" by a percentage change in the firm's price. A firm's price-cost margin equals -1 times the inverse of its own-price elasticity. See Lerner, A. "The Concept of Monopoly and the Measurement of Monopoly Power." *Review of Economic Studies, Review of Economic Studies1934* (1934), pp. 157–75.

[45] One study estimated own-price elasticities of -1.4 to -2.6 for Verizon and -1.7 to -2.6 for AT&T. See Sinkinson, Michael. "Pricing and entry incentives with exclusive contracts: Evidence from smartphones." (2014), available https://ssrn.com/abstract=2391745, accessed August 23, 2018.

[46] Many prepaid providers offer plans that largely mimic the services offered by postpaid plans (e.g., unlimited text and calling) with the primary difference being how the plans are financed and the credit check requirement for postpaid service.

In addition to the postpaid plans sold under their marquis brands, the four national carriers also sell prepaid plans, both under their marquis brands (e.g., T-Mobile One Prepaid) and/or under a dedicated brand, such as Cricket Wireless (owned by AT&T) or MetroPCS (owned by T-Mobile). Table 13 below provides a summary of carrier presence over time in the prepaid segment. However, unlike the postpaid segment, where the MNOs account for nearly all subscribers, MVNOs, particularly TracFone, are significant providers of prepaid wireless service plans.

**Table 13: Prepaid Connections and Segment Share, 2014-2017**

| | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **Prepaid Connections (millions)** | | | | |
| AT&T | 11.0 | 11.6 | 13.5 | 15.3 |
| Verizon | 6.1 | 5.6 | 5.5 | 5.4 |
| Sprint | 15.5 | 14.7 | 11.8 | 9.0 |
| T-Mobile | 16.3 | 17.6 | 19.8 | 20.7 |
| U.S. Cellular | 0.3 | 0.4 | 0.5 | 0.5 |
| TracFone | 26.0 | 25.7 | 26.1 | 23.1 |
| Other MVNO | 13.0 | 17.8 | 19.5 | 19.4 |
| **Total** | **88.4** | **93.3** | **96.7** | **93.5** |
| **Prepaid Market Share (%)** | | | | |
| AT&T | 12.4% | 12.4% | 14.0% | 16.4% |
| Verizon | 6.9% | 6.0% | 5.6% | 5.8% |
| Sprint | 17.6% | 15.7% | 12.2% | 9.6% |
| T-Mobile | 18.5% | 18.9% | 20.5% | 22.1% |
| U.S. Cellular | 0.4% | 0.4% | 0.5% | 0.6% |
| TracFone | 29.4% | 27.6% | 27.0% | 24.7% |
| Other MVNO | 14.7% | 19.0% | 20.2% | 20.8% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

Sources: 2014 - 2017 Company Annual Reports; Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2016 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 14, 2017, available https://www.prepaidphonenews.com/2017/02/fourth-quarter-2016-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2015 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 17, 2016, available https://www.prepaidphonenews.com/2016/02/fourth-quarter-2015-prepaid-mobile.html, accessed August 15, 2018; Dennis Bournique, "Fourth Quarter, 2014 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2015, available https://www.prepaidphonenews.com/2015/02/fouth-quarter-2014-prepaid-mobile.html, accessed August 15, 2018.

Notes: Connection counts are end of year December 31. Other MVNO calculated by subtracting TracFone prepaid connection counts from the sum of AT&T, Verizon, Sprint, and T-Mobile's total wholesale connections count.

As shown in the table, TracFone accounts for the largest share of prepaid subscribers (24.7%), while T-Mobile is the largest MNO in the segment (22.1%). Sprint accounts for almost 10% of prepaid subscribers. Table 14 below provides a summary of ARPU for prepaid wireless plans across carriers.

**Table 14: Prepaid Average Revenue per Unit, 2014 - 2017**

| Provider | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| AT&T | N/A | N/A | N/A | N/A |
| Verizon | N/A | N/A | N/A | N/A |
| Sprint | N/A | $33.39 | $34.46 | $37.67 |
| T-Mobile | $37.10 | $37.68 | $37.92 | $38.69 |
| U.S. Cellular | $33.98 | $35.72 | $34.38 | $33.16 |
| TracFone | $20.65 | $20.26 | $21.24 | $22.83 |

Sources: 2014 - 2017 Company Annual Reports.

Notes: Sprint ARPU numbers are end of year March 31, while the other carriers' ARPU numbers are end of year December 31. U.S. Cellular ARPU is calculated by a weighted average of all quarterly Prepaid ARPU estimates in the given year. T-Mobile and TracFone prepaid ARPU is calculated by dividing prepaid revenues by the number of months in the given period (12). Sprint ARPU is from their annual reports.

By comparison to prices for postpaid plans shown in Table 9 above, it is evident that the ARPU for postpaid service exceeds the prepaid ARPU by more than $12, or a little more than 30%. Although prepaid ARPU information is not available from public SEC filings for AT&T and Verizon, there is a clear difference in ARPU for prepaid plans between Sprint and T-Mobile (approximately $38), which operate national networks, and TracFone (approximately $23), which fills its network needs through wholesale agreements with the national carriers. Although TracFone is the largest seller of prepaid plans (in comparison to both facilities-based carriers and the other MVNOs), this pricing differential suggests either cost or quality (such as plan data allowances) differences in TracFone's offerings versus the national network carriers that have been persistent over time. Indeed, T-Mobile's CFO has recognized that TracFone is "becoming less and less relevant and more and more stressed from a pricing standpoint."[47]

For the four national, facilities-based carriers, as with postpaid plans, the incremental costs for prepaid customers are made up of the incremental network infrastructure costs required to add

[47] Braxton Carter, CFO, T-Mobile US, Inc., Remarks at UBS Global Media and Communications Conference, Fair Disclosure Wire (Dec. 5, 2016).

subscribers as well as additional operating costs, costs to acquire those subscribers and replace subscribers who leave through normal churn, and increased general and overhead costs. For the MVNOs, such as TracFone (and its various subsidiary brands), while they incur incremental operating costs from adding new subscribers, there are no incremental network infrastructure costs to be incurred to maintain network quality when adding subscribers. Instead, the MVNOs purchase network access for their subscribers on the wholesale market from the facilities-based carriers. Further discussion of such costs is presented below.

### 2. The Wholesale Market

As mentioned above, MVNOs purchase wireless services from network operators in a wholesale market and resell these services to consumers. At least 58 independently owned MVNO brands are currently active in the U.S.,[48] with an estimated 42.5 million connections.[49] As shown in Table 13, above, TracFone, the largest MVNO with approximately 23 million connections, alone accounts for approximately 25% of prepaid wireless connections and over half of all MVNO connections.

Table 15 summarizes U.S MVNO brands and agreements by host network. As the table illustrates, 25 out of the 58 MVNO brands reviewed operate under multiple agreements with national network operators. Sprint and T-Mobile appear to be more active in the wholesale market, being party to respectively 27 and 30 MVNO agreements, and 14 MVNO brands have agreements with both Sprint and T-Mobile. Further details on U.S. MVNO brands are provided in Appendix B.

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[48] For the purposes and analyses included in this section we have reviewed 58 independently owned MVNOs, excluding those owned and operated by one of the four national network operators.

[49] See Table 13, summing TracFone and Other MVNOs.

**Table 15: U.S. MVNO Market Overview Excluding Facilities Based Providers**

| **Brands** | Count |
|---|---|
| Total U.S. MVNO Brands | 58 |
| MVNO Owners with Multiple Brands | 3 |
| **MVNO Agreements by Carrier** | |
| AT&T | 18 |
| Verizon | 23 |
| Sprint | 27 |
| T-Mobile | 30 |
| U.S. Cellular | 1 |
| Multiple Carrier Agreements | 25 |
| Agreements with Sprint and T-Mobile | 14 |

Sources: "List of United States Mobile Virtual Network Operators," Best MVNO, available https://bestmvno.com/mvnos/, accessed August 23, 2018; "Online database of MVNOs," MVNO Directory, available http://www.blog.mvnodirectory.com, accessed August 23, 2018. Marc Lagace, "Complete List of Sprint MVNOs," *Android Central*, April 14, 2017, available https://www.androidcentral.com/complete-list-sprint-mvnos, accessed August 23, 2018; "Complete List of Verizon Wireless MVNOs," *Android Central*, April 12, 2017, available https://www.androidcentral.com/complete-list-verizon-mvnos, accessed August 23, 2018; Mike Tanasychuk, "Complete List of AT&T MVNOs," *Android Central*, May 8, 2017, available https://www.androidcentral.com/complete-list-att-mvnos, accessed August 23, 2018; Marc Lagace, "Complete List of T-Mobile MVNOs," *Android Central,* May 3, 2017, available https://www.androidcentral.com/complete-list-t-mobile-mvnos, accessed August 23, 2018.

Notes: This is not an exhaustive list of active MVNOs in the U.S.

Among the host networks, Sprint and T-Mobile account for a large fraction of the wholesale market. Table 16 below provides a summary of T-Mobile and Sprint's wholesale business as reported in their respective annual reports. Based on our estimates of the number of the wholesale connections, Sprint and T-Mobile (combined) account for more than 60% of wholesale connections (i.e., 26.6 million of the estimated 42.5 million connections).

**Table 16: T-Mobile and Sprint's Wholesale Business as Reported in 2017 Annual Reports**

| Provider | Connections (millions) [A] | Revenue (USD millions) [B] | ARPU [C] |
|---|---|---|---|
| Sprint | 13.4 | $1,179 | $7.35 |
| T-Mobile | 13.3 | $1,102 | $6.92 |
| **Total** | **26.6** | **$2,281** | **$7.13** |

Sources: Sprint 2017 Q4 10-Q; Sprint 2015 Q4 10-Q; T-Mobile 2017 Annual Report; T-Mobile 2015 Annual Report.

Notes:

[A]: Connection counts are calculated by averaging 2016 and 2017's end of the year wholesale connection counts. Connection counts do not include Lifeline customers.

[B]: Sprint's 9-month wholesale revenue is multiplied by 1.33 to estimate their 12-month wholesale revenue.

[C]: ([B] / [A]) / 12.

As seen in the table, wholesale prices charged to MVNOs may represent a significant fraction of MVNO retail (prepaid) prices. For example, T-Mobile's and Sprint's average wholesale ARPU of $7.13 would be more than 30% of TracFone's prepaid ARPU.[50]

## B. Market Share Screening of the T-Mobile/Sprint Merger

Among facilities-based carriers, the merger would combine the third and fourth largest suppliers of wireless service in the U.S. As shown in Table 17, Sprint and T-Mobile currently account for 13% and 17% of total wireless connections, respectively. New T-Mobile would account for approximately 30%, and become close in size to AT&T and Verizon, which have shares of 34% and 35%, respectively. Most importantly, a Sprint/T-Mobile merger would yield a more symmetric market structure, resulting in three dominant carriers accounting for roughly one-third of wireless connections each.

The analysis of market shares and concentration levels in the relevant product and geographic markets is a useful starting point for assessing the effect of a proposed merger. As explained above, the FCC considers retail mobile voice/broadband connections as the relevant product market. Following that precedent, we calculate concentration based on the supply of facilities-based wireless connections, attributing MVNO connections to their host networks.[51] In subsequent sections we separately consider competitive effects of the merger in the retail market and its postpaid and prepaid segments, as well as in the wholesale market.

Competition agencies measure concentration using the Herfindahl Hirschman Index ("HHI"), which is the sum of squared shares across market participants. When using the HHI, agencies consider both the post-merger level of the HHI and the increase in the HHI resulting from the

[50] Calculation: $7.13 / $22.83 = 31.2%.

[51] FCC Staff Report, ¶ 41.

merger. According to the Merger Guidelines, markets are classified as "Moderately Concentrated" if the pre-merger HHI is between 1500 and 2500, and "Highly Concentrated" if the pre-merger HHI is above 2,500.[52] The Merger Guidelines further indicate that:[53]

- Mergers resulting in a post-merger HHI between 1,500 and 2,500 (moderately concentrated) that involve an increase in the HHI of more than 100 points "potentially raise significant competitive concerns and often warrant scrutiny";
- Mergers resulting in a post-merger HHI above 2,500 (highly concentrated) a) "potentially raise significant competitive concerns and often warrant scrutiny" if they involve an increase in the HHI of between 100 points and 200 points, and b) "will be presumed to be likely to enhance market power" if they involve an increase in the HHI of more than 200 points. This presumption may be rebutted with persuasive evidence demonstrating that the proposed merger "is unlikely to enhance market power."

Under the Merger Guidelines, the market for supplying facilities-based wireless communications in the United States is already highly concentrated. Table 17 presents concentration metrics for this market before and after a potential Sprint/T-Mobile merger.

**Table 17: Market Shares and HHI Screens Based on 2017 Total Connections**

| | All Connections | | Postpaid Connections | | Prepaid Connections | |
|---|---|---|---|---|---|---|
| Provider | Connections (millions) | Share | Connections (millions) | Share | Connections (millions) | Share |
| AT&T | 141.6 | 33.8% | 77.9 | 30.0% | 24.7 | 26.4% |
| Verizon | 145.3 | 34.7% | 110.9 | 42.8% | 11.0 | 11.8% |
| Sprint | 54.6 | 13.0% | 31.9 | 12.3% | 22.6 | 24.2% |
| T-Mobile | 72.6 | 17.3% | 34.1 | 13.2% | 34.6 | 37.0% |
| U.S. Cellular | 5.0 | 1.2% | 4.5 | 1.7% | 0.5 | 0.6% |
| **Total** | **419.1** | **100.0%** | **259.3** | **100.0%** | **93.5** | **100.0%** |
| | | | | | | |
| **New T-Mobile** | **127** | **30.3%** | **66** | **25.5%** | **57** | **61.2%** |
| **Pre-Merger HHI** | **2,814** | | **3,057** | | **2,793** | |
| **Post-Merger HHI** | **3,265** | | **3,381** | | **4,585** | |
| **Delta HHI** | **451** | | **324** | | **1,792** | |

Sources: 2017 Company Annual Reports; Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator;" Prepaid Phone News, February 19,

[52] Horizontal Merger Guidelines, p. 19.

[53] *Ibid.*

2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

Notes: Total retail connections are estimated total retail connections for publicly traded facilities–based mobile wireless service providers (in thousands). Connections counts are for end of the year December 31. HHI is calculated as the sum of the squares of each firm's market share.

Prepaid connections attribute MVNO connections to their host networks based on the number of wholesale connections estimated for each MNO.

As shown in Table 17, before the merger the HHI is already 2,814, which is in the "Highly Concentrated" range according to the Merger Guidelines. Were Sprint and T-Mobile to merge, the HHI would increase to 3,265, an increase of 451 points. Both the level of concentration post-merger and its potential increase due to the merger raise competitive concerns according to the Merger Guidelines standards.

Table 17 also shows the relative differences in the concentration of suppliers of postpaid versus prepaid connections. New T-Mobile will account for approximately 25% of postpaid connections and over 60% of prepaid connections in the U.S.[54] The pre-merger supply of postpaid connections is relatively concentrated with an HHI of 3,057, while the pre-merger supply of prepaid connections is somewhat less concentrated (but nevertheless "highly concentrated" vis-à-vis the Merger Guidelines) at 2,793. However, due in part to Verizon's relatively smaller supply of prepaid connections, the change in concentration (1,792) is much higher for the supply of prepaid connections in comparison to postpaid connections (324). Not only will New T-Mobile be the dominant supplier of facilities-based prepaid connections, over 87% of that market segment will be supplied by just two firms: New T-Mobile and AT&T.

## C. Unilateral Effects in the Retail Segments

As indicated above, the proposed merger would combine the third and fourth largest nationwide service providers in the U.S., potentially resulting in harm to competition in both the retail and wholesale markets for mobile voice/broadband services by effectively lowering the incentives for price and non-price competition, increasing the likelihood of coordination and likely resulting in higher prices. This section focuses on the unilateral pricing effects of the merger using standard tools considered by antitrust authorities and practitioners.

[54] We attribute the retail connections of the MVNOs to their host networks based on the number of wholesale connections for each MNO.

In subsection 1-a below we present the results of various pricing pressure tests for both the postpaid and prepaid segments, as well as a combined analysis of all connections. Pricing pressure tests such as the GUPPI provide a useful preliminary screen for the potential incentives for merger-induced price increases as well as the magnitude of the required cost efficiencies needed to eliminate those incentives. The data needed to perform the GUPPI are relatively modest, consisting primarily of information on firms' price-cost margins and an estimate of diversion ratios, which measure the amount of sales captured by one substitute product as a proportion of the amount of sales lost by the product for which price is increased.

In subsection 1-b below we present the results of various merger simulation predictions for both the postpaid and prepaid segments. Merger simulation models provide a quantitative assessment of the merger's unilateral effects on prices, shares, and consumer welfare. Relative to the price pressure tests, merger simulation models have the advantage of factoring into the analysis realistic substitution patterns and competitors' responses to the price increase. They also provide direct price predictions, which, although predicated on simplifying assumptions about consumer demand, nevertheless provide additional information relative to the price pressure tests.

### 1. Price Pressure Tests

A core concern with any horizontal merger is that the reduction in competition between the Applicants will result in higher prices for consumers. Before the merger, if Sprint raises its price, some customers will choose to switch to products sold by other carriers, including T-Mobile. After a merger with T-Mobile, however, if Sprint were to raise its prices, the customers who would otherwise switch to T-Mobile will likely remain customers of the merged firm. This "recapture" of customers makes increasing prices more profitable for the merged firms than when they operate independently.[55] Below we describe the GUPPI test and identify the necessary data sources to implement it. We then present results in the context of the proposed T-Mobile/Sprint merger.

[55] Horizontal Merger Guidelines, p. 20.

### a. The Gross Upward Price Pressure Index[56]

The GUPPI measures the value of sales that are diverted to one firm (or brand) measured in proportion to the lost revenues attributable to the reduction in unit sales resulting from the price increase by another firm (or brand). This ratio provides a metric for scoring the "upward pricing pressure" from the unilateral effects of a merger. The GUPPI does not take merger synergies into account.

The following formula estimates the percentage change in Firm 1's price following a merger between Firm 1 and Firm 2:

$$GUPPI_1 = D_{12} \times m_2 \times \frac{P_2}{P_1},$$

where:

- $D_{12}$ is the diversion ratio between Firm 1 and Firm 2 (number of customers who leave Firm 1 for Firm 2 divided by the total number of customers who leave firm 1);
- $m_2$ is the variable profit margin for Firm 2 as a fraction of revenue; and
- $P_2 / P_1$ is the price of Firm 2 relative to Firm 1.

The diversion ratio is the percentage of customers one firm loses when it increases prices who substitute to the other merging firm's product. For example, if Firm 1 increases prices and loses 100 customers, 50 of whom switch to Firm 2, 30 of whom switch to Firm 3, and 20 of whom choose some other option, then the diversion ratio between Firm 1 and Firm 2 ($D_{12}$) is 50/100 = 0.5. That is, 50% of the customers that would leave Firm 1 are recaptured if Firms 1 and 2 are combined.

We approximate diversion ratios between Sprint and T-Mobile for the postpaid segment using data on gross subscriber additions.[57] Gross subscriber additions are measured as the number of

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[56] Farrell, Joseph, and Carl Shapiro. "Antitrust evaluation of horizontal mergers: An economic alternative to market definition." *The BE Journal of Theoretical Economics* 10, no. 1 (2010).

[57] Ideally, because diversion is technically based on responses to price changes, it is best estimated using variation in prices and shares over time, possibly in response to exogenous shocks (such as cost increases or new taxes). Such information is not available here, so we pair information on gross

Continued on next page

new subscribers each firm adds within a given period. With these data, the diversion ratio between Firm 1 and Firm 2 is approximated by:

$$D_{Pre,12} = \frac{[\text{Gross number of subscribers gained by Firm 2}] \times [\text{Assumed Recapture Rate}]}{\text{Gross number of subscribers gained by all firms EXCEPT Firm 1}}$$

UBS Global Research provides gross additions for 2016 for the four national carriers as well as US Cellular, the largest regional carrier in the U.S.[58] Using these data and the equation above we can calculate diversion ratios.

The "Assumed Recapture Rate" accounts for the percentage of consumers who will switch to an "outside option" in response to a price increase by one firm.[59] The recapture rate is defined as the fraction of customers that leave a firm due to a price increase that do not exit the wireless segment. The 80% recapture rate is consistent with other studies of the mobile voice/broadband markets and is also consistent with the FCC's review of the AT&T/T-Mobile merger application.[60]

Because we lack reliable data on gross subscriber additions in the prepaid segment, we calculate our prepaid diversion ratios based on the assumption that customers that divert from one firm are distributed across the other firms in proportion to their relative subscriber shares. Based on this assumption, the prepaid diversion ratio between Firm 1 and Firm 2 is approximated by:

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Continued from previous page

subscriber additions with an assumption of proportionality, similar to the share proportionality that results when consumer demand is based on the logit model.

58 UBS Wireless Report.

59 This outside option includes customers who switch to a small regional provider not included in the analyses as well as those who choose to purchase a wireless plan of any kind.

60 For example, the FCC's staff report, describes the Applicants' (AT&T/T-Mobile's) assumption of a 60% recapture rate as too low stating "Our simulations show that the Applicants' unsupported assumption about the rate at which customers would abandon wireless services leads the economic model to overstate the benefits of this transaction." FCC Staff Report, ¶ 152

Besen, Kleter, Moresi, Salop and Woodbury also adopt an 80% recapture rate for their published analysis of the AT&T – T-Mobile USA wireless merger. See Besen, Stanley M., Stephen D. Kletter, Serge X. Moresi, Steven C. Salop, and John R. Woodbury. "An economic analysis of the AT&T-T-mobile USA wireless merger." *Journal of Competition Law and Economics* 9, no. 1 (2013): 23-47.

$$D_{Post,12} = \frac{[\text{Share Firm 2}] \times [\text{Assumed Recapture Rate}]}{1 - [\text{Share Firm 1}]}$$

The variable profit margin as a fraction of revenue can be calculated as the profit earned divided by total revenue. In Appendix A we calculate long-run marginal costs for each firm on a per subscriber basis and use this along with each firm's ARPU to calculate the variable profit margin.[61] The relative price is the ratio of the prices for each of the merging firms. To calculate this ratio, we use each provider's postpaid ARPU.

### *b. Test Results*

Table 18 presents the results of the GUPPI test for Sprint and T-Mobile within the postpaid segment. The postpaid segment GUPPI scores for both Sprint (9.9%) and T-Mobile (9.2%) suggest that the merger would likely create significant upward pricing pressure.

**Table 18: Pricing Pressure Tests for Postpaid**

| | | Diversion Ratio | Gross Margin % | Price ($/unit) | Price Ratio | Incremental Cost | Gross Upward Pricing Pressure |
|---|---|---|---|---|---|---|---|
| | | [A] | [B] | [C] | [D] | [E] | [F] |
| Sprint | [1] | 19.8% | 49.1% | $46.14 | 1.02 | $23.49 | 9.9% |
| T-Mobile | [2] | 17.0% | 54.9% | $46.97 | 0.98 | $21.16 | 9.2% |

Sources: 20th Mobile Wireless Competition Report; UBS Wireless Report.

[A]: Diversion ratios are constructed based on annual postpaid gross additions.

[B]: ([C] – [E])/[C].

[C]: 2017 Company Annual Reports; See Table 9.

[D]: (merging partner ARPU)/(own ARPU).

[E]: See Appendix A.

[F]: $[F_1] = [A_1] \times [B_2] \times [D_1]$ and $[F_2] = [A_2] \times [B_1] \times [D_2]$; where subscripts denote rows [1] or [2].

Table 19, shown below, presents the results of the GUPPI test for Sprint and T-Mobile within the prepaid segment. The prepaid segment GUPPI for both Sprint (7.6%) and T-Mobile (4.4%), although lower than their counterparts in the postpaid segment, suggests that the merger would likely create significant upward pricing pressure in the prepaid segment, too.

[61] See Table 12.

**Table 19: Pricing Pressure Tests for Prepaid**

| | | Diversion Ratio | Gross Margin % | Price ($/unit) | Price Ratio | Incremental Cost | Gross Upward Pricing Pressure |
|---|---|---|---|---|---|---|---|
| | | [A] | [B] | [C] | [D] | [E] | [F] |
| Sprint | [1] | 19.6% | 37.7% | $37.67 | 1.03 | $23.49 | 7.6% |
| T-Mobile | [2] | 9.9% | 45.3% | $38.69 | 0.97 | $21.16 | 4.4% |

Sources: 20th Mobile Wireless Competition Report; UBS Wireless Report.

[A]: Diversion ratios are constructed based on subscriber counts published in Company Annual Reports; See Table 13.

[B]: ([C] – [E])/[C].

[C]: 2017 Company Annual Reports; See Table 14

[D]: (merging partner ARPU)/(own ARPU).

[E]: See Appendix A.

[F]: $[F_1] = [A_1] \times [B_2] \times [D_1]$ and $[F_2] = [A_2] \times [B_1] \times [D_2]$; where subscripts denote rows [1] or [2].

The pricing pressure tests above calculate diversion ratios from information on gross subscriber additions and subscriber shares, each of which relies upon a diversion-by-share assumption. Porting data available in this proceeding allows for calculations of the fraction of wireless phone numbers that port to a given network from a given network, which can be used as an alternative proxy for the true diversion ratio values. Because these data do not distinguish among service type, the resulting diversion ratios provide estimates of diversion across all connections. We combine these "all connection" diversion ratios with corresponding ARPU values for each carrier[62] to estimate the upward pressure indexes for the broad market, which includes all mobile voice/broadband services. Table 20 presents the resulting GUPPI. The GUPPI screen is higher in this broader analysis than they were in either of the corresponding postpaid or prepaid analyses.

[62] Calculated as all wireless service revenue divided by total connections, divided by 12 months per year.

**Table 20: Pricing Pressure Tests for All Connections Using Porting Data**

{{BEGIN NRUF/LNP HCI

END NRUF/LNP HCI}}

Notes:

[A]: Diversion ratios are constructed based on LNP Data.

[B]: ([C]-[E])/[C].

[C]: Based on 2016 wireless revenues and connections from Company Annual Reports.

[D]: (Merging partner ARPU)/(own ARPU).

[E]: See Appendix A.

[F]: $[F_1] = [A_1] \times [B_2] \times [D_1]$ and $[F_2] = [A_2] \times [B_1] \times [D_2]$; where subscripts denote rows [1] or [2].

## 2. Merger Simulation

Our merger simulation models competition among cellular services providers based on a differentiated "Bertrand" model of competition. The Bertrand competition assumption is the typical basis of merger simulation. Under this assumption, each firm sets prices to maximize profits, taking account of the strategic, but non-collusive pricing decisions of its competitors. Under standard Nash Bertrand equilibrium, no firm can increase its profits by unilaterally changing the price of brands under its control.

When high frequency transaction level data, such as scanner data, are available, demand models can be estimated econometrically. In many instances, including with this transaction, estimating a demand system is not feasible. When demand estimation is not possible, the data required to specify, or calibrate, a merger simulation model can be lessened by adopting additional assumptions regarding the nature of demand and by imposing a condition that the firms' pricing decisions strictly adhere to the Nash Bertrand equilibrium assumption.

The ALM and the PC-AIDS models are two of the most commonly used calibrated demand models. Both models share the same structural assumptions and input requirements to identify the initial pre-merger own-price and cross-price elasticities.[63]

The substantive difference between the ALM and the PC-AIDS simulation models is in the assumed curvature of each demand system. That is, the two simulation models differ in terms of the effect a change in the price of a given product will have on the own and cross elasticities of demand for the merging products and close substitutes. The ALM model assumes that demand curves are relatively flat (little curvature) compared to the PC-AIDS model, which implies that the logit demand curves become more elastic than the PC-AIDS demand for a given price change. This implies that the ALM model will produce lower unilateral price effect predictions than its PC-AIDS counterpart. As a consequence, the two models provide useful insight on likely lower and upper bounds for the expected price effects of the merger.

Our postpaid segment modeling assumes that the facilities-based wireless carriers (AT&T, Verizon, Sprint, T-Mobile, and U.S. Cellular, which we have conservatively included) offer a single differentiated product each, at a single national price before the merger. Our prepaid segment modeling conservatively includes TracFone as a participant in addition to four of the five national wireless carriers.[64] The prepaid segment modeling also includes the other MVNOs as a competitive fringe of non-strategic participants.[65] Inputs for both segments include shares and prices for each carrier, as well as the incremental cost information as shown in Table 8 above. To determine shares, we consider mobile voice/broadband services in each segment as the relevant product.[66] Aggregate elasticities and the "size" of the outside option for each segment are

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63 One exception is that the logit model requires sales volume shares for all brands whereas the PC-AIDS model utilizes revenue shares for calibration.

64 U.S. Cellular has a very small presence in the prepaid segment (roughly 0.5% of subscribers) and is not included in our prepaid simulations.

65 In our ALM modeling the competitive fringe of MVNOs is strictly non-strategic, while in our PC-AIDS modeling the competitive fringe is composed of many very small, but strategic firms.

66 Consistent with economic theory, the logit model is calibrated using sales volume shares and the PC-AIDS model is calibrated based on brands' revenue shares.

determined endogenously within the models.[67] As shown above, we calculate carriers' post- and prepaid ARPUs as our approximation of prices for each segment.

### a. ALM Simulation Results

Results from our national-level postpaid logit merger simulation are presented in Table 21.[68] For each of the four carriers, the table reports pre-merger and post-merger volume shares and monthly ARPU along with the percent changes in each. Under the assumption of logit demand, merger simulation results indicate that New T-Mobile would likely increase prices by 5%, while the corresponding price increases for AT&T and Verizon would be 0.3% and 0.5%, respectively. These price increases would be expected to reduce the number of postpaid subscribers by about 2 million and the corresponding consumer surplus by about $2.1 billion (annually).

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[67] The logit model calibration of shares and estimated markups leads to an implied aggregate elasticity of -0.55 for the postpaid segment and we use the same value for the prepaid segment. These elasticities are consistent with values seen in prior analysis of mobile wireless mergers. For example, Moresi et al employ an elasticity of -0.5.

The subsequent PC-AIDs simulations take the initial aggregate elasticities imputed from the Logit model as given and calibrate using segment prices, shares, and an estimate of Sprint's margin.

*See* Besen, Stanley M., Stephen D. Kletter, Serge X. Moresi, Steven C. Salop, and John R. Woodbury. "An economic analysis of the AT&T-T-mobile USA wireless merger." *Journal of Competition Law and Economics* 9, no. 1 (2013): 23-47.

[68] The system of equations derived from the model under standard assumptions is an over-identified system; there are more model equations than parameters to be calibrated. *See* Werden, Gregory J., and Luke M. Froeb. "The effects of mergers in differentiated products industries: Logit demand and merger policy." *JL Econ. & Org.* 10 (1994): 407. This is because for postpaid services we have all carriers' ARPU, incremental costs and subscriber counts, which leaves only the price sensitivity parameter and the market elasticity to be calibrated. Industry priors are employed to pin down the set of equations that will be used for the calibration. *See* Besen, Stanley M., Stephen D. Kletter, Serge X. Moresi, Steven C. Salop, and John R. Woodbury. "An Economic Analysis Of The AT&T-T-Mobile USA Wireless Merger." *Journal of Competition Law and Economics* 9, no. 1 (2013): 23-47. Then, for the merger simulation, incremental costs that are consistent with the logit model are calculated and used.

**Table 21: Postpaid Merger Simulation Results for 2017, Assuming Logit Demand**

| Carrier | Pre-Merger Subscriber Share [A] | Post-Merger Subscriber Share [B] | Change in Subscriber Share [C] | Pre-Merger ARPU [D] | Post-Merger ARPU [E] | Pct Chg ARPU [F] |
|---|---|---|---|---|---|---|
| AT&T | 30.0% | 30.8% | 0.8% | $47.79 | $47.93 | 0.3% |
| Verizon | 42.8% | 43.7% | 1.0% | $43.45 | $43.66 | 0.5% |
| Sprint | 12.3% | 11.4% | -0.9% | $46.14 | $48.47 | 5.0% |
| T-Mobile | 13.2% | 12.3% | -0.9% | $46.97 | $49.14 | 4.6% |
| U.S. Cellular | 1.7% | 1.8% | 0.1% | $44.39 | $44.40 | 0.0% |
| Combined | 100.0% | 100.0% | 0.0% | $45.56 | $46.21 | 1.4% |
| Market Elasticity | -0.55 | -0.57 | | | | |
| Total Subscribers (millions) | 259 | 257 | | | | |
| Industry Revenue (millions) | $141,779 | $142,575 | | | | |
| Consumer Surplus Loss (millions) | | -$2,116 | | | | |

Sources: 20th Mobile Wireless Competition Report, p. 15; 2017 Company Annual Reports.

Notes: Post-merger results produced from simulation. Marginal costs calculated by Brattle. See Table 12.

[A]: Share of total connections in 2017 calculated from 2017 Company Annual Reports See Table 8.

[C]: Post-merger share as estimated by simulation.

[C]: ([B] - [A]) / [A].

[D]: Postpaid ARPU for 2017 from 2017 Company Annual Reports. See Table 9.

[E]: Estimated post-merger price produced from simulation.

[F]: ([E] - [D]) / [D].

"Market" Elasticity estimated from logit model calibration and post-merger simulation.

Total postpaid subscribers from Company Annual Reports. Change in subscribers calculated from simulation.

Industry postpaid revenues calculated as (ARPU x Subscribers) across 4 carriers.

Consumer Surplus Loss calculated from simulation.

Results from our national-level prepaid logit merger simulation are presented in Table 22.[69] For each of the major prepaid networks,[70] the table reports pre-merger and post-merger volume

[69] Given the available data the calibration of the model collapses to solving an exactly identified system of equations derived from the model under standard assumptions. *See* Werden, Gregory J., and Luke M. Froeb. "The effects of mergers in differentiated products industries: Logit demand and merger policy." *JL Econ. & Org.* 10 (1994): 407. These standard equations are used together with the data available which consists of the ARPU for Sprint, T-Mobile, and TracFone the incremental costs for AT&T, Verizon, Spring, T-Mobile, and the subscriber count for each carrier's prepaid service, to calibrate for the values of model parameters that are not available as data (missing prices and

Continued on next page

shares and monthly ARPU along with the percent changes in each. Under the assumption of logit demand, the merger simulation results indicate that New T-Mobile would likely increase prices in the prepaid segment by 2.8% (T-Mobile) to 7.3% (Sprint), or approximately 5.0% on average across the two brands, while the corresponding price increases for AT&T, Verizon, and TracFone would be 0.2%, 0.0%, and 0.1% respectively. These price increases would be expected to reduce the number of prepaid subscribers by about 0.86 million and the corresponding consumer surplus by about $0.6 billion (annually).

**Table 22: Prepaid Merger Simulation Results for 2017, Assuming Logit Demand**

| Carrier | Pre-Merger Subscriber Share [A] | Post-Merger Subscriber Share [B] | Change in Subscriber Share [C] | Pre-Merger ARPU [D] | Post-Merger ARPU [E] | Pct Chg ARPU [F] |
|---|---|---|---|---|---|---|
| AT&T | 16.4% | 17.0% | 0.6% | $33.05 | $33.11 | 0.2% |
| Verizon | 5.8% | 6.0% | 0.2% | $32.82 | $32.83 | 0.0% |
| Sprint | 9.6% | 8.1% | -1.5% | $37.67 | $40.43 | 7.3% |
| T-Mobile | 22.1% | 21.2% | -1.0% | $38.69 | $39.78 | 2.8% |
| TracFone | 24.7% | 25.5% | 0.8% | $22.83 | $22.92 | 0.4% |
| Other MVNOs | 21.3% | 22.2% | 0.9% | $31.58 | $31.58 | 0.0% |
| Combined | 100.0% | 100.0% | 0.0% | $31.89 | $32.16 | 0.9% |
| Market Elasticity | -0.55 | -0.58 | | | | |
| Total Subscribers (000s) | 93,466 | 92,618 | | | | |
| Industry Revenue (000s) | $35,767,399 | $35,744,860 | | | | |
| Consumer Surplus Loss (000s) | | -$576,840 | | | | |

Sources: 20th Mobile Wireless Competition Report, p. 15; 2017 Company Annual Reports.

Notes: Post-merger results produced from simulation. Marginal costs calculated Brattle. See Table 12. Pre-merger ARPU for AT&T and Verizon calculated from model calibration.

Continued from previous page

incremental costs, the market elasticity, and price sensitivity parameter). These calibrated parameters, data, and equations are then used together to simulate the merger scenario.

While our prepaid merger simulations include an MVNO presence via TracFone, we do not attempt to model the effect in the prepaid segment from the consolidation of Sprint and T-Mobile as wholesale suppliers to MVNOs, nor do we attempt to model in this simulation any vertical pricing effects. As explained further below, each of these effects would tend to induce higher wholesale prices for MVNOs as a result of the merger, further increasing the overall price effect in the downstream, prepaid wireless segment.

[70] Our analysis includes TracFone in the prepaid segment as an important retail brand, although it is not a facilities-based carrier. As indicated above, TracFone is the largest of the MVNOs, possibly accounting for over half of all wholesale purchases.

Marginal cost for TracFone calculated from model calibration. Other MVNOs ARPU calculated as the weighted average ARPU for Sprint, T-Mobile, and TracFone.

[A]: Share of total connections in 2017 calculated from Company Annual Reports. See Table 13.

[B]: Post-merger share as estimated by simulation.

[C]: ([B] - [A]) / [A].

[D]: Prepaid ARPU for 2017 from Company Annual Reports and model calibration.

[E]: Estimated post-merger price produced from simulation.

[F]: ([E] - [D]) / [D].

"Market" Elasticity estimated from logit model calibration and post-merger simulation.

Total prepaid subscribers from 2017 Company Annual Reports; "Other MVNOs" includes U.S. Cellular. Change in subscribers calculated from simulation.

Industry prepaid revenues calculated as (ARPU x Subscribers) across 5 carriers.

Consumer Surplus Loss calculated from simulation.

### *b. PC-AIDS Postpaid & Prepaid Simulation Results*

Results from our national-level postpaid PC-AIDS merger simulation are presented in Table 23. For each of the four carriers, the table reports pre-merger and post-merger revenue shares and monthly ARPU, along with the percent changes in each. The PC-AIDS merger simulation results indicate that New T-Mobile will increase postpaid prices by approximately 9%, while the corresponding price increases for AT&T and Verizon would be 1.9% and 2.1%, respectively. These price increases are expected to reduce the number of postpaid subscribers by almost 5 million.

**Table 23: Postpaid Merger Simulation Results for 2017, Assuming PC-AIDS Demand**

| Carrier | Pre-Merger Revenue Share [A] | Post-Merger Revenue Share [B] | Change in Revenue Share [C] | Pre-Merger ARPU [D] | Post-Merger ARPU [E] | Pct Chg ARPU [F] |
|---|---|---|---|---|---|---|
| AT&T | 31.5% | 32.2% | 0.7% | $47.79 | $48.68 | 1.9% |
| Verizon | 40.8% | 41.6% | 0.8% | $43.45 | $44.37 | 2.1% |
| Sprint | 12.5% | 11.7% | -0.8% | $46.14 | $50.33 | 9.1% |
| T-Mobile | 13.6% | 12.8% | -0.8% | $46.97 | $50.96 | 8.5% |
| U.S. Cellular | 1.7% | 1.7% | 0.0% | $44.39 | $44.98 | 1.3% |
| Combined | 100.0% | 100.0% | | $45.61 | $47.23 | 3.6% |
| Market Elasticity | -0.55 | -0.55 | | | | |
| Total Subscribers (000s) | 259,303 | 254,214 | | | | |
| Industry Revenue (000s) | $141,779,340 | $144,314,466 | | | | |

Sources: 20th Mobile Wireless Competition Report, p. 15 and 2017 Company Annual Reports.

Notes: Post-merger results produced from simulation. The model is calibrated using Sprint's marginal cost estimate shown in Table 12.

[A]: Total revenue shares are based on 2017 subscriber shares and 2017 Postpaid ARPU. 2017 Company Annual Reports. See Table 8 and Table 9.

[B]: Post-merger segment share as estimated by simulation.

[C]: ([B] - [A]) / [A].

[D]: Postpaid ARPU for 2017 from Company Annual Reports. See Table 9.

[E]: Estimated post-merger price produced from simulation.

[F]: ([E] - [D]) / [D].

Aggregate Elasticity estimated from logit model calibration and post-merger simulation.

Industry postpaid revenues calculated as (ARPU x Subscribers) across 4 carriers.

Results from national-level prepaid PC-AIDS merger simulation are presented in Table 24. For each of the four carriers, the table reports pre-merger and post-merger revenue shares and monthly ARPU along with the percent changes in each. The PC-AIDS merger simulation results indicate that New T-Mobile will increase prepaid prices by approximately 15.5% and 8.2% for the Sprint and T-Mobile brands, respectively, while the corresponding price increases for AT&T, Verizon, and TracFone would be approximately 2% each. These price increases are expected to reduce the number of postpaid subscribers by approximately 2 million.

**Table 24: Prepaid Merger Simulation Results for 2017, Assuming PC-AIDS Demand**

| Carrier | Pre-Merger Revenue Share [A] | Post-Merger Revenue Share [B] | Change in Revenue Share [C] | Pre-Merger ARPU [D] | Post-Merger ARPU [E] | Pct Chg ARPU [F] |
|---|---|---|---|---|---|---|
| AT&T | 17.0% | 17.8% | 0.8% | $33.05 | $33.81 | 2.3% |
| Verizon | 5.9% | 6.3% | 0.3% | $32.82 | $33.50 | 2.1% |
| Sprint | 11.4% | 9.6% | -1.8% | $37.67 | $43.52 | 15.5% |
| T-Mobile | 26.9% | 25.6% | -1.3% | $38.69 | $41.88 | 8.2% |
| TracFone | 17.7% | 18.5% | 0.8% | $22.83 | $23.36 | 2.3% |
| Other MVNOs | 21.1% | 22.2% | 1.1% | $31.58 | $32.21 | 2.0% |
| Combined | 100.0% | 100.0% | | $32.45 | $33.78 | 4.1% |
| Market Elasticity | -0.55 | -0.55 | | | | |
| Total Subscribers (000s) | 93,466 | 91,362 | | | | |
| Industry Revenue (000s) | $35,767,399 | $37,816,005 | | | | |

Sources: 20th Mobile Wireless Competition Report, p. 15 and 2017 Company Annual Reports.

Notes: Post-merger results produced from simulation. The model is calibrated using Sprint's marginal cost estimate shown in Table 12.

[A]: Total revenue shares are based on 2017 subscriber shares and 2017 Postpaid ARPU. Company Annual Reports. We model Other MVNO's as 15 equally sized brands. See Table 13 and Table 14.

[C]: Post-merger segment share as estimated by simulation.

[C]: ([B] - [A]) / [A].

[D]: Prepaid ARPU for 2017 from Company Annual Reports. See Table 14.

[E]: Estimated post-merger price produced from simulation.

[F]: ([E] - [D]) / [D].

Aggregate Elasticity estimated from logit model calibration and post-merger simulation.

Total prepaid subscribers from 2017 Company Annual Reports. Change in subscribers calculated from simulation.

Industry prepaid revenues calculated as (ARPU x Subscribers) across carriers.

### 3. Conclusions on Unilateral Effects in Retail Market

Both the price pressure screens and the more complex merger simulations provide consistent evidence indicating that a Sprint/T-Mobile merger would likely result in unilateral price increases. While the GUPPI price pressure screen provides a qualitative assessment of the likely price effects, the results from preliminary merger simulations indicate that New T-Mobile would increase its prices in the range of 4% to 10% following the merger.

## D. Unilateral Effects in the Wholesale Market

As shown in Table 13, TracFone and at least 58 other MVNOs account for approximately 45% of prepaid subscribers. We estimate that Sprint and T-Mobile account for over 60% of wholesale connections to MVNOs.[71] Given the MVNOs' relatively large share of prepaid wireless connections, the important role that Sprint and T-Mobile play in supplying MVNOs with network access, and the fact that prepaid MVNOs compete against Sprint and T-Mobile in the retail prepaid segment, we evaluate the effect of the merger on New T-Mobile's unilateral pricing incentives to raise its prepaid rivals' wholesale costs.

We assess New T-Mobile's incentives to increase wholesale prices using a Vertical Gross Upward Pricing Pressure Index ("vGUPPI") screen.[72] The vGUPPI screens evaluate the incentives to

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[71] Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

Sprint and T-Mobile accounted for 13.6 million and 13.9 million of wholesale connections, respectively. AT&T and Verizon accounted for roughly 15 million wholesale connections combined.

[72] Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring unilateral pricing incentives in vertical mergers." *Antitrust LJ* 79 (2013): 185.

foreclose using prices.[73] Our analysis focuses on the "upstream vGUPPI", which measures T-Mobile and Sprint's upstream pricing incentives in selling to downstream MVNOs that compete against Sprint and T-Mobile in the retail prepaid segment. The vGUPPI calculation weighs the incremental value from diverted downstream sales against the lost wholesale revenues resulting from the input price increase.

Because both Sprint and T-Mobile already compete in both vertical segments (i.e., the wholesale and prepaid retail segments), we focus on New T-Mobile's incremental change in incentives to raise MVNOs' costs relative to the pre-merger, standalone incentives of Sprint and T-Mobile. That is, we focus on New T-Mobile's incentive to raise wholesale prices for (pre-merger) T-Mobile MVNO partners as a result of recapture of retail prepaid revenue through Sprint's wholesale MVNO partners, an incentive which was absent when T-Mobile was determining prices with its MVNO partners. And we also focus on New T-Mobile's incentive to raise wholesale prices for (pre-merger) Sprint MVNO partners as a result of recapture of retail prepaid revenue through T-Mobile's wholesale MVNO partners, an incentive which was absent when Sprint was determining prices with its MVNO partners.

Our analysis considers two measures of vGUPPI: The first is a simple vGUPPI screen that assumes that the targeted MVNO retailer (e.g., TracFone) is unable to switch to an alternative wholesaler in response to a wholesale price increase from either Sprint or T-Mobile. The second vGUPPI calculation accounts for the targeted MVNO's ability to find an alternative host network in response to New T-Mobile's wholesale price increases.

Like the horizontal GUPPI presented above, the vGUPPI is the product of a diversion ratio, a profit margin and a price ratio.[74] The vGUPPI calculation that accounts for input substitution requires additional inputs related to Sprint and T-Mobile's wholesale margins and the MVNO's ability to pass through cost increases to consumers. Publically available information that would allow us to estimate Sprint and T-Mobile's wholesale margins and allow us to estimate the MVNO's pass-through rate is not available. Thus, we assume that Sprint and T-Mobile earn a

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[73] The traditional vertical arithmetic focuses on foreclosure through non-price means (e.g., refusals to deal).

[74] Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring unilateral pricing incentives in vertical mergers." *Antitrust LJ* 79 (2013): 185.

gross margin percentage on their wholesale sales to MVNOs that is equal to the margin the MVNO earns on its retail prepaid sales. Our analyses further assumes that the MVNO has a pass-through rate of 0.5 – implying that a $1 increase in its costs results in a $0.50 increase in the retail prices the MVNO charges its customers. Higher pass-through rates would imply higher vGUPPI values.

The results of both vGUPPI screens are presented in Table 25. For this analysis, we examine the vGUPPI based on ARPU information for TracFone, which, prior to the merger, has contracts with both T-Mobile and Sprint. Both screens indicate that New T-Mobile would have significant increases in its incentives to raise the wholesale prices on TracFone's wholesale contracts.

**Table 25: vGUPPI Calculation for TracFone**

| Item | Quantity of Interest | Source | |
|---|---|---|---|
| [A.1] | Diversion Ratio - TracFone to Sprint | *Diversion ratios assume proportional diversion of prepaid subscriber shares.* | 10% |
| [A.2] | Diversion Ratio - TracFone to T-Mobile | | 24% |
| [B.1] | Retail Prepaid Margin - Sprint | *See horizontal GUPPI margin table for prepaid segment.* | 41% |
| [B.2] | Retail Prepaid Margin - T-Mobile | | 45% |
| [C.1] | Price - Sprint | *See Logit & PC-AIDS results tables for prepaid segment.* | $37.67 |
| [C.2] | Price - T-Mobile | | $38.69 |
| [C.3] | Price - Tracfone | | $22.83 |
| [D.1] | Wholesale Price - Sprint to Tracfone | *Wholesale prices are from Table 12.* | $7.35 |
| [D.2] | Wholesale Price - T-Mobile to Tracfone | | $5.91 |
| [E.1] | vGUPPIu w/out Input Substitution - Sprint | ([A.2] x [B.2] x [C.2] / [D.1]) | **55.4%** |
| [E.2] | vGUPPIu w/out Input Substitution - T-Mobile | ([A.1] x [B.1] x [C.1] / [D.2]) | **26.8%** |
| [F.1] | *Tracfone Pass Through Rate* | Assumed | 50.0% |
| [F.2] | *Demand elasticity: Retail* | From Prepaid Logit Model Calibration | -0.825 |
| [F.3] | *Tracfone Gross Margin* | From Prepaid Logit Model Calibration | 0.777 |
| [G.1] | vGUPPIu with Input Substitution - Sprint | ([A.2] x [B.2] x [C.2] / [D.1]) / (1/[F.3] + [F.2][F.1][D.1]/[C.3]) | **48.0%** |
| [G.2] | vGUPPIu with Input Substitution - T-Mobile | ([A.1] x [B.1] x [C.1] / [D.2]) / (1/[F.3] + [F.2][F.1][D.2]/[C.3]) | **22.7%** |

Note: See Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring unilateral pricing incentives in vertical mergers." *Antitrust LJ* 79 (2013): 185.

# IV. Coordinated Effects

## A. The Mobile Voice/Broadband Market Is Suitable for Tacit Collusion

The mobile voice/broadband market can be partitioned into retail (postpaid and prepaid), enterprise (corporations and governments), and wholesale segments. This discussion will focus on the retail segments, particularly the postpaid segment.

A market is suitable for tacit collusion if it is conducive to firms coordinating on a stable collusive arrangement. There is a well-accepted set of market traits that determines a market's suitability for establishing and maintaining collusive prices.[75] One such market trait is transparent pricing, meaning that firms can easily and quickly observe rival firms' prices. Transparent pricing is instrumental to firms coordinating on supracompetitive prices, such as through the use of price leadership. Transparent pricing is also instrumental to stability, as the maintenance of supracompetitive prices requires that firms are able to monitor other firms for compliance and then quickly retaliate with lower prices. When prices are transparent, detection of a deviation is quick and retaliation can be swift.

The stability of a collusive arrangement also requires controlling potentially disruptive forces such as large buyers and the supply of firms not part of the collusive arrangement. Large buyers can disrupt attempts by firms to enact common price increases by threatening not to buy, finding alternative sources of supply, or representing a sizeable chunk of market demand that is sufficient to induce discounting or other forms of chiseling on a price agreement. Even if all firms comply with setting supracompetitive prices, collusion can be undermined by entry into the market and the expansion of fringe suppliers. The loss of sales to entrants and fringe suppliers can cause colluding firms to lower their prices to reclaim sales, which could destabilize a collusive arrangement.

In the context of the proposed merger between AT&T and T-Mobile in 2011, the Antitrust Division of the U.S. Department of Justice recognized that the wireless market was suitable for collusion because of "transparent pricing, little buyer-side power, and high barriers to entry and expansion."[76] Regarding those market traits, little has changed in the last six years and, as a result, the wireless retail market (both postpaid and prepaid) remains suitable for tacit collusion.

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[75] These traits can be found in Motta, Massimo. *Competition policy: theory and practice*. Cambridge University Press, 2004, Chapter 4.2.

[76] "Certain aspects of mobile wireless telecommunications services markets, including transparent pricing, little buyer-side market power, and high barriers to entry and expansion, make them particularly conducive to coordination." Complaint, *U.S. v. AT&T Inc., T-Mobile USA, Inc., and Deutsche Telekom AG,* 1:11-cv-01560, 2011 U.S D.D.C., August 31, 2011, ¶ 36.

Transparent pricing is present in the retail market because firms post their prices online and in stores, and they extensively advertise them.[77] In 2016 alone, the four national wireless carriers collectively spent over $9 billion on advertising.[78] While firms primarily disseminate price and plan information to inform consumers, rival firms will also easily and quickly learn those prices and plans. This price transparency is further enhanced by a general policy of nationwide pricing by network operators.[79]

In addition, the plans that network operators offer have become more similar since 2011. Currently, AT&T, Sprint, T-Mobile, and Verizon all offer plans that provide unlimited talk, text, and data. All providers offer plans that provide high-speed LTE data, and each carrier slows the data speed of high usage customers during periods of congestion.[80] Verizon and AT&T also offer lower-tier unlimited plans which are subject to such congestion-related data speed reductions regardless of monthly usage. The frequency of network congestion is likely to vary across providers, and even with these selective speed reductions, all users are likely to experience slower speeds during congested periods. All four carriers' top-tier unlimited plans include "mobile hotspots" which allow a customer to use their device as a Wi-Fi network for other

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77 Sprint, for example, lists prices for all four national carriers on its website, along with a comparison of other plan features. "Sprint Unlimited data, talk & text cell phone plans," Sprint, available https://www.sprint.com/en/shop/plans/unlimited-cell-phone-plan.html?ECID=vanity:unlimited, accessed August 6, 2018.

78 In 2016, AT&T spent $3.8 billion on advertising, while Verizon spent $2.7 billion, Sprint spent $1.1 billion, and T-Mobile spent $1.7 billion. See 20th Mobile Wireless Competition Report, ¶ 67.

79 Nineteenth Report, *In the Matter of Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services,* WT Docket No. 16-137, FCC, September 23, 2016, fn. 227, https://apps.fcc.gov/edocs_public/attachmatch/DA-16-1061A1.pdf, accessed August 23, 2018 (19th Mobile Wireless Competition Report).

80 Verizon's and AT&T's thresholds are 22 GB/month, Sprint's and T-Mobile's are 50 GB/month. See "Unlimited Data Plans," AT&T, available https://www.att.com/plans/unlimited-data-plans.html, accessed August 18, 2018; "Unlimited," Verizon, available https://www.verizonwireless.com/plans/verizon-plan/, accessed August 17, 2018; "Sprint Unlimited data, talk & text cell phone plans," Sprint, available https://www.sprint.com/en/shop/plans/unlimited-cell-phone-plan.html?ECID=vanity:unlimited, accessed August 6, 2018; and "T-MobileONE," T-Mobile, available https://www.t-mobile.com/cell-phone-plans?icid=WMM_TM_Q117TMO1PL_H85BRNKTDO37510, accessed August 6, 2018.

internet-capable devices, though each carrier limits usage in some way.[81] Except for Sprint, each carrier also offers some form of international calling or roaming in their plans.[82] The similarity in plans makes coordination on prices easier. In sum, transparency with respect to prices (as well as plan features) is present in the retail market, and that is a market trait conducive to tacit collusion.

There is little buyer-side power in the retail market because buyers are largely individual consumers. In reviewing the AT&T/T-Mobile proposed merger, Commission staff found that transparent pricing and minimal buyer power are present in the retail market (and are conducive to collusion):

> The transparency of prices (firms post and publicize them to market their plans), small size of individual retail transactions relative to the size of the market, and the common use of contracts by postpaid customers, make it likely that cheating on a coordinated consensus would be detected rapidly and matched (or otherwise punished).[83]

The market has become more suitable for tacit collusion on prices since 2011 because the four network operators have not used long-term service contracts since late 2015. Hence, the consequences of a punitive price war (in response to a firm having undercut the collusive price) will be more severe, for those lower prices will apply not just to new customers but also to many of a firm's existing customers. The threat of such a price war will then be a more effective deterrent, and that makes for a more stable collusive arrangement.

Collusion in the mobile voice/broadband market is also facilitated by high barriers to entry by facilities-based service providers and barriers to expansion by fringe suppliers (which include resellers and MVNOs). Entry by a facilities-based service provider is difficult, as it would require

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81 Verizon and AT&T reduce speed after 22 GB/month, Sprint and T-Mobile after 50 GB/month. See "Unlimited Data Plans," AT&T, accessed August, 18, 2018, https://www.att.com/plans/unlimited-data-plans.html; "Unlimited," Verizon, accessed August 17, 2018, https://www.verizonwireless.com/plans/verizon-plan/; "Sprint Unlimited data, talk & text cell phone plans," Sprint, accessed August 6, 2018, https://www.sprint.com/en/shop/plans/unlimited-cell-phone-plan.html?ECID=vanity:unlimited; and "T-MobileONE," T-Mobile, accessed August 6, 2018, https://www.t-mobile.com/cell-phone-plans?icid=WMM_TM_Q117TMO1PL_H85BRNKTDO37510.

82 Plan details for each carrier were collected from the carriers' websites on August 6, 2018.

83 FCC Staff Report, ¶ 77.

a massive investment in spectrum and physical infrastructure. A facilities-based entrant would first need access to spectrum. Consequently, access to spectrum is a significant barrier to entry.

Even if an entrant could potentially acquire sufficient spectrum, the cost to acquire that spectrum would be high. The average spectrum holdings for the four largest providers are 141.1 MHz, and the minimum spectrum holdings for a national provider are 109.8 MHz.[84] The preferred deployment of LTE networks is in 20 MHz channels. Even assuming a new entrant would be able to deploy more efficiently than incumbents (that is, with no legacy 2G or 3G networks using some of their spectrum), an entrant would likely need at least 40 MHz, but possibly as much as 60 MHz or 80 MHz, depending on its market ambitions.[85] A national network of cell sites would require around 50,000 sites.[86] Other network infrastructure, customer acquisition costs, and overhead would require additional up-front costs.

A second source of entry is from fringe supply in the form of resellers and MVNOs which, rather than own a network, lease parts of the networks of network operators. However, absent new regulations or merger conditions, fringe supply would not be an effective constraint on the setting of supracompetitive prices by the network operators because the network operators *control* the cost and quality of service and the capacities of MVNOs.[87]

MVNOs need access to the networks of the network operators and, therefore, network operators can control how much those suppliers can expand. Even when given access, network operators control the form of that access (as MVNO contracts with MNOs do not necessarily include "core control") which affects the quality of service and limits the type of services that can be provided by the MVNO. Finally, network operators set the wholesale prices that are charged to resellers and MVNOs for access. If the contractual relationship between an MVNO and a network

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[84] See Table 28.

[85] A potential entrant interested in achieving only 5% of the market may in principle operate its network using only 20 MHZ of LTE spectrum. However, as the target market share increases, more spectrum will be needed to effectively compete in quality with the other carriers.

[86] AT&T, Verizon, Sprint, and T-Mobile all have more than 50,000 cell sites as of 2015. John C. Hodulik, Batya Levi, Lisa L. Friedman, and Christopher Schoell, "UBS Evidence Lab: Switching intent on the rise," UBS, Version 59, March 2, 2016, Figure 75.

[87] The FCC does not regulate the terms of MVNO agreements. As the following discussion suggests, this implies that network operators can effectively control the type, quantity, and price of the services that an MVNO can offer.

operator ties the wholesale price paid by the MVNO to the retail prices set by the network, then any rise in retail prices due to collusion would automatically translate into higher wholesale rates, and that would limit the expansion of MVNOs. With all of these instruments at their disposal, network operators can prevent fringe supply from being a disruptive force if network operators were to collude.

A market's suitability for tacit collusion could also depend on the extent of switching costs faced by consumers. Switching costs refer to the costs that a consumer incurs to change its supplier.[88] The presence of switching costs causes a firm's demand to be less sensitive to its price because a firm's existing customers are less inclined to leave and rival firms' customers less inclined to come. In the mobile voice/broadband market, switching costs are the costs associated with a consumer changing his or her provider.

Switching costs affect the stability of a collusive arrangement. On the one hand, higher switching costs mean that a firm undercutting the collusive price will lure fewer customers from rival firms. That makes deviation less attractive and, therefore, collusion more stable. On the other hand, once having lured those customers through a price cut, switching costs will keep them with the firm and that enhances the profits from each customer taken from a rival firm; hence, deviation is more attractive and, therefore, collusion is less stable. The net effect of higher switching costs on the stability of tacit collusion is ambiguous.

Consider the costs from switching providers in the mobile voice/broadband market. As in any market, there are the time and psychological ("hassle") costs of researching different providers, contacting the current provider to end service, and contracting with the new provider to begin service.[89] Potentially more significant are termination fees associated with exiting a contract early. However, these have fallen as the industry has moved away from long-term contracts. Before 2013, customers who received subsidized phones faced early termination fees if they wanted to change providers prior to the conclusion of their contract term. Since all the national carriers have stopped requiring long-term contracts, customers are able to move between carriers

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88 Farrell, Joseph, and Paul Klemperer. "Coordination and lock-in: Competition with switching costs and network effects." *Handbook of industrial organization* 3 (2007): 1967-2072.

89 These "hassle costs" of switching have been estimated at around $40-$88. Weiergräber, Stefan. "Network effects and switching costs in the US wireless industry." (2014); Sonley, Laura. "Consumer Switching Costs in Mobile Telecommunications." PhD diss., Carleton University Ottawa, 2014.

without facing early termination fees. However, for customers who opt to purchase a phone using an installment plan, the remaining balance on the phone must be paid off if the customer switches to a different provider.[90]

Given that switching costs have declined, one would expect the incidence of customers changing their wireless provider to increase. However, this has not been the case in the U.S. where subscriber "churn"—which measures the proportion of customers who leave their current provider in a given time period—has been generally steady or declining for each of the national carriers between 2012 and 2016.[91] Over this time period, churn rates for Verizon, AT&T, and Sprint have remained relatively flat, while the churn rate for T-Mobile has fallen by half. In 2011, T-Mobile had the highest churn rate in the industry, with over 3.5% of its customers leaving each month compared to 2.25% for Sprint, and 1.2%-1.4% for Verizon and AT&T. By 2016, T-Mobile's churn rate was only 1.7% compared to Sprint's 2.18% and Verizon and AT&T's 1.25%-1.5%.[92] These figures indicate that wireless customers have been no more likely, and, in the case of T-Mobile, significantly less likely, to switch wireless providers today than they were when early termination fees and long term contracts imposed relatively higher switching costs.

Between 2014 and 2016, T-Mobile's network quality improved substantially relative to AT&T and Verizon.[93] A potential explanation for the declining churn rates for T-Mobile relative to the other carriers is due to this narrowing of the quality gap between the providers' services. By 2016 the difference in network coverage between T-Mobile, Verizon, and AT&T was substantially smaller than it was in the early 2010s. This decline in the quality differential along with the convergence in pricing illustrated in Table 9 has reduced the difference between providers in terms of both price and quality. Prior to these shrinking differences, consumers could select a

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90 T-Mobile, "Equipment Installment Plan (EIP)," available https://support.t-mobile.com/docs/DOC-1674, accessed August 6, 2018.

91 Seventeenth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 13-135, FCC, December 18, 2014, p. 15, available https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1862A1_Rcd.pdf, accessed August 6, 2018 (17th Mobile Wireless Competition Report.); 20th Mobile Wireless Competition Report, p. 18.

92 17th Mobile Wireless Competition Report, p. 15; 20th Mobile Wireless Competition Report, p. 18.

93 "State of Mobile Networks: USA (February 2016)," *OpenSignal*, available https://opensignal.com/reports/2016/02/usa/state-of-the-mobile-network, accessed August 15, 2018.

lower-price but lower-quality network from Sprint or T-Mobile or they could opt for a higher-price, higher-quality network in AT&T or Verizon. If consumers' preferences between price and quality change over time, or if customers experience a shock in terms of price increases or unexpected quality issues that might induce them to switch wireless providers. The convergence of price and quality among the carriers could reduce the incentive for current subscribers to change providers and thus explain how the absence of a rise in churn rates is consistent with lower switching costs.

The Salop/Sarafidis Declaration argues that the presence of switching costs makes tacit collusion among firms in the mobile phone industry difficult.[94] However, given the ambiguous effect of switching costs on the stability of collusion and that switching costs have declined in the mobile voice/broadband market, our conclusion is that switching costs are not a significant factor when evaluating the suitability of the mobile voice/broadband market for tacit collusion.

In sum, transparent pricing makes it feasible for firms to coordinate on supracompetitive prices and to monitor for compliance with those prices. Little buyer-side power and high barriers to entry and expansion of fringe supply are conducive to the stability of a collusive arrangement. We conclude that the postpaid and prepaid retail segments are suitable for tacit collusion.

Before concluding our evaluation of the retail mobile voice/broadband market, it is worth noting a comparable market for which there was evidence of tacit collusion. Paul MacAvoy studied the market for long-distance telephone services in the late 1980's and early 1990's.[95] Like wireless, this market involved telecommunication services and was characterized by transparent pricing, little buyer-side power, high entry barriers, and some switching costs. During the period of the MacAvoy study, the long-distance telephone services industry was dominated by three firms—AT&T, Sprint, and MCI—and, if the Applicants' merger were to occur, so would the wireless industry with AT&T, New T-Mobile, and Verizon. Professor MacAvoy concluded that pricing behavior is "consistent not with price competition but rather with emerging tacit collusion

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94 Salop/Sarafidis Declaration, ¶82.

95 MacAvoy, Paul W., "Tacit Collusion Under regulation in the Pricing of Interstate Long□Distance Telephone Services," *Journal of Economics & Management Strategy* 4, no. 2 (1995): 147-185.

among AT&T, MCI, and Sprint."[96] At a minimum, this study suggests that tacit collusion is plausible in the mobile voice/broadband market.

Turning to the enterprise (corporations and governments) and wholesale (MVNOs) markets, our assessment is that they are distinctly less suitable for tacit collusion. The most substantive obstacle to tacit collusion on prices is the lack of transparent pricing. Given that customers in those markets are not small, enterprise customers can use RFPs and consultants to negotiate prices, which means that prices are confidential and not public information.[97] Given that a firm cannot then easily and quickly learn of rival firms' prices in the enterprise and wholesale markets, coordination on prices is difficult, as is monitoring for compliance.[98] Secondly, the fact that some buyers in the enterprise and wholesale markets are large introduces a potential source of instability due to buyer power (though there have been many successful episodes of collusion when there is significant buyer power).

However, barriers to entry to the enterprise and wholesale markets are probably at least as high as with retail markets. Furthermore, MVNOs are generally even less of a factor in the enterprise market than in the retail market, because governments and businesses often want the broader coverage that only national network operators are able to deliver. There is the possible exception that regional operators (like U.S. Cellular) may be able to effectively compete for small businesses and governments that mostly need regional coverage. The wholesale market is currently only supplied by the four network operators and there is no meaningful source of alternative supply.

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[96] MacAvoy, Paul W., "Tacit Collusion Under regulation in the Pricing of Interstate Long Distance Telephone Services." *Journal of Economics & Management Strategy* 4, no. 2 (1995): p. 147.

[97] Jarrett, Douglas, "Understanding the Business Deal in Wireless and Wireline Services Agreements," *Beyond Telecom Law Blog*, May 23, 2011, available https://www.beyondtelecomlawblog.com/understanding-the-business-deal-in-wireless-and-wireline-services-agreements/, accessed August 6, 2018.

[98] Cartels in markets such as the enterprise wireless market, where price transparency is lacking, often coordinate on a market allocation scheme (e.g., each firm is allocated a sales quota) and then monitor it with respect to sales. Thus, sales monitoring replaces price monitoring. See Harrington Jr, Joseph E. "How do cartels operate?" *Foundations and Trends® in Microeconomics* 2, no. 1 (2006): 1-105; Marshall, Robert C., and Leslie M. Marx, *The Economics of Collusion: Cartels and Bidding Rings*. MIT Press, 2012. While coordinating and monitoring a market allocation scheme is feasible when firms engage in express communication, it is not clear how effectively it could be done using more tacit means.

In conclusion, the determinative factor in the enterprise and wholesale markets is the lack of transparent pricing and, on those grounds, the enterprise and wholesale markets do not appear particularly suitable for tacit collusion.

## B. Would the Merged Firm be a "Maverick"?

### 1. T-Mobile's Maverick Strategy

For years, T-Mobile has been viewed as a maverick firm disrupting the industry to the benefit of consumers.[99] In its review of the proposed AT&T/T-Mobile transaction, Commission staff noted T-Mobile's history of acting as a maverick,[100] introducing innovations related to customer usage, pricing, and network improvements.

Over the years, T-Mobile has introduced many innovations that provide its subscribers with various forms of unlimited calling and data use.[101] With respect to pricing innovations, T-Mobile was the first nationwide carrier to eliminate the typical two-year contract and offer month-to-month postpaid plans without early termination fees (2008) and to allow subscribers who were not on a long-term contract to pay for a new device in interest-free installments (2008).[102] In addition, T-Mobile also caused other carriers to accelerate network improvements, such as deployment of High Speed Packet Access ("HSPA+"): T-Mobile was the first carrier to deploy HSPA+ throughout its network, which caused AT&T to accelerate its own deployment.[103] The

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99 For a discussion of mavericks in the context of merger analysis, see Horizontal Merger Guidelines, Sections 2.1.5, 5.3, and 7.1.

100 FCC Staff Report, ¶ 24.

101 For example, T-Mobile was the first carrier to offer unlimited Wi-Fi calling to customers who subscribed to its Hotspot data plans through its Unlimited Hotspot Calling (2007) and T-Mobile Hotspot @Home (2008) offerings. It also was the first carrier to allow subscribers who reached their monthly data cap to continue using data (albeit, at slower speeds) without incurring overage fees (2010), and the first carrier to extend unlimited sharing in family plans to text and data allowances (2011). See FCC Staff Report, ¶ 24.

102 T-Mobile also offered customers a prepaid plan without an up-front deposit, at the same rates as postpaid subscribers pay through its Flex Pay plan in 2008. FCC Staff Report, ¶ 24.

103 HSPA+ was the technology for GSM providers, such as AT&T and T-Mobile, prior to the development of Long Term Evolution (LTE) networks. Fifteenth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile*

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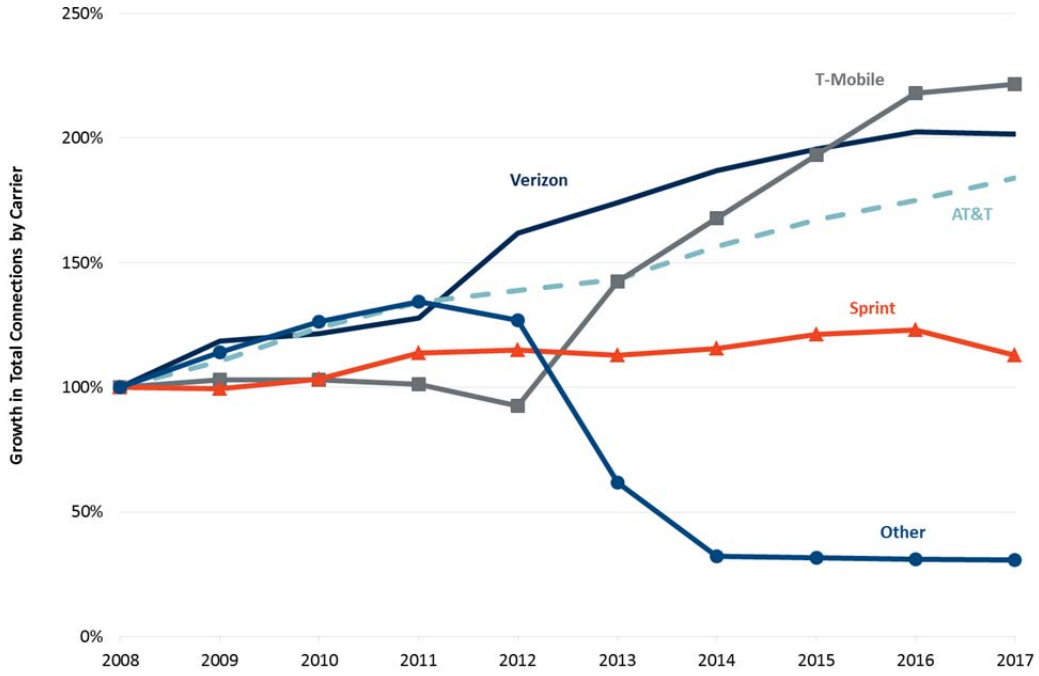
success of T-Mobile's strategy can be seen in its higher rate of customer growth. As shown in Figure 4, T-Mobile has seen its total number of wireless connections more than double since 2012, at a pace faster than any other carrier.

**Figure 4: Growth in Total Wireless Connections by Provider, 2008-2017**




Sources: Sixteenth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 11-186, FCC, March 21, 2013, p. 55, available https://apps.fcc.gov/edocs_public/attachmatch/FCC-13-34A1_Rcd.pdf, accessed August 23, 2018 (16th Mobile Wireless Competition Report.); 19th Mobile Wireless Competition Report, p. 11; 20th Mobile Wireless Competition Report, p. 15; Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

In recent years, T-Mobile has continued to disrupt the market by improving its service offerings, often causing other national carriers to follow. Notably, T-Mobile was the first carrier to

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*Services*, WT Docket No. 11-103, FCC, June 24, 2011, pp. 76 and 243-244, available https://docs.fcc.gov/public/attachments/FCC-11-103A1.pdf, accessed August 22, 2018 (15th Mobile Wireless Competition Report).

reintroduce unlimited data offerings in 2016 and included taxes and fees in the plan's advertised price.[104] However, its competitive pressure on prices has decreased, likely reflecting the improvement of its network and the parallel increase in its market share.[105]

### 2. New T-Mobile Would Have Reduced Incentives for a Maverick Strategy

The impact of this proposed merger could well turn on whether or not the merged firm continues to be a maverick. We first describe the possible rationales for T-Mobile having been a maverick and then explain why those rationales may no longer be relevant after a merger with Sprint.

A maverick is a "firm that plays a disruptive role in the market to the benefit of customers."[106] T-Mobile's decision to be a maverick reflects a decision to adopt a strategic plan to compete aggressively. To be able to predict whether New T-Mobile would be a maverick, it is necessary to determine why T-Mobile has chosen to be a maverick and whether that rationale would persist after a merger with Sprint.

A plan of aggressive competition is costly to a firm, whether it means lower revenues from lower prices or higher cost from unlimited plans and any other feature of its offerings that serve to attract consumers. At its most basic level, as the Salop/Sarafidis Declaration notes,[107] T-Mobile's maverick strategy is about foregoing some short-run profit in order to gain more subscribers,

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104 Tara Donnelly, "T-Mobile's Unlimited Family Plan Deal: 4 Lines for the Price of 3," *WhistleOut,* September 9, 2016, available https://www.whistleout.com/CellPhones/News/t-mobile-unlimited-family-plan-deal-4-lines-for-the-price-of3, accessed August 6, 2018; Chaim Gartenberg, "Why Every US Carrier Has a New Unlimited Plan," The Verge, February 17, 2017, https://www.theverge.com/2017/2/17/14647870/us-carrier-unlimited-plans-competition-tmobile-verizon-att-sprint, accessed August 18, 2018.

105 T-Mobile's current unlimited plan pricing and T-Mobile's pricing of a single smartphone plan including the Equipment Installment Plan are in line with the pricing of similar plans by Verizon and AT&T. Also, in recent years T-Mobile has significantly improved the quality of its network, and its market share has increased by nearly 40% since 2014. See "State of Mobile Networks: USA (February 2016)," *OpenSignal*, available https://opensignal.com/reports/2016/02/usa/state-of-the-mobile-network, accessed August 15, 2018; Table 8.

106 Horizontal Merger Guidelines, p. 3.

107 Salop/Sarafidis Declaration, ¶ 56.

more sales, more market share, and ultimately greater profits. A maverick strategy is an investment, where the cost of investment is lower short-run profit in the short term due to lower revenues or higher costs, and the benefit of the investment is higher future profits from a large customer base.

The higher future profit can come from demand-side or supply-side effects. The demand-side effect is most likely due to switching costs. The relevance of switching costs is that, all else the same, it is easier for a firm to retain an existing customer than to attract new customers because existing customers must overcome switching costs to leave, while new customers either face no switching costs (if they are new to the market) or incur switching costs to come (if they are currently being supplied by another provider). As switching costs cause existing customers to be "locked in" to some degree, existing customers are less responsive to the firm's price than are potential new customers. While the firm would then like to charge existing customers a higher price than new customers, that is not done in practice and is generally not feasible (though a firm might be able to offer some initial enticements to a new customer).[108] In deciding on its price, a firm balances a desire to price higher in order to earn more profit from existing customers, with a desire to price lower in order to attract new customers. The more existing customers that a firm has relative to the number of potential new customers (for which market share is a good proxy), the more its price decision is driven by extraction of profit from existing customers rather than attracting new customers. Hence, *a firm's optimal price is increasing its market share*, which is a crucial property of a market in which customers face some switching costs, such as the mobile voice/broadband market.[109] T-Mobile has been pursuing a maverick strategy of low pricing in order to build up its customer base. That makes sense given its low market share (compared to AT&T and Verizon) for then the gain in new customers more than offsets the foregone revenue from existing customers. It is essential to emphasize that the future return from building a customer base is only realized when the firm starts charging higher prices to those locked-in customers.

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[108] When multi-year term contracts were offered, they were able to price discriminate between existing and new customers, especially in a market like wireless with rapidly declining unit prices.

[109] "[A] firm with more locked-in customers has more incentive to charge a high price to exploit them, and so sets high prices with greater probabilities than its rival." Farrell, Joseph, and Paul Klemperer. "Coordination and lock-in: Competition with switching costs and network effects." *Handbook of Industrial Organization* 3 (2007): 1967-2072.

On the supply-side, there could be scale economies from serving more customers. For example, economies of scale may be achieved by adding customers and spectrum to an existing network, because individual cell sites will be able to serve more customers reducing the average cost per customer.[110] Scale economies are also present when marketing and advertising expenses and also customer care and marketing costs are spread over a larger customer base.

In summary, the takeaway from the preceding discussion is that T-Mobile's past aggressive conduct reflects a strategic decision to forego short-run profit in exchange for expanding its customer base which will contribute to higher future profit. How would a merger with Sprint affect those rationales for T-Mobile's maverick strategy? Like any investment, a maverick strategy is a temporary foregoing of profits to yield higher profits in the future. The investment is not intended to last forever, but rather only to persist until success (it delivers the intended higher profits) or failure (it is determined not to be a worthwhile investment). Thus, a maverick firm likely will not continue being a maverick once it has become a major firm in the market for, having achieved that status, it is time to cash in on the investment. This is why mavericks are rarely, if ever, market leaders or among the largest firms in a market, but tend to be smaller, less well-established firms.

A merger with Sprint would achieve the goal of T-Mobile's maverick strategy, which is to expand its customer base in order to reap demand-side and supply-side benefits. Not only is the goal reached, but it becomes far more costly to continue to compete aggressively. The larger customer base after the merger would make low prices more costly in terms of foregone profits on that base. It is more sensible to price high in order to reap larger profits on those customers, rather than price low to attract new customers. As already explained above, a firm's optimal price is increasing in its market share. For that reason, a maverick strategy of aggressive pricing is less attractive when a firm has a higher market share, as would be the case with New T-Mobile. With the demand-side and supply-side benefits realized from the expansion of its customer base as a result of the merger, it would not be optimal for New T-Mobile to employ a maverick strategy, just as it is not optimal for AT&T and Verizon to use a maverick strategy. Rather, it would be

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[110] This is true because the costs associated to each cell site include the tower costs and radio equipment costs. If only additional spectrum is used to serve new customers, then the average cost per costumer will go down as the number of customers increase, because tower costs will be divided by a larger customer base.

better for New T-Mobile to stop trying to grow market share and instead focus on increasing margins as, for example, would be done by likely engaging in tacit collusion with AT&T and Verizon.

Consistent with this view, the Salop/Sarafidis Declaration notes that T-Mobile is pursuing a strategy of investing in a larger customer base in the present in order to enjoy higher future profits, and refer to it as "penetration pricing."[111] It is well recognized that penetration pricing can be a profitable strategy because the firm undertaking it can later raise prices on customers once a sufficiently large customer base has been established.[112]

That New T-Mobile would not use a maverick strategy and instead act like AT&T and Verizon in the post-merger market is consistent with Table 28, which shows that the merged firm would be very similar to AT&T and Verizon in terms of total subscriber connections, spectrum holdings, and cell sites. New T-Mobile would have total subscriber connections of 135 million compared to 145 million and 131 million for AT&T and Verizon, respectively.[113] The coverage of the three network operators would be at least 95% of the U.S. population, and the low-band spectrum holdings of New T-Mobile would be almost exactly that of AT&T.[114]

The Salop/Sarafidis Declaration claims that the merged firm will maintain and reinforce T-Mobile's current reputation as the disruptive "Un-carrier" on the grounds that (quoting Peter Ewens) "squandering such a successful Un-carrier business strategy for small incremental profits would be a financial and business disaster for the long-term success of New T-Mobile."[115] If New T-Mobile, along with AT&T and Verizon, raised prices as part of tacit collusion, it is true that their customers would not be pleased, just as no customers are pleased with higher prices. But where would they go? There is no other "Un-carrier" to which customers can turn. The lack of

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111 Salop/Sarafidis Declaration, ¶ 56.

112 Spann, Martin, Marc Fischer, and Gerard J. Tellis. "Skimming or penetration? Strategic dynamic pricing for new products." *Marketing Science* 34, no. 2 (2014): 235-249.

113 See Table 28.

114 See 20th Mobile Wireless Competition Report, Appendix III: Table III.D.ii. Assuming there are no divestitures, New T-Mobile would have far more high-band spectrum than either AT&T or Verizon. See Section V.

115 Salop/Sarafidis Declaration, ¶ 24 (quoting Declaration of Peter Ewens, ¶ 8).

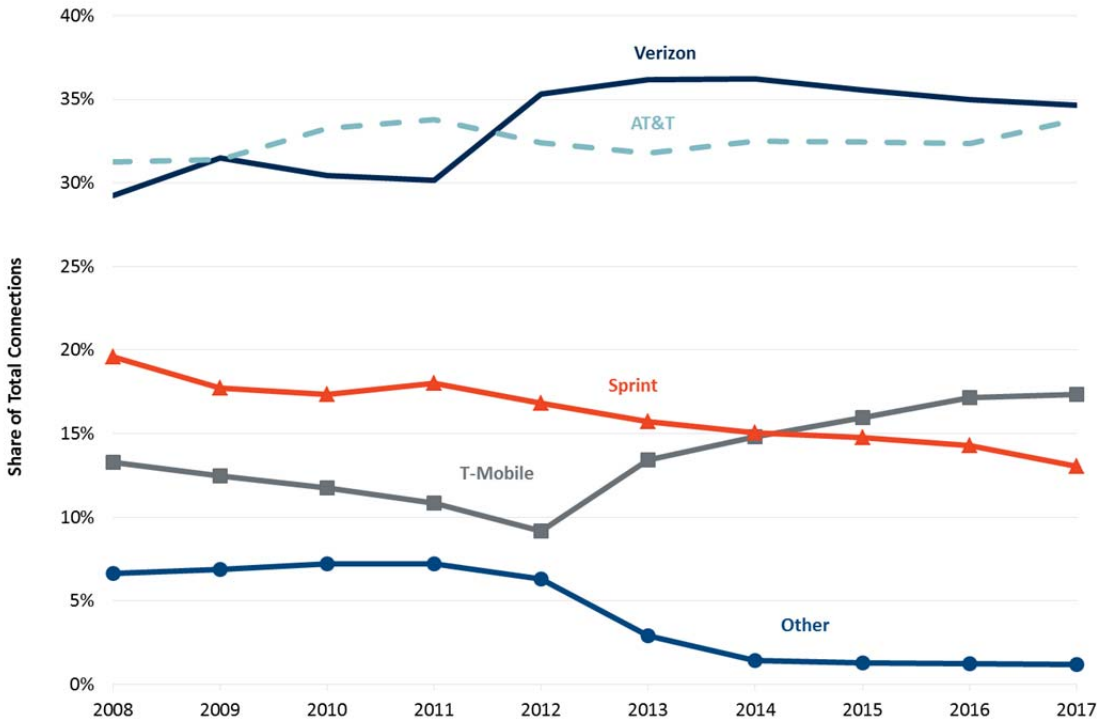
that option for its customers gives New T-Mobile the incentive to replace a maverick strategy with a more accommodating strategy with AT&T and Verizon.

Even if the rationale for T-Mobile using a maverick strategy remained relevant for New T-Mobile, it would not be in the best interests of New T-Mobile to pursue it because of a likely aggressive response from AT&T and Verizon. A maverick strategy can be rational only as long as the other firms do not respond in kind. If they were to respond in kind, then a firm has foregone profits without gaining market share. It makes little sense for a firm to reduce its price when it will cause rival firms to reduce their prices, and thereby thwart its attempt to attract more customers. In that situation, a maverick strategy has lower profit margins without gaining customers. Given that AT&T and Verizon would be likely to match an aggressive strategy of the comparably-sized New T-Mobile, the merged firm would be choosing between intense competition (and little change in market share) and modest competition or collusion (and little change in market share). The latter is more attractive and is made even more so with the enhanced prospect of collusion as a result of the merger.

The Salop/Sarafidis Declaration observes that T-Mobile continued with a maverick strategy after it acquired MetroPCS in 2013, and then comments that it is a good predictor of how T-Mobile would behave after merging with Sprint. Such a prediction is not warranted because the acquisitions are very different in size and character. As seen in Figure 5 below, MetroPCS accounted for less than 5% of total wireless connections.[116] While the acquisition of MetroPCS led to an immediate jump in T-Mobile's connection share, in 2013 T-Mobile (post-acquisition) still remained the fourth largest firm, lagging just behind Sprint (at more than 15% share) and much smaller than AT&T and Verizon (both greater than 30%).

[116] MetroPCS is part of "Other" in Figure 5. Specifically, in 2012 FCC data indicate that MetroPCS held 2.7% of all wireless connections.

**Figure 5: Share of Total Wireless Connections by Provider, 2008-2017**




Sources: 16th Mobile Wireless Competition Report, p. 55; 19th Mobile Wireless Competition Report, p. 11; 20th Mobile Wireless Competition Report, p. 15; Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator;" Prepaid Phone News, February 19, 2018, https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

Compare the MetroPCS acquisition to the proposed merger between T-Mobile and Sprint. T-Mobile's market share would rise from 17.3% to 30.3% (see Table 17), which would make it comparable in size to AT&T (33.8%) and Verizon (34.7%). Furthermore, Sprint owns considerably more spectrum than MetroPCS had. There is really no comparison between T-Mobile acquiring MetroPCS and merging with Sprint. The MetroPCS acquisition was just one of many steps to grow T-Mobile's customer base towards becoming a major player in the mobile voice/broadband market. The merger with Sprint is a quantum leap that achieves the goal of being a major player. With such a quantum leap, one should expect a change in a firm's strategy, and not simply a continuation of what was done in the past.

In conclusion, T-Mobile has been pursuing a maverick strategy to gain advantages from building its customer base and, having achieved that goal as a consequence of the merger, it likely would

not be profitable for it to continue to use a maverick strategy. Furthermore, AT&T and Verizon are unlikely to accommodate New T-Mobile acting as a maverick because its size would make it more of a threat. A merger between the Applicants likely would not result in a maverick, but rather a firm whose size is comparable to AT&T and Verizon and whose interests are well-aligned with those of AT&T and Verizon. Such a market structure is conducive to collusion.

## C. Would a Merger Between the Applicants Have Coordinated Effects?

As stated in the Merger Guidelines: "an acquisition eliminating a maverick firm in a market vulnerable to coordinated conduct is likely to cause adverse coordinated effects."[117] Section IV.A discussed how the prepaid and postpaid mobile voice/broadband retail market is "vulnerable to coordinated conduct." Section IV.B.2 noted that it would not be in the best interests of New T-Mobile to use a maverick strategy and, therefore, a merger between the Applicants likely would mean "eliminating a maverick firm." According to the Merger Guidelines, the combination of these two conditions suggests that a merger between the Applicants would have coordinated effects. The objective of this section is to evaluate the applicability of that claim to the Applicant's proposed merger.

Coordinated effects occur when a merger facilitates market conduct to move from competition to collusion. For collusion to arise, three conditions must be satisfied.[118] First, enough firms in a market must want to collude, which is referred to as the "participation" condition. Second, there must exist a stable collusive arrangement. Referred to as the "stability" condition, it ensures that if firms are able to replace competitive prices with collusive prices, then those higher prices will persist over time; that is, there is not an incentive for one or more firms to undermine the collusive arrangement (e.g., by undercutting the collusive price). Third, even if firms want to collude ("participation") and can collude ("stability"), there is still the matter of transiting from competition to collusion. Firms must be able to orchestrate a coordinated shift from competition to collusion. Referred to as the "coordination" condition, it is especially relevant when firms do not engage in express communication, which is the presumption we will be making.

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[117] Horizontal Merger Guidelines, p. 25.

[118] Harrington Jr, Joseph E., "Thoughts on Why Certain Markets are More Susceptible to Collusion and Some Policy Suggestions for Dealing with Them," In *Background Paper, OECD Global Forum on Competition*, 2015.

Our coordinated effects analysis of a merger between Sprint and T-Mobile will take account of whether the merger would make it more likely that the participation, stability, and coordination conditions are satisfied and, therefore, whether tacit collusion is substantively more likely as a result of the merger.

Section IV.A made the case that the retail market is suitable for tacit collusion. However, just because a market is suitable for tacit collusion, it does not follow that tacit collusion is likely to emerge. For there to be a serious risk of tacit collusion, there must be an appropriate market structure; that is, a configuration of firms, with regard to their number and traits, that make them inclined to want to collude and to be able to tacitly coordinate on a collusive arrangement. This section takes account of the mobile voice/broadband market structure in assessing whether a merger between Sprint and T-Mobile would likely have coordinated effects. Our conclusion is that it likely would.

Our approach to evaluating whether a merger between Sprint and T-Mobile would have coordinated effects has three steps. First, we note that there are some serious impediments in the pre-merger market that make tacit collusion difficult to achieve. The pre-market configuration of firms is not particularly conducive to tacit collusion emerging. Second, we discuss how a merger between Sprint and T-Mobile would alleviate those impediments and, therefore, would significantly increase the likelihood of tacit collusion. Third, we argue that the merger would not only make tacit collusion significantly more likely, but that there would be a serious risk of tacit collusion in the post-merger market.

### 1. Tacit Collusion Remains Difficult in the Pre-Merger Market

As noted, for tacit collusion to occur in a market, three conditions must be satisfied: participation, stability, and coordination. First, enough firms in a market must want to collude (participation). Second, there must exist a stable collusive arrangement (stability). Third, firms must be able to orchestrate a coordinated shift from competition to collusion (coordination). With those conditions in mind, the possible collections of firms in the pre-merger market and the likelihood of tacit collusion given the current market structure are assessed.

AT&T and Verizon are currently the dominant firms in the mobile voice/broadband market, as shown by Table 26. AT&T and Verizon each has a share of estimated total connections that is about double that of Sprint or T-Mobile, and combined they account for approximately two-

thirds of total connections. The capital investment over the last five years was 130% to 150% higher for AT&T and Verizon than for Sprint and T-Mobile. In terms of customer performance, AT&T and Verizon have lower churn rates and longer average subscription duration. Given their dominant position in the mobile voice/broadband market, collusion is unlikely to be effective unless both AT&T and Verizon were to participate. Therefore, the relevant candidate collusive arrangements in the pre-merger market are: (1) AT&T and Verizon colluding by themselves (that is, without Sprint and T-Mobile); (2) AT&T and Verizon colluding with either Sprint or T-Mobile (but not both); and (3) AT&T and Verizon colluding with both Sprint and T-Mobile.

**Table 26: 2016 U.S. Wireless Provider Comparison**

| Provider | 2016 Market Share | Share of Total U.S. Population Covered | Share of Total U.S. Square Miles Covered | Total 5 Year Capital Investment | Total 10 Year Capital Investment | Average Monthly Churn | Average Subscription Life (Years) |
|---|---|---|---|---|---|---|---|
| [A] | [B] | [C] | [D] | [E] | [F] | [G] | [H] |
| AT&T | 32.4% | 99.3% | 71.7% | $ 52,519,000,000 | $ 86,954,000,000 | 1.5% | 6.1 |
| Verizon | 35.0% | 97.3% | 66.3% | $ 51,762,000,000 | $ 89,273,000,000 | 1.2% | 7.3 |
| Sprint | 14.3% | 92.0% | 27.5% | $ 22,426,000,000 | $ 34,885,000,000 | 2.2% | 4.3 |
| T-Mobile | 17.1% | 95.1% | 47.7% | $ 20,885,000,000 | $ 36,333,000,000 | 1.7% | 5.3 |

Sources: Estimated total connections, coverage data, and capital expenditure data from 2010 through 2016 from the 20th Mobile Wireless Competition Report, pp. 15, 48, and 80. Capital expenditure data from 2005 through 2009 from the 15th Mobile Wireless Competition Report, p. 132. Churn data UBS Wireless Report, p. 19.

Notes:

[B]: Market share based on estimated total connections as reported in the 20th Mobile Wireless Competition Report.

[C]: Share of total U.S. population covered by provider as reported in the 20th Mobile Wireless Competition Report.

[D]: Share of total U.S. square miles covered by provider as reported in the 20th Mobile Wireless Competition Report.

[E]: Sum of capital expenditures for each provider from 2012 through 2016 as reported in the 20th Mobile Wireless Competition Report.

[F]: Sum of capital expenditures for each provider from 2007 through 2016 as reported in the 15th Mobile Wireless Competition Report and the 20th Mobile Wireless Competition Report. Capital expenditures from 2005 through 2009 are estimated based on Chart 30 in the 15th Mobile Wireless Competition Report.

[G]: Average monthly churn calculated as the geometric mean of monthly churn rates as reported in UBS Wireless Report.

[H]: Average subscription life, calculated as 1 / average monthly churn. Figures based on monthly churn rates reported in UBS Wireless Report.

Collusion on price by AT&T and Verizon without Sprint and T-Mobile would be difficult because it would be likely to violate the stability condition. If Sprint and T-Mobile were not part of the collusive arrangement, then in response to coordinated price increases by AT&T and Verizon, Sprint, and T-Mobile would be expected not to follow those increases and sell at a

discount to AT&T and Verizon. Consumers have exhibited a willingness to switch and that increased discount would induce some customers to move from AT&T and Verizon to Sprint and T-Mobile. The evolution of T-Mobile's market share is supportive of this point. From 2013 to 2017, T-Mobile expanded its share of total connections from approximately 13% to approximately 17% in 2017.[119] Furthermore, Sprint and T-Mobile have the excess capacity to serve a substantive increase in demand. This is shown in Table 28, which notes that both Sprint and T-Mobile have fewer subscribers per cell than either AT&T or Verizon, as well as larger spectrum holdings than either AT&T or Verizon. And, as shown in Table 11, the estimated marginal capital costs per subscriber are only $56 and $58 for Sprint and T-Mobile, respectively, compared to $81 and $94 for Verizon and AT&T, respectively. Thus, Sprint and T-Mobile are in a good position to expand their subscriber base should AT&T and Verizon enact coordinated price increases.

T-Mobile not only has the capacity to expand supply, its conduct in recent years has revealed a desire and an ability to expand. In March 2013, T-Mobile launched its "Un-carrier" initiative, which started the industry trend of moving away from long-term contracts and data overage charges, and returning to unlimited data plan offerings.[120] Prior to its aggressive "Un-carrier" strategy, T-Mobile's subscriber base was not growing significantly.[121] However, beginning in 2013, T-Mobile began to gain large numbers of subscribers, and by 2015 and into 2016 it had the largest net subscriber additions of any national carrier.[122] A coordinated price increase by AT&T and Verizon would provide a golden opportunity for T-Mobile to further expand, and at even higher profit margins than in the past. In sum, the loss of sales that AT&T and Verizon would experience from implementing a common price increase without the participation of Sprint and T-Mobile is likely to make collusion untenable. Collusion by AT&T and Verizon would leave too much capacity controlled by firms not party to the collusive arrangement.

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119 See Figure 5 and Table 17.

120 17th Mobile Wireless Competition Report, p. 69.

121 From 2008 to 2012, T-Mobile averaged 850,000 net additions per year. See 16th Mobile Wireless Competition Report, p. 14.

122 From 2013 to 2016, T-Mobile averaged 7.27 million net additions per year. See 20th Mobile Wireless Competition Report, p. 17.

Collusion by AT&T, Verizon, and either Sprint or T-Mobile (but not both) is unlikely because it would violate the participation condition and could also violate the coordination condition. Consider, say, Sprint tacitly colluding with AT&T and Verizon, and all three firms implementing a coordinated price increase. T-Mobile could then either maintain its price or increase it less than the rise in the prices by the other three network operators, which would result in T-Mobile's sales and market share rising due to the discount it is offering relative to its competitors. This shift of sales from AT&T, Verizon, and Sprint to T-Mobile would be especially severe for Sprint as Sprint's customers have been found to be more sensitive to T-Mobile's prices. As shown in Figure 5, T-Mobile's share of connections has been steadily climbing since 2013 while Sprint's connection share has steadily dropped (and over this same period AT&T and Verizon experienced little change in their shares).[123] Anticipating a loss in sales and market share, Sprint would not want to participate in coordinated price increases with AT&T and Verizon. Hence, the participation condition for Sprint is likely to be violated if collusion were only to involve AT&T, Verizon, and Sprint. An analogous argument holds if instead collusion were only to involve AT&T, Verizon, and T-Mobile. In that case, it is T-Mobile's participation condition that would be violated. In conclusion, we do not believe that collusion on price in the pre-merger market among AT&T, Verizon, and either Sprint or T-Mobile would occur because not all of the firms would want to participate.

Even if AT&T, Verizon, and either Sprint or T-Mobile did want to participate in a collusive arrangement, which we have argued would probably not be the case, the coordination condition is likely to be violated. Though it can be feasible for three firms to tacitly coordinate, the risk of mis-coordination is heightened in the current market because of the uncertainty regarding whether Sprint or T-Mobile would participate. That uncertainty could deter any of the network operators from taking the lead on price as part of tacit collusion. Thus, even if Sprint (or T-Mobile) were willing to collude with AT&T and Verizon, coordination would be another obstacle to collusion.

Finally, there is the case of all four network operators colluding. Collusion by AT&T, Verizon, Sprint, and T-Mobile is unlikely because it would violate the participation and coordination conditions, and could also violate the stability condition. The participation condition would

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[123] Given that AT&T and Verizon gained market share through acquisitions of MVNOs and resellers, that their market share are largely unchanged indicates that they also lost some market share to T-Mobile.

likely be violated for T-Mobile. T-Mobile's maverick strategy is consistent with a goal of growing market share. That means it is unlikely to participate in a collusive arrangement that would require freezing its market share, which is typically implicit or explicit in a collusive arrangement.[124] T-Mobile's past conduct is inconsistent with it participating in the typical collusive arrangement.

Even if T-Mobile were willing to participate, which seems unlikely, it is difficult for four firms to coordinate without express communication. The prospect of coordination failure is heightened by the uncertainty regarding whether T-Mobile wants to participate. For example, even if Sprint were willing to participate if the other three network operators were to do so, it may still not follow a price increase by, say, AT&T because it is unsure that T-Mobile would follow, and Sprint may not want to risk losing market share to T-Mobile; and if it is uncertain that Sprint and T-Mobile would follow a price increase, it becomes risky for either AT&T or Verizon to lead on price. Tacit collusion among four firms is inherently challenging and that is made more so when there is uncertainty regarding whether all firms want to collude. For this reason, the coordination condition is unlikely to be satisfied.

Even if all four network operators did want to participate in a collusive arrangement to raise prices and were able to coordinate, there is a reasonable chance that the stability condition would be violated. Sprint or T-Mobile could be tempted to undercut price in order to pick up market share, hoping that the three remaining firms would continue to collude. Collusion is fragile when some firms are discontent with their market shares, and Sprint's and T-Mobile's

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[124] Some examples of cartels in which the market allocation involved maintaining market shares prior to collusion include those in the markets for citric acid, organic peroxides, sorbates, and zinc phosphate; see European Commission decisions reported in Harrington Jr, Joseph E., "How do cartels operate?" *Foundations and Trends® in Microeconomics* 2, no. 1 (2006): 1-105. There are also documented episodes in which a firm discontinued its participation in a collusive arrangement because of its expressed desire to increase its market share. Some examples include cement, choline chloride, and lysine; see Harrington, Joseph E., Kai Hüschelrath, Ulrich Laitenberger, and Florian Smuda, "The discontent cartel member and cartel collapse: The case of the German cement cartel," *International Journal of Industrial Organization* 42 (2015): 106-119.

recent attempts to increase their market shares reveal that they are not content with their market positions.[125]

Summarizing our assessment of the likelihood of tacit collusion in the pre-merger environment, we find:

- Collusion by only AT&T and Verizon is unlikely because collusion would probably be unstable. There would be too much capacity controlled by firms that are not part of the collusive arrangement.
- Collusion by AT&T, Verizon, and either Sprint or T-Mobile (but not both) is unlikely because neither Sprint nor T-Mobile would want to participate. If Sprint were to collude with AT&T and Verizon, it would lose potentially significant market share to T-Mobile and thus it would not participate. An analogous argument applies to participation by T-Mobile, which would lose market share to Sprint. Furthermore, the uncertainty surrounding participation by Sprint or T-Mobile would make coordination challenging.
- Collusion by all four network operators is unlikely because it violates the coordination and participation conditions. T-Mobile is unlikely to want to participate because it wants to grow market share, and participation would require maintaining its market share. Even if the participation condition was satisfied for all four network operators, coordination is problematic because tacit coordination is very difficult when it involves four firms, especially given the uncertainty about whether T-Mobile would participate.

### 2. Tacit Collusion Would Be Significantly More Likely in the Post-Merger Market

Distilling the key points in the preceding analysis, the primary obstacles to tacit collusion in the pre-merger market are: 1) Sprint and T-Mobile have enough excess capacity that, if they were not to collude, it would undermine collusion between AT&T and Verizon; 2) Sprint is unlikely to collude with AT&T and Verizon because it would lose market share to T-Mobile (with an analogous argument applying to T-Mobile if it were to participate in a collusive arrangement

[125] Harrington, Joseph E., Kai Hüschelrath, Ulrich Laitenberger, and Florian Smuda, "The discontent cartel member and cartel collapse: The case of the German cement cartel," *International Journal of Industrial Organization* 42 (2015): 106-119.

with AT&T and Verizon); and 3) T-Mobile is unlikely to collude with AT&T, Verizon, and Sprint because T-Mobile would not achieve its goal of increasing its market share.

With that understanding, a merger between Sprint and T-Mobile likely would have coordinated effects because: 1) New T-Mobile is more willing to collude with AT&T and Verizon than is either Sprint or T-Mobile before a merger, which means the participation condition for collusion is more likely to be satisfied; and 2) it is less difficult for AT&T, Verizon, and New T-Mobile to coordinate than any collection of three or four firms in the pre-merger market, which means the coordination condition for tacit collusion is more likely to be satisfied. Finally, the stability condition is satisfied for the reasons given in Section IV.A and we elaborate upon these points in Section IV.C.3 below.

One of the major obstacles to collusion in the pre-merger market is that T-Mobile has been pursuing a maverick strategy to grow its market share. Participation in a collusive arrangement would require T-Mobile to adopt a less aggressive strategy and accept little growth in its market share. T-Mobile's past conduct reveals it is not willing to do that.

As noted in Section IV.B, the merger of the Applicants would result in a combined firm that is more content with its market share (than is T-Mobile currently) and that would not find a maverick strategy to be in its best interests. New T-Mobile's interests would be more aligned with those of AT&T and Verizon with an emphasis on increasing profit margins rather than capturing market share. Those interests would be best served through coordinated price increases, which tacit collusion would deliver. The claim that New T-Mobile would likely not be a maverick and would have interests aligned with those of AT&T and Verizon was discussed above in Section IV.B.2.

A merger among medium-sized firms—such as Sprint and T-Mobile in the mobile voice/broadband market—can have significant coordinated effects because it affects the incentive to participate in a collusive arrangement:

> In exploring the incentives associated with joining a cartel, a firm faces a trade-off. By becoming a member of the cartel, more capacity is brought under the control of the cartel, which leads to a higher cartel price. Hence, a firm benefits from a higher price-cost margin by joining the cartel. The downside is that it is forced to reduce its sales … A firm finds it optimal not to join the cartel when its capacity is sufficiently low because the effect of its membership on price is trivial but, at the same time, it experiences a non-trivial reduction in its output. Thus, we

> should not expect a cartel to include very small firms. [T]he merger with the biggest price effect involves a medium firm and either another medium firm or a small firm.[126]

As previously stated, significant unused capacity would be available outside of a collusive arrangement involving only AT&T and Verizon, and that would be a challenge to the stability of collusion. Under the current market structure, Sprint would not want to join an arrangement with AT&T and Verizon because it would forego too much in sales and market share to T-Mobile, as long as T-Mobile remained outside of the collusive arrangement. Similarly, T-Mobile would not want to join an arrangement with AT&T and Verizon.

However, the merged firm's incentives are very different, for now New T-Mobile joining a collusive arrangement with AT&T and Verizon would bring more capacity to the table—which means price will commensurately increase more—and leaves less capacity (effectively, none) outside of it—which means there will not be a loss of sales and market shares. It is the merger between the Applicants—rather than between any other two network operators—that would have the largest coordinated effects because it would create the strongest incentives for all network operators to participate in a collusive arrangement.[127]

In addition to participation in collusion becoming more likely as a consequence of a merger between Sprint and T-Mobile, coordination also becomes easier. Of course, it is easier for three firms to coordinate than it is for four firms.[128] But the merger does more than that; it eases the challenge of coordination by aligning firms' interests. In the post-merger market, AT&T, Verizon, and New T-Mobile would have a common interest in colluding and, furthermore, their

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126 Bos, Iwan, and Joseph E. Harrington, Jr. "Endogenous cartel formation with heterogeneous firms." *The RAND Journal of Economics* 41, no. 1 (2010): 92-117.

127 "A merger between two moderate-sized firms may significantly expand the size and profitability of a potential cartel by inducing the merged firm to be a cartel member. From the perspective of an antitrust or competition authority, concerns about coordinated effects may be most severe for these mergers involving firms which are not small, but not large either." Bos, Iwan, and Joseph E. Harrington, Jr. "Endogenous cartel formation with heterogeneous firms." *The RAND Journal of Economics* 41, no. 1 (2010): 108.

128 "Other things being equal, collusion is the more likely the smaller the number of firms in the industry. … [T]he lower the number of [firms] in the industry the easier for them to coordinate their behaviour." Motta, Massimo, *Competition policy: theory and practice*, Cambridge University Press, 2004, pp. 142-143.

pricing incentives would be more aligned and that makes it easier to coordinate on common price increases.

There is a substantive misalignment of interests in the pre-merger market between AT&T and Verizon on one hand and Sprint and T-Mobile on the other hand. Given their smaller market shares, Sprint and T-Mobile have been more aggressive in growing market share than AT&T and Verizon. Table 9 shows that, recently, ARPUs have been similar between AT&T and Verizon, and they have been well above the ARPUs for Sprint and T-Mobile. That measure reflects their different positions in the market; Sprint and T-Mobile need to expand and solidify their customer base with lower prices, while that is not a first-order concern for AT&T and Verizon. This misalignment of interests between the two larger network operators—AT&T and Verizon—and the two smaller network operators—Sprint and T-Mobile—makes tacit collusion difficult in the pre-merger market. In Section IV.B, we noted that New T-Mobile would likely not be the maverick that T-Mobile was, and that, more generally, the merger aligns the interests of AT&T, Verizon, and New T-Mobile, which is conducive to collusion.

Elaborating on this point, the merger would better align the pricing incentives of the network operators. This is because of the relationship between a firms' preferred price and its market share in a market with switching costs. For the current discussion, the relevance of switching costs is that, all else the same, it is easier for a firm to retain an existing customer than to attract new customers because existing customers must overcome switching costs to leave, while new customers either face no switching costs (if they are new to the market) or incur switching costs to come (if they are currently being supplied by another provider).

As discussed in Section IV.A, a firm's existing customers are less responsive to its price than are potential new customers. While the firm would then like to charge existing customers a higher price than new customers, that is not done in practice and is generally not feasible (though a firm might be able to offer some initial enticements to a new customer).[129] In deciding on its price, a firm balances a desire to price higher in order to earn more profit from existing customers, with a desire to price lower in order to attract new customers. The more existing customers that a firm

[129] When multi-year term contracts were offered, they were able to price discriminate between existing and new customers, especially in a market like mobile voice/broadband with rapidly declining unit prices.

has relative to the number of potential new customers (for which market share is a good proxy), the more is its price decision driven by extraction of profit from existing customers rather than attracting new customers. Hence, a firm's preferred profit margin is increasing in its market share, which is a crucial property of a market in which customers face switching costs, such as the mobile voice/broadband market.[130]

By this argument, the higher market shares of AT&T and Verizon compared to Sprint and T-Mobile imply that the preferred profit margins of AT&T and Verizon are generally higher than those for Sprint and T-Mobile, which is consistent with the profit margin estimates shown in Table 12. As the merger would result in New T-Mobile having a market share similar to that of AT&T and Verizon,[131] the post-merger market would have firms whose pricing incentives are much better aligned compared to the pre-merger market. With more similar pricing incentives, it is easier for firms to coordinate on a collusive price increase, as there is a larger range of price increases that all firms agree are attractive. Smaller differences in network quality between carriers after the merger could further facilitate such price increases since the services offered by different providers would be more similar.

This merger-induced alignment of pricing incentives arose in a recent merger case in the Italian mobile telecommunications market.[132] As with the case of a merger between the Applicants in the U.S. wireless market, the Italian case involved a merger between the two smallest network operators—H3G and WIND—and would have induced a change in market structure from four to three network operators.[133]

> First, from an economic perspective, firms with a comparatively low market share such as H3G benefit appreciably less from coordination attempts than larger incumbents, since they have a smaller customer base on which they could earn a supra-competitive margin. Such firms are therefore much less inclined to cement the existing market structure by agreeing to engage in accommodative pricing. On the contrary, they have a comparatively stronger incentive to try and win over customers from rivals through price cuts.

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130 *Supra*, fn 109.

131 See Table 17.

132 European Commission CASE M.7758-Hutchinson 3G Italy/WIND/JV 01/09/2016.

133 European Commission CASE M.7758-Hutchinson 3G Italy/WIND/JV 01/09/2016, Table 6, p. 75.

> Second, firms with smaller market shares such as H3G have to be less concerned than large incumbents that aggressive price discounts would cannibalise the profits they make with their existing mobile customer base. As a result, smaller contestants are generally more inclined to discount their price in an effort to win customers from rivals. Conversely, [mobile network operators] with a large market share are likely to be concerned that competitive discounting policies to attract new customers might later force them to offer better terms also to their large existing customer base.[134]

As with WIND and H3G merging in the Italian wireless market, a merger between the Applicants would alter their pricing incentives such that they desire to set higher prices, and those incentives would be more aligned with the pricing incentives of AT&T and Verizon. That means the three remaining network operators would be more likely to be able to coordinate on common price increases, and that makes tacit collusion more likely in the post-merger market.

For the reasons mentioned above, we conclude that a merger between the Applicants likely would be expected to have coordinated effects.

Additional evidence in support of the conclusion that a merger between the Applicants would have coordinated effects comes from the calculation of the pre-merger and post-merger Coordinated Price Pressure Index ("CPPI"). The CPPI is a price pressure test under the assumption of tacit collusion. Originally developed by the Applicants' experts Professor Salop and Dr. Sarafidis (with coauthors) to analyze the proposed merger of AT&T and T-Mobile,[135] the CPPI was designed to assess the impact of a merger on the likelihood of coordinated effects through price leadership.[136] Formally, the CPPI measures the maximum common price increase that a pair of firms is willing to initiate and match, holding the prices of all the other firms constant.

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134 European Commission CASE M.7758-Hutchinson 3G Italy/WIND/JV 01/09/2016, ¶ 975-6.

135 Moresi, Serge, David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011).

136 The CPPI is designed to capture upward pricing pressure for only one form of coordinated effects—price leadership—within the confines of one particular oligopoly model and under particular assumptions—price competition and only two firms engaging in parallel conduct. The form of collusion considered has one firm raising its price with the expectation that the other firm will match that price increase.

**Table 27: The Coordinated Price Pressure Test**

| Pre-Merger Coalition [A] | Pre-Merger CPPI [B] | Post-Merger CPPI [C] | Delta CPPI [D] |
|---|---|---|---|
| T-Mobile - Verizon | 6.8% | 21.9% | 15.1% |
| T-Mobile - AT&T | 8.8% | 29.3% | 20.5% |
| Sprint - Verizon | 6.8% | 21.9% | 15.1% |
| Sprint - AT&T | 8.8% | 29.3% | 20.5% |

Sources: 20th Mobile Wireless Competition Report; UBS Wireless Report; 2017 Company Annual Reports.

Notes:

[A]: Two-firm coalition.

[B]: CPPI for listed firm pair before Sprint/T-Mobile merger.

[C]: CPPI for listed firm pair after Sprint/T-Mobile merger.

[D]: Change in CPPI for listed firm pair due to Sprint/T-Mobile merger.

In Table 27, we report the pre-merger and post-merger CPPIs between the merging firms—T-Mobile and Sprint—and each one of the other national carriers, AT&T and Verizon.[137] In the pre-merger market, a CPPI of 6.8% for T-Mobile-Verizon indicates that T-Mobile and Verizon would find it profitable to implement a 6.8% increase in their prices with one of them leading and the other following. The price increase that New T-Mobile and Verizon could profitably implement is distinctly higher at 21.9%. As the table illustrates, in all cases the post-merger CPPI is significantly higher than the pre-merger CPPI, suggesting that the merger likely would increase the incentives to engage in tacit collusion through price leadership.[138]

It is important to note that the CPPI only captures some of the relevant factors that determine whether tacit collusion would occur in a market. Its value resides in assessing whether a merger

[137] CPPIs are calculated based on postpaid subscriber connections and margins for each firm as shown in Table 12. Own-price elasticities were calculated based on the Lerner index. Diversion ratios were calculated using gross subscriber additions for postpaid, as was done for the pricing pressure tests discussed in Section III.C.

[138] The approach we have taken is that used in Moresi et al. (2011), which calculates the post-merger CPPI between the two merging firms and a rival by summing the shares of the merging firms and using the pre-merger price-cost margin and elasticity of demand of one of the two merging firms along with diversion ratios based on pre-merger market shares. See Moresi, Serge, David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011).

would substantively increase those particular factors. We find that the CPPI would be significantly higher with a merger between Sprint and T-Mobile, and that this evidence is consistent with the merger having coordinated effects.

### 3. There Is a Serious Risk of Tacit Collusion in the Post-Merger Market

To summarize the analysis thus far regarding coordinated effects, the mobile voice/broadband market is suitable for tacit collusion and a merger between Sprint and T-Mobile would result in a market structure for which tacit collusion is significantly more likely. However, the merger not only makes tacit collusion significantly more likely but we believe it creates a serious risk of tacit collusion emerging, both on pricing and on network quality. To substantiate this claim, it is necessary to go beyond describing market conditions and market structure, and describe how tacit collusion would work in the post-merger market.

As has been explained, it would be in the interests of the three remaining network operators to participate in a collusive arrangement. Such a desire to collude can only be translated into actual collusion if firms are able to coordinate on a stable collusive arrangement. This can be done as follows. Coordination could be achieved through price leadership by one of the three network operators, which initiates a "trial" price increase for acceptance by the other operators. A stable collusive arrangement requires monitoring for compliance, and an effective punishment when there is evidence of non-compliance. Monitoring would be effective because of price and plan transparency in the retail market. Punishment would be effective because any deviation would be quickly observed, and firms can retaliate by lowering their prices (and adjusting plan features) and advertising these changes. This punitive price war would be swift and severe because of the absence of long-term service contracts. If a firm that deviates can anticipate only a short period of higher sales before aggressive competition returns, it will be inclined to go along with coordinated price increases and plan changes.

If firms offered the same services and charged a single price for their services, what has just been described would be sufficient for firms to tacitly collude on price. One of the firms could raise price and, given it is publicly observed, the other firms could match that price. If any firm did not do so then other firms could lower their prices.

However, tacit collusion on price in the mobile voice/broadband market defies that simple description for two reasons. First, network operators do not charge a single price. A firm's offerings are multi-dimensional as a plan has a monthly payment with a maximum number of minutes, overage charges (which could take the form of an additional fee or slower speeds), discounts for additional lines, and so on. To provide an example, AT&T's Unlimited Choice plan starts at less than $40 dollars per month per line for four lines or $70 dollars per month for one line.[139] This plan includes an HBO subscription for all devices, unlimited texting to 120+ countries, and roaming in Mexico and Canada.[140] AT&T does not charge overages ever, but data speeds on an individual line may be throttled after 22GB of usage in a given month. Thus, tacit collusion could mean coordinating on something more than a common price.

Second, network operators offer similar, but not identical, services. While all network operators offer the same type of talk, text, and data services, services differ in terms of their quality and coverage because of different network structures. For example, coverage varies across providers, with Verizon and AT&T having the most extensive coverage, T-Mobile close behind, and Sprint a distant fourth, covering roughly 17 million fewer people and 59% less land area than Verizon.[141] If there are differences in service quality in the post-merger market then tacit collusion—which has all three network operators coordinating on identical (or highly similar) prices and plans—would result in sales shifting from firms with lower quality to those with higher quality. This could destabilize collusion, in that the firm losing market share might depart from the common supracompetitive price to reclaim sales.

These complications would not prevent tacit collusion from emerging and persisting over time in the mobile voice/broadband market. To begin, there are several ways that tacit collusion could work even with multi-dimensional offerings. First, firms could coordinate on all of those dimensions, for they are all publicly observed. Just as a consumer can learn a plan's prices and features, so can rival firms. A workable method would be for firms to coordinate on some standard plans, thereby leaving only a few dimensions to adjust over time. For example, all

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[139] "Unlimited Data Plans," AT&T, available https://www.att.com/plans/unlimited-data-plans.html/, accessed August 18, 2018.

[140] "Unlimited Data Plans," AT&T, available https://www.att.com/plans/unlimited-data-plans.html/, accessed August 18, 2018.

[141] Calculations: 304 million – 287 million = 17 million. (2,377,385 – 976,639) / 2,377,385 = 59%. See 20th Mobile Wireless Competition Report, Appendix III: Table III.D.ii.

network operators have come to have the common feature of an unlimited number of texts and voice minutes for postpaid service. Additionally, all carriers currently offer unlimited data, with potential speed reductions for heavy data users.[142] All carriers also now allow customers to use their wireless devices as "mobile hotspots" and, except for Sprint, allow some form of international roaming or calling. If the three network operators standardize on plan features, it would only require them coordinating on the monthly fee. In that case, there would effectively be a single menu of prices that firms would need to coordinate on over time.[143]

Second, even if the other dimensions did not become standardized, collusion can be effective even when firms coordinate on only a subset of dimensions and compete on the remaining ones. It is rarely the case that collusion—even when it is explicit—involves coordination on all relevant dimensions. There are always some instruments for which firms do not coordinate, yet collusion proves successful.[144] While competition may intensify on those dimensions for which firms do not coordinate—as the profit margins on gained units are now higher as a result of

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[142] Unlimited plans of all carriers throttle heavy users, but each has a different threshold for defining heavy users, currently 22GB for AT&T and Verizon, and 50GB for Sprint and T-Mobile. See "Unlimited Data Plans," AT&T, available https://www.att.com/plans/unlimited-data-plans.html, accessed August 18, 2018; "Unlimited," Verizon, available https://www.verizonwireless.com/plans/verizon-plan/, accessed August 17, 2018; "Sprint Unlimited data, talk & text cell phone plans," Sprint, available https://www.sprint.com/en/shop/plans/unlimited-cell-phone-plan.html?ECID=vanity:unlimited, accessed August 6, 2018; and "T-MobileONE," T-Mobile, available https://www.t-mobile.com/cell-phone-plans?icid=WMM_TM_Q117TMO1PL_H85BRNKTDO37510, accessed August 6, 2018.

[143] Such was the view of the FCC in 2011 when it expressed concerns about the proposed AT&T and T-Mobile merger having coordinated effects: "Because these providers offer the same plans and charge the same prices nationwide, increased coordination would most likely take the form of raising the level of prices." FCC Staff Report, ¶ 76.

[144] For example, airlines successfully colluded over 1999-2006 in the air cargo market by only coordinating on a fuel surcharge; all other components of price (as well as any non-price dimensions) were left to the discretion of the airlines. The effectiveness of collusion in raising transaction prices is evidenced by the collection of damages totaling $1,235,907,442 from 28 airline defendants (*Air Cargo Shipping Services Antitrust Litigation*). "Air Cargo," Hausfeld, available https://www.hausfeld.com/what-we-do/eu/case-studies/air-cargo, accessed August 6, 2018; "Hausfeld Announces Final Settlement in Decade-Long Air Cargo Price Fixing Litigation," Hausfeld, May 29, 2016, available https://globenewswire.com/news-release/2016/05/19/841819/0/en/Hausfeld-Announces-Final-Settlement-in-Decade-Long-Air-Cargo-Price-Fixing-Litigation.html, accessed August 6, 2018.

collusion on some dimensions—collusion will remain worthwhile as long as that intensified competition does not dissipate a large fraction of the incremental profits from collusion.[145]

There are at least two reasons why competition on other dimensions would not dissipate all supracompetitive profits and thus not undermine the stability of collusion. First, the intensity of competition in a dimension depends on how sensitive consumers are to that dimension. The less sensitive are consumers to a dimension, the less aggressively a firm will compete in that dimension because, for any given cost of competing, there is a smaller benefit in terms of additional sales. For example, if consumers are not very responsive to overage charges then it is not worthwhile for firms to compete aggressively on that dimension as they forego revenue without yielding much of a return in terms of attracting new customers.

What is critical for effective collusion is that firms coordinate on the variable for which consumer demand is most sensitive, and that variable is likely to be the monthly fee. That it is the most heavily advertised is consistent with firms believing it is the most crucial variable determining consumer demand. Other fees such as roaming charges and overage charges are unlikely to be influential in a consumer's choice of a carrier. Roaming historically accounted for only a small fraction of minutes,[146] and national network operators no longer charge for roaming services within the U.S. Also, consumers have been shown to be overconfident that they will not incur overage charges,[147] which would imply that their choice of a carrier and plan is not very sensitive to overage charges.

The second reason that competition on these other dimensions may not destabilize collusion has to do with monitoring. Firms observe market shares, and recognize that intensified competition leading to a shift in market shares may cause collusion to breakdown. A network operator that loses too much market share may, in response, undercut the collusive price. As network operators provide market shares, net additions, ARPU, and other relevant information in their quarterly reports, monitoring for evidence of non-collusive conduct would be quick and

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[145] Professor Salop and Dr. Sarafidis believe that collusion on network investment is unlikely. However their analysis of collusion on this particular dimension is incomplete. See Salop/Sarafidis Declaration, Section III.A.

[146] See, e.g., 15th Mobile Wireless Competition Report, p. 123.

[147] Grubb, Michael D., "Selling to overconfident consumers," *American Economic Review* 99, no. 5 (2009): 1770-1807.

reasonably effective. For this reason, firms would unilaterally restrain how aggressively they compete on the dimensions for which they have not coordinated.

The second complication for tacit collusion in the mobile voice/broadband market is that firms may offer different quality services. If that is the case, then coordinating on a common higher price may not prove sustainable, as the network operator with the lowest quality will lose market share. However, coordinating on a common price is not the only way in which firms can tacitly collude. They could instead coordinate on a common price increase (either in dollars or percentage terms) from the current base in which network operators offer different prices. It is likely that a modest common increase in the monthly fee would prove profitable and sustainable, particularly to the extent that differences in quality will be lower after the merger.

Regardless of the extent of demand or cost heterogeneity among competitors, a small rise in the lowest price in the market, with the other firms optimally responding to that price increase, would likely be profitable for all firms.[148] Thus, the lowest-priced firm is acting like a leader. One could imagine that, after the merger, New T-Mobile leads a price increase (beyond that predicted by any unilateral effects). Doing so would signal that it is no longer a maverick and is instead interested in reducing the intensity of competition. In response, AT&T and Verizon would raise their prices to maximize their profits. These price increases would raise all firms' profits. This is just one way in which, in spite of possibly offering services of different qualities, simple price leadership could work to coordinate on a stable collusive outcome.

Though coordination in the retail market is complicated by the multi-dimensional offerings and possible heterogeneity in service quality and coverage, we do not believe these complications are substantive obstacles to tacit collusion. Tacit collusion is likely to succeed if network operators offer comparable plans and coordinate on common increases in monthly rates. That they currently offer highly similar plans gives them a useful starting point.

Earlier analysis expressed that the enterprise and wholesale markets are not particularly suitable for tacit collusion. While tacit collusion would not be easy in those markets, there are some circumstances whereby it could occur. Though enterprise and wholesale prices are not

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[148] Harrington, Joseph E., "Heterogeneous firms can always collude on a minimum price," *Economics Letters* 138 (2016): 46-49. For such a price increase to be profitable for all firms, it is not necessary that other firms match the increase but instead respond unilaterally to it.

transparent, customers are observable and, in particular, it could be observed that one network operator attracts a customer away from another network operator. The observability of network operator-MVNO relationships was documented further in Section III.A.2. Such competition could be avoided if network operators were to coordinate on a "no poaching" agreement whereby each network operator does not offer attractive prices to the customers of the other network operators. If there was that understanding then each network operator could charge higher prices on its enterprise and wholesale customers. While such an arrangement would not affect competition for customers new to the market, it would result in supracompetitive prices for existing customers. A "no poaching" agreement would circumvent the lack of transparent pricing though it is unclear how easily firms could coordinate on it.

A second way in which competition may be softened in the enterprise and wholesale markets is through multi-market effects. If tacit collusion emerges in the retail market, a network operator may be hesitant to compete too aggressively in the enterprise and wholesale markets because it could spill over to undermine collusion in the retail market. If competition in the enterprise and wholesale markets causes a network operator to lose market share in those markets, it may try to make up for it by cutting retail prices and picking up more market share in the retail market.

For these reasons, one cannot dismiss the possibility that tacit collusion (or, more generally, some softening of competition) would arise in the enterprise and wholesale markets, even though those markets are not particularly well-suited for tacit collusion.

# V. Spectrum Utilization and Screen

## A. The Spectrum Utilization

As shown in Table 28, whether measured by subscribers per MHz, subscribers per cell site, or subscribers per MHz per cell site, there are significant differences in the intensity of network use. Verizon is using its network resources most intensively, serving more customers per unit of spectrum than its competitors. Likewise, Sprint is using its resources least intensively. The logic of a spectrum screen, or more broadly looking at the spectrum input as a measure of market structure, requires a presumption that these measures of intensity of network use will converge over time.

## Table 28: Major Carriers' Wireless Networks

| Carrier [1] | | Population-Weighted Average MHz Holdings [2] | Percentage of Big Four Population Weighted Average MHz Holdings [3] | Cell Sites [4] | Total Subscriber Connections (thousands) [5] | Subscribers per MHz [6] | Subscribers / Cell Site [7] | Subscribers / MHz / Cell Site [8] |
|---|---|---|---|---|---|---|---|---|
| AT&T | [A] | 152.0 | 26.9% | 67,000 | 134,875 | 887,139 | 2,013 | 13.2 |
| Sprint | [B] | 186.4 | 33.0% | 50,000 | 59,515 | 319,298 | 1,190 | 6.4 |
| T-Mobile | [C] | 109.8 | 19.4% | 59,417 | 71,455 | 650,790 | 1,203 | 11.0 |
| Verizon | [D] | 116.4 | 20.6% | 58,300 | 145,859 | 1,253,549 | 2,502 | 21.5 |
| **With Spectrum Cap** | | | | | | | | |
| New T-Mobile - All Cell Sites | [E] | 238.5 | 42.2% | 109,417 | 130,970 | 549,140 | 1,197 | 5.0 |
| New T-Mobile - 11,000 Retained Cell Sites | [F] | 238.5 | 42.2% | 70,417 | 130,970 | 549,140 | 1,860 | 7.8 |
| **Without Spectrum Cap** | | | | | | | | |
| New T-Mobile - All Cell Sites | [G] | 296.2 | 52.5% | 109,417 | 130,970 | 442,182 | 1,197 | 4.0 |
| New T-Mobile - 11,000 Retained Cell Sites | [H] | 296.2 | 52.5% | 70,417 | 130,970 | 442,182 | 1,860 | 6.3 |

Source: 20th Mobile Wireless Competition Report, Table II.B.1 and Table II.F.i, For 11,000 retained cell sites from Sprint, see Declaration of Neville R. Ray, ¶ 31. Spectrum holdings are Brattle estimates. Spectrum holdings are as of August 2018 and are based on data from the FCC Universal Licensing System, http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly.

Notes:

[2]: Brattle estimates as of August 2018. Reported 2017 screen level for [E] and [F] since combined spectrum holdings would exceed the 238.5 MHz screen.

[3]: [2] / 570.6 MHz which is the total population weighted average MHz holdings for the big four.

[4]: As of 2016.

[5]: End of year 2016.

[6]: ([5] x 1,000) / [2].

[7]: ([5] x 1,000) / [4].

[8]: ([5] x 1,000) / [2] / [4].

[E][4] - [E][5]: [B] + [C].

[F][5]: [B] + [C].

[F][4], [H][4]: [C] + 11,000. 11,000 retained cell sites from Sprint as reported in Declaration of Neville R. Ray.

[G][2] - [G][5]: [B] + [C].

[H][2], [H][5]: [B] + [C].

In Table 28, the subscriber/MHz/Cell Site provides a measure of how "full" a carrier's network is. A carrier can continue to add cells (up to a point), but at some point will need more spectrum to expand its capacity. As Table 28 indicates, Verizon uses its spectrum most efficiently, serving 21.5 customers per MHz after accounting for spectrum reuse as measured by the number of towers deployed. AT&T is next in intensity of spectrum use at 13.2 subscribers per MHz, followed by T-Mobile (11.0) and Sprint (6.4). In the scenario in which New T-Mobile retains 11,000 Sprint cell sites and divests their spectrum holdings that exceed the screen, its network will have 7.8 subscribers/MHz/Cell Site.

## B. The Spectrum Screen

Since commercial mobile services became available in the early 1980s, the FCC has implemented policies and tools to prevent undue concentration of spectrum licenses in particular geographic markets.[149] This section describes the screen currently applied by the FCC to secondary market transactions.

### 1. The Current Spectrum Screen

Generally, the FCC's spectrum screen is characterized by the following:[150]

1. The FCC implements its case-by-case review for secondary market transactions rather than adopting bright line limits, and it believes it is in the public interest to do so.[151]
2. The FCC considers the appropriate product market for the screen to be the combined "mobile telephony/broadband services market," including mobile voice and data services. It considers the appropriate geographic market to be local, though it analyzes effects of transactions that exhibit national characteristics at the national level as well.[152]
3. The FCC applies the spectrum screen on a county-by-county basis to identify Cellular Market Areas ("CMAs") in which an entity would hold approximately one-third or more of the total spectrum that is both suitable and available for the provision of mobile telephony/broadband services post-transaction. The FCC then evaluates these markets for possible competitive harm.[153]
4. The FCC does not limit its analysis of potential competitive harms to markets identified in the initial screen, as it may encounter other factors that bear on the public interest inquiry.[154]

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149 Report and Order, *In the Matter of Policies Regarding Mobile Spectrum Holdings and Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, WT Docket No. 12-269 and Docket No. 12-268, FCC, June 2, 2014, ¶¶ 7-8, accessed September 25, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-63A1_Rcd.pdf (Mobile Spectrum Holdings Report and Order, ¶¶ 7-8).

150 Mobile Spectrum Holdings Report and Order, ¶¶ 227, 234, and 241.

151 Mobile Spectrum Holdings Report and Order, ¶¶ 17, 227, and 231.

152 See Section V.B.1.a.

153 See Section V.B.1.a ;Mobile Spectrum Holdings Report and Order, ¶ 252 and 256-258.

154 See Section V.C.

### *a. Application of the Spectrum Screen*

In determining which spectrum bands should be included in the spectrum screen, the FCC evaluates whether bands are "suitable" and "available" in the near future for the provision of mobile/broadband services.[155] "Suitable" spectrum is defined as "spectrum that is capable of supporting mobile service given its physical properties and the state of equipment technology, [that] is licensed with a mobile allocation and corresponding service rules, and [that] is committed to another use that effectively precludes its uses for mobile services."[156] "Available spectrum" is spectrum for which it is "fairly certain that it will meet the criteria for suitable spectrum in the near term, an assessment that can be made at the time the spectrum is licensed or at later times after changes in technology or regulation that affect the consideration."[157] In the *Mobile Spectrum Holdings R&O*, the FCC noted that within the pool of mobile spectrum considered for the screen, the different characteristics of spectrum (*e.g.*, the propagation characteristics of below-1-GHz spectrum versus the suitability of above-1-GHz spectrum for increasing network capacity) are not considered in evaluating the suitability and availability of specific spectrum bands for the provision of mobile telephony/broadband services under its definition.[158]

In 2004, the FCC established a spectrum screen threshold of approximately one-third of suitable and available spectrum in a given market that would be held by an acquiring entity post-transaction. The FCC has stressed that a market may contain more than three viable competitors even in cases in which one entity controls approximately one-third of suitable and available spectrum and noted that, at the time, there were some providers who were competing

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155 Mobile Spectrum Holdings Report and Order, ¶ 70.

156 Mobile Spectrum Holdings Report and Order, ¶ 71. See, *e.g.*, AT&T-Qualcomm Transaction Order, ¶ 38 and AT&T-Centennial Transaction Order, ¶ 43.

157 Mobile Spectrum Holdings Report and Order, ¶ 71. See, *e.g.*, AT&T-Qualcomm Transaction Order, ¶ 38; Memorandum Opinion and Order, *In the Matter of Applications of AT&T Inc. and Cellco Partnership d/b/a/ Verizon Wireless For Consent To Assign or Transfer Control of Licenses and Authorizations and Modify a Spectrum Lease Agreement*, WT Docket No. 09-104, FCC, June 22, 2010, ¶¶ 30 and 39, available https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-116A1.pdf, accessed August 23, 2018 (AT&T-Verizon Wireless Transaction Order, ¶¶ 30 and 39); and AT&T-Centennial Transaction Order, ¶¶ 34 and 43.

158 Mobile Spectrum Holdings Report and Order, ¶ 72.

successfully with less than one-third of suitable and available spectrum.[159] In the *Mobile Spectrum Holdings NPRM*, the FCC sought comment on whether the one-third threshold was still appropriate and found that it was.[160] The screen is triggered when an entity would have, on a county-by-county basis, an attributable interest[161] in one-third or more of suitable and available spectrum in a given market.[162] Over time, the FCC has revised the type and amount of spectrum included in the screen. Table 29 shows the evolution of the screen from 2013 to the present.

[159] Mobile Spectrum Holdings Report and Order, ¶ 242 and AT&T Wireless-Cingular Wireless Transaction Order, ¶ 109.

[160] Mobile Spectrum Holdings NPRM, ¶¶ 33-34; Mobile Spectrum Holdings Report and Order, ¶ 227.

[161] The *Mobile Spectrum Holdings R&O* defines an "attributable interest" for the purpose of applying the FCC's initial spectrum screen to secondary market transaction as "all controlling interests and non-controlling interests of ten percent or more… Interests of less than ten percent would be attributable if the interest confers *de facto* control, including but not limited to partnership and other ownership interests and any stock interest in a licensee." The FCC also attributes "long-term *de* facto transfer leasing agreements and long-term spectrum manager leasing arrangements to the lessor and the lessee, including sublessors and sublessees. Mobile Spectrum Holdings Report and Order, ¶¶ 300-301.

[162] In cases in which AWS-1 and/or BRS/EBS spectrum were not available in a particular market, these bands were not counted for the purposes of applying the spectrum screen trigger to that market. See Mobile Spectrum Holdings Report and Order, ¶ 251 at footnote 667.

## Table 29: Total Spectrum Included in the FCC Spectrum Screen (MHz), 2013-2017

| Spectrum Band | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| [A] | [B] | [C] | [D] | [E] | [F] |
| 600 MHz | | | | | 70.0 |
| 700 MHz | 80.0 | 70.0 | 70.0 | 70.0 | 70.0 |
| Cellular | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| SMR | 26.5 | 14.0 | 14.0 | 14.0 | 14.0 |
| Broadband PCS | 130.0 | 130.0 | 130.0 | 130.0 | 130.0 |
| AWS-1 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| AWS-3 | | | | 15.0 | 65.0 |
| AWS-4 | | 40.0 | 40.0 | 40.0 | 40.0 |
| H Block | | 10.0 | 10.0 | 10.0 | 10.0 |
| WCS | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| BRS | 55.5 | 67.5 | 67.5 | 67.5 | 67.5 |
| EBS | | 89.0 | 89.0 | 89.0 | 89.0 |
| **Total** | **452.0** | **580.5** | **580.5** | **595.5** | **715.5** |
| **Reported Screen Level** | **151.0** | **194.0** | **194.0** | **199.0** | **238.5** |

Sources: 16th Mobile Wireless Competition Report, p. 82 at Table 16; 17th Mobile Wireless Competition Report, p. 50 at Table IV.A.1; Eighteenth Report, In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 15-125, FCC, December 23, 2015, p. 40 at Table IV.A.1, available https://docs.fcc.gov/public/attachments/DA-15-1487A1.pdf, accessed August 23, 2018; 19th Mobile Wireless Competition Report, p. 46 at Table IV.A.1; 20th Mobile Wireless Competition Report, p. 28 at Table II.E.1; Report and Order, In the Matter of Policies Regarding Mobile Spectrum Holdings and Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, WT Docket No. 12-269 and Docket No. 12-268, FCC, June 2, 2014, ¶ 251, available https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-63A1_Rcd.pdf, accessed August 23, 2018; and Memorandum Opinion and Order, In the Matter of Applications of AT&T Inc. and Atlantic Tele-Network, Inc. For Consent To Transfer Control of and Assign Licenses and Authorizations, WT Docket No. 13-54, FCC, September 20, 2013, ¶ 30 at footnote 79, available https://apps.fcc.gov/edocs_public/attachmatch/DA-13-1940A1_Rcd.pdf, accessed August 23, 2018.

Notes:

[B]: In 2013, the FCC Mobile Wireless Competition Report noted that the 26.5 MHz of SMR spectrum included 19 MHz of SMR spectrum and 7.5 MHz of spectrum that was available for SMR and other services. The broadband PCS spectrum included in the screen included 10 MHz of 1910-15/1990-95 MHz of spectrum held by Sprint that resulted from the 800 MHz Band Reconfiguration. The 700 MHz spectrum included 10 MHz of Upper 700 MHz D Block spectrum. AWS-1 was not attributable in markets where federal government users had not been relocated, and BRS was not attributable in markets where previous BRS licensees had not been transitioned.

[C]-[E]: In 2014-2016, FCC Mobile Wireless Competition Reports noted that AWS-1 was not attributable in markets where federal government users had not been relocated, and BRS was not attributable in markets where previous BRS licenses had not been transitioned.

[F]: In 2017, the FCC noted that it considers AWS-1 and BRS spectrum to be available nationally. While 15 MHz of AWS-3 spectrum is available nationally (1695-1710 GHz), the FCC has noted that it will "evaluate the availability of the remaining 50 [MHz] of AWS-3 spectrum (1755-1780 GHz and 2155-2180 GHz) on a market-by-market basis." Though 112.5 MHz of EBS spectrum is considered to be available, the FCC discounts this spectrum such that 89 MHz is included in the screen. The 70 MHz of 700 MHz spectrum included in the screen does not include the 20 MHz of 700 MHz spectrum allocated to public safety. The 2017 reported screen level is the screen applied later in this memo.

There are some limits placed on spectrum available for purposes of measuring the screen. In its recent 20th Mobile Wireless Competition Report, the FCC noted that that it considers AWS-1 and BRS spectrum as available on a nationwide basis.[163] It also noted that while 15 MHz of AWS-3 spectrum is now available on a nationwide basis (1695-1710 GHz), the FCC will evaluate the availability of the remaining 50 MHz of AWS-3 spectrum (1755-1780 GHz and 2155-2180 GHz) on a market-by-market basis. [164] While 112.5 MHz of EBS spectrum are available, the FCC discounts this spectrum such that 89 MHz is included in the screen for review of proposed transactions. [165] The 70 MHz of 700 MHz spectrum included in the screen does not include the 20 MHz of 700 MHz spectrum allocated to public safety.[166]

## C. Spectrum Holdings by Carrier

This section describes the calculation of spectrum holdings by licensee and by market based on information from the FCC's licensing database. In particular, we calculate the spectrum holdings at the county level for Sprint, T-Mobile, AT&T, and Verizon, described henceforth as "carriers of interest." All other licensees (including DISH and U.S. Cellular) are still below the threshold of the spectrum screen.

Individual spectrum licenses are pulled from the FCC's Universal Licensing System ("ULS").[167] Specifically, we focus on the "BRS & EBS," "Cellular," and "Market Based Services" files from the

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163 20th Mobile Wireless Competition Report, p. 28 at footnote 130.

164 20th Mobile Wireless Competition Report, p. 28 at footnote 130.

165 20th Mobile Wireless Competition Report, p. 28 at footnote 130.

166 20th Mobile Wireless Competition Report, p. 28 at footnote 131.

167 "ULS Frequently Asked Questions," FCC, last updated October 4, 2016, available http://wireless.fcc.gov/uls/index.htm?job=about, accessed August 23, 2018.

FCC's database downloads.[168] Table 30 illustrates which Radio Service Codes we use to identify the spectrum licenses that are covered by the screen.

**Table 30: Radio Service Codes of Bands included in the Spectrum Screen**

| Band | Radio Service Code |
|---|---|
| 600 MHz | WT |
| 700 MHz | WU |
| 700 MHz | WY |
| 700 MHz | WZ |
| Cellular | CL |
| SMR | YC |
| SMR | YH |
| Broadband PCS | CW |
| Broadband PCS | CY |
| AWS-1 | AW |
| AWS-3 | AT |
| AWS-4 | AD |
| H Block | AH |
| WCS | WS |
| BRS | BR |
| EBS | ED |

Note: For SMR, we only consider the 14 MHz defined by the frequencies 817-824 MHz and 862-869 MHz, consistent with the FCC's guidance on SMR in the screen. See Section V.D.

### 1. License Ownership

To accurately map licenses to the appropriate wireless carrier, we created a map of all FCC Registration Numbers ("FRNs") associated with each of the carriers of interest based on Ownership Disclosure Filings (Form 602) filed with the FCC. For any filer, these ownership filings identify both the entities in which the filer has an interest and the entities that have an interest in the filer. In the *Mobile Spectrum Holdings R&O*, the FCC notes that it uses a 10 percent threshold for attributing ownership. Applying that threshold, we consider entities linked

[168] See "Databases," Universal Licensing System, FCC, available http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly. These files were last downloaded on August 7, 2018.

if one owns at least 10 percent of the other.[169] Using these relationships, we identify all FRNs in which each of the carriers of interest has an interest.[170]

In the *Mobile Spectrum Holdings R&O*, the FCC notes that it "attribute[s] long-term de facto transfer leasing arrangements and long-term spectrum manager leasing arrangements to the lessor and the lessee, including sublessors and sublessees."[171] We thus include a particular license in the spectrum holdings of both the lessor and lessee for all long-term leases. This double counts spectrum in the holdings of the lessor and lessee, but as the major carriers do not lease spectrum to each other, this does not present an issue for the current analysis.

### 2. Cellular and Market-Based Licenses

Although spectrum licenses are typically licensed by the FCC for whole markets and for the entire channel block of a particular band, they may be sub-divided over time. Both the frequencies and the geographic coverage of a band may be divided; the former is known as "spectrum disaggregation," and the latter is known as "geographic partitioning." To get an accurate account of the coverage of each license, we map each geographic area covered by the license to the frequencies covering that geography.

Ultimately we create a list of counties covered by each license as well as the MHz of spectrum covered in each county. When a license covers an entire market, we map the license to all counties within the particular market. When partitioned licenses do not cover an entire market, we map the license only to the counties it covers.[172]

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169 Mobile Spectrum Holdings Report and Order, at Appendix B.

Specifically, in creating a map of entity relationships, we drop all links between entities in which the ownership stake is less than 10 percent and keep all others. For instance, if Entity A has a 10 percent interest in Entity B, and Entity B has a 10 percent stake in Entity C, we treat Entity A, Entity B, and Entity C as all being part of the same entity. There are certain entities that link to more than one carrier of interest. For example, T-Mobile Puerto Rico LLC is linked with both T-Mobile and AT&T. In this case, the licenses of that entity are counted with the holdings of both linked carriers.

170 In the case when an FRN is missing from the data, we use the name of the entity as the identifier.

171 Mobile Spectrum Holdings Report and Order, ¶ 301.

172 Geographic partitions are classified as either "defined" or "undefined." A "defined" area is generally made up of one or more counties while an "undefined" area does not have a pre-defined geographic designation. Some licenses (*e.g.*, B166) have such undefined areas carved out of the coverage of certain counties, but we do not account for these areas in this analysis.

### 3. BRS/EBS Licenses

BRS and EBS spectrum licenses are particularly complicated to define, but especially important given Sprint's dominant position in this band. Licenses in the BRS and EBS bands may have one of two types of geographic footprints: a P35 service area or a Basic Trading Area ("BTA") service area. A P35 consists of a particular coordinate point and the area within 35 miles of this point. Each BTA license covers the part of the BTA that is not covered by P35 licenses.[173] Further complicating the analysis, P35 licenses may overlap with each other, which requires assigning the spectrum in the overlapping areas to one license or the other, creating complicated (and somewhat arbitrary) geographic definitions of licenses.[174] In addition, a BTA license also may have been partitioned, and in those cases, we find the counties covered by the BTA using the same methodology described above for geographic partitions.

ULS does not identify the specific counties covered by P35 areas or account for overlaps between two or more P35 licenses. To determine each licensee's spectrum holdings in a county, we identify the census tracts that are within 35 miles of the central point of each P35 license. If the population weighted centroid of the census tract is within 35 miles of the central point of the P35 license, we assign the tract to the license.[175] When a tract falls within two or more P35 licenses, we calculate the distance between each license's center point and the census tract population centroid and assign the census tract to the nearest P35 license, defined as having the minimum distance between P35 center point and census tract population centroid. An example of assigning populations to P35s is shown below in Figure 6.

For each frequency block, after finding the census tracts covered by each P35 license, we find the remaining portions of each county covered only by a BTA licensee, defined as census tracts covered by a BTA license and not by a P35 license. Since this results in partial coverage of

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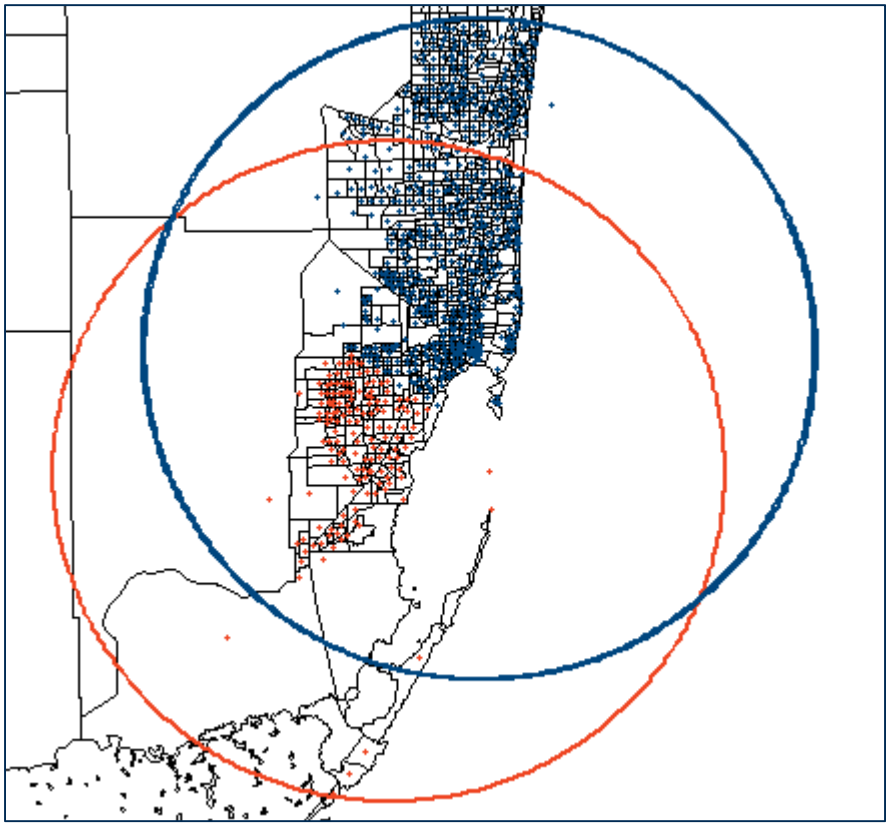
[173] See "Broadband Radio Service & Education Broadband Service," FCC, April 19, 2017, at tab "Licensing," available https://www.fcc.gov/wireless/bureau-divisions/broadband-division/broadband-radio-service-education-broadband-service, accessed August 23, 2018.

[174] More than one P35 can overlap each other. In fact, a few are known to overlap each other for the same frequencies.

[175] A small issue arises from using the population-weighted centroid of a census tract to assign population to P35 licenses. We note that a few P35 licenses do not cover any census tract population centroids and are assigned 0 population coverage. These two licenses are dropped from the analysis.

counties, we assign the spectrum in the particular county to the licensee only if the licensee covers at least 10 percent of the population in the county.[176]

**Figure 6: Illustration of P35 Census Tract Assignment for L000004109 (and Overlapping Licenses)**



## D. Application of the Spectrum Screen to Current FCC Holdings

### 1. Spectrum Holdings in Screen by Carrier

Table 29 illustrates the spectrum in each band included in the screen. The spectrum in most bands is considered to be available on a nationwide basis, but as noted above there are some adjustments and the FCC has noted that it will consider AWS-3 spectrum on a market-by-market basis.[177] Thus, we calculate the amount of AWS-3 spectrum available in each market by

[176] This means that it is possible for the same frequencies to be assigned to multiple entities in a single county, if more than one entity owns frequencies covering more than 10 percent of the population in the county.

[177] 20th Mobile Wireless Competition Report, p. 28 at footnote 130.

identifying which markets do not have AWS-3 licenses for certain channel blocks. This means that the MHz in the screen varies by county depending on the amount of AWS-3 licensed in that county. For a county with all spectrum available, the threshold for being above the screen is 238.5 MHz.[178] However, when we flag carriers as being above the spectrum screen in certain counties, we use a county-by-county threshold that may be lower, depending on how much spectrum is available in that county.

In addition, in the *Mobile Spectrum Holdings R&O*, the FCC noted that it includes all BRS spectrum except BRS Channel 1 and discounts EBS spectrum included in the screen. Specifically, it first excludes 5 percent of EBS spectrum as reserved for serving educational purposes, and then discounts an additional 16.5 percent for white space on a nationwide basis.[179] We discount holdings by 5 percent to account for educational purposes. Although the 5 percent reserve is actually time-based, following the FCC's guidance, we translate it into its spectrum equivalent for purposes of the screen. Since EBS white space is not licensed, we do not discount holdings to account for white space. Instead, if a licensee has more spectrum in a particular county than the spectrum counted for in the screen (89 MHz), we count only 89 MHz of the spectrum in that county for purposes of the screen.

After compiling the county-level spectrum holdings for all spectrum included in the screen, we map the spectrum holdings of each of the carriers of interest. The following maps illustrate these holdings. Of the carriers of interest, Sprint clearly holds the most spectrum in certain counties and is the only one of the carriers to hold more than 240 MHz in any county.[180] In particular, Sprint's current spectrum holdings are above the spectrum screen in 8 counties.[181]

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178 Calculation: 238.5 MHz = 715.5 MHz / 3.

179 Mobile Spectrum Holdings Report and Order, ¶¶ 118-125.

180 AT&T holds more than 240 MHz in certain counties in Puerto Rico. This depth of holdings in Puerto Rico is partly due to an ownership link between AT&T and T-Mobile Puerto Rico LLC. Thus, the holdings for this entity count for both AT&T and T-Mobile.

181 As discussed above, being over the screen is determined on a county-by-county basis by considering the suitable and available frequencies in each county as well as the total MHz held by any entity (or proposed entity).

**Figure 7: Sprint Spectrum Holdings in Screen**

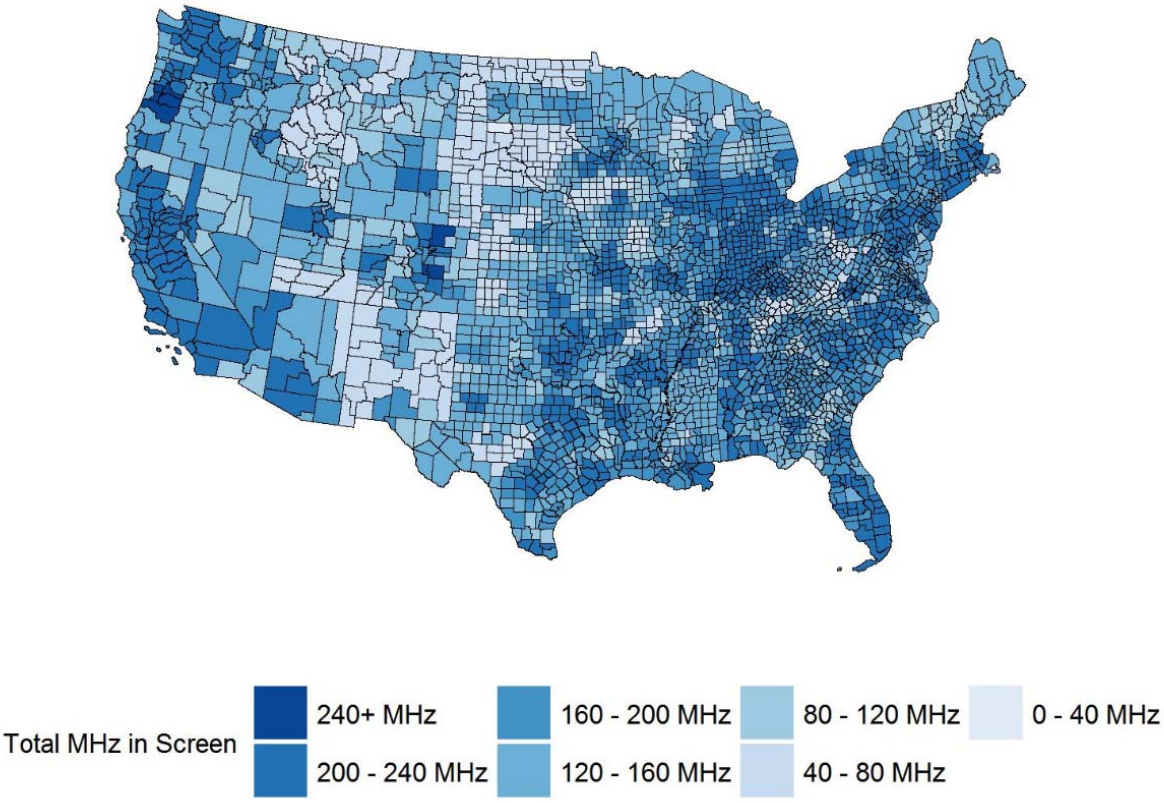



**Figure 8: T-Mobile Spectrum Holdings in Screen**

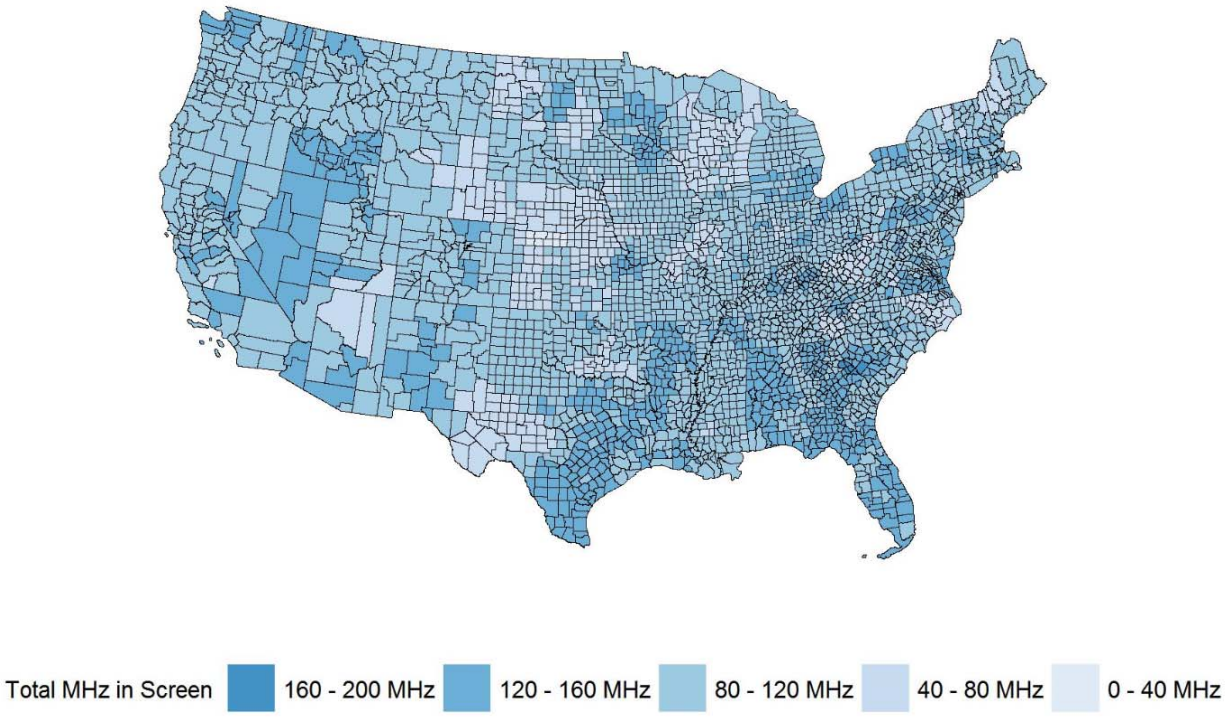


**Figure 9: AT&T Spectrum Holdings in Screen**

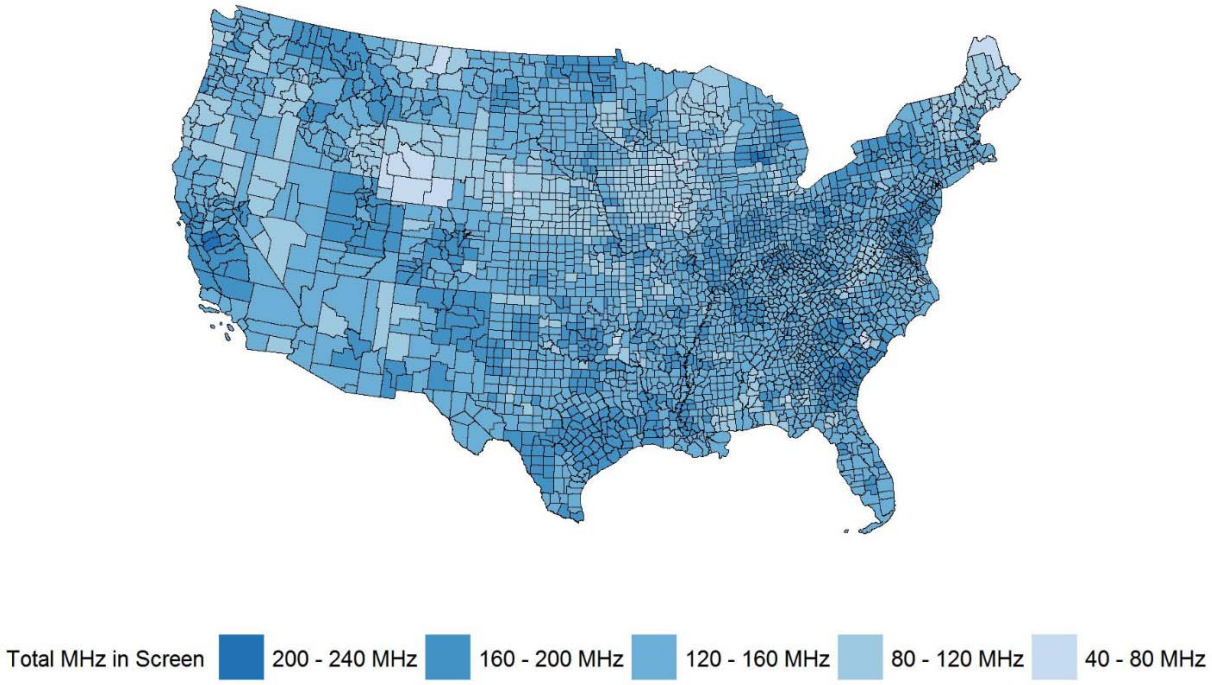
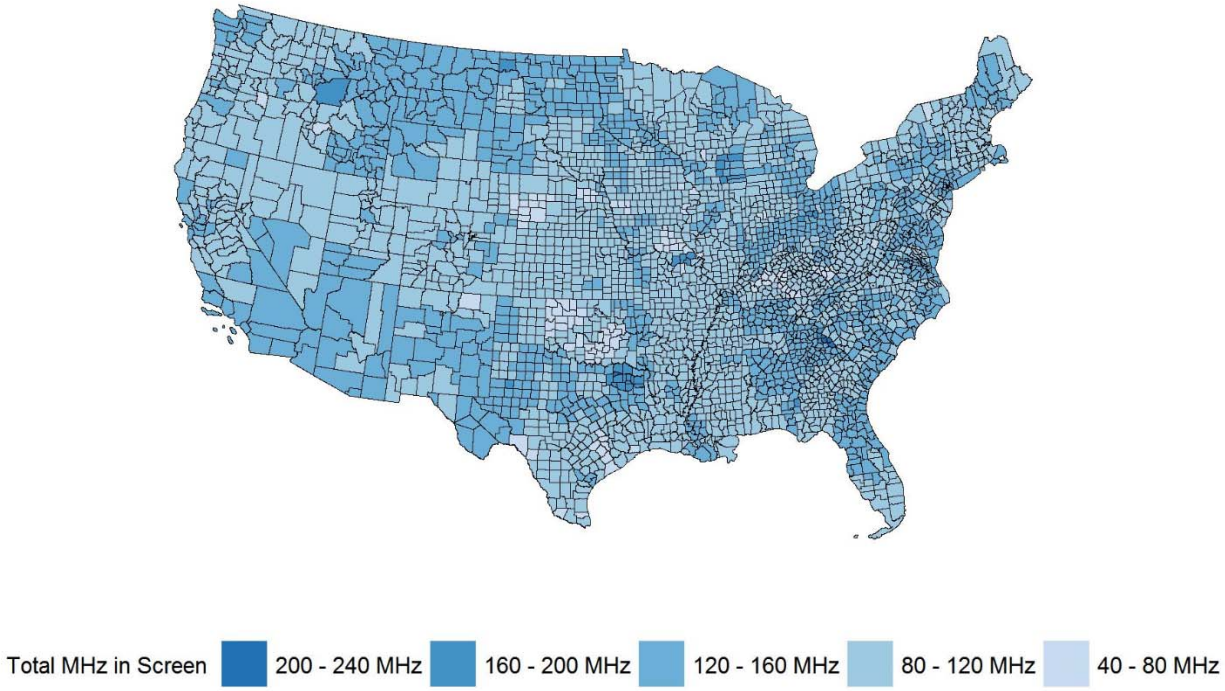


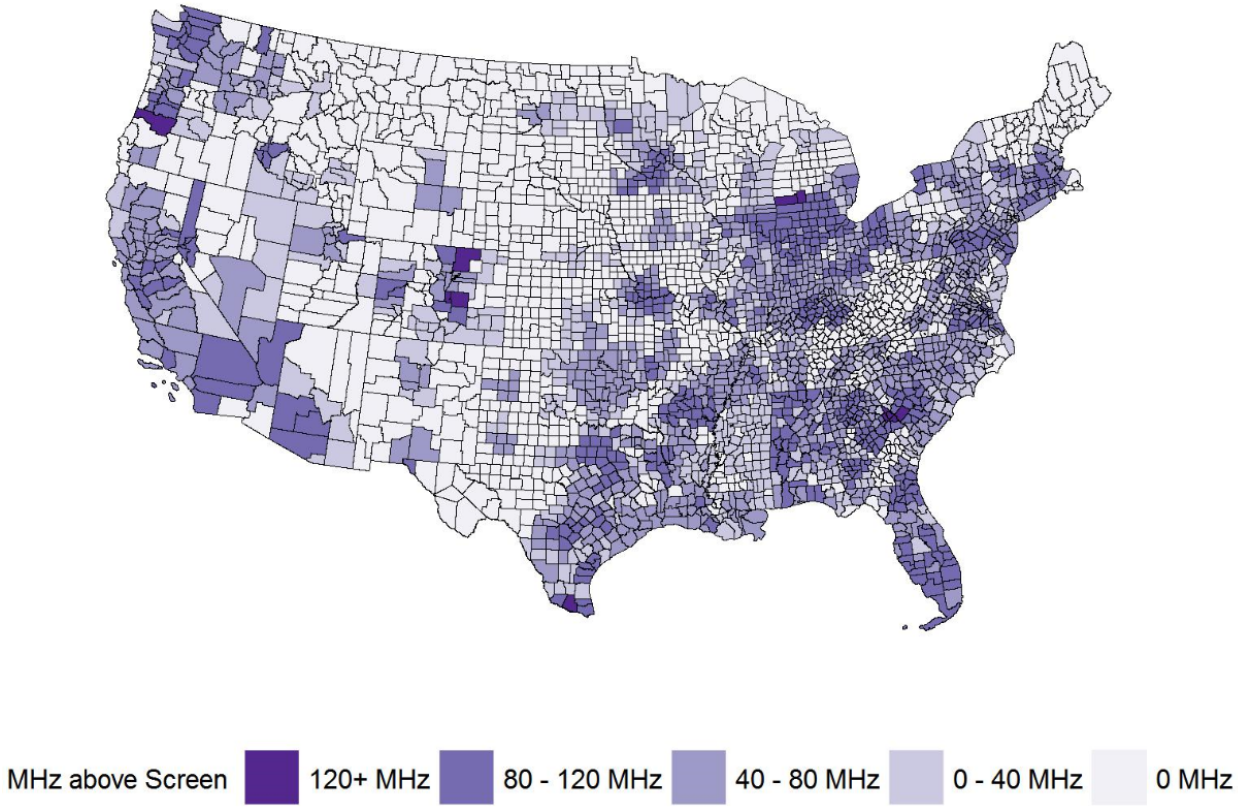

**Figure 10: Verizon Spectrum Holdings in Screen**



## 2. Spectrum Screen Implications of a Merger Between the Applicants

Given that both Sprint and T-Mobile have sizable spectrum holdings, a merger between the two entities would necessarily involve a review of whether their combined holdings cross the spectrum screen threshold. Although Sprint individually crosses the threshold in 8 counties, the combined holdings of Sprint and T-Mobile do so in almost 2,000 counties.[182] The depth of the combined holdings above the screen varies significantly, from only a few MHz in some counties to almost 140 MHz in others. Figure 11 illustrates the depth of spectrum above the screen for these combined holdings.

**Figure 11: Depth of Combined Sprint & T-Mobile Spectrum Holdings above Spectrum Screen**




[182] T-Mobile does not individually cross the threshold in any county.

Figure 12 illustrates the distribution of the depth of combined holdings above the screen. For the great majority of counties, the combined holdings are within 100 MHz of the spectrum screen.

**Figure 12: Distribution of the Depth of Combined Sprint & T-Mobile Spectrum Holdings above Spectrum Screen**

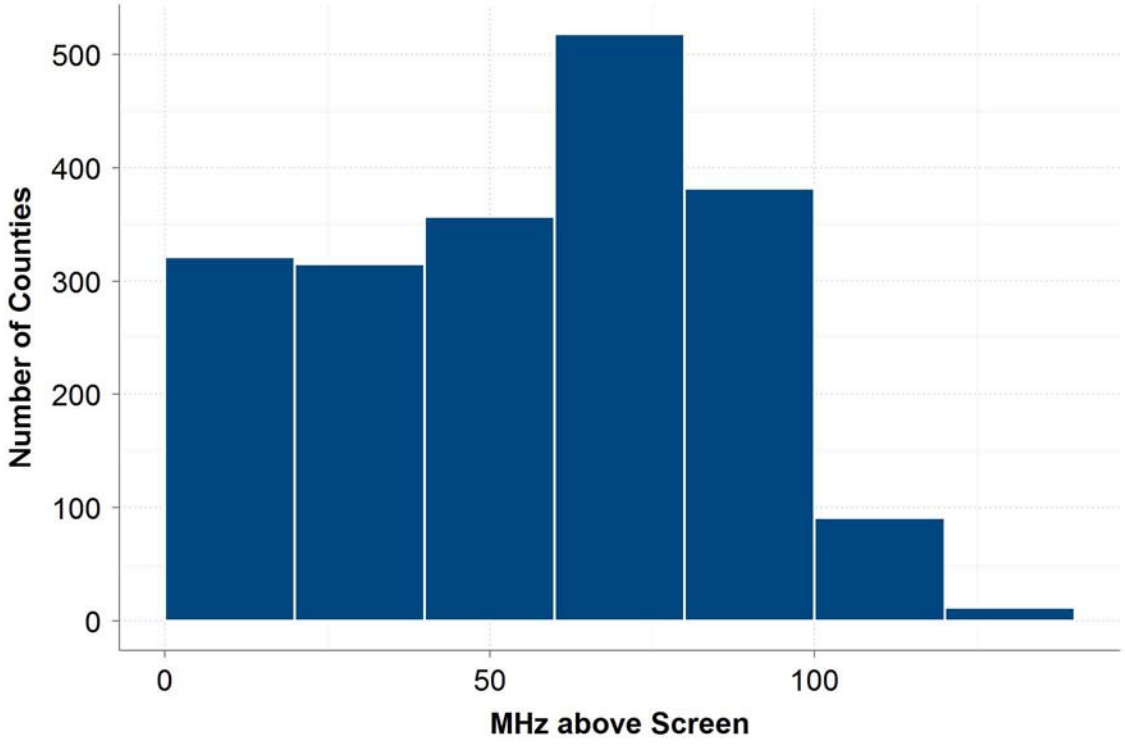



Table 31 reports the breadth of population and land area of the counties affected by the spectrum screen. Ninety percent of the U.S. population and almost half of the country's land mass would require some level of divestiture for the merged parties to remain under the screen.

**Table 31: Summary of Counties in Screen**

| | Above Screen | Not Above Screen |
|---|---|---|
| Count of Counties | 1,996 | 1,225 |
| *% of Total* | *62.0%* | *38.0%* |
| Population | 281,927,239 | 30,544,088 |
| *% of Total* | *90.2%* | *9.8%* |
| Land Area | 1,577,558 | 1,957,772 |
| *% of Total* | *44.6%* | *55.4%* |

Source: FCC; 2010 Census Gazetteer File.

### 3. Spectrum Screen Below 1 GHz

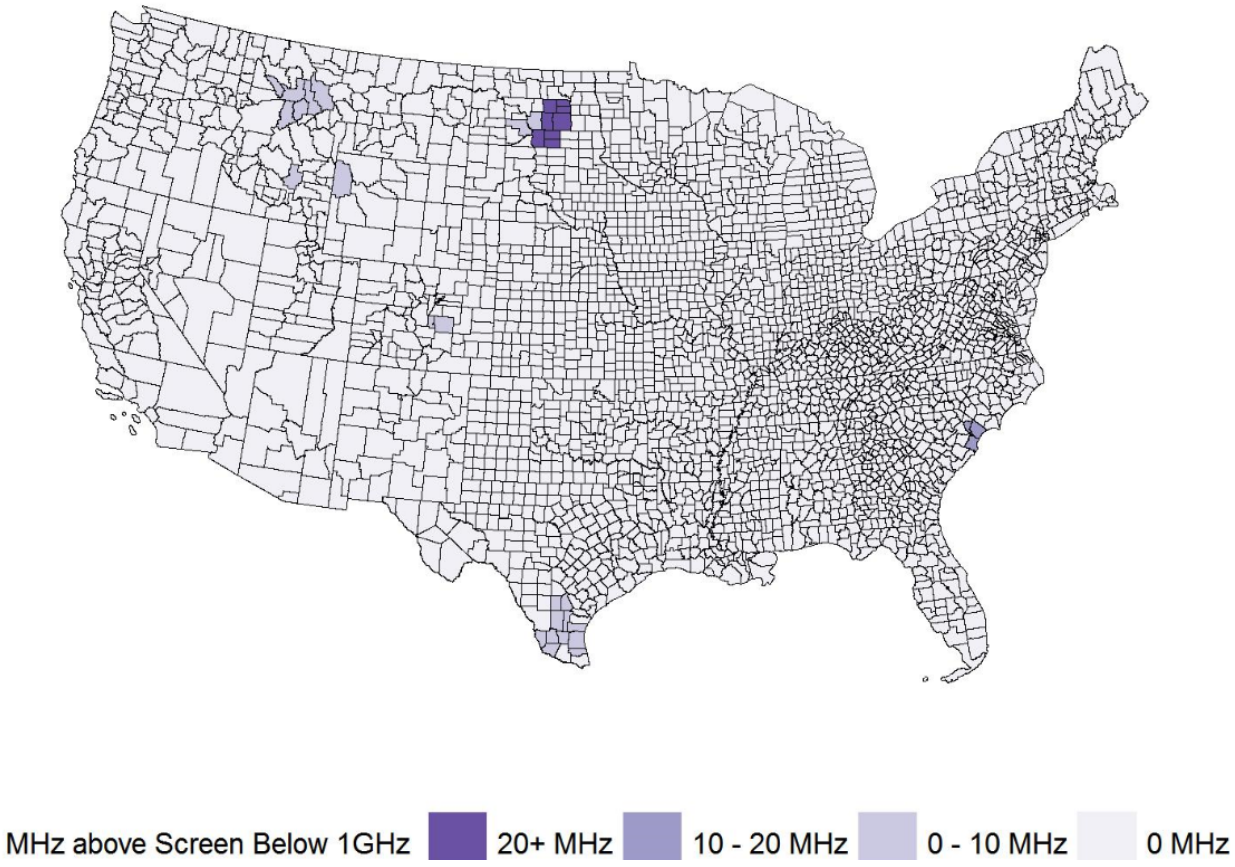
Although New T-Mobile's holdings are above the screen in the majority of counties, if the FCC does require any divestitures, either AT&T or Verizon (or both) would have the capacity to absorb all spectrum above the screen in all but a few counties.[183] There are 18 counties in which neither AT&T nor Verizon would be able to absorb the entire depth of combined spectrum holdings while still being under the screen. On the other hand, both DISH and U.S. Cellular would be able to absorb spectrum in all counties in which Sprint and T-Mobile go over the cap.

Although the FCC does not currently apply weights to spectrum in the screen, it will likely pay close attention to spectrum under 1 GHz. Restricting Sprint and T-Mobile's combined holdings to bands below 1 GHz significantly decreases the number of counties above the screen threshold to just 35 counties.[184] The following map highlights the counties in which the combined holdings of licenses below 1 GHz are above the screen threshold.

[183] If U.S. Cellular is included, there is an entity able to absorb all spectrum above the screen in all counties in which the combined holdings of Sprint and T-Mobile are above the screen.

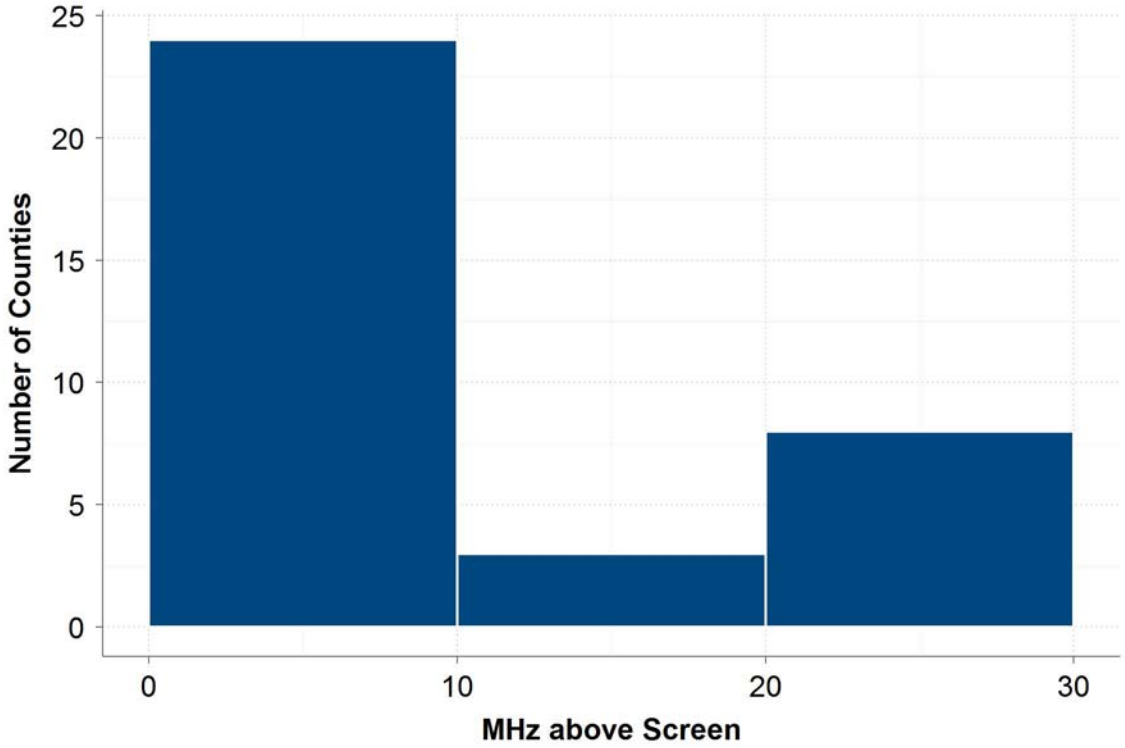
[184] Of the 715.5 MHz in the screen, 204 MHz are for bands below 1 GHz. Therefore, since all of these bands are considered to be available on a nationwide basis, the threshold for spectrum under 1 GHz is 68 MHz, one-third of 204 MHz. The following bands in the screen are under 1 GHz: 600 MHz, 700 MHz, SMR, and Cellular.

**Figure 13: Depth of Combined Sprint & T-Mobile Spectrum Holdings Under 1 GHz above Spectrum Screen**




In more than half of the counties in which Sprint and T-Mobile's combined holdings cross the 1 GHz-threshold, the depth of spectrum above the threshold is 10 MHz or less. Figure 14 illustrates this distribution.

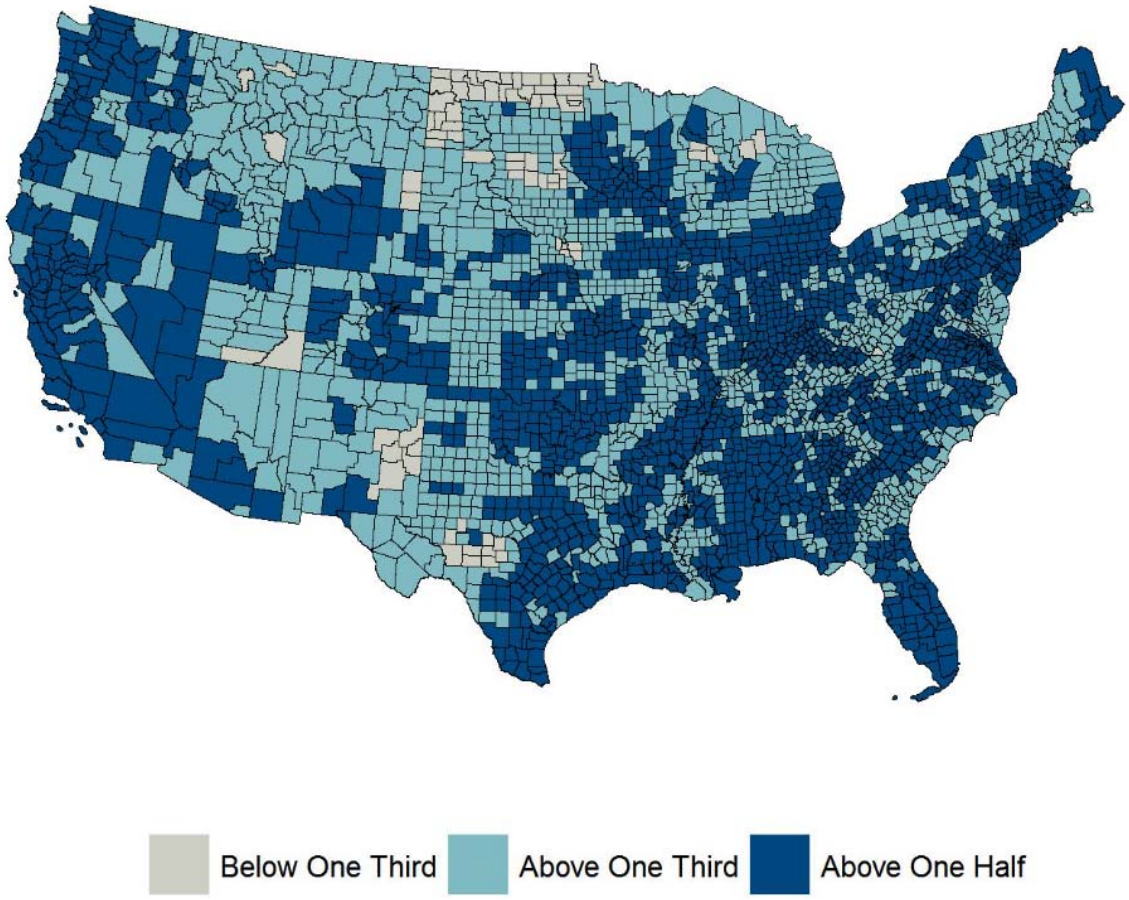
**Figure 14: Distribution of the Depth of Combined Sprint & T-Mobile Spectrum Holdings below 1 GHz above Spectrum Screen**




## 4. Spectrum Holdings Shares Among the Big-4 Carriers

The spectrum screen incudes all licensed frequencies from specified bands in a given geography. Of course, the impact of frequencies owned by the competitive fringe is different from the impact of frequencies owned by the major network operators. Consequently, although beyond the current spectrum screen, it can be informative to examine concentration of spectrum controlled by the big four network operators. The spectrum holdings share of New T-Mobile would be even greater when only the spectrum holdings of the Big 4 facilities-based carriers are considered. New T-Mobile would hold more than a third of that spectrum in 3,142 counties, and more than half in 1,712 counties, as shown in Figure 15.

**Figure 15: New T-Mobile's Spectrum Holdings as Share of Big Four**



# VI. Appendix A

## A. Marginal Cost Analysis

### Table 32: AT&T Wireless Cost Structure, 2017-2031

| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annualized Churn | [1] | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% | 16.35% |
| Inflation Rate | [2] | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% |
| Connections | [3] | 141,600,000 | | | | | | | | | | | | | | |
| Acquisition Cost per Connection | [4] | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 |
| Operating Cost per Connection | [5] | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 | $78 |
| Overhead Cost per Connection | [6] | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 | $45 |
| Gross Connections at Beginning of Period | [7] | 0 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Churn | [8] | 0 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 | -163,481 |
| Gross Additions | [9] | 1,000,000 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 | 163,481 |
| Gross Connections at End of Period | [10] | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Marginal Capital Cost | [11] | $94,251,923 | $0 | $0 | $0 | $0 | $94,251,923 | $0 | $0 | $0 | $0 | $94,251,923 | $0 | $0 | $0 | $0 |
| Acquisition Cost | [12] | $258,750,000 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 | $42,300,802 |
| Operating Cost | [13] | $0 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 | $78,293,946 |
| Overhead Cost | [14] | $0 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 | $44,944,711 |
| Sum of Costs | [15] | $353,001,923 | $165,539,459 | $165,539,459 | $165,539,459 | $165,539,459 | $259,791,382 | $165,539,459 | $165,539,459 | $165,539,459 | $165,539,459 | $259,791,382 | $165,539,459 | $165,539,459 | $165,539,459 | $165,539,459 |
| Average Costs Per Connection | [16] | $353.00 | $165.54 | $165.54 | $165.54 | $165.54 | $259.79 | $165.54 | $165.54 | $165.54 | $165.54 | $259.79 | $165.54 | $165.54 | $165.54 | $165.54 |
| Nominal Discount Rate | [17] | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% |
| Real Discount Rate | [18] | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% |
| Discount Factor | [19] | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.70 | 0.67 | 0.65 | 0.62 | 0.60 |
| Present Value | [20] | $359.78 | $162.42 | $156.36 | $150.52 | $144.90 | $218.91 | $134.28 | $129.27 | $124.44 | $119.80 | $180.99 | $111.02 | $106.87 | $102.88 | $99.04 |
| Sum of Present Value Costs | [21] | $2,301.48 | | | | | | | | | | | | | | |
| Annual Constant Cost Per Connection | [22] | $216.13 | | | | | | | | | | | | | | |
| Monthly Constant Cost Per Connection | [23] | $18.01 | | | | | | | | | | | | | | |

Sources & Notes:

[1]: Annualized churn based on monthly churn rates. USB Wireless Report, p. 19 at Figure 35.

[2]: 10-year expected inflation rate as of October 1, 2017. "Inflation Expectations," Federal Reserve Bank of Cleveland, November 15, 2017, accessed August 23, 2018, https://www.clevelandfed.org/our-research/indicators-and-data/inflation-expectations.aspx.

[3]: Dennis Bournique, “Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator,” Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

[4]: T-Mobile's 2013 average acquisition cost per connection. John C. Hodulik, Batya Levi, Lisa L. Friedman, and Christopher Schoell, "US Wireless 411: Version 51," UBS, March 18, 2014, p. 25 at Figure 44.

[5]: Brattle calculations of AT&T Mobility cost of services / [3]. AT&T Inc., Form 10-K for the Fiscal Year Ended December 31, 2017, AT&T Inc. 2016 Annual Report at pp. 14 and 40, accessed September 26, 2017, https://otp.tools.investis.com/clients/us/atnt/SEC/sec-show.aspx?Type=html&FilingId=11869124&CIK=0000732717&Index=10000.

[6]: Brattle calculations of AT&T Mobility SG&A less 2016 gross acquisition costs, per connection. AT&T Inc., Form 10-K for the Fiscal Year Ended December 31, 2017, AT&T Inc. 2016 Annual Report at pp. 14 and 40, available https://otp.tools.investis.com/clients/us/atnt/SEC/sec-show.aspx?Type=html&FilingId=11869124&CIK=0000732717&Index=10000, accessed August 23, 2018.

[7]: Connections maintained at beginning of the year after a one-time addition of 1 million connections.

[8]: ( - [1] ) x [7].

[9]: Gross additions necessary to maintain 1 million connections given [8].

[10]: [7] + [8] + [9].

[11]: Brattle estimation. Expenditure recurs every five years to maintain capacity.

[12]: [9] x [4].

[13]: [5] x [10]. Overhead costs for additional connections are 0 in 2017.

[14]: [5] x [10]. Operating costs for additional connections are 0 in 2017.

[15]: Sum of [11] to [14].

[16]: [15] / [10].

[17]: Average weighted average cost of capital for AT&T, Verizon, Sprint, and T-Mobile as of September 30, 2017. Bloomberg, accessed August 21, 2018.

[18]: [ ( 1 + [17] ) / ( 1 + [2] ) ] - 1.

[19]: ( 1 / [18] ) ^ ((Year - 2017) - .5). Mid-year periods used to reflect costs incurred over the course of the year.

[20]: [19] x [16].

[21]: Sum of [20].

[22]: [ ( [18] x [21] ) ] / [ 1 - (1 + [18] ) ^ - ( 2031 - 2017) ].

[23]: [22] / 12.

[24]: SEC 10-K Filing.

[25]: ( [24] - [23] ) / [24].

## Table 33: Verizon Cost Structure, 2017-2031

| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annualized Churn | [1] | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% | 13.79% |
| Inflation Rate | [2] | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% |
| Connections | [3] | 145,300,000 | | | | | | | | | | | | | | |
| Acquisition Cost per Connection | [4] | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 |
| Operating Cost per Connection | [5] | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 | $55 |
| Overhead Cost per Connection | [6] | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 | $91 |
| Gross Connections at Beginning of Period | [7] | 0 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Churn | [8] | 0 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 | -137,880 |
| Gross Additions | [9] | 1,000,000 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 | 137,880 |
| Gross Connections at End of Period | [10] | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Marginal Capital Cost | [11] | $80,975,936 | $0 | $0 | $0 | $0 | $80,975,936 | $0 | $0 | $0 | $0 | $80,975,936 | $0 | $0 | $0 | $0 |
| Acquisition Cost | [12] | $258,750,000 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 | $35,676,382 |
| Operating Cost | [13] | $0 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 | $54,975,912 |
| Overhead Cost | [14] | $0 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 | $90,528,605 |
| Sum of Costs | [15] | $339,725,936 | $181,180,898 | $181,180,898 | $181,180,898 | $181,180,898 | $262,156,835 | $181,180,898 | $181,180,898 | $181,180,898 | $181,180,898 | $262,156,835 | $181,180,898 | $181,180,898 | $181,180,898 | $181,180,898 |
| Average Costs Per Connection | [16] | $339.73 | $181.18 | $181.18 | $181.18 | $181.18 | $262.16 | $181.18 | $181.18 | $181.18 | $181.18 | $262.16 | $181.18 | $181.18 | $181.18 | $181.18 |
| Nominal Discount Rate | [17] | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% |
| Real Discount Rate | [18] | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% |
| Discount Factor | [19] | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.70 | 0.67 | 0.65 | 0.62 | 0.60 |
| Present Value | [20] | $346.25 | $177.77 | $171.13 | $164.74 | $158.59 | $220.90 | $146.97 | $141.48 | $136.20 | $131.12 | $182.63 | $121.51 | $116.97 | $112.61 | $108.40 |
| Sum of Present Value Costs | [21] | $2,437.27 | | | | | | | | | | | | | | |
| Annual Constant Cost Per Connection | [22] | $228.88 | | | | | | | | | | | | | | |
| Monthly Constant Cost Per Connection | [23] | $19.07 | | | | | | | | | | | | | | |

Sources & Notes:

[1]: Annualized churn based on monthly churn rates. USB Wireless Report, p. 19 at Figure 35.

[2]: 10-year expected inflation rate as of October 1, 2017. "Inflation Expectations," Federal Reserve Bank of Cleveland, November 15, 2017, available https://www.clevelandfed.org/our-research/indicators-and-data/inflation-expectations.aspx, accessed August 23, 2018.

[3]: Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

[4]: T-Mobile's 2013 average acquisition cost per connection. John C. Hodulik, Batya Levi, Lisa L. Friedman, and Christopher Schoell, "US Wireless 411: Version 51," UBS, March 18, 2014, p. 25 at Figure 44.

[5]: Cost of services / [3]. Verizon Communications Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, Exhibit 13 at Note 12, available https://www.sec.gov/Archives/edgar/data/732712/000119312517050292/d296602dex13.htm, accessed August 23, 2018.

[6]: SG&A less 2016 gross acquisition costs, per connection. Verizon Communications Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, Exhibit 13 at Note 12, available https://www.sec.gov/Archives/edgar/data/732712/000119312517050292/d296602dex13.htm, accessed August 23, 2018.

[7]: Connections maintained at beginning of the year after a one-time addition of 1 million connections.

[8]: ( - [1] ) x [7].

[9]: Gross additions necessary to maintain 1 million connections given [8].

[10]: [7] + [8] + [9].

[11]: Brattle estimation. Expenditure recurs every five years to maintain capacity.

[12]: [9] x [4].

[13]: [5] x [10]. Overhead costs for additional connections are 0 in 2017.

[14]: [5] x [10]. Operating costs for additional connections are 0 in 2017.

[15]: Sum of [11] to [14].

[16]: [15] / [10].

[17]: Average weighted cost of capital for AT&T, Verizon, Sprint, and T-Mobile as of September 30, 2017. Bloomberg, accessed August 21, 2018.

[18]: [ ( 1 + [17] ) / ( 1 + [2] ) ] - 1.

[19]: ( 1 / [18] ) ^ ((Year - 2017) - .5). Mid-year periods used to reflect costs incurred over the course of the year.

[20]: [19] x [16].

[21]: Sum of [20].

[22]: [ ( [18] x [21] ) ] / [ 1 - (1 + [18] ) ^ - ( 2031 - 2017) ].

[23]: [22] / 12.

[24]: SEC 10-K Filing.

[25]: ( [24] - [23] ) / [24].

## Table 34: Sprint Wireless Cost Structure, 2017-2031

| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annualized Churn | [1] | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% | 23.20% |
| Inflation Rate | [2] | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% |
| Connections | [3] | 54,600,000 | | | | | | | | | | | | | | |
| Acquisition Cost per Connection | [4] | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 |
| Operating Cost per Connection | [5] | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 | $122 |
| Overhead Cost per Connection | [6] | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 | $57 |
| Gross Connections at Beginning of Period | [7] | 0 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Churn | [8] | 0 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 | -232,030 |
| Gross Additions | [9] | 1,000,000 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 | 232,030 |
| Gross Connections at End of Period | [10] | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Marginal Capital Cost | [11] | $56,290,127 | $0 | $0 | $0 | $0 | $56,290,127 | $0 | $0 | $0 | $0 | $56,290,127 | $0 | $0 | $0 | $0 |
| Acquisition Cost | [12] | $258,750,000 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 | $60,037,832 |
| Operating Cost | [13] | $0 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 | $122,234,432 |
| Overhead Cost | [14] | $0 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 | $56,678,136 |
| Sum of Costs | [15] | $315,040,127 | $238,950,400 | $238,950,400 | $238,950,400 | $238,950,400 | $295,240,528 | $238,950,400 | $238,950,400 | $238,950,400 | $238,950,400 | $295,240,528 | $238,950,400 | $238,950,400 | $238,950,400 | $238,950,400 |
| Average Costs Per Connection | [16] | $315.04 | $238.95 | $238.95 | $238.95 | $238.95 | $295.24 | $238.95 | $238.95 | $238.95 | $238.95 | $295.24 | $238.95 | $238.95 | $238.95 | $238.95 |
| Nominal Discount Rate | [17] | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% |
| Real Discount Rate | [18] | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% |
| Discount Factor | [19] | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.70 | 0.67 | 0.65 | 0.62 | 0.60 |
| Present Value | [20] | $321.09 | $234.45 | $225.69 | $217.27 | $209.16 | $248.78 | $193.83 | $186.59 | $179.63 | $172.92 | $205.68 | $160.25 | $154.27 | $148.51 | $142.96 |
| Sum of Present Value Costs | [21] | $3,001.09 | | | | | | | | | | | | | | |
| Annual Constant Cost Per Connection | [22] | $281.83 | | | | | | | | | | | | | | |
| Monthly Constant Cost Per Connection | [23] | $23.49 | | | | | | | | | | | | | | |

Sources & Notes:

[1]: Annualized churn based on monthly churn rates. USB Wireless Report, p. 19 at Figure 35.

[2]: 10-year expected inflation rate as of October 1, 2017. "Inflation Expectations," Federal Reserve Bank of Cleveland, November 15, 2017, available https://www.clevelandfed.org/our-research/indicators-and-data/inflation-expectations.aspx, accessed August 23, 2018.

[3]: Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

[4]: T-Mobile's 2013 average acquisition cost per connection John C. Hodulik, Batya Levi, Lisa L. Friedman, and Christopher Schoell, "US Wireless 411: Version 51," UBS, March 18, 2014, p. 25 at Figure 44.

[5]: Cost of services / [3]. Sprint Corporation, Form 10-K for the Fiscal Year Ended March 31, 2017, p. 30, available http://d18rn0p25nwr6d.cloudfront.net/CIK-0000101830/b3706741-5644-4c1d-8e1e-80d91085fe07.pdf, accessed August 23, 2018.

[6]: SG&A less 2016 gross acquisition costs, per connection. Sprint Corporation, Form 10-K for the Fiscal Year Ended March 31, 2017, p. 30, available http://d18rn0p25nwr6d.cloudfront.net/CIK-0000101830/b3706741-5644-4c1d-8e1e-80d91085fe07.pdf, accessed August 23, 2018.

[7]: Connections maintained at beginning of the year after a one-time addition of 1 million connections.

[8]: ( - [1] ) x [7].

[9]: Gross additions necessary to maintain 1 million connections given [8].

[10]: [7] + [8] + [9].

[11]: Brattle estimation. Expenditure recurs every five years to maintain capacity.

[12]: [9] x [4].

[13]: [5] x [10]. Overhead costs for additional connections are 0 in 2017.

[14]: [5] x [10]. Operating costs for additional connections are 0 in 2017.

[15]: Sum of [11] to [14].

[16]: [15] / [10].

[17]: Average weighted average cost of capital for AT&T, Verizon, Sprint, and T-Mobile as of September 30, 2017. Bloomberg, accessed August 21, 2018.

[18]: [ ( 1 + [17] ) / ( 1 + [2] ) ] - 1.

[19]: ( 1 / [18] ) ^ ((Year - 2017) - .5). Mid-year periods used to reflect costs incurred over the course of the year.

[20]: [19] x [16].

[21]: Sum of [20].

[22]: [ ( [18] x [21] ) ] / [ 1 - (1 + [18] ) ^ - ( 2031 - 2017) ].

[23]: [22] / 12.

[24]: SEC 10-K Filing.

[25]: ( [24] - [23] ) / [24].

## Table 35: T-Mobile Wireless Cost Structure, 2017-2031

| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annualized Churn | [1] | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% | 18.82% |
| Inflation Rate | [2] | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% | 1.89% |
| Connections | [3] | 72,600,000 | | | | | | | | | | | | | | |
| Acquisition Cost per Connection | [4] | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 | $259 |
| Operating Cost per Connection | [5] | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 | $79 |
| Overhead Cost per Connection | [6] | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 | $84 |
| Gross Connections at Beginning of Period | [7] | 0 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Churn | [8] | 0 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 | -188,195 |
| Gross Additions | [9] | 1,000,000 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 | 188,195 |
| Gross Connections at End of Period | [10] | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 |
| Marginal Capital Cost | [11] | $58,219,159 | $0 | $0 | $0 | $0 | $58,219,159 | $0 | $0 | $0 | $0 | $58,219,159 | $0 | $0 | $0 | $0 |
| Acquisition Cost | [12] | $258,750,000 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 | $48,695,419 |
| Operating Cost | [13] | $0 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 | $78,939,394 |
| Overhead Cost | [14] | $0 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 | $83,501,928 |
| Sum of Costs | [15] | $316,969,159 | $211,136,742 | $211,136,742 | $211,136,742 | $211,136,742 | $269,355,901 | $211,136,742 | $211,136,742 | $211,136,742 | $211,136,742 | $269,355,901 | $211,136,742 | $211,136,742 | $211,136,742 | $211,136,742 |
| Average Costs Per Connection | [16] | $316.97 | $211.14 | $211.14 | $211.14 | $211.14 | $269.36 | $211.14 | $211.14 | $211.14 | $211.14 | $269.36 | $211.14 | $211.14 | $211.14 | $211.14 |
| Nominal Discount Rate | [17] | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% | 5.84% |
| Real Discount Rate | [18] | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% | 3.88% |
| Discount Factor | [19] | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.70 | 0.67 | 0.65 | 0.62 | 0.60 |
| Present Value | [20] | $323.06 | $207.16 | $199.42 | $191.98 | $184.81 | $226.97 | $171.27 | $164.88 | $158.72 | $152.79 | $187.65 | $141.60 | $136.31 | $131.22 | $126.32 |
| Sum of Present Value Costs | [21] | $2,704.16 | | | | | | | | | | | | | | |
| Annual Constant Cost Per Connection | [22] | $253.95 | | | | | | | | | | | | | | |
| Monthly Constant Cost Per Connection | [23] | $21.16 | | | | | | | | | | | | | | |

Sources & Notes:

[1]: Annualized churn based on monthly churn rates USB Wireless Report, p. 19 at Figure 35.

[2]: 10-year expected inflation rate as of October 1, 2017. "Inflation Expectations," Federal Reserve Bank of Cleveland, November 15, 2017, available https://www.clevelandfed.org/our-research/indicators-and-data/inflation-expectations.aspx, accessed August 23, 2018.

[3]: Dennis Bournique, "Fourth Quarter, 2017 Prepaid Mobile Subscriber Numbers by Operator," Prepaid Phone News, February 19, 2018, available https://www.prepaidphonenews.com/2018/02/fourth-quarter-2017-prepaid-mobile.html, accessed August 15, 2018.

[4]: T-Mobile's 2013 average acquisition cost per connection. John C. Hodulik, Batya Levi, Lisa L. Friedman, and Christopher Schoell, "US Wireless 411: Version 51," UBS, March 18, 2014, p. 25 at Figure 44.

[5]: Cost of services / [3]. T-Mobile US, Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 50, available http://www.snl.com/Cache/c38030540.html, accessed August 23, 2018; divided by total connections.

[6]: SG&A less 2016 gross acquisition costs, per connection. T-Mobile US, Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 50, available http://www.snl.com/Cache/c38030540.html, accessed August 23, 2018.

[7]: Connections maintained at beginning of the year after a one-time addition of 1 million connections.

[8]: ( - [1] ) x [7].

[9]: Gross additions necessary to maintain 1 million connections given [8].

[10]: [7] + [8] + [9].

[11]: Brattle estimation. Expenditure recurs every five years to maintain capacity.

[12]: [9] x [4].

[13]: [5] x [10]. Overhead costs for additional connections are 0 in 2017.

[14]: [5] x [10]. Operating costs for additional connections are 0 in 2017.

[15]: Sum of [11] to [14].

[16]: [15] / [10].

[17]: Average weighted average cost of capital for AT&T, Verizon, Sprint, and T-Mobile as of September 30, 2017. Bloomberg, accessed August 21, 2018.

[18]: [ ( 1 + [17] ) / ( 1 + [2] ) ] - 1.

[19]: ( 1 / [18] ) ^ ((Year - 2017) - .5). Mid-year periods used to reflect costs incurred over the course of the year.

[20]: [19] x [16].

[21]: Sum of [20].

[22]: [ ( [18] x [21] ) ] / [ 1 - (1 + [18] ) ^ - ( 2031 - 2017) ].

[23]: [22] / 12.

[24]: SEC 10-K Filing.

[25]: ( [24] - [23] ) / [24].

# VII. Appendix B

## A. List of Wholesale MVNO-Host Network Relationships

### Table 36: U.S. MVNO Brands Excluding Facilities Based Providers

| Owner | MVNO Brand | Host Network | Supplemental Sources |
|---|---|---|---|
| [A] | [B] | [C] | [D] |
| Armed Forces Mobile* | Armed Forces Mobile | Verizon Wireless | |
| Affinity Cellular* | Affinity Cellular | Verizon Wireless | |
| AirVoice Wireless | AirVoice Wireless | AT&T | |
| Albany Mutual Telephone | Albany Mutual Telephone | Verizon Wireless | "FAQ," Albany Mutual Telephone, accessed October 25, 2017, http://www.albanytel.com/faq/. |
| Best Cellular* | Best Cellular | AT&T, Sprint, T-Mobile, Verizon Wireless | |
| Black Wireless* | Black Wireless | AT&T | |
| Boom! Mobile* | Boom! Mobile | AT&T, Sprint, T-Mobile, Verizon Wireless | |
| campusSIMs* | campusSIMs | AT&T, T-Mobile | |
| CellNUVO* | CellNUVO | Sprint | |
| ChitChat Mobile* | ChitChat Mobile | Sprint | |
| Comcast Corporation | Xfinity Mobile | Verizon Wireless | Mike Dano, "Editor's Corner - A look at how Comcast is taking its Xfinity Mobile MVNO to market," *Fierce Wireless,* September 1, 2017, accessed December 12, 2017, https://www.fiercewireless.com/wireless/editor-s-corner-a-look-at-how-comcast-taking-its-xfinity-mobile-mvno-to-market. |
| Consumer Cellular Inc. | Consumer Cellular | AT&T, T-Mobile | |
| KDDI America | EasyGO Wireless | AT&T | "About H2O Wireless," EasyGO, accessed December 12, 2017, https://easygo.h2owirelessnow.com/mainControl.php?page=about. |
| EcoMobile* | EcoMobile | Sprint, T-Mobile, Verizon Wireless | |
| Expo Mobile* | Expo Mobile | Sprint, Verizon Wireless | |
| FreedomPop | FreedomPop | AT&T, Sprint | |
| Google | Project Fi | Sprint, T-Mobile, U.S. Cellular | |
| good2GO Mobile* | good2GO Mobile | AT&T, Sprint | |
| GreatCall, Inc. | GreatCall | Verizon Wireless | |
| Hayai Mobile* | Hayai Mobile | T-Mobile | |
| Jaguar Mobile* | Jaguar Mobile | T-Mobile | |
| Network Enhanced Technologies, Inc. | Jolt Mobile | AT&T, T-Mobile | |
| Karma Mobility* | Karma Mobility | Sprint | |
| KDDI America | H2O Wireless | AT&T | "About H2O Wireless," EasyGO, accessed December 12, 2017, https://easygo.h2owirelessnow.com/mainControl.php?page=about. |
| KidsConnect* | KidsConnect | T-Mobile | |
| Liberty Wireless* | Liberty Wireless | T-Mobile | |
| Lycamobile | Lycamobile | T-Mobile | |
| United Online, Inc. | NetZERO | Sprint | |
| Pix Wireless* | Pix Wireless | AT&T, Sprint | "Check our Coverage," Pix Wireless, accessed December 12, 2017, https://www.pixwireless.com/coverage. |
| Puppy Wireless* | Puppy Wireless | Verizon Wireless | |
| Telrite Corporation | Pure TalkUSA | AT&T | "Pure TalkUSA Everything You Should Know Before Subscribing," Best MVNO, accessed December 12, 2017, https://bestmvno.com/mvnos/pure-talkusa/. |
| Red Pocket Mobile* | Red Pocket Mobile | AT&T, Sprint, T-Mobile, Verizon Wireless | |
| Bandwith.com, Inc. | Republic Wireless | Sprint, T-Mobile | |
| ROK Mobile* | ROK Mobile | AT&T, Sprint, Verizon Wireless | |
| Scratch Wireless* | Scratch Wireless | Sprint | |
| Selectel Wireless* | Selectel Wireless | Verizon Wireless | |
| SpeedTalk Mobile* | SpeedTalk Mobile | T-Mobile, Sprint, Verizon Wireless | |
| KeepCalling | Tello | Sprint | Colin Gibbs, "UK's Tello launches in a cutthroat MVNO segment via Sprint's network," *Fierce Wireless,* May 5, 2016, accessed December 12, 2017, https://www.fiercewireless.com/wireless/uk-s-tello-launches-a-cutthroat-mvno-segment-via-sprint-s-network. |
| Tempo Telecom* | Tempo Telecom | Sprint | |
| TextNow* | TextNow | Sprint, T-Mobile | |
| The People's Operator USA (TPO)* | The People's Operator USA (TPO) | Sprint, T-Mobile | |
| TracFone Wireless | GoSmart Mobile | T-Mobile | |
| TracFone Wireless | Net10 Wireless | AT&T, Sprint, T-Mobile, Verizon Wireless | |
| Page Plus Cellular | Page Plus Cellular | Verizon Wireless | |
| TracFone Wireless | Simple Mobile | T-Mobile | |
| TracFone Wireless | Straight Talk Wireless | AT&T, Sprint, T-Mobile, Verizon Wireless | |
| TracFone Wireless | Telcel America | Sprint, T-Mobile | |
| TracFone Wireless | Total Wireless | Verizon Wireless | |
| TracFone Wireless | TracFone Wireless | AT&T, T-Mobile, Verizon Wireless | |
| TracFone Wireless | Walmart Family Mobile | T-Mobile | |
| Tucows | Ting | Sprint, T-Mobile | |
| Twigby* | Twigby | Sprint, Verizon Wireless | "Twigby Everything You Should Know Before Subscribing," Best MVNO, accessed December 12, 2017, https://bestmvno.com/mvnos/twigby/. |
| Ultra Mobile | Mint SIM | T-Mobile | |
| Ultra Mobile | Ultra Mobile | T-Mobile | |
| US Mobile* | US Mobile | T-Mobile, Verizon Wireless | |
| Working Assets | Credo Mobile | Verizon Wireless | |
| ZingPCS* | ZingPCS | Sprint, T-Mobile, Verizon Wireless | |
| ZIP SIM* | ZIP SIM | T-Mobile | |

Sources: For list of MVNOs and owners, "List of United States Mobile Virtual Network Operators," Best MVNO, available https://bestmvno.com/mvnos/ and "Online database of MVNOs," accessed August 23, 2018; "MVNO Directory, available http://www.blog.mvnodirectory.com, accessed August 23, 2018. For MVNOs on Sprint's network, Marc Lagace, "Complete List of Sprint MVNOs," *Android Central*, April 14, 2017, available https://www.androidcentral.com/complete-list-sprint-mvnos, accessed August 23, 2018. For MVNOs on Verizon Wireless's network, Mike Tanasychuk, "Complete List of Verizon Wireless MVNOs," *Android Central*, April 12, 2017, available https://www.androidcentral.com/complete-list-verizon-mvnos, accessed August 23, 2018. For MVNOs on AT&T's network, Mike Tanasychuk, "Complete List of AT&T MVNOs," *Android Central*, May 8, 2017, available https://www.androidcentral.com/complete-list-att-mvnos, accessed August 23, 2018. For MVNOs on T-Mobile's network, Marc Lagace, "Complete List of T-Mobile MVNOs," *Android Central,* May 3, 2017, available https://www.androidcentral.com/complete-list-t-mobile-mvnos, accessed August 23, 2018.

Note: This is not an exhaustive list of active MVNOs in the U.S.

[A]: Asterisks indicate MVNOs for which no ownership information could be found. In these cases, we assume that the MVNO is not owned by another firm.

*  *  *  *

The foregoing declaration has been prepared using facts of which we have personal knowledge or based upon information provided to us. We declare under penalty of perjury that the foregoing is true and correct to the best of our current information, knowledge, and belief.

Executed on August 27, 2018

William P. Zarakas
Principal
The Brattle Group

Jeremy A. Verlinda, Ph.D.
Principal
The Brattle Group

Coleman Bazelon
Principal
The Brattle Group

Joseph Harrington
Business Economics and Public Policy
Department Chair
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# Exhibit C

# Declaration of Stephen Wilkus

**REDACTED—FOR PUBLIC INSPECTION**

# DECLARATION OF STEPHEN WILKUS

I, Stephen Wilkus, being over 18 years of age, swear and affirm as follows:

1. I make this declaration in support of the Petition to Deny of DISH Network Corporation ("DISH") regarding the transfer of control of Sprint Corporation to T-Mobile US, Inc. (together, the "Applicants") (WT Docket No. 18-197). This declaration will focus on statements made by representatives of the Applicants concerning their post-merger plans for 5G, spectrum usage, and integration. In addition to the Application, I have reviewed the declarations of Neville R. Ray, Executive Vice President and Chief Technology Officer ("CTO") of T-Mobile; Michael Sievert, President and Chief Operating Officer ("COO") of T-Mobile; John Saw, Chief Technology Officer ("CTO"), Sprint; and Brandon "Dow" Draper, Chief Commercial Officer ("CCO").

2. My review of the Application and related materials indicates that the Applicants' presentation of their post-merger network plans suffers from a number of technical gaps and inconsistencies. These gaps and inconsistencies render the technical analysis in the Application incomplete and unreliable, requiring substantial additional information before a full assessment of the Applicants' post-merger plans can be performed and the claimed benefits verified.

3. I hold a B.S. degree in Physics and a MSEE degree from the University of Illinois and have extensively studied and worked on RF SAW filter design and wireless system design, architecture, system engineering, regulatory, standards issues. I was employed by Bell Labs for 28 years as a Distinguished Member of the Technical Staff and Member of the Alcatel-Lucent Technical Academy, and served most recently as a director in the Wireless Chief Technology Office, where I advised North American operators on technical aspects of spectrum issues, wireless equipment, and strategies. Over the years I have led teams in developing cellular

filters, early Wireless LAN products, a wireless shelf label (RFID) system, and a fixed wireless terminal. I have been awarded over 13 patents and have published more than 12 peer reviewed articles and book chapters, edited several whitepapers for 4GAmericas and the IWPC on MIMO and Smart antennas, and have been an invited subject matter expert at several FCC workshops,[1] as well as Mexico's CoFeTel and Rutgers University Summits. I am a senior member of the IEEE and on the advisory boards of Rutgers University's WINLAB and Electrical and Computer Engineering School. Since leaving Bell Labs in 2014, I have consulted on spectrum valuation and wireless system proposals and have been a managing partner and CTO of Spectrum Financial Partners, LLC.

**Declaration of Neville Ray, T-Mobile CTO**

4. Mr. Ray attempts to show how New T-Mobile will take the two distinct T-Mobile and Sprint networks and combine them into a nationwide 5G superpower. He also tries to set forth the benefits consumers will receive from the resulting 5G deployment. He delves into issues regarding infrastructure, spectral efficiency and capacity, and integration. On each of these issues, Mr. Ray raises new questions as to whether the merger can achieve the benefits that he claims.

*Infrastructure*

5. It is not clear from the Application how the infrastructure from the stand-alone companies will be combined to create the dynamic 5G network that the Applicants claim they

[1] *See* Alcatel Lucent presentation at FCC forum on the future of wireless band plans of July 16, 2012, last accessed June 25, 2018 and available at: http://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting71612/PANEL2.2-Wilkus-Alcatel-Lucent.pdf; FCC Receiver Workshop of March 12, 2012 last accessed June 25, 2018 and available on-line at https://transition.fcc.gov/bureaus/oet/receiver-workshop1/Session3/SESSION-3-4-Wilkus-ALU.pdf; FCC Learn Workshop on Incentive Auctions of May 3, 2013, agenda available on-line, last accessed June 26, 2018 https://ecfsapi.fcc.gov/file/7022421551.pdf.

cannot achieve on their own. For example, T-Mobile currently has 61,000 sites and 18,000 small cells and distributed antennas systems ("DAS").[2] The majority of these locations are leased and not owned; this implies that renegotiated lease agreements and upgrades might be required to install Sprint's 2.5 GHz spectrum equipment on all the sites for 5G deployment. The Applicants should explain how they will deal with this integration challenge.

*Spectral Efficiency and Capacity*

6. The Applicants have touted the benefits of the 5G network that the combined companies will be able to deploy. But they appear to have wrapped into their story certain benefits that are not at all tied to 5G, or at least not 5G alone. Mr. Ray quotes the capability requirements accepted by the ITU standards bodies,[3] but not all of these capabilities will be delivered by all 5G networks, and not all capabilities will be simultaneously available by virtue of a 5G implementation. In particular, the "tenfold improvement in the typical user experienced data rate from 10 Mbps to 100 Mbps or more" assumes that additional spectrum is used in the implementation, and the "three times greater spectral efficiency" depends upon the spectrum band and details of implementation as seen in Table 3, ¶ 50 of Mr. Ray's Declaration.

7. Nor is the Applicants' story clear as to why the merger would be such a boon for throughput rates. The 25 Mbps average throughput rate appear to be based on 10+10 MHz for 600 MHz with a spectral efficiency of 2.5 bps/Hz.[4] However, it is unclear how the Applicants arrived at the peak rate of 900 Mbps. Does it include other spectrum? If so, why is that spectrum not considered in the average capacity number? Similarly, in paragraph 53 of Mr.

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[2] Ray Declaration ¶ 5.

[3] *Id.* ¶¶ 11-15.

[4] *See id.* ¶ 17. The notation, 10+10 MHz is to indicate 10 MHz of uplink plus 10 MHz of downlink spectrum blocks. Downlink data rates of 25 Mbps are available with 10 MHz of downlink spectrum at an efficiency of 2.5 bps/Hz; 2.5*10.

Ray's Declaration, Tables 4 and 5 present unexplained numbers; considering 60 MHz of 2.5 GHz spectrum and a 4:1 TDD ratio, and using the average spectral efficiency number expected for mid-band 5G of 3.8 bps/Hz, Sprint should be able to support an average capacity of 182.4 Mbps. However, in paragraph 53 (Table 4), Sprint's stand-alone 5G average rate is shown to be only 55 Mbps. In addition, given that Sprint has already demonstrated peak speeds of up to 1 Gbps using 60 MHz for LTE,[5] it is unclear why the peak speeds for 5G on a standalone basis for the same amount of spectrum will result in peak speeds of only 300 Mbps.

8. Figures 3 and 4 of Mr. Ray's Declaration are difficult to credit.[6] They show that Sprint and T-Mobile will have zero subscribers with speeds greater than 200 Mbps or 250 Mbps without the merger in years 2021 through 2024. It appears that T-Mobile is excluding the 28 GHz spectrum that it owns and plans to deploy, as well as the 28/39 GHz spectrum and the CBRS spectrum that it may acquire and deploy in the upcoming auctions from these projections. T-Mobile also does not mention the use of unlicensed spectrum and related technologies like LAA that it has been trialing and deploying, nor the fact that both T-Mobile and Sprint have already announced trials of 1 Gbps with existing spectrum.[7] Additional data, including breakdown for covered rural, suburban and urban POPs are required to evaluate the claims of improved throughput for the population given the propagation characteristics of 2.5 GHz spectrum.

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[5] "Sprint Debuts Gigabit Class LTE in New Orleans," press release of March 9, 2017 accessed on line on Aug 19, 2018 available on line at: http://newsroom.sprint.com/sprint-debuts-gigabit-class-lte-in-new-orleans.htm; Press Release, "T-Mobile, Ericsson exceed 1 Gbps with LAA demo," December 05, 2017, last accessed Aug. 19, 2018 and available on-line at https://www.t-mobile.com/news/tmobile-ericsson..

[6] *See* Ray Declaration ¶¶ 18-20.

[7] Press Release, "T-Mobile, Ericsson exceed 1 Gbps with LAA demo," December 05, 2017, last accessed Aug. 19, 2018 and available on-line at https://www.t-mobile.com/news/tmobile-ericsson.

9. The Applicants also appear to be underplaying Sprint's peak speed in a 5G world as a stand-alone company. Mr. Ray seems to imply that this speed will peak at 300 Mbps.[8] However, Sprint has publicly stated that its 5G deployments in 2019 will result in significantly higher speeds.[9] Additionally, Ericsson and Qualcomm have demonstrated Gbps speeds using technologies like LAA, 256 QAM, and 4x4 MIMO.[10] T-Mobile has indicated an average 5G capacity of 25 Mbps for the lower bands.[11] This is reasonable assuming 10+10 MHz of 600 MHz at 2.5 bps/hz. However, under the same approach using 3.8 bps/Hz and 4:1 TDD ratio, 60 MHz of 2.5 GHz should result in an *average* capacity of 182.4 Mbps in areas where 2.5 GHz spectrum is deployed for 5G by Sprint on a stand-alone basis. Peak speed should be much higher.

10. Mr. Ray indicates that New T-Mobile will perform cell splitting of anchor T-Mobile sites by retaining up to 11,000 of Sprint sites. However, gains resulting from the cell splitting will depend on the existing layouts of Sprint and T-Mobile sites. Mr. Ray seems to imply that cell splitting will result in a doubling of capacity for the split sites. However, it is unclear if the full benefit will be realizable. It is also unclear if anchoring on the T-Mobile sites and selectively retaining Sprint sites is a better strategy than selecting and retaining optimum site locations from the combined pool of both T-Mobile and Sprint's sites. Additional data are

[8] Ray Declaration ¶ 53.

[9] Sprint Press Release of Sept. 12, 2017, "Sprint and Ericsson Conduct First U.S. Field Tests for 2.5 GHz Massive MIMO," http://investors.sprint.com/news-and-events/press-releases/press-release-details/2017/Sprint-and-Ericsson-Conduct-First-US-Field-Tests-for-25-GHz-Massive-MIMO/default.aspx

[10] https://www.ericsson.com/en/press-releases/2017/8/gigabit-speeds-blast-1.07-gbps-in-north-america

[11] Ray Declaration ¶ 53.

required to evaluate the amount of gain that is being attributed to the retention of 11,000 Sprint sites.

*Integration*

11. Integration will likely be a significant challenge post-merger. Mr. Ray's Declaration cannot help drawing attention to some of these issues. For example, Mr. Ray states that New T-Mobile intends to only retain 11,000 cell sites from Sprint,[12] a small fraction of Sprint's total sites.[13]

12. One would expect that there would be comparable numbers of optimal "anchor" sites coming from each company's site database. That only Sprint's sites would be decommissioned ought to worry Sprint customers who receive only CDMA voice service—a service that will not be available from T-Mobile sites. This suggests that Sprint assets would not be optimally used, to the potential detriment of current Sprint customers.

13. Mr. Ray also appears to misstate the importance of signal strength. Signal to interference ratio, or SINR, also needs to be considered.[14] Mr. Ray does not show that SINR will be improved as a result of this transaction. It is simple to say that doubling the number of base stations can double the overall network capacity, but if the user density also doubles, the average user experience may not necessarily change, assuming the spectrum and SINR are unchanged.

[12] *Id.* ¶ 31.

[13] "A merged Sprint/T-Mobile will shutter 25,000 towers, and Crown Castle will suffer most," Fierce Wireless April 30, 2018 by Mike Dano. Available on-line as of Aug. 20, 2018 at: https://www.fiercewireless.com/wireless/a-merged-sprint-t-mobile-will-shutter-25-000-towers-and-crown-castle-will-suffer-most.

[14] *See* Ray Declaration ¶¶ 38, 39.

14. Mr. Ray declares that "I expect that Sprint customers are likely to be completely migrated within three years."[15] But this is belied by the historical record of how long it takes to migrate customer bases, particularly now that smart phone lifespans have grown, with 42% of users waiting three or more years between replacements—longer than the time period during the MetroPCS merger and subsequent integration.[16] This can be seen in the long transition time for subscribers in Dr. Evans' Declaration. Dr. Evans notes that there are still 9% of U.S. mobiles using 2G. This speaks to the need to plan much longer transitions for convincing customers to give up their immensely personal mobile devices for a transition to 5G. Tower negotiations, modifications, and installation of 2.5 GHz MIMO antennas and associated Remote Radio Heads ("RRHs") may also take longer than three years in many cases.

15. Mr. Ray provides a macro cell site count of 84,000.[17] But 61,000 (T-Mobile) + 11,000 (retained Sprint) totals 72,000 sites. Are the Applicants planning to build an additional 13,000 sites? If so, are these going to be predominantly in rural areas?

16. The Applicants' story on rural coverage is also incomplete. Mr. Ray claims that outdoor rural coverage will be 59.4 million POPs, and indoor rural coverage will be 31 million POPs.[18] This appears to be solely from T-Mobile's 600 MHz holdings and not a synergy provided by the two companies' spectrum holdings, since the outdoor and indoor coverage of Sprint's 1.9 GHz and 2.5 GHz holdings are significantly lower. Incremental rural POPs coverage, then, has not yet been shown to be a benefit of the merger. In spite of the claims about

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[15] *Id.* ¶ 65.

[16] "Americans Keep Their Cellphones Longer," Thoma Gryta, Wall Street Journal, April 18, 2016, last accessed Aug 20, 2018, available at https://www.wsj.com/articles/americans-keep-their-cellphones-longer-1461007321

[17] Ray Declaration ¶ 73.

[18] *Id.* ¶ 74.

rural coverage, most of the rural population will be covered by anchor T-Mobile sites that have likely been planned for deployment with T-Mobile's 600 MHz spectrum. Sprint has minimal rural coverage using 2.5 GHz.[19] Therefore, it is unlikely that the 11,000 Sprint sites that are to be retained post-merger will be able to supplement the rural coverage being provided by T-Mobile's 600 MHz rural sites.

**Declaration of Mike Sievert, T-Mobile President and COO**

17. Mr. Sievert speaks to T-Mobile's position as a market disruptor, the merger's synergies, and the post-merger plans for New T-Mobile. Specifically, he addresses issues of integration, capacity, new services, and job creation. But there are missing pieces and inconsistencies throughout Mr. Sievert's testimony that need to be addressed.

*Integration with Respect to Capital Expenditures*

18. The projected $40 billion capital spend in first three years does not break out the costs of integration. The costs of integrating 2.5 GHz equipment on existing T-Mobile sites may be higher than expected, given the weight and wind loading that some tower sites may need to be reinforced against. The time to migrate the Sprint customer base may also take longer than envisioned. The Applicants should provide more detailed accounting of the transition plans and contingencies for expanded timeframes that do not overstress the customers or the site upgrade costs and difficulties.

*Capacity*

19. Mr. Sievert also appears undecided on the improvement to capacity that the merger will bring. He asserts that capacity will be "four times" in paragraph 17, but then states that "capacity will double" in paragraph 21.

[19] Saw Declaration ¶ 32.

*New Services*

20. Mr. Sievert declares that "[b]y 2024, New T-Mobile is expected to provide in-home broadband service to 9.5 million households nationwide…"[20] In Mr. Ray's Declaration, however, the estimate seems far more ambitious: "By 2024, New T-Mobile will deliver fixed broadband service meeting the FCC's speed definition for broadband of 25/3 Mbps to a total of 52.2 million rural POPs over 2.4 million square miles…"[21]

*Jobs*

21. The Applicants promise job gains, but this appears far from certain.[22] As 35,000 cell sites are decommissioned, there will surely be field maintenance personnel who will become redundant, as well as accounting, marketing, advertising and similar general and administrative personnel. It is unclear whether the Applicants have accounted for those that will be "let go" as a result of the proposed consolidation.

**Declaration of John Saw, Sprint CTO**

22. Mr. Saw's Declaration details the challenges Sprint has faced deploying its networks and competing in the marketplace. But these are obstacles that likely can be overcome without a merger.

23. Much of the difficulty that Mr. Saw cites with Sprint's 2.5 GHz spectrum is the nature of TDD, where reduced transmit times reduce the energy that can be transmitted from power limited amplifiers. This has been mitigated somewhat by the development of the High Power User Equipment standard ("HPUE"), though only by increasing the peak transmit power from 23 dBm to 26 dBm, 3 dB or a simple factor of 2 for band 41 operations (2.5 GHz band).

[20] *Id.*

[21] Ray Declaration ¶ 76.

[22] Sievert Declaration ¶ 19.

The Applicants have not addressed the prospects that this technology portends for a standalone Sprint.

24. Mr. Saw also appears to take the position that low latency benefits of 5G are possible only by dedicating the entire 2.5 GHz band to the endeavor on a standalone basis. However, Sprint has not demonstrated why 5G deployed in split mode within a spectrum band cannot be rolled out on a standalone basis.

**Declaration of Dow Draper, CCO, Sprint Corporation**

25. Mr. Draper addresses the challenges Sprint faces in the marketplace "just trying to catch up with the competition." Specifically, Mr. Draper discusses Sprint's planned 5G capital expenditures, its reliance on CDMA technology, its coverage, and its competitiveness with AT&T and Verizon. But some of his statements provide evidence that Sprint can be successful without the merger.

26. Sprint's plans to spend $5-6 billion per year on 5G over each of the next three years make the Applicants' argument that $40 billion will be used to build out a 5G network seem less than impressive.[23] Indeed, when Sprint's stand-alone figures are combined with T-Mobile's, they add up to a total of $10-12 billion per year, which is roughly consistent with what New T-Mobile purportedly would be spending.

27. Sprint claims continued reliance on CDMA technology, which it says, among other things, keeps it from having a presence in the IoT market.[24] But, given the support for IoT in LTE, it is unclear why Sprint needs to continue to rely on CDMA.

[23] *See* Draper Declaration ¶ 5.

[24] *Id.* ¶ 38.

**Conclusion**

28. The Applicants have not yet shown that the benefits they claim will come from their merger are real, verifiable, and transaction specific.

*  *  *  *

The foregoing declaration has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing is true and correct to the best of my current information, knowledge, and belief.

Executed on August 27, 2018

Stephen Wilkus
Managing Partner and Chief Technology Officer
Spectrum Financial Planners, LLC

**REDACTED—FOR PUBLIC INSPECTION**

## CERTIFICATE OF SERVICE

I, Andrew Golodny, hereby certify that on August 27, 2018, I caused true and correct copies of the foregoing public, redacted version to be served by electronic mail upon the following:

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**REDACTED—FOR PUBLIC INSPECTION**

October 31, 2018

***BY ECFS***

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

**Re: Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197**

Dear Ms. Dortch:

In accordance with the *Protective Order* and *NRUF/LNP Protective Order* in the above-captioned proceeding,[1] DISH Network Corporation ("DISH") submits the enclosed public, redacted version of its Reply, including supporting exhibits. DISH has denoted with **{{BEGIN HCI END HCI}}** and **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** where Highly Confidential Information has been redacted. A Highly Confidential version of this filing is being simultaneously filed with the Commission and will be made available pursuant to the terms of the *Protective Order* and the *NRUF/LNP Protective Order*.

Please contact us with any questions.

Respectfully submitted,

Pantelis Michalopoulos
Christopher Bjornson
*Counsel for DISH Network Corporation*

Enclosure

[1] Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *Protective Order*, WT Docket No. 18-197, DA 18-624 (June 15, 2018) ("*Protective Order*"); Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, *NRUF/LNP Protective Order*, WT Docket No. 18-197, DA 18-777 (July 26, 2018) ("*NRUF/LNP Protective Order*").

**REDACTED—FOR PUBLIC INSPECTION**

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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# REPLY OF DISH NETWORK CORPORATION


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October 31, 2018

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**Before the**
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## REPLY OF DISH NETWORK CORPORATION

DISH Network Corporation ("DISH") respectfully replies to the Joint Opposition of T-Mobile US, Inc. ("T-Mobile") and Sprint Corporation ("Sprint")[1] in the above-referenced proceeding.

## I. INTRODUCTION AND SUMMARY

The proposed merger of T-Mobile and Sprint (together, the "Applicants") will create a national mobile voice/broadband market controlled by three companies, lead to excessive concentration in other relevant markets, and increase prices for consumers. The Applicants have not come close to demonstrating that the merger as currently proposed would serve the public interest. In many respects, the Opposition, as well as the internal documents produced by the Applicants, set their case back significantly.

[1] Joint Opposition of T-Mobile US, Inc. and Sprint Corporation, WT Docket No. 18-197 (Sept. 17, 2018) ("Opposition").

**Unilateral Effects.** The Applicants' experts admit that the price impact that would result from this merger would be even greater than DISH's experts originally estimated—roughly **{{BEGIN HCI END HCI}}** times what DISH calculated. The Applicants assert, however, that such a price impact should not matter because even anticompetitive effects of this greater magnitude will be offset by the benefits they claim this transaction will produce. Tellingly, the Applicants do not deny that the price of consumers' plans may increase as a result of this merger. Instead, they argue that consumers should not care about the higher prices they will pay for their plans because they allegedly will have more data and greater speeds at their disposal.

However, the higher prices that this merger would produce are not offset by the claimed increase in the quantity or speed of data consumers could potentially receive. If true diversion data—"porting" information—are used to measure the current rivalry between Sprint and T-Mobile, the transaction's price impact is not merely **{{BEGIN HCI END HCI}}** times what DISH had estimated; it is **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** times worse. Such price increases are clearly not in the public interest and raise severe competitive issues.

This is not simply a 4-to-3 merger. The diversion data shows that T-Mobile and Sprint are each other's closest competitors. Consumers leaving each disproportionately go to the other. As a result, barring the entry of a new nationwide facilities-based competitor, this merger would result in significantly higher prices for consumers.

**Prepaid Services.** The Applicants assert that the impact of the merger on prepaid customers should not be analyzed separately because of the "greater substitutability" between prepaid and postpaid services. But the proof of substitutability is substitution; of that there is little. The majority of customers that leave a prepaid service do not join a postpaid service.

Prepaid service therefore constitutes a separate submarket, one in which only three facilities-based carriers compete today, leaving only two after the merger. Indeed, the Applicants' experts lump prepaid and postpaid services together in an apparent effort to obscure a fact that emerges from their own calculations: the merger would have an even more dramatic upward effect on prepaid than postpaid service prices.

**Other 4-3 Mergers.** The Applicants do not dispute that the many other 4-to-3 transactions DISH cited have brought about consumer price increases. Instead, they claim there is "little point in belaboring or rebutting [these] examples" on account of their supposedly different characteristics. But many of the transactions DISH cited were 4-3 deals in the mobile voice/broadband market, with similar competitive effects and claimed benefits.

And, the instant proposed combination is even worse than the attempted AT&T/T-Mobile merger in at least one important respect: it creates a third player of roughly equal size to the two other carriers, aligning the interests of the remaining three players more closely than the AT&T/T-Mobile consolidation would have done, thereby facilitating coordination and even greater price increases.

**Coordinated Effects.** The Applicants' experts continue to ignore their own Coordinated Price Pressure Index ("CPPI") method for computing the heightened risk of coordination this deal portends, instead alleging that the method does not apply here. But according to these experts' own article introducing the CPPI index, the method is clearly applicable to gauge incentives in a three-firm market. Significantly, the Applicants do not dispute that the CPPI calculation points to substantial price increases over and above those resulting from New T-Mobile's unilateral market power.

**Market Entry.** The Applicants argue that the upward price pressure shown by both sides' models will be defused by market entry. That is theoretically possible. The creation of a nationwide facilities-based competitor that is able to compete on a level playing field and does not face significant barriers to entry is generally the only remedy that could potentially mitigate the adverse effects of a 4-to-3 consolidation in the mobile voice/broadband market. DISH is the only possible nationwide facilities-based competitor in the wings, but the first phase of its deployment does not include 5G mobile voice/broadband. And, this transaction could hamper and delay DISH's 5G entry by placing more key inputs, including radios, chipsets, devices, towers, crews, and backhaul, under New T-Mobile's newly created influence—a risk that the Applicants do not even try to rebut, and do not state they will avert.

**Failing Firm.** The Applicants continue to question Sprint's viability as a standalone entity. But, Sprint's own financial results tell a very different story. The company's 2018 Q2 earnings, from today, release boasted "strong year-to-date performance," an adjusted free cash flow of $525 million, "[f]ive consecutive quarters of postpaid net additions and seven consecutive quarters of prepaid net additions" and "continued progress on executing its Next-Gen Network plan."[2] This is not the picture of a weak or dying firm. Even more important, Sprint **{{BEGIN HCI**

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[2] Press Release, *Sprint Reports Year-Over-Year Growth in Wireless Service Revenue with Fiscal Year 2018 Second Quarter Results*, (Oct. 31, 2018), http://investors.sprint.com/news-and-events/press-releases/press-release-details/2018/Sprint-Reports-Year-Over-Year-Growth-In-Wireless-Service-Revenue-With-Fiscal-Year-2018-Second-Quarter-Results/default.aspx.

[3] SPR-FCC-04230255 at SPR-FCC-04230259 **{{BEGIN HCI**
**END HCI}}**.

**No Proven Benefits for Consumers.** While the Applicants' experts allege the impact of these price increases will be offset by marginal cost savings and quality improvements, the Applicants' experts have not independently verified or quantified most of these benefits. Instead, they have simply used them as inputs for their work. The Applicants' economists deserve credit for finding an even greater upward price impact from the transaction than DISH's economists. But, their claim that this impact should not matter in light of alleged benefits—most of which they have not themselves estimated—should not be given similar weight.

The Applicants' experts also make a fundamental mistake: they average one consumer's benefits against another's harms. They argue that the merger is procompetitive even if Sprint customers pay higher prices, so long as T-Mobile customers benefit and the latter's benefit exceeds the former's harm. Their lumping-together of prepaid and postpaid customers is based on the same principle. Neither the public interest standard nor the antitrust laws condone such cross-subsidies.

The Applicants' experts also admit that marginal cost savings are sometimes not enough to avoid price increases even when their own numbers are used. They therefore resort to a different approach: price increases should be ignored because consumers are willing to pay more for "higher quality." They base that view on self-evident but irrelevant truths—that many customers leave their carriers because of poor quality, or that carriers charge higher prices for faster speeds. They rely on flawed adjustments to an inapplicable model, which had looked to the benefits of speed improvements at much lower speeds than those in question here. A phrase from the declaration of the Applicants' economists seems to sum up the Applicants' approach to meeting their burden: "improvements in network quality . . . might be more important to

consumers than modest changes in the level of their monthly bill."[4] Or, they might not: many consumers will not care that the capacity increase they may experience is proportionately greater than the large price increase they will be forced to pay.

And, in any event, even accepting this flawed "quality-beats-price-hikes" premise, the Applicants' experts fail to show that the supposed quality improvements are enough to justify the price increases.

**Marginal Cost Savings.** The merger's marginal cost savings, which are incapable of offsetting price increases even at the levels estimated by the Applicants' experts, would in fact be much lower than these estimates.

**5G and the Merger**. Both the claimed benefits and their link to the merger remain unproven by the Applicants. To begin, the Applicants do not address each company's own emphatic prior statements that T-Mobile and Sprint standing alone each have the spectrum necessary to deploy robust standalone 5G networks.

More importantly, the Applicants have now had to make significant admissions undermining their entire 5G-dependent benefit claim. Their own engineering model, which they have had to revise twice, now shows that each company will be able to provide *full 5G* without experiencing almost *any* congestion at all. Indeed, Sprint's CFO recently told investors that standalone Sprint's re-farming of their 2.5 GHz spectrum—whose supposed difficulty is the cornerstone of the Applicants' case—can be converted at "the flick of a switch."[5] He also

[4] Declaration of Compass Lexecon ¶ 124 (Sept. 17, 2018) (Appendix F to Opposition) ("Compass Lexecon Declaration").

[5] Transcript, Sprint Presentation at Deutsche Bank Leveraged Finance Conference, Fair Disclosure Wire (Oct. 2, 2018) ("2.5 GHz is great spectrum for us. We can deploy it and still allow it to carry both LTE and 5G traffic. The technology itself is software-upgradable. So as the

discounted the Applicants' statements to the Commission, explaining that they were "tailor[ed]" to a particular audience.[6]

In fact, far from creating an easier path to standalone broadband, the prospect of the merger may have already constrained the transition to 5G. Internal documents show that **{{BEGIN HCI**

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**Millimeter Wave Spectrum.** The Applicants do not take into account additional spectrum, primarily the millimeter wave bands, which each company today plans to acquire.[7] DISH's experts have added millimeter wave spectrum to each company's standalone capabilities and to those of New T-Mobile. The result? The alleged efficiency improvement from the combination predicted by the models goes from a **{{BEGIN HCI END HCI}}** increase in offered capacity in 2021 down to a fraction—only a **{{BEGIN HCI END HCI}}** increase. This translates into an **{{BEGIN HCI END HCI}}** reduction in claimed marginal cost savings over the years 2021-24, down to **{{BEGIN HCI END HCI}}**.

**Mid-Band Spectrum.** While the Applicants dismiss the mid-band spectrum to be made available by the Commission (including the 3.5 GHz CBRS spectrum) as speculative, impractical, and suffering from significant drawbacks, T-Mobile appears to believe the opposite.

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5G standards become definitized, it is literally flick the switch to convert to 5G rather than having to reclaim the tower one more time . . . .").

[6] *Id.*

[7] *See* Letter from Nancy Victory to Marlene Dortch, AU Docket No. 18-85, at 3 (July 23, 2018) (requesting permission to allow T-Mobile to participate in the upcoming auction despite its pending merger with Sprint); Sprint Corp., Petition for Expedited Declaratory Ruling or Waiver Regarding Joint Bidding and Request for Limited Waiver of Auction Form Rules, AU Docket No. 18-85, at 1-2 (Aug. 6, 2018) (requesting approval to participate in the 24 and 28 GHz auctions).

T-Mobile's Chief Technology Officer has written that such mid-band spectrum is suitable "for reliable capacity and consistent mobile broadband speeds."[8] And T-Mobile internally **{{BEGIN HCI END HCI}}**[9]

**Fixed Broadband.** The Applicants essentially present the risk of substantial price increases for mobile services as an acceptable sacrifice on the altar of another good—fixed broadband. At as much as $13.6 billion, fixed broadband is one of the largest benefits they credit to the merger.[10] But even if this were an acceptable quid pro quo between less competition in one market and more in another (which it is not), fixed broadband is not a merger benefit at all. True fixed broadband likely requires spectrum that neither company currently brings to the table. Both Applicants' internal documents show that **{{BEGIN HCI END HCI}}**

Even if true fixed broadband were a merger-specific benefit, the Applicants do not credibly estimate its magnitude. The Applicants' expert, Dr. Furchtgott-Roth, has not estimated the price reductions that the Applicants and their competitors will supposedly initiate. He has simply assumed them.

**Implementation Costs.** The Applicants further understate New T-Mobile's costs to upgrade to 5G, which would likely be significantly higher than those of standalone Sprint. To refarm the 2.5 GHz spectrum, standalone Sprint only needs to substitute massive MIMO antennas for its current equipment. New T-Mobile, on the other hand, plans to decommission

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[8] Neville Ray, *5G Reality vs. 5G Hype: The Un-carrier vs. the Carriers*, T-Mobile Blog (Jan. 16, 2018), https://www.t-mobile.com/news/5g-ces-wrap-up.

[9] TMUS-FCC-01147013 at TMUS-FCC-01147020 **{{BEGIN HCI END HCI}}**; TMUS-FCC-01177915 at TMUS-FCC-01177930 **{{BEGIN HCI END HCI}}**.

[10] *See* Opposition at 72.

most of Sprint's sites and likely would need to *add* massive MIMO antennas to many of its existing sites, necessitating additional costs for decommissioning, rent increases and construction. All of these costs reduce any claimed marginal cost savings.

Instead of recognizing the higher 5G upgrade costs for New T-Mobile, the Applicants mistakenly assume the opposite: that they are lower than those of Sprint. Correcting these discrepancies to conservatively reflect the same 5G upgrade cost for Sprint and New T-Mobile reduces the claimed marginal cost savings by **{{BEGIN HCI END HCI}}**

**2.5 GHz Refarming Speed.** A faster refarming of the 2.5 GHz spectrum by standalone Sprint—something the company has already predicted with confidence it will be able to do—further reduces the merger's claimed increase in 2021 capacity from **{{BEGIN HCI END HCI}}** to **{{BEGIN HCI END HCI}}** meaning a **{{BEGIN HCI END HCI}}** reduction in marginal cost savings.

**Usage Estimates**. Without adequate justification, the Applicants' economic experts have cut by approximately half the 5G usage estimates flowing from the Applicants' model, which has artificially boosted the Applicants' marginal cost savings claims.

**Spectral Efficiency.** The substitution of more accurate spectral efficiency numbers in the Applicants' model shows that a standalone Sprint would be able to avoid congestion by even greater margins at an even lower cost, reducing marginal cost savings by as much as 50% for Sprint, and reducing the net present value of the claimed marginal cost savings by **{{BEGIN HCI END HCI}}**

**Rural Coverage.** Finally, the Applicants gloss over the cost of deploying 5G in rural America, significantly inflating the expansion of coverage that will supposedly result from the merger. Internal documents show that **{{BEGIN HCI**

**END HCI}}** The Applicants do not explain persuasively how this will change with the merger. DISH's experts disprove the Applicants' claim that the merger will expand rural population coverage: all but **{{BEGIN HCI END HCI}}** of the nodes added to the stand-alone T-Mobile model, or about **{{BEGIN HCI END HCI}}** are already placed inside the area of the existing network sites, suggesting no expansion at all. DISH's experts have also calculated the population coverage of all cell sites in the Applicants' model that the Applicants quantify as rural based on census data. DISH's experts have concluded New T-Mobile rural coverage would be at most **{{BEGIN HCI END HCI}}** compared with the 59.4 million people claimed by the Applicants for outdoor coverage.[11]

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Stripped of these claimed benefits, the merger would unilaterally produce a price increase of as much as **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** percent for Sprint consumers and as much as **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** percent for T-Mobile consumers. And, coordination would produce even higher price increases. Given these severe harms, among others, the merger as currently proposed should be denied.

## II. THE APPLICANTS CONCEDE, OR FAIL TO ADDRESS, KEY HARMS OF THE TRANSACTION

The Applicants' purported case for their merger is seriously undermined by a number of their own admissions, non-denials, omissions and contradictions. They include: admissions that the price pressure from the deal would be even greater than DISH economists estimated;

[11] Opposition at 94; Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197, at 66 (June 18, 2018) ("Application").

revisions to the engineering model showing that each company's capabilities are greater than initially presented; a wealth of internal documents showing that each company **{{BEGIN HCI**

**END HCI}}**; the contradiction between the bleak view of the standalone Sprint transition to 5G offered by the Applicants and the bright one offered by Sprint's CFO; and the inconsistency between the Application's pessimistic depiction of the challenges facing Sprint and the sanguine picture drawn in internal documents. Appendix A lists some of these admissions, non-denials, and omissions.

## III. THE APPLICANTS DO NOT DENY THE MERGER WILL UNILATERALLY INCREASE PRICES, LEAD TO EXCESSIVE CONCENTRATION, AND HARM CONSUMERS

The Applicants suggest that the transaction's purported benefits will be a panacea that will cure all the harms that their combination will produce, including: the risk of unilateral price increases, the risk of coordinated price increases, the excessive increase in concentration in the national market, and the excessive concentration in control over available spectrum in many local markets.[12] Crucially, the Applicants' experts claim that the merger's adverse effects should be disregarded by the Commission in the name of offsetting benefits they have largely failed to examine, quantify, verify or prove. Instead, the Applicants' economists concede that they mostly took what the Applicants themselves provided:

[12] *See* Opposition at 9-10 (dismissing the risk of unilateral price increases with the "significant merger-specific efficiencies" that will be produced); *id.* at 14 ("[T]he efficiencies flowing from the transaction" will "make post-transaction coordination implausible."); *id.* at 35-36 (rebutting HCI concerns noting the merger will result in various benefits); *id.* at 32 (suggesting the claim of excessive concentration in local markets "is under cut . . . by evidence of competitive benefits in the merger simulation.").

- "Given the merger-specific efficiencies estimated by T-Mobile…"[13]
- "My analysis is based on the Parties' forecast of network performance for New T-Mobile and the stand-alone companies."[14]
- "[M]y premise, which is based on the declaration of Mr. Neville Ray… "[15]
- "We base our analysis on the revised Network Build Model that T-Mobile submitted to the Commission on September 17, 2018."[16]
- "Our analysis builds on the baseline networks planned by each company."[17]
- "The Parties' network plans and T-Mobile's Network Build Model imply that New T-Mobile's network will have significantly lower marginal costs..."[18]

The juxtaposition between the many adverse effects the Applicants' experts *admit* and the benefits they *assume* is important. The Commission should accord more weight to their declarations for the former than for the latter. After all, any merger, including a merger that would result in a monopoly, can be presented as procompetitive if an expert calculates its impact on prices or output and then claims that, no matter how large the number, it is offset by countervailing hypothetical benefits. But this is not how proper merger analysis works.

### A. The Applicants Admit That The Unilateral Effects Of The Merger On Consumer Prices Will Be Even Greater Than DISH Previously Estimated

The Applicants concede the transaction will produce upward pressure on consumer prices, and adjust *upward* DISH's estimates of that price impact. In other words, they admit that the transaction would have even more severe unilateral effects on competition than DISH previously estimated. As Compass Lexecon explains, while all of DISH's "merger simulations require **{{BEGIN HCI** **END HCI}}** of efficiencies for the

[13] Reply Declaration of David Evans ¶ 42 (Appendix G to Opposition) ("Evans Reply Declaration").

[14] *Id.* ¶ 6.

[15] *Id.* ¶ 11.

[16] Compass Lexecon Declaration ¶ 55 n.56.

[17] *Id.* ¶ 58.

[18] *Id.* ¶ 6.

proposed merger to be procompetitive,"[19] Compass Lexecon has found that even more efficiencies are required. The amount of efficiencies required for the merger to be procompetitive estimated by Compass Lexecon is specifically less than **{{BEGIN HCI END HCI}}** or about **{{BEGIN HCI END HCI}}** the amount found by DISH's experts. Compass Lexecon thus calculates an "efficiency threshold" of between **{{BEGIN HCI END HCI}}** using the model from the Brattle Declaration.[20] This is compared to an efficiency threshold of between **{{BEGIN HCI END HCI}}** using the "more conservative" Compass Lexecon model.[21]

Compass Lexecon refers to the efficiencies required to make the merger procompetitive as the "threshold efficiency" value of the merger. This is a euphemistic term for the upward price impact that the merger would produce if it is not offset by efficiencies.[22] Stripped of jargon, Compass Lexecon has admitted that, without efficiencies, the merger would produce **{{BEGIN HCI END HCI}}** the price impact DISH estimated. The reality is darker still: the merger would produce **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** times the price increase DISH estimated.

[19] *Id.* ¶ 6.

[20] *Id.* ¶ 46.

[21] *Id.* ¶ 48.

[22] As explained by Compass Lexecon, the "break-even efficiencies" are "the level of efficiencies that, given the impact of the loss of competition between the Parties, would still result in the transaction's having a neutral effect on consumer welfare." *Id.* ¶ 44.

Why would the Applicants' experts predict even more dire competitive effects than the Petitioners? The Applicants cite a preference for more "conservative assumptions."[23] But the facts are actually worse for the Applicants' case than DISH had believed. In fact, they are so much worse that, far from being conservative, the Applicants' assumptions skew in the opposite direction, falling short of revealing the transaction's full upward price impact.

Diversion refers to the proportion of customers leaving or coming to each Applicant for or from another carrier in the market. Diversion ratios are key to estimating the effects of a horizontal merger, especially a 4-to-3 consolidation like this one. The Compass Lexecon economists claim that they conservatively assume "higher estimated diversion ratios between Sprint and T-Mobile"[24] than DISH assumed, but the true diversion numbers are even higher, revealing that the two firms are fiercer rivals still.

This is because, for some of their calculations, DISH's experts had simply estimated that T-Mobile subscribers leave T-Mobile for Verizon, AT&T and Sprint in proportion to the market shares of each carrier. In other words, Verizon, AT&T, T-Mobile and Sprint have the following approximate market shares: 34.7%, 33.8%, 17.3% and 13.0%, respectively. This means that, excluding Sprint, each of Verizon, AT&T and T-Mobile has 40.4%, 39.9%, and 20.2% of the remaining customer pool, respectively. As a result, DISH's experts had estimated for some of their analyses that, of every 100 subscribers leaving Sprint, 20.2 ended up in T-Mobile, and made corresponding assumptions about the subscribers leaving T-Mobile.

[23] Opposition at 6.

[24] Compass Lexecon Declaration ¶ 6.

Compass Lexecon used a diversion ratio between the two Applicants based on a study conducted for T-Mobile called the "Harris Mobile Insights Survey," which shows an average diversion ratio of **{{BEGIN HCI**

**END HCI}}**[25] But the average diversion ratio based on porting data is even higher. A full **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** of customers departing Sprint switch to T-Mobile, and **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** of customers leaving T-Mobile go to Sprint.[26] This is a *41.4% increase* from the Harris Mobile Insights data.[27]

This is significant: the greater the substitution between the two firms, the fiercer the current rivalry between them, the greater the loss of competition, and the greater the harm from the merger's unilateral effects.

Compass Lexecon should have used porting data, as the superior accuracy of these data has, correctly, been settled by the Commission. As Commission staff explained in the AT&T/T-Mobile transaction, "porting data measures substitution patterns directly, based on data reported from each wireless provider."[28] The staff found that AT&T's failure to use porting data in that case was one of the "assumptions that lead to a systematic understatement of the harms from

[25] *See id.* ¶ 178, Table 28.

[26] *Id.*

[27] *Id*.

[28] Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations, *Order*, 26 FCC Rcd. 16184, 16255 ¶ 149 (2011) ("AT&T/T-Mobile Staff Report").

potential unilateral effects."[29] After considering some potential shortcomings (mainly, the possibility of selection bias), the staff concluded: "we have no evidence that those who port their numbers are systematically different from those who do not, and no evidence that those who port would react differently to a price increase than those who do not."[30]

Compass Lexecon recognizes that, "[i]n previous mobile telecom merger reviews, the Commission estimated diversion ratios using porting data . . . ."[31] What is more, Compass Lexecon admits that "diversion ratios based on porting data are not systematically biased as a result of the reasons for porting."[32] But Compass Lexecon then walks that admission back, speculating that the switchers "who do port may not be representative of all switchers." Of course, "may not be" is not evidence of bias. Compass Lexecon nevertheless purports to find three reasons for such supposed bias, none of which support its existence, and one of which weighs in the opposite direction.

First, Compass Lexecon argues that Local Number Portability ("LNP") data account for only a small percentage of total gross additions and deactivations.[33] But, whatever the percentage, it does not mean that the porting data are unrepresentative, let alone that they are biased.

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[29] *Id.* at 16254 ¶ 146. *See also id*. at Appendix C 16319 ¶ 8 ("The degree of buyer substitution between the products of the merging firms is one of the central components of any analysis of the unilateral effects of a merger between sellers of differentiated products, whereby the greater the degree of buyer substitution, the larger the predicted unilateral pricing effects would be.").

[30] *Id.* at Appendix C, 16321 ¶ 10.

[31] Compass Lexecon Declaration ¶ 173.

[32] *Id.* ¶ 174.

[33] *Id.* ¶ 176.

Second, Compass Lexecon states that "LNP porting systematically overstates Sprint and T-Mobile switches relative to [the Applicants' estimates of] total gross additions and deactivations," which are consistent with the Applicants' estimates of the Harris Study.[34] But this is a conclusory statement; the proposition that the Applicants' estimates are more accurate than the facts shown by the porting data must be proven, not merely asserted without evidence as Compass Lexecon has done here.

Third, Compass Lexecon states that "Sprint and T-Mobile offer incentives to customers to port their numbers when switching to the firms' prepaid brands, while MVNOs such as TracFone do not offer such incentives."[35] From that Compass Lexecon concludes: "[b]ecause the LNP data attribute MVNO ports to the facilities-based carriers, porting activity for AT&T and Verizon is under-represented in these data relative to the activity for Sprint and T-Mobile causing diversion rates between Sprint and T-Mobile based on LNP data to be overestimated."[36] But this point actually reveals a bias in the opposite direction. The convention that diversions to TracFone are diversions to the underlying facilities-based carriers—primarily AT&T and Verizon—overstates diversions to AT&T and Verizon and conversely understates diversions to T-Mobile and Sprint, not the other way around. The Applicants do not show that the alleged lack of MVNO porting incentives is enough to offset this overstatement of AT&T/Verizon diversions.

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[34] *Id.*

[35] *Id.* ¶ 177.

[36] *Id.*

Finally, while Compass Lexecon criticizes the porting data, it does not provide any defense of the method it does use—the Harris Study. The Applicants do not even describe the study's methodology.

Adjusting the Compass Lexecon model to use diversion rates based on porting data results in an upward price impact **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** times greater than DISH had initially estimated. The porting data also has broader significance for the Commission: it proves this is not just a simple 4-to-3 merger. The two merging parties are each other's closest competitors.

All in all, when stripped of the unsupported benefits, discussed further below, this merger will increase prices as much as **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** percent for Sprint customers and as much as **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** percent for T-Mobile customers. As a result, the merger as currently proposed is not in the public interest.

### B. Prepaid And Postpaid Voice Services Are Separate Submarkets And The Merger Will Likely Cause Price Increases In Both

DISH has explained that postpaid services are not a substitute for prepaid plans for low-income or price-sensitive customers.[37] Prepaid services thus constitute a separate submarket, one in which only three facilities-based carriers compete. Indeed, in contrast to postpaid services, prepaid services are often used by lower-income customers or those with poor credit, especially in urban areas. Sprint's Boost Mobile and T-Mobile's MetroPCS brands are prominent players

[37] Petition to Deny of DISH Network Corp., WT Docket No. 18-197, at 53-54 (Aug. 27, 2018) ("DISH Petition to Deny").

in the prepaid market, meaning "a union of MetroPCS and Boost Mobile would make the prepaid market in urban America far less competitive, leading to higher prices."[38]

The Applicants claim that the impact of the merger on prepaid customers should not be analyzed separately because of the "greater substitutability" between prepaid and postpaid services.[39] But they do not provide evidence for this assertion, i.e., they do not offer proof that consumers switch from prepaid to postpaid plans. And, the data show that decidedly few do. The Applicants claim that 135,000, 71,000, and 40,000 prepaid subscribers of T-Mobile, Sprint, and AT&T, respectively, migrated to postpaid plans in 2018. This is a miniscule amount: the Applicants tell us that recent churn of prepaid customers was 3.81% for T-Mobile and 5.24% for AT&T.[40] In the first half of 2018, this means that 798,842 people left T-Mobile's prepaid service and 805,702 people left AT&T's prepaid service. Of those, the majority went to another prepaid service or to no service at all; and, according to the Applicants, only a small percentage—16.9% for T-Mobile and 5% for AT&T——upgraded to postpaid services.

Nor do the Applicants persuasively rebut the fact that the merger would take the prepaid services submarket from three to only two national facilities-based competitors.[41] In their

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[38] Rob Pegoraro, *Could the Sprint-T-Mobile Merger Mean Higher Bills for Boost or MetroPCS Customers?*, USA Today (May 11, 2018), https://www.usatoday.com/story/tech/columnist/2018/05/11/sprint-t-mobile-merger-make-your-boost-metropcs-bill-higher/587179002.

[39] Opposition at 74-76.

[40] *Id.* at 83-84.

[41] *See* Altice USA, Inc. Petition to Condition or Deny, WT Docket No. 18-197, at 11 (Aug. 27 2018) ("Altice Petition to Deny") ("The competition between T-Mobile and Sprint as MVNO and roaming partners has been good for smaller wireless players, the MVNO market and consumers. If the transfer applications are approved, that competition will be gone. Combining Sprint and T-Mobile into the New T-Mobile will not only remove a competitor from the larger

Opposition, the Applicants seek to excuse, but do not deny, Verizon's absence as a prepaid competitor. While they explain that Verizon has "historically outsourced its prepaid offering to TracFone,"[42] they do not explain how the merger will change this history, or why Verizon and TracFone should count as two separate competitors. Nor do they deny that, like other MVNOs, TracFone has to contend with the handicap of not having its own facilities.[43]

The Applicants attempt to build Verizon into a standalone competitor, but this effort fails in the face of the facts. Verizon reported a loss of 335,000 prepaid customers in the first quarter of 2018, a loss of 236,000 prepaid customers in the second quarter of 2018, and a loss of 96,000 prepaid customers in the third quarter of 2018, for a total loss of 667,000 prepaid customers in

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wireless consumer market, it also will effectively eliminate two 'maverick' MVNO and roaming partners.").

[42] Opposition at 81.

[43] *See* Altice Petition to Deny at 16 ("It clearly is not lost on Applicants that MVNOs such as Tracfone, Altice, Charter, and Comcast need nationwide, long-term, MVNO agreements in order to provide nationwide wireless service and, without these arrangements, MVNOs cannot compete."); Comments of Charter Communications, Inc., WT Docket No. 18-197, 2-3 (Aug. 27, 2018) ("Charter Comments") ("In the mobile space, Charter is a brand new entrant whose nascent business operations are easily dwarfed by the four nationwide facilities-based carriers, as well as by multiple multi-regional and regional mobile providers. Charter faces formidable competition from all of the very well-established and well-resourced facilities-based carriers and other participants in the market. . . . With fewer than two months of operation, it is unrealistic to expect Charter's Spectrum Mobile service to gain sufficient scale in a time frame sufficient to counter-act any anticompetitive effect of the transaction in the mobile wireless space.").

the first three quarters of 2018.[44] But, the Applicants ignore these numbers and instead highlight Verizon's gain of 158,000 prepaid customers in the second and third quarters of 2017.[45]

In addition, the Applicants report revenues and churn from prepaid and postpaid customers separately on their annual reports[46] and generally treat the two services as separate markets. **{{BEGIN HCI**

**END HCI}}**[47] For example, **{{BEGIN HCI**

**END HCI}}**[48] Similarly, **{{BEGIN HCI**

**END HCI}}**[49] Sprint also has **{{BEGIN HCI**

**END HCI}}**[50] Sprint's COO apparently **{{BEGIN HCI**

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[44] Verizon, Q2 2018 Earnings Call Transcript at 5 (July 24, 2018), https://www.verizon.com/about/investors/quarterly-reports/2q-2018-quarter-earnings-conference-call-webcast; Verizon, Q1 2018 Earnings Call Transcript at 5 (Apr. 24, 2018), https://www.verizon.com/about/investors/quarterly-reports/1q-2018-quarter-earnings-conference-call-webcast; Verizon, Q3 2018 Financial Statement at 5 (October 23, 2018), https://www.verizon.com/about/file/30563/download?token=olmB3leC.

[45] Opposition at 81.

[46] T-Mobile US, Inc., Annual Report (Form 10-K) at 26 (Feb. 8, 2018) ("T-Mobile 2018 Annual Report"); Sprint Corp., Annual Report (Form 10-K) at 47 (June 6, 2018) ("Sprint 2018 Annual Report").

[47] SPR-FCC-04222952 at SPR-FCC-04222961 **{{BEGIN HCI**

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[48] SPR-FCC-04351924 at SPR-FCC-04351924-25 **{{BEGIN HCI**

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[49] SPR-FCC-00959715 **{{BEGIN HCI**
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[50] SPR-FCC-00819820 **{{BEGIN HCI** **END HCI}}**

**END HCI}}**[51] In the talks leading up to the merger announcement, **{{BEGIN HCI**

**END HCI}}**[52]

The Applicants' experts, however, do the opposite: they lump prepaid and postpaid prices together in the "nested logit" model for estimating the merger's effects on consumer welfare. As the Brattle Reply Declaration shows, this obscures the fact that the merger is likely to have an even more severe upward effect on prepaid than postpaid prices.

### C. The Applicants Avoid Addressing Other 4-to-3 Deals And Their Upwards Effects On Prices

The Applicants do not dispute that many of the 4-to-3 transactions DISH cited have resulted in price increases. Instead, they avoid the discussion entirely, stating that there is "little point in belaboring or rebutting [these] examples" on the grounds that these transactions are different than the one the Applicants propose, and that they do not promise to produce the same benefits as New T-Mobile.[53] It is of course not true that the Communications Act bars the Commission from considering prior transactions as relevant precedent.[54] The Commission

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[51] SPR-FCC-00822699 at SPR-FCC-00822700 **{{BEGIN HCI**
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[52] SPR-FCC-04005417 at SPR-FCC-04005417-18 **{{BEGIN HCI**

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[53] *See* Opposition at 22-23.

[54] *See id.* at 21.

routinely considers previous transactions in its merger decisions,[55] often comparing a transaction under review to past mergers in the context of considering its effects on market consolidation.[56] The Commission has even considered analogous examples from European precedent, finding in the Sprint/Nextel merger that "evidence from international experience suggests that technological innovation may not be a very effective constraint on coordinated interaction when competing carriers use the same technology."[57]

No two transactions are exactly the same, but that does not negate the relevance of similar precedent in competition analysis. In fact, many of the transactions DISH cited were 4-to-3 deals in the mobile voice/broadband market, with similar competitive effects and claimed benefits. And, T-Mobile's own affiliates were either a merger party or one of the three surviving

[55] *See e.g.*, Applications of Comcast Corp., General Electric Co. and NBC Universal, Inc. for Consent to Assign Licenses and Transfer Control of Licensees, *Memorandum Opinion and Order*, 26 FCC Rcd. 4238, 4309-11 ¶¶ 168-73 (2011) (discussing the analysis and conclusions reached in the *News Corp./Hughes* decision and the extent to which those conclusions should be weighed in the review of the current transaction); Applications of Charter Communications, Inc., Time Warner Cable Inc., and Advance/Newhouse Partnership for Consent to Assign or Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 31 FCC Rcd. 6327, 6347 ¶ 46 (2016) ("Finally, we disagree that New Charter's lack of a direct ownership interest in national programming makes it less likely that the combined entity would harm OVDs. In the *Comcast-NBCU Order*, the Commission found that Comcast would use its control over video and broadband networks, as well as its control over programming, to protect its MVPD business.") *id.* at 6424-26 ¶¶ 201-04 (comparing and contrasting the then-instant transaction to the Comcast/NBCU, Adelphia, and Liberty Media/DirecTV transactions).

[56] *See* News Corp. & the DirecTV Group Inc., Transferors, & Liberty Media Corp., Transfer., *Memorandum Opinion and Order*, 23 FCC Rcd. 3265, 3290-92 ¶¶ 54-59 (comparing acquisition to prior mergers).

[57] Applications of Nextel Communications, Inc. & Sprint Corp. for Consent to Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 20 FCC Rcd. 13967, 13998 ¶ 82 (2005) (citing comments submitted to the European Commission). The Applicants refer to international precedent when it suits their interests. *See* Opposition, Appendix I at 4-5 (citing European Commission decisions and the UK Competition and Markets Authority).

players in two of them.[58] Take the proposed transaction between O2 and Three in the UK. As here, the applicants claimed that, post-transaction, the merged entity would be able to build out its network and compete more aggressively with the two dominant mobile carriers, BT/EE and Vodafone.[59] As here, the applicants claimed that post-merger, they would have no incentive to increase prices, but would rather continue to compete for greater market share.[60] The European Commission disagreed and denied permission for that transaction.[61]

Likewise, in the merger of Italian carriers H3G and WIND, the applicants claimed that, absent the transaction, each party standing alone would be unable to meet customers' data needs because of its lack of adequate 4G coverage.[62] The applicants also claimed that the merger

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[58] T-Mobile Nederland was a party to a 4-to-3 merger with Orange in the Netherlands, and T-Mobile Austria was one of the three remaining carriers in Austria after the merger of Orange Austria and H3G.

[59] European Commission, Case M.7612 – Hutchison 3G UK/Telefonica UK ¶ 873 (Nov. 5, 2016), http://ec.europa.eu/competition/mergers/cases/decisions/m7612_6555_3.pdf ("The Notifying Party considers that the Transaction will not result in the creation of a dominant position and will instead enable the merged entity to significantly improve its network coverage and performance (and in particular download speeds) and to compete with EE and Vodafone on a more equal footing. This would ultimately benefit customers, as it would prevent the mobile market in the United Kingdom developing into a bifurcated market with BT/EE and Vodafone as largely unchallenged market leaders on the one side and Three and O2 operating their businesses defensively and developing increasingly into second tier players.").

[60] *Id*. ¶ 875 ("According to the Notifying Party, the post-Transaction market will remain characterised by a number of strong operators with the incentive and ability to constrain the combined business by competing aggressively on price and quality to retain and attract customers. In the face of the challenges presented by the dynamism of the mobile market in the United Kingdom, driven by competition from new players and technological developments, the combined business will have all the incentives to compete aggressively to retain its existing customer base and attract new customers.").

[61] *Id.* ¶¶ 878-88, 3152 ("The Transaction is likely to negatively impact the incentives to compete that Three and O2 would have on a standalone basis.").

[62] European Commission, Case M.7758 Hutchison 3G Italy/Wind JV, Commission Decision, ¶¶ 405-06 (Jan. 9, 2016),

would not result in the loss of a maverick player in the Italian market, but instead it would allow H3G to compete more effectively.[63] There, the applicants committed to make divestitures sufficient to allow for the entry of a fourth MNO, Iliad.[64] Iliad launched as a low-cost operator in May 2018 and has experienced success.[65] And, in the Austrian merger of Orange and H3G, the applicants argued that the combined entity would be able to quickly roll out an LTE network and continue to compete for more customers.[66] While the EC had imposed a condition of facilities-based entry to mitigate the effects of the 4-to-3 merger of MNOs Orange Austria and H3G Austria, that condition did not materialize, as the spectrum earmarked for it reverted to H3G. The result? Consumers suffered a 14% to 20% price increase from that merger.[67] It is

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http://ec.europa.eu/competition/mergers/cases/decisions/m7758_2937_3.pdf ("The Parties explain that H3G and WIND are currently lagging behind TIM and Vodafone in terms of rollout of 4G network.").

[63] *Id.* ¶¶ 426-28 ("The Parties claim that H3G does not play a unique and irreplaceable role in the competitive process. Therefore, the fact that it will no longer operate on a standalone basis will not result in the removal of an 'important competitive force' within the meaning of the Horizontal Guidelines.")

[64] *Id.* ¶¶ 1800-02.

[65] Reuters, *Iliad Reaches 1 Million Subscribers in Italy, Extends Low-Cost Offer* (July 18, 2018), https://www.reuters.com/article/iliad-italy/iliad-reaches-1-million-subscribers-in-italy-extends-low-cost-offer-idUSI6N1TT01D.

[66] European Commission, Case No M.6497 Hutchison 3G Austria/Orange Austria ¶ 253 (Dec. 12, 2012), http://ec.europa.eu/competition/mergers/cases/decisions/m6497_20121212_20600_3210969_EN.pdf ("The Notifying Party submits that, after the merger, the competitive constraints exercised by H3G on the market would increase, because it has clear incentives to continue its growth strategy. Furthermore, the Proposed Transaction would increase H3G's ability to win new subscribers; it would improve its coverage and network quality and bring about a faster roll out of LTE. Therefore, the Notifying Party submits that it would have all the necessary economic incentives to continue pursuing its growth strategy after the merger.").

[67] Bundeswettbewerbsbehörde, The Austrian Market for Mobile Telecommunication Services to Private Customers: An Ex-post Evaluation of the Mergers H3G/Orange and TA/Yesss!, Sectoral Inquiry BWB/AW-393, Final Report at 3 (March 2016)

little wonder that the Applicants here are hard pressed to distinguish the price increases that ultimately flowed from these transactions and instead resort to silence.

### D. By Facilitating Coordination, The Proposed Merger Would Have Worse Effects Than Those Of The Previously Proposed AT&T/T-Mobile Deal

The Applicants attempt to distinguish the proposed AT&T/T-Mobile merger on the ground that AT&T is larger than Sprint.[68] But they ignore the fact that this combination is even worse in that it creates a third player of roughly equal size to the two others, facilitating harmful coordination.

When there are fewer firms in a market, it is easier for the firms to coordinate their behavior. The reason is straightforward: it is simpler to maintain a collusive arrangement among fewer parties, and it is easier to detect and punish a firm that deviates from the collusive arrangement. For example, if firms are coordinating to maintain a price above the "competitive price" that would otherwise prevail in the market, and one of the colluding firms "defects" by lowering its price below that of the other coordinating firms, the coordinating firms will more easily be able to detect cheating and punish the defector.

The Commission has recognized that the mobile voice/broadband market is conducive to coordination.[69] That risk is especially acute here: the proposed merger facilitates coordination not only by decreasing the number of firms in the market, but also by creating a market with three firms that are nearly equal in size and that will have similar wireless network cost

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https://www.bwb.gv.at/fileadmin/user_upload/PDFs/BWB2016-summary-Ex-post_evaluation_of_the_mobile_telecommunications_market.pdf.

[68] Opposition at 22.

[69] AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16227 ¶ 75 ("Coordinated effects are of particular concern here because the retail mobile wireless services market, being relatively concentrated and hard to enter, appears conducive to coordination.").

structures and capabilities. Firms in a collusive arrangement may coordinate on prices and levels of investment to generate higher profits for the colluding firms (at the expense of consumers). Such coordination, however, is made more difficult when the coordinating firms have different sizes, cost structures, and network capabilities. For example, a firm with higher costs will prefer higher prices than a firm with lower costs, so a price on which the firms can "agree" might be difficult to establish. Likewise, a small firm may wish to coordinate on a high price with a large firm, while the large firm may find it more profitable to simply undercut the smaller firm's price.[70]

This means that, by creating roughly three equal players in the market, this merger would raise the risk of coordination more than the AT&T/T-Mobile consolidation would have done, because that merger would instead have created a lopsided market structure. In addition, this proposed merger's alleged benefits would, if they were real, further increase the risk of coordination by aligning New T-Mobile's efficiency in spectrum use more closely to that of Verizon and AT&T.[71]

### E. The Applicants Also Concede That The Merger Will Produce Upward Price Pressure on MVNOs, But Incorrectly Calculate Its Magnitude

The Applicants also concede that the merger would create the risk of higher prices for MVNOs, but only quibble that the upward pressure here is less than DISH estimated.[72]

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[70] DISH Petition to Deny at 82.

[71] *See* Joint Declaration of Joseph Harrington and The Brattle Group at 79-91 (Exhibit B to DISH Petition to Deny) ("Brattle Declaration").

[72] Altice Petition to Deny at iii ("New T-Mobile will not have every 'incentive' to support its MVNO partners in expanding service nationwide, over the long term, but it will have every incentive to expand its own market power by refusing to afford its MVNO partners nationwide,

Correcting for a mathematical mistake made by the Applicants' experts shows that the actual upward pressure estimated by the Applicants themselves is many times what the Opposition reflects.

Specifically, T-Mobile's TracFone wholesale prices are predicted to increase from **{{BEGIN HCI END HCI}}** pre-merger to between **{{BEGIN HCI END HCI}}** following the merger, depending on the year and input substation scenario considered, or an increase of approximately **{{BEGIN HCI END HCI}}**. For Sprint resellers, wholesale prices are predicted to increase from **{{BEGIN HCI END HCI}}** pre-merger to between **{{BEGIN HCI END HCI}}** following the merger, depending on the year, or an increase of more than **{{BEGIN HCI END HCI}}**[73]

In fact, on the related question of inter-carrier roaming agreements, the documents supplied by the Applicants highlight the proposed merger's risk for roaming charges. The information submitted by Sprint shows a huge difference in roaming charges between small and large carriers. For example, the blended average data rate imposed on Sprint by "non-preferred partners" (i.e., Verizon and AT&T) is **{{BEGIN HCI END HCI}}**[74] This is in contrast to

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long-term, wholesale agreements. T-Mobile's own comments to date, and its refusals to make commitments to the MVNO market, already have telegraphed this result.").

[73] Brattle Declaration at 45. Given these wholesale price increases, it is unclear why TracFone decided to support the merger.

[74] Response of Sprint Corp. to General Information and Document Request, WT Docket No. 18-197, at 44 (Sept. 5, 2018) ("Sprint RFI Response").

the **{{BEGIN HCI END HCI}}** that T-Mobile is currently charging Sprint,[75] and the **{{BEGIN HCI END HCI}}** charged Sprint by "regional carriers."[76]

With the heft of AT&T and Verizon, why would New T-Mobile charge smaller carriers any less than AT&T and Verizon do? The answer is they likely will not, harming the small regional providers who currently purchase roaming from either Sprint or T-Mobile, in addition to the new entrants on whom the Applicants' case so crucially depends.[77]

### F. Meaningful Facilities-Based Market Entry Is Far From Ensured By The Transaction As Currently Structured

The Applicants argue that the upward price pressure shown by both sides' models will be defused by market entry. That is theoretically possible. The creation and successful entry of a nationwide facilities-based competitor that is able to compete on a level playing field is generally the only remedy that could potentially mitigate the effects of a 4-to-3 merger. In fact, facilities-based market entry has been the principal condition to the approval of at least two 4-to-3 consolidations in the mobile voice/broadband markets of other countries.

For example, the European Commission approved the merger of H3G and WIND in Italy only after imposing structural remedies that required the applicants to divest spectrum to a new mobile network operator ("MNO") entrant, co-locate certain cell sites with the new MNO, and

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[75] *Id.* at 46. The T-Mobile rate to Sprint **{{BEGIN HCI END HCI}}** *Id.*

[76] *Id.* at 44.

[77] *See* Charter Comments at 6 ("Providing mobile service through Charter's MVNO resale arrangement is materially different than providing mobile service as a facilities-based nationwide or even regional mobile carrier. At the same time, substantial barriers exist to entering the mobile services market as a facilities-based carrier. . . . Given these substantial barriers to entry, Charter believes that under the existing MVNO agreement, Spectrum Mobile is not and cannot reasonably be viewed as having the ability to counteract price increases or other anticompetitive effects, if any, arising from a merged T-Mobile/Sprint.").

allow the new MNO access to the merged entity's national network for 4G and 5G.[78] Likewise, the European Commission only approved the merger of Austrian carriers H3G and Orange after the applicants committed to structural remedies to offset the competitive harm of the transaction, including (1) divesting spectrum to facilitate the entry of a fourth MNO; (2) providing national roaming service and colocation on H3G's existing sites to the new MNO; (3) giving the new MNO the option to purchase certain sites; and (4) allowing MVNOs wholesale access to the merged entity's network for ten years.[79]

But in this case, the emergence of an effective nationwide facilities-based competitor in a meaningful time frame is unlikely. Here again, the Applicants fail to address the concerns DISH raised. They devote just one paragraph to market entry, saying only that companies like DISH, Charter, and Comcast are "well-established, well-capitalized and have widely recognized brands."[80] As mentioned above, they do not even try to rebut DISH's point that the total dependency of MVNOs (including Comcast and Charter) on the facilities of one of the big 4 is a significant handicap impairing their effectiveness today, and will become greater if the big 4 are reduced to 3. On this point, the Applicants merely cite "New T-Mobile and Sprint's positive relationships and contractual commitments with MVNOs, including Altice . . . ."[81] But Altice,

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[78] European Commission, Case M.7758 Hutchison 3G Italy/Wind JV, Commission Decision ¶¶ 1721-77 (Jan. 9, 2016), http://ec.europa.eu/competition/mergers/cases/decisions/m7758_2937_3.pdf.

[79] European Commission, Case M.6497 Hutchison 3G Austria/Orange Austria ¶ 518, Annex III (Dec. 12, 2012), http://ec.europa.eu/competition/mergers/cases/decisions/m6497_20121212_20600_3210969_EN.pdf.

[80] Opposition at 31-32.

[81] *Id.* at 89.

an MVNO with some facilities, filed a Petition to Deny, arguing that the competition between T-Mobile and Sprint that "has been good for smaller wireless players, the MVNO market and consumers … will be gone" if the merger is approved.[82]

As for DISH, the only potential nationwide facilities-based entrant, the Applicants have not addressed DISH's two key points. First, DISH noted that, while it is "building a nationwide wireless network, the first phase of that network's deployment will be devoted to narrowband IoT . . . ."[83] The second 5G phase will not be initiated until after the standardization of 3GPP Release 16 (expected in December 2019) and the clearing of the 600 MHz licenses (required by July 2020).[84] In response, the Applicants collapse this important sequence into one phase, asserting that "DISH has announced near-term plans for both a narrowband IoT network and a 5G network."[85]

Second, DISH has already explained that the transaction itself could hamper and delay its 5G entry by giving New T-Mobile greater influence over an ecosystem of key network inputs, including radios, chipsets, devices, towers, crews, and backhaul.[86] New T-Mobile, for example, would have the incentive and ability to use its newfound market power to customize radio solutions that could be detrimental to DISH and lead to a delay in DISH being able to implement its 5G entry.[87] The Applicants say nothing in response.

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[82] Altice Petition to Deny at 11.

[83] DISH Petition to Deny at 50.

[84] *Id.* at 51.

[85] Opposition at 32.

[86] DISH Petition to Deny at 52.

[87] *Id.*

Incredibly, T-Mobile has contradicted the Applicants' initial claims about the benefits of DISH's wireless entry by seeking to block DISH's deployment plans (which were first announced nearly 20 months ago). In a letter dated October 25, 2018, after DISH filed its Petition to Deny in this proceeding, T-Mobile claims that DISH is "hoarding" spectrum and urges the Commission to take away DISH's AWS-4, H Block and E Block spectrum licenses if DISH moves forward with its plan to build a narrowband IoT network by March 2020 (Phase 1 of its wireless plans).[88] Such action would obviously destroy DISH's ability to enter the 5G market (Phase 2 of DISH's wireless plans). T-Mobile's letter to the Commission is a blatant attempt to stifle the competition upon which the Applicants' own case for this merger relies, and foreshadows the harms this transaction would bring.

Moreover, the Applicants' internal documents show that **{{BEGIN HCI**

**END HCI}}**[89] Sprint chose another route on account of the larger *private* benefits to Sprint. **{{BEGIN HCI**

**END HCI}}**[90] But the fact remains: by **{{BEGIN HCI**

[88] Letter from Kathleen O'Brien Ham, Senior Vice-President, Government Affairs, T-Mobile, to Donald Stockdale, Chief, Wireless Bureau (Oct. 25, 2018).

[89] *See generally* SPR-FCC-10466293 at SPR-FCC-10466297-300 **{{BEGIN HCI**
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[90] Consideration of alternative means for entry formed the centerpiece of DOJ's successful challenge to Primestar's attempt to acquire satellite assets from News Corp. DOJ's complaint alleged that Primestar would not be incentivized to use the satellite assets to offer a DBS service that would compete with the cable services operated by Primestar's stakeholders. Critically, the

**END HCI}}** the merger will likely hamper DISH's market entry and the preservation and enhancement of a 4-player market, thus undermining one of the main rationales on which the Applicants rely for approval of this merger.

The Applicants have not offered any assurances that they will both accelerate market entry and safeguard facilities-based entrants from the power that they would accumulate through the merger.

### G. New T-Mobile Is Unlikely To Charge Lower Prices In Light Of Its Excess Capacity

Essentially, the Applicants claim that the Commission need not be concerned about the higher consumer prices that their merger would produce because the transaction will generate excess capacity. In their words, "Dr. Evans shows that the dynamic merger-specific decline in price/GB in 2024 would be 49.9 percent even if he assumed that ARPUs would increase by the upper bound of 10.4 percent claimed by the DISH economists. The bottom line is that the dynamic, efficiency-driven price declines exceed the DISH economists' estimates of static price increases."[91] But excess capacity is seldom the primary, or only, determinant of pricing decisions—after all, reducing output is one of the main fears arising from the creation of a market-dominating entity. Monopolists often reduce output because it is more profitable to produce less, not because they cannot produce more. In determining profit-maximizing prices

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complaint concluded that "absent this proposed transaction with Primestar" News Corp. "would have entered the MVPD market with a high-power DBS service, either on a stand-alone basis or via a toehold acquisition . . . ." Complaint ¶ 84, *United States v. Primestar, Inc.*, Case No. 1:98CV01193 (D.D.C. June 12, 1998).

[91] Opposition at 8.

and output, New T-Mobile will be primarily informed by the elasticity of demand, not by the availability of more capacity than it needs to meet demand.

## IV. THE APPLICANTS ARE WRONG IN THEIR CHARACTERIZATION OF THE HHI AND SPECTRUM SCREEN ANALYSES

**Spectrum Screen.** The Applicants do not deny DISH's analysis that New T-Mobile would exceed the Commission's spectrum screen in 532 CMAs, or 1,996 of the nation's 3,221 counties, covering all of the top 100 markets.[92] Nor do they disagree with DISH that exceeding the screen in 532 CMAs is unprecedented.[93] Instead, the Applicants claim that "[t]hese screens…are merely tools used to distinguish [CMAs] that should be exempt from detailed review rather than undergo closer examination . . . ."[94] This is incorrect for at least two reasons. First, the Applicants are not correct that "the number of markets subject to review is not a factor in the competitive analysis."[95] The Commission also evaluates a transaction's effects at a national level.[96] Indeed, "[i]ncreased spectrum aggregation in many local markets across the country may imply that harms that occur at the local level collectively could have nationwide competitive effects."[97]

Second, for the markets flagged as exceeding the screen, merger applicants have the burden of making a localized showing taking into account a number of factors. These factors

[92] DISH Petition to Deny at 71.

[93] By contrast, the rejected AT&T/T-Mobile merger would have caused AT&T to exceed the screen in 274 CMAs. AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16211 ¶ 45.

[94] Opposition at iii.

[95] *See id.* at 25.

[96] Policies Regarding Mobile Spectrum Holdings Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Report and Order*, 29 FCC Rcd. 6133, 6225-26 ¶¶ 238, 241 (2014) ("*Mobile Spectrum Order*").

[97] *Id.* at 6232 ¶ 263.

include: (1) the total number of rival service providers; (2) the number of rival firms that can offer competitive nationwide service plans; (3) the coverage by technology of the firms' respective networks; (4) the rival firms' market shares; (5) the combined entity's post-transaction market share and how that share changes as a result of the transaction; (6) the amount of spectrum suitable for the provision of mobile telephony/broadband services controlled by the combined entity; and (7) the spectrum holdings of each of the rival service providers.[98] The Applicants have completely failed to make such a showing, confining themselves to a sweeping statement that "there were no markets where both T-Mobile and Sprint were considered competitors, but where Verizon and AT&T were not also considered competitors" (with the exception of Puerto Rico).[99]

**HHI.** The Applicants also do not dispute DISH's analysis showing that the transaction would lead to a dramatic increase in the HHI index—451 points from its already "highly concentrated" value of 2,814 to 3,265.[100] As explained by the Horizontal Merger Guidelines ("the Guidelines"), mergers resulting in "highly concentrated markets that involve an increase in the HHI of more than 200 points will be presumed to be likely to enhance market power."[101] Here, the presumption is particularly strong: a change in concentration of just 200 points (instead of 451) from a pre-merger value of as little as 2,301 (instead of 2,814) would be enough to create

[98] *Id.* at 6238-39 ¶¶ 280, 284.

[99] Opposition at 31.

[100] *See* DISH Petition to Deny at 74.

[101] U.S. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines § 5.3 (2010) ("Horizontal Merger Guidelines").

the presumption.[102] The Applicants seek to minimize the importance of the HHI analysis, consigning their discussion to a single paragraph, and arguing that the presumption is "far outweighed by the enormous benefits to competition and consumers from the merger."[103] As explained below, such disregard for the adverse competitive effects and consumer harms in favor of hypothetical and unsupported benefits is inappropriate and inconsistent with the standards used by the courts, the antitrust agencies, and the Commission itself.[104] In short, the Applicants cannot defeat this presumption merely by touting the merger's supposed benefits.

## V. SPRINT IS NOT A FAILING FIRM

The Applicants further try to mask the impact of the excessive concentration this deal would produce by casting doubt on Sprint's viability as a standalone entity. They cite Sprint's allegedly "significant structural challenges," including: "lack of free cash flow"; "limited current network footprint"; and allegedly unsustainable pricing practices.[105] In an ex parte presentation, Sprint outlined an even bleaker picture, describing itself as having "no obvious path to solve key business challenges."[106]

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[102] A market is considered "highly concentrated" if it has an HHI of about 2,500. Horizontal Merger Guidelines § 5.3. *See FTC v. H.J. Heinz Co.*, 246 F.3d 708, 716 (D.C. Cir. 2001) (merger than increased HHI by 510 points to 5,285 created presumption of anticompetitive effects by a "wide margin"); *United States v. H&R Block, Inc.*, 833 F. Supp. 2d 36, 72 (D.D.C. 2011) (finding merger that increased HHI by approximately 400 points to 4,691 created presumption of anticompetitive effects, and enjoining merger because it was reasonably likely to cause anticompetitive effects).

[103] Opposition at 36.

[104] *Id.* at 35.

[105] *Id.* at 17-20.

[106] Letter from Regina M. Keeney, Counsel for Sprint Corp., to Marlene Dortch, Secretary, FCC, WT Docket No. 18-197, Attachment C at 23 (Sept. 25, 2018) ("Dow Draper Ex Parte Presentation").

This argument is contradicted by Sprint's public statements, and indeed was all but disavowed by Sprint's CFO as recently as October 2, 2018. Asked about Sprint's statements to the Commission that the company "faces substantial challenges that limit its effectiveness,"[107] Sprint's CFO responded: "you also have to recognize that you have to be able to tailor your message based on the same set of facts to different audiences, dependent on what point you're trying to make."[108]

> Sprint's CFO went on to say the following about the health of standalone Sprint:
>
> [S]o having said that, we've been on a very profound transformation plan. So we've taken more than $6 billion of cost out over the last 4 years. We've now put the next-gen network plan in place in our network, quality and speeds are much better than they were previously. We have strengthened the balance sheet. We've got good funding, good liquidity.[109]

The Applicants cannot credibly claim that DISH "cherry-pick[ed]" financial metrics[110] to depict Sprint as healthy; by Sprint's own admission, it is the Applicants who have tailored these statements to depict Sprint as ailing.

These facts about Sprint's health are moreover consistent with Sprint's own financial disclosures, which tout Sprint's turnaround, proclaiming among other things:

- Adjusted EBITDA of $3.3 billion, the highest in more than 11 years
- Positive adjusted free cash flow in five of the last six quarters
- 12th consecutive quarter of postpaid phone net additions
- Lowest prepaid churn in more than three years
- Highest postpaid phone gross additions in six years
- Highest operating income in company history[111]

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[107] *Id.* at 23.

[108] Transcript, Sprint Presentation at Deutsche Bank Leveraged Finance Conference, Fair Disclosure Wire (Oct. 2, 2018).

[109] *Id.*

[110] Opposition at 17.

A February 2018 press release by Sprint likewise brims with optimism about its network improvement program, noting the following investments:

- "Upgrade existing towers to leverage all three of the company's spectrum bands – 800 MHz, 1.9 GHz and 2.5 GHz – for faster, more reliable service."
- "Build thousands of new cell sites to expand its coverage footprint and extend coverage to more popular customer destinations."
- "Add more small cells – including Sprint Magic Boxes, mini-macros and strand mounts to densify every major market and significantly boost capacity and data speeds – and leverage the recent strategic agreements with Altice and Cox. The company has already deployed more than 80,000 Sprint Magic Boxes in approximately 200 cities across the country and plans to deploy more than 1 million as part of its multi-year roadmap."
- "Deploy game-changing 64T64R Massive MIMO 2.5 GHz radios to increase capacity up to 10 times that of current LTE systems and increase data speeds for more customers in high-traffic locations. Massive MIMO, a key enabler for 5G, will allow the company to support both LTE and 5G NR (New Radio) modes simultaneously without additional tower climbs."[112]

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[111] Applicants point to Sprint's "lack of free cash flow," Opposition at 18, but Sprint had positive cash flow in Q1 2018, compared to negative $240 million in the prior quarter, with net cash from operations of $2.4 billion and positive cash flow in five of the last six quarters. *See e.g.*, Press Release, Sprint Corp., Sprint Reports Inflection in Wireless Service Revenue with Fiscal Year 2018 First Quarter Results (Aug. 1, 2018), http://investors.sprint.com/news-and-events/press-releases/press-release-details/2018/Sprint-Reports-Inflection-In-Wireless-Service-Revenue-With-Fiscal-Year-2018-First-Quarter-Results/default.aspx ("Sprint Aug. 1, 2018 Press Release"); Press Release, Sprint Corp., Sprint Delivers Best Financial Results in Company History With Highest Ever Net Income and Operating Income in Fiscal Year 2017 (May 2, 2018), http://s21.q4cdn.com/487940486/files/doc_financials/quarterly/2017/q4/Fiscal-4Q17-Earnings-Release-FINAL.pdf ("Sprint May 2, 2018 Press Release"). And Sprint's CEO recently said that Sprint's "liquidity position now is strong," and that Sprint has "a strong and robust balance sheet." Transcript, Sprint Corp. at Goldman Sachs Communacopia Conference, Fair Disclosure Wire (Sept. 14, 2018).

[112] Press Release, Sprint Corp., Sprint Reports Highest Retail Net Additions In Nearly Three Years And Raises Adjusted Free Cash Flow Guidance With Fiscal 2017 Third Quarter Results (Feb. 2, 2018), http://s21.q4cdn.com/487940486/files/doc_financials/quarterly/2017/q3/01_Fiscal-3Q17-Earnings-Release-FINAL.pdf.

The above statements may offer the most striking contradictions of the Applicants' claims, but they are far from the only ones. Below is a comparison of what Sprint has said to the Commission and other statements it has made to investors:

| **What Sprint Says to the Commission** | **What Sprint Says to Investors** |
|---|---|
| "Despite achieving substantial cost reductions and stabilizing its financial position, Sprint has not been able to turn the corner with respect to its core business challenges[.] Sprint tried a more localized approach in an attempt to drive growth, but continues to face declining subscribers and revenue[.]"[113] | "By balancing growth and profitability, we were able to grow wireless service revenue sequentially, continue to add retail phone customers, generate net income for the third consecutive quarter, and improve the network."[114] |
| "FY 2017 is first profitable year in 11 years[.]"[115] | "Sprint reported its third consecutive quarter of net income, its 10th consecutive quarter of operating income, and its highest adjusted EBITDA in more than 11 years, all excluding the positive impact of the new revenue recognition standard. The new revenue recognition standard had a positive impact of $152 million on reported net income and $192 million on reported operating income and adjusted EBITDA in the quarter."[116] |
| "Network Shortcomings Limit Our Ability to Attract and Retain Subscribers . . . Coverage and consistency challenges impact both network performance and customer perception[.] Sprint's network perception lags far behind the other carriers, making it very difficult to sell our network[.] Poor network experience is a leading cause of Sprint's subscriber churn[.]"[117] | "Network Built for Unlimited Keeps Getting Better[.] With more than 200 MHz of sub-6 GHz spectrum, Sprint has the Network Built for Unlimited and made continued progress on executing its Next-Gen Network plan in the quarter. . . . These deployments are contributing to Sprint providing customers with a better network experience. In fact, Sprint is the most improved network according to Ookla as shown in Speedtest Intelligence |

[113] Dow Draper Ex Parte Presentation, Attachment C at 2.

[114] Sprint Aug. 1, 2018 Press Release.

[115] Dow Draper Ex Parte Presentation at 3.

[116] Sprint Aug. 1, 2018 Press Release at 1.

[117] Dow Draper Ex Parte Presentation at 6.

| What Sprint Says to the Commission | What Sprint Says to Investors |
|---|---|
| | data, and PCMag's 2018 Fastest Mobile Networks. In both, the company's year-over-year increase in national average download speeds outpaced the competitors, including an 87 percent lift reported in PCMag's annual tests."[118] |
| "Sprint Struggles to Retain Its Base and Attract New Subscribers[.] As a result of our network performance limitations and perception, Sprint has consistently had the highest churn in the industry and failed to retain its subscriber base . . . ."[119] | "Sprint Adds Nearly 1 Million Retail Phone Customers in Fiscal Year 2017[.] Sprint's focus on both its postpaid and prepaid businesses resulted in nearly 1 million retail phone net additions in fiscal year 2017, an improvement of more than 1 million compared to the prior year."[120] |
| "Sprint Is Also Challenged in the Prepaid Segment."[121] | "Prepaid net additions of 363,000 compared to net losses of 1 million in the prior year, an improvement of nearly 1.4 million driven by a resurgence in the Boost brand. Prepaid churn of 4.58 percent, the lowest in three years, improved by 80 basis points year-over-year. For the fourth quarter, prepaid net additions were 170,000, including the highest share of gross additions in two years and year-over-year improvement in churn for the seventh consecutive quarter."[122] |
| "Sprint is Unable to Consistently Make Necessary Network Investments[.] Sprint has not been able to invest sufficient capital to achieve network performance necessary to attract and retain enough subscribers to improve its scale."[123] | "Sprint's deployment of Massive MIMO radios, a key technology for 5G, is underway and the company continues to expect to launch the first mobile 5G network in the U.S. in the first half of 2019."[124] |

[118] Sprint Aug. 1, 2018 Press Release at 2-3.

[119] Dow Draper Ex Parte Presentation at 7.

[120] Sprint May 2, 2018 Press Release.

[121] Dow Draper Ex Parte Presentation at 9.

[122] Sprint May 2, 2018 Press Release at 2.

[123] Dow Draper Ex Parte Presentation at 12.

Analysts agree with the statements Sprint has made outside the Application, not with the Applicants' claims to the Commission. As one recently wrote: "Sprint's network modernization and integration efforts, lucrative unlimited data plans, promotional offers in both postpaid and prepaid plans have paid off, in terms of huge subscriber gains. The stock has also outperformed the industry in the past six months on an average."[125] And, in October 2018, Sprint was once again recognized for its "outstanding mobile products" by Mobile Breakthrough: "Sprint's innovative Massive MIMO solution was selected as 'Commercial 5G Solution of the Year,' while the company's SpiderCloud small-cell solution for enterprises and public venues was honored as the winner of both the 'Overall Wireless Broadband Solution' and 'Next-Gen Wi-Fi Operator Deployment of the Year' awards."[126]

Sprint's most recent earnings results (for Q2 2018), released today, reflect its strength in the market: the company reported a 19 percent year over year growth in EBITDA and adjusted free cash flow of $525 million. Sprint noted that Q2 2018 represents its "its fourth consecutive quarter of net income, its 11th consecutive quarter of operating income, and its highest fiscal second quarter adjusted EBITDA in 12 years," leading to "[f]ive consecutive quarters of postpaid net additions and seven consecutive quarters of prepaid net additions within the Boost brand."[127]

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[124] Sprint Aug. 1, 2018 Press Release at 3.

[125] Zacks Investment Research, *Analyst Report for Sprint Corporation*, at 1 (Sept. 21, 2018).

[126] Sprint Wins Three Mobile Breakthrough Awards for Innovative 5G Massive MIMO and SpiderCloud Small-Cell Technologies, PR Newswire (Oct. 24, 2018), https://www.prnewswire.com/news-releases/sprint-wins-three-mobile-breakthrough-awards-for-innovative-5g-massive-mimo-and-spidercloud-small-cell-technologies-300736906.html.

[127] Press Release, *Sprint Reports Year-Over-Year Growth in Wireless Service Revenue with Fiscal Year 2018 Second Quarter Results*, (Oct. 31, 2018), http://investors.sprint.com/news-and-

Sprint also touted its continued progress deploying its "Next-Gen Network," highlighting plans to launch a mobile 5G service in the first half of 2019. Among other achievements, the company boasted the following:

- "Sprint completed thousands of tri-band upgrades and now has 2.5 GHz spectrum deployed on 70 percent of its macro sites.
- Sprint added thousands of new outdoor small cells and currently has 21,000 deployed including both mini macros and strand mounts.
- Sprint continued commercial deployment of Massive MIMO radios, which increase the speed and capacity of the LTE network and, with a software upgrade, will provide mobile 5G service launching in the first half of 2019.
- These deployments are contributing to Sprint providing customers with a better network experience, as seen in Speedtest Intelligence data from Ookla.
- Best-ever showing with the fastest average download speed in 123 cities, including Seattle, Pittsburgh, Denver, and Honolulu.
- Most improved network among national carriers with national average download speeds up 31.5 percent year-over-year.
- The company has reached nationwide deployment with LTE Advanced features such as 256 QAM, 4X4 MIMO, and two- and three-channel carrier aggregation, a milestone on the road to 5G. These enhancements are expected to deliver up to two times faster speeds than Sprint 4G LTE on capable devices."[128]

This is hardly the picture of an ailing firm, or one that needs a market-consolidating merger to launch a 5G network that is already underway.

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events/press-releases/press-release-details/2018/Sprint-Reports-Year-Over-Year-Growth-In-Wireless-Service-Revenue-With-Fiscal-Year-2018-Second-Quarter-Results/default.aspx.

[128] *Id.*

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Moreover, the Applicants do not take into account additional measures that could be used to reinforce Sprint's financial position further. Sprint's owner Softbank could continue to increase its investment in Sprint as a standalone entity. SoftBank holds more than $31 billion (more than 3 trillion yen) in cash and cash equivalents across its portfolio.[133] SoftBank's Vision Fund has more than $90 billion (10 trillion yen) in capital from both SoftBank and third parties, which it invests in cutting-edge technology companies.[134] And more cash is on the way:

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[129] SPR-FCC-10466293 at SPR-FCC-10466294 **{{BEGIN HCI**
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[130] *Id.* at SPR-FCC-1046666320.

[131] *Id.* at SPR-FCC-1046666319.

[132] SPR-FCC-13417696 at SPR-FCC-13417699 **{{BEGIN HCI**
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[133] SoftBank Group Corp., Annual Report FY 2018 at 1 (July 20, 2018), https://cdn.group.softbank/en/corp/set/data/irinfo/financials/annual_reports/pdf/2018/softbank_annual_report_2018_001.pdf.

[134] SoftBank Group Corp., Consolidated Financial Report For the Three-month Period Ended June 30, 2018 at 22 (Aug. 6, 2018) ("As of the end of the first quarter [June 30, 2018], the total

SoftBank is reportedly planning an IPO of its Japanese mobile division, listing the offering at $30 billion (3 trillion yen)—the largest ever.[135]

Softbank's CEO has assured investors that Sprint can compete standing alone,[136] noting that control of Sprint was a key element of SoftBank's long-term strategy for its portfolio, especially for the assets of the Vision Fund:

> And most of our assets in the portfolio would utilize the infrastructure in the U.S. as the biggest market that we would invest in. So communication infrastructure is critical for us to deliver information to those markets, including the U.S. So keeping control of Sprint allows us to build our future strategy of the SoftBank group.[137]

Even if Sprint is failing (and it is not), its parent is well positioned and incentivized to infuse it with the resources it needs to accelerate the next generation of wireless deployment.

Sprint has also internally discussed **{{BEGIN HCI**

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acquisition cost and fair value of investments of SoftBank Vision Fund was $27.1 billion and $32.5 billion, respectively."), https://cdn.group.softbank/en/corp/set/data/irinfo/financials/financial_reports/pdf/2018/softbank_results_2018q4_001.pdf.

[135] *See, e.g.*, Giles Turner, Ruth David, and Takahiko Hyuga, *SoftBank Weighs the Largest Public Listing Ever*, Bloomberg (Aug. 6, 2018), https://www.bloomberg.com/news/articles/2018-08-06/softbank-is-said-to-discuss-90-billion-value-for-mobile-unit.

[136] SoftBank Group Corp., Earnings Results Briefing for Q1/FY2017 at 36:45–53 (Aug. 7. 2017) ("[T]hat's why we believe that the Sprint can be stand alone to compete in the market."), https://webcast.softbank.jp/en/detail/video/ref:20170807_01_en.

[137] SoftBank Group Corp., Earnings Results Briefing for Q2/FY2017 at 19:50–20:34 (Nov. 6, 2017), https://webcast.softbank.jp/en/detail/video/ref:20171106_01_en.

[138] SPR-FCC-00866405 at SPR-FCC-008866406 **{{BEGIN HCI**
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The Applicants essentially attempt to take advantage of the "failing firm" doctrine, under which the market share of the failing firm is treated as zero (because it is in danger of imminent failure and thus would exit the market).[139] But the Applicants do not cite to the doctrine itself or any case law applying it.[140] The reason is obvious: Sprint's financial health is much too strong to support a failing firm defense. The failing firm doctrine applies a "choice of evils" approach where "the possible threat to competition resulting from an acquisition is deemed preferable to the adverse impact on competition and other losses if the company goes out of business."[141] The doctrine is exceedingly "narrow in scope" and therefore "rarely succeeds."[142] The Guidelines explain that to qualify as a failing firm, a merger applicant must show that:

1. it is unable to meet its obligations as they come due;
2. it would not be able to reorganize successfully in bankruptcy; and
3. it has made unsuccessful good-faith efforts to elicit reasonable alternative offers that would keep its assets in the relevant market and pose a less severe danger to competition than does the proposed merger.[143]

And that is not all: the merger applicant also needs to show "that there [i]s no other prospective purchaser for it."[144] The Applicants have not even tried to make such a showing.[145]

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[139] *See* Horizontal Merger Guidelines § 11.

[140] *See* Opposition at 17-18.

[141] *United States v. Gen. Dynamics Corp.*, 415 U.S. 486, 507 (1974).

[142] *Citizen Pub. Co. v. United States*, 394 U.S. 131, 139 (1969); Philip E. Areeda & Herbert Hovenkamp, Antitrust Law ¶ 951e (4th ed. 2016).

[143] Horizontal Merger Guidelines § 11.

[144] *United States v. Greater Buffalo Press, Inc.*, 402 U.S. 549, 555 (1971). *See also Citizen Pub. Co. v. United States*, 394 U.S. at 138 (1969) ("The failing company doctrine plainly cannot be applied in a merger or in any other case unless it is established that the company that acquires the failing company or brings it under dominion is the only available purchaser.").

Here, the Applicants' admission that Sprint has "the ability to operate as a competitive restraint on the decisions of other wireless carriers"[146] is enough to defeat any suggestion that Sprint is on the brink of failure. Even if the Applicants were correct that Sprint would be a less effective competitor than the hypothetical New T-Mobile (which they have not proven, as discussed below), that would be irrelevant to the failing firm analysis.

And finally, the Applicants make no effort to argue that T-Mobile is the only possible purchaser for Sprint. "The failing company doctrine plainly cannot be applied in a merger or in any other case unless it is established that the company that acquires the failing company . . . is the only available purchaser."[147] The Applicants do not show that Sprint made "good faith efforts to elicit reasonable alternative offers . . . that would keep its tangible and intangible assets in the relevant market and pose a less severe danger to competition."[148] The Commission should ignore the Applicants' plea for special treatment based on a picture of an ailing company from which even Sprint has distanced itself.

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[145] *See also* Petition to Deny of Common Cause, Consumers Union, New America's Open Technology Institute, Public Knowledge & Writers Guild of America, West, Inc., WT Docket No. 18-197, at 23 (Aug. 27, 2018) ("Common Cause et al. Petition") ("The failing firm doctrine cannot be applied unless it is established that the acquiring company is the only available purchaser. Securities and Exchange Commission filings suggest that Sprint may have had merger discussions with three other companies prior to entering into its proposed merger with T-Mobile. The viability of these potential alternative purchasers, including whether they were given the opportunity to conduct due diligence and possibly make an offer for Sprint's assets, should be assessed prior to applying the failing firm doctrine to Sprint.").

[146] Opposition at 20.

[147] *United States v. Energy Sols.*, 265 F. Supp. 3d 415, 445 (D. Del. 2017) (quoting *Citizen Pub., Co. at* 138 (1969)).

[148] *See* Horizontal Merger Guidelines § 11.

## VI. THE APPLICANTS' EXPERTS STILL FAIL TO CALCULATE THE HEIGHTENED RISK OF COORDINATION AND INCORRECTLY ARGUE THAT COORDINATION RISKS ARE AVERTED BY THE TRANSACTION'S CLAIMED BENEFITS

The Applicants' experts still fail to compute the CPPI, a method for assessing coordination risk that they themselves devised, arguing instead that the method does not apply here.[149] But the reasons why they deem it inapplicable are inconsistent with their prior exposition of their method.[150] Equally important, even if their method had the limited scope they now allege, it would still apply here.

Salop and Sarafidis maintain that their index can be applied only to gauge the incentives of two leading firms to engage in parallel accommodating conduct, and, according to the Applicants, T-Mobile and Sprint are "clearly" not leading firms.[151]

But, to begin with, this analysis is incorrect based on their own writings. Nothing in their initial explanation of this method restricts its applicability to leading firms. To the contrary, the

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[149] *See* Serge Moresi, David Reitman, Steven Salop, & Yianis Sarafidis, *Gauging Parallel Accommodating Conduct Concerns With The CPPI* (2011), http://www.crai.com/sites/default/files/publications/Gauging_Parallel_Accomodating_Conduct_Concerns_with_the_CPPI.pdf.

[150] *Id.* at 2-4 ("Parallel accommodating conduct (PAC) has a long history in oligopoly theory, dating back more than seventy years. PAC is a type of coordinated conduct that does not require an agreement. Instead, it involves a firm engaging in a certain conduct, with the expectation that one or more other firms will follow that same conduct. For example, PAC could involve two leading firms raising their prices in parallel over and above the prices determined by their unilateral pricing incentives. One firm would raise price above this level and the other firm would simply follow. . . . Suppose that there is a merger in the market in which Firm A acquires a third firm (say, Firm C). In this situation, the CPPI for Firms A (now merged with C) and B may rise. If so, the merger would increase the magnitude of the potential parallel price increases. Thus, the increase in the CPPI (—'Delta CPPI') can be used as a measure of the parallel accommodating conduct concerns raised by the merger.").

[151] Supplemental Declaration of Steven C. Salop and Yianis Sarafidis ¶¶ 5, 51 (Exhibit H to Opposition); Opposition at 17.

2011 Salop and Sarafidis article that introduced CPPI makes clear that it is not restricted to coordination between two leading firms: the article's abstract states that parallel accommodating conduct involving two leading firms is only one "example," and describes the conduct to which CPPI applies as involving "a firm engaging in a certain conduct, with the expectation that one or more other firms will follow that same conduct."[152]

Moreover, it is precisely the behavior of leading firms that needs to be measured here. T-Mobile and Sprint are asking for permission to merge, meaning their incentives to engage in parallel conduct as standalone companies would not be at issue, because the two entities would become one. The incentives that need to be gauged are those of any two among the three remaining leading firms (New T-Mobile/Verizon, New T-Mobile/AT&T, and Verizon/AT&T). Under the Applicants' own definition, the CPPI is applicable to gauge these incentives.

Even if the transaction's claimed benefits were real, they do not materially reduce the coordination risk, and may even increase it. If the proposed merger were to result in the large marginal cost reductions claimed by the Applicants, these reductions would align margins across the three MNOs and therefore increase their ability to coordinate. As discussed in the Brattle Reply, this is because, all else being equal, coordination is easier the more similar the cost structures (and therefore optimal prices) across the firms in the coalition.

Additionally, regardless of the incremental effect of such efficiencies, the Brattle Reply also shows that, after accounting for the claimed efficiencies in the Compass Lexecon Reply, the incentives to coordinate *increase* as a result of the merger. Specifically, the Brattle Reply shows

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[152] Serge Moresi, David Reitman, Steven Salop, & Yianis Sarafidis, *Gauging Parallel Accommodating Conduct Concerns With The CPPI*, at 1 (2011), http://www.crai.com/sites/default/files/publications/Gauging_Parallel_Accomodating_Conduct_Concerns_with_the_CPPI.pdf.

that the CPPI increases by a significant amount even when Compass' overstated efficiencies are included (between **{{BEGIN HCI END HCI}}** ).[153] Thus, including Compass Lexecon's assumed efficiency gains in the CPPI calculations does not meaningfully alter Brattle's original findings that the proposed merger will make coordination between the remaining firms considerably easier than if the firms remain separate. The result? Even higher prices for consumers.

## VII. DR. EVANS SIMPLY ASSUMES THE APPLICANTS' BENEFIT CLAIMS, AND ALSO ASSUMES THAT EVER–INCREASING DATA WILL CONTINUE TO HAVE THE SAME UTILITY FOR ALL CUSTOMERS

Dr. Evans' reply to DISH's expert, Professor Sappington, does little to alleviate the concerns Professor Sappington raised regarding Dr. Evans' initial declaration. As Professor Sappington explained, Dr. Evans' "unquestioning adoption of predictions of large capacity increases for New T-Mobile" led him to make "rosy predictions about the impact of the merger on the price of wireless data in 2024."[154] However, Dr. Evans' analysis in his Reply Declaration "remains compromised by its unquestioning acceptance of the Applicants' original projections and its reliance on assumptions that are not fully supported."[155]

Dr. Evans continues to accept T-Mobile's projections without question and does nothing to verify them.[156] Specifically, Dr. Evans accepts the Applicants' overly optimistic forecasts of

[153] Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas Table 24 (attached as Exhibit 1) ("Brattle Reply Declaration").

[154] Declaration of David E.M. Sappington at 9 (Exhibit A to DISH Petition to Deny) ("Sappington Declaration").

[155] Reply Declaration of David E.M. Sappington at 8 (attached as Exhibit 2) ("Sappington Reply Declaration").

[156] *See* Evans Reply Declaration ¶ 4 ("Given the merger-specific efficiencies estimated by T-Mobile..."); *id.* ¶ 6 ("My analysis is based on the Parties' forecast of network performance of

New T-Mobile's 5G capacity. On that basis, Dr. Evans predicts that the proposed merger will produce a substantial decline in the per unit price of wireless data.[157] Dr. Evans also assumes—without proof—that the unit price of wireless data is the ratio of predicted industry revenue to predicted industry capacity. The Brattle Report, however, shows that the Applicants substantially overstate the extent to which the proposed merger would increase the combined capacity of T-Mobile and Sprint.[158]

Dr. Evans also assumes that AT&T and Verizon will operate with the same practical capacity per subscriber as New T-Mobile following the merger. In other words, in his view, if the merger increases the practical capacity per subscriber of New T-Mobile, it will automatically increase the corresponding capacities of AT&T and Verizon.[159] This capacity assumption "is of fundamental importance" to Dr. Evans' analysis.[160] Dr. Evans admits that there will be a dramatically smaller price reduction in the absence of a capacity match—he projects a 50% price reduction in the event of a capacity match, but only a 5% reduction in the absence of a capacity match.[161] However, Dr. Evans has still not established the accuracy of this key assumption through econometric analysis, instead relying on "back-and-forth marketing claims,"[162]

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New T-Mobile and the stand-alone companies."); *id.* ¶ 11 ("[M]y premise, which is based on the declaration of Mr. Neville Ray…").

[157] *Id.* ¶ 4.

[158] Brattle Reply Declaration at 48, Table 13.

[159] Evans Reply Declaration ¶ 6.

[160] Sappington Reply Declaration at 4.

[161] *Id.* at 4; Evans Reply Declaration, Exhibit 1A and 3B.

[162] Declaration of David Evans ¶ 128 (Appendix G to Application).

presentations at the Applicants' board meetings,[163] blog posts,[164] and press reports.[165] Dr. Evans also fails to account for the potential coordinated effects of the proposed merger on the price of wireless data.[166]

And finally, Dr. Evans makes a further leap: he assumes that price reductions of a given magnitude imply increases in consumer welfare of a corresponding magnitude (*i.e.*, a 5% decline in the per-GB price of wireless data implies a 5% increase in consumer welfare).[167] Not so. As DISH's expert, Dr. Sappington, explains, "unlimited wireless data plans that entail a higher price and a more-than-proportionate increase in average data consumption can reduce the welfare of consumers who use relatively little data."[168]

## VIII. THE COMMISSION'S STANDARD EXAMINES EFFECTS BEFORE BENEFITS AND ANTICOMPETITIVE EFFECTS CANNOT BE REFUTED SOLELY BY INVOKING A TRANSACTION'S BENEFITS

As discussed above, if merger analysis disregarded a transaction's competitive effects, no matter how severe, in the name of claimed benefits, we would be surrounded by monopolies. The Applicants' dismissal of the competitive effects they acknowledge in the name of benefits that they claim will occur does not square with the standard followed by the Commission, antitrust agencies, or the courts.

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[163] *Id.* ¶ 141.

[164] *Id.* ¶ 145.

[165] *Id.* ¶ 163.

[166] Sappington Reply Declaration at 6-7.

[167] *Id.* at 7.

[168] *Id.* at 8.

In evaluating a proposed merger, the Commission asks first if a transaction would adversely affect competition, and, second, if these effects can be mitigated by conditions.[169] In the Commission's words, "[i]f the Commission has determined that a transaction raises no public interest harms or any such harms have been ameliorated by narrowly tailored conditions, the Commission next considers a transaction's public interest benefits."[170] Only then does the Commission also ask about the transaction's countervailing public benefits.[171]

The Guidelines reflect a similar analysis. In their words, "the greater the potential adverse competitive effect of a merger, the greater must be the cognizable efficiencies, and the more they must be passed through to customers…"[172] Significantly, the Guidelines note that the analysis proceeds in this manner because "the antitrust laws give competition, not internal operational efficiency, primacy in protecting customers."[173]

Consistent with the Guidelines, courts apply a "burden-shifting analysis" to "the merger's effect on competition."[174] First, the plaintiff must establish a presumption of an anticompetitive

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[169] Applications of Level 3 Communications Inc. and CenturyLink for Consent to Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 32 FCC Rcd. 9581, 9585 ¶ 9 (2017).

[170] *Id.* at 9586 ¶ 10.

[171] *Id.*; *see also* Applications of General Communication, Inc. & GCI Liberty, Inc. for Consent to Transfer Control, *Memorandum Opinion and Order*, 32 FCC Rcd. 9349, 9353 ¶ 9 (2017); Joint Application of Securus Inv. Holdings, LLC et al. for Grant of Authority to Transfer Indirect Ownership and Control of Licenses, *Memorandum Opinion and Order*, 32 FCC Rcd 9564, 9570 ¶ 14 n.42 (2017) ("[T]he Commission has not allowed potential competitive harms to go unremedied nor allowed them to be offset by benefits that are not transaction-specific, *i.e.*, benefits that do not naturally arise from the transaction at issue.").

[172] Horizontal Merger Guidelines § 10.

[173] *Id.*

[174] *United States v. Anthem, Inc.*, 855 F.3d 345, 349 (D.C. Cir. 2017) (citing *United States v. Baker Hughes Inc.*, 908 F.2d 981, 982 (D.C. Cir. 1990)).

effect by showing that the "transaction will lead to undue concentration in the market for a particular product in a particular geographic area."[175] As discussed, the HHI calculation of this transaction's effect on concentration creates this presumption with an ample margin. Once the *prima facie* case is made, the burden shifts to the defendant to rebut the presumption.[176] The D.C. Circuit has found that "a defendant seeking to rebut a presumption of anticompetitive effect must show that the *prima facie* case inaccurately predicts the relevant transaction's probable effect on future competition."[177] In the court's words, the "more compelling the *prima facie* case, the more evidence the defendant must present to rebut it successfully."[178]

The courts have moreover made clear that this presumption cannot be refuted solely by invoking a transaction's benefits. In fact, the presumption "may be rebutted by persuasive evidence showing that the merger is unlikely to enhance market power."[179] It is only after such evidence is put forward that the question of benefits is reached, in the context of whether the alleged benefits "counteract the potentially harmful effects of increased concentration."[180]

Before turning to the benefits, courts thoroughly consider the anticompetitive effects of a merger.[181] "[E]fficiencies are most likely to make a difference in merger analysis when the

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[175] *Id.* (noting that "the most common way to make this showing is through . . . HHI").

[176] *Id.*

[177] *See Baker Hughes*, 908 F.2d at 991 (D.C. Cir. 1990).

[178] *Id.*

[179] Horizontal Merger Guidelines § 5.3.

[180] *Id.*

[181] *See FTC v. H.J. Heinz Co.*, 246 F.3d 708, 715–21 (D.C. Cir. 2001); *United States v. Aetna Inc.*, 240 F. Supp. 3d 1, 94 (D.D.C. 2017) ("The Court will therefore consider Aetna's and Humana's efficiencies defense, while keeping in mind that 'the high market concentration levels present in this case require, in rebuttal, proof of extraordinary efficiencies.'").

likely adverse competitive effects, absent the efficiencies, are not great."[182] Only "proof of extraordinary efficiencies" can defeat evidence the merger will result in a highly concentrated market.[183] For example, the Third Circuit flatly rejected the defendants' efficiencies defense in light of high HHI numbers, stating:

> Even if we were to agree with the Hospitals that their ability to forego building a new 100-bed tower as a result of the merger is a cognizable efficiency that is verified, merger specific, and did not arise from any anticompetitive reduction in output, **we cannot overlook that the HHI numbers here eclipse any others we have identified in similar cases. They render this combination not only presumptively anticompetitive, but so likely to be anticompetitive that "extraordinarily great cognizable efficiencies [are] necessary to prevent the merger from being anticompetitive."** This high standard is not met here—nor, we note, has this high standard been met by any proposed efficiencies considered by a court of appeals.[184]

Similarly, in *United States v. Anthem*, the district court first considered the government's *prima facie* case that the proposed merger would result in anticompetitive effects.[185] The court then considered evidence put forward by the defendants to rebut the presumption that the merger was anticompetitive. Only then did the court turn to claimed benefits, including "cost savings that, according to counsel, will be entirely passed through to consumers."[186] The court found them lacking: "there is no support for Anthem's contention that the Court should consider claimed benefits to consumers or society in general when assessing the legality of a proposed merger's impact on competition within the relevant market."[187]

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[182] Horizontal Merger Guidelines § 10.

[183] *Heinz*, 246 F.3d at 720.

[184] *FTC v. Penn State Hershey Medical Center*, 838 F.3d 327, 350 (3d Cir. 2016) (quoting Horizontal Merger Guidelines § 10).

[185] *See United States v. Anthem, Inc.*, 236 F. Supp. 3d 171 (D.D.C. 2017).

[186] *Id.* at 231.

[187] *Id.* at 237.

When the anticompetitive effects of a transaction are severe, as here, efficiencies are unlikely to be a sufficient counterweight for one additional reason: they are "difficult to verify and quantify."[188] According to the Guidelines, "efficiencies projected reasonably and in good faith by the merging firms may not be realized."[189] Experience confirms that merger parties' benefit estimates tend to be exaggerated and to stay largely unrealized.[190] Sprint's acquisition of Nextel is a case in point: the merger was first projected to produce $12 billion in synergies, a figure that was later expanded to $14.5 billion in net benefits. Instead, it ultimately resulted in well over $30 billion in losses (starting with a $29.5 billion write-off just a few years after the transaction closed) and the death of Nextel's innovative network and service offerings.[191] That merger's failure is particularly relevant here and not just because it involves one of the Applicants. As explained in Section XI below, that merger bears similarities to this one, and indicates that integration of the Applicants' separate networks may be difficult and costly.

Making short shrift of competitive effects is especially inappropriate here, where there is not a great disparity between the Applicants' and Petitioners' estimates of these effects. In fact, the Applicants believe that the effects of the concentration increase on consumer prices are even

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[188] Horizontal Merger Guidelines § 10.

[189] *Id.*

[190] *See Saint Alphonsus Medical Center Nampa Inc. v. St. Luke's Health Sys.*, Ltd., 778 F.3d 775, 792 (9th Cir. 2015) (noting that even if claimed efficiencies were merger-specific, they merely improved operations, and affirming district court's finding that defendant failed to show "that efficiencies resulting from the merger would have a positive effect on competition"); *see also FTC v. H.J. Heinz Co.*, 246 F.3d at 721 (reversing district court for failing to "undertake a rigorous analysis of the kinds of efficiencies being urged by the parties" that was required "given the high concentration levels" established by analysis of anticompetitive effects).

[191] Sprint RFI Response at 6-7; David Goldman, *Sprint's Nextel network gets its death date: June 30, 2013*, CNNMoney (May 29, 2012), https://money.cnn.com/2012/05/29/technology/sprint-nextel-shutdown/index.htm.

more severe than DISH had estimated, before benefits are considered.[192] And DISH has shown that 4-to-3 consolidations have proven harmful in the mobile voice/broadband space: such transactions have consistently resulted in price increases despite claims of enormous benefits the merger parties have made in each case.

## IX. THE APPLICANTS ALLEGE BENEFITS THAT ARE TOO REMOTE IN TIME TO BE CREDITED

As discussed below, the benefits the Applicants claim will result from this merger are either not consumer benefits, not merger-specific, or not real. In addition, many of the benefits claimed by the Applicants are remote in time and will not be realized before 2024, six years into the future.[193] To be sure, DISH is not arguing here that this remoteness in time is an automatic disqualification. But the Commission, the Justice Department, the Federal Trade Commission, and the D.C. Circuit all have agreed that delayed benefits should be viewed skeptically or discounted entirely.

The Commission generally requires applicants to demonstrate that the benefits of a transaction will occur in the near-term, normally within two years.[194] The Commission has

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[192] *See Anthem*, 236 F. Supp. 3d at 237 (finding that "no matter which expert's method for calculating competitive effects is adopted," "the defense ha[d] not presented evidence that could outweigh the anticompetitive harm").

[193] *See, e.g.*, Opposition at 67 ("By 2024, New T-Mobile will be able to cover more than 250 million people with data rates greater than 300 Mbps and more than 200 million people at greater than 500 Mbps.") (footnote omitted).

[194] Applications of GCI Communications Corp., ACS Wireless License Sub, Inc., ACS of Anchorage License Sub, Inc., & Unicom, Inc. for Consent to Assign Licenses to the Alaska Wireless Network, LLC, *Memorandum Opinion and Order*, 28 FCC Rcd. 10433, 10468 ¶ 87 (2013) ("[B]enefits that are to occur only in the distant future may be discounted or dismissed because, among other things, predictions about the more distant future are inherently more speculative than predictions about events that are expected to occur closer to the present."); *see also* Applications of Cricket License Co., LLC, Leap Wireless International, Inc., & AT&T Inc.

discounted distant benefits (i.e. longer than two years) in other transactions. In 2016, it deemed claimed benefits unreliable because they would not come into effect until three to five years after a transaction.[195] Extended timeframes are "inherently more speculative" than forecasts with earlier results.[196] The Commission has also used the same rationale to reject claims of technical efficiencies that would only come into effect three years after a proposed merger.[197] The Commission discounted as too speculative benefits claimed to accrue five years after a transaction.[198]

The Guidelines emphasize the speculative nature of delayed benefits: "delayed benefits from efficiencies (due to delay in the achievement of, or the realization of customer benefits from, the efficiencies) will be given less weight because they are less proximate and more

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for Consent to Transfer Control of Authorizations and Application of Cricket License Co., LLC & Leap Licenseco Inc. for Consent to Assignment of Authorization, *Memorandum Opinion and Order*, 29 FCC. Rcd. 2735, 2798–99 ¶¶ 146-47 (2014) ("In the absence of any specific time commitment from AT&T on that point, and given the contingencies that must be met before AT&T can deploy, we find that any claimed benefit is too speculative and distant in time to be credited.").

[195] Applications of Sprintcom, Inc., Shenandoah Personal Communications, LLC, & Ntelos Holdings Corp. for Consent to Assign Licenses and Spectrum Lease Authorizations, *Memorandum Opinion and Order*, 31 FCC Rcd. 3631, 3649-51 ¶¶ 38-43 (2016) ("*Sprintcom Order*") ("To the extent that the proposed transaction would facilitate more rapid 4G LTE deployment in these markets, it likely would lead to discernible benefits to those NTELOS customers that transition to the higher quality network. We note that we cannot fully credit this claimed public interest benefit given the timeframes as articulated by the Applicants as the timeframes are inherently more speculative than predictions that are closer to the present.").

[196] *Id.*

[197] EchoStar Communications Corp., *Hearing Designation Order*, 17 FCC Rcd. 20559, 20634 ¶ 202 (2002) ("*Echostar HDO*") ("More generally, many of the Applicants' efficiency claims are inherently speculative because they are not projected to occur until three or more years after consummation of the merger.").

[198] *Sprintcom Order*, 31 FCC Rcd. at 3649-51 ¶¶ 38-43.

difficult to predict."[199] The D.C. Circuit has agreed, holding that benefits that only occur after three to five years are speculative.[200]

But, even if the Applicants are afforded the leniency of a protracted time horizon to realize their claimed benefits, as discussed below, they have not proven that these benefits will be passed through to consumers, that they are real, or that they are merger-specific.

## X. MANY OF THE APPLICANTS' CLAIMED BENEFITS ARE NOT CONSUMER BENEFITS, NOT MERGER SPECIFIC, OR NOT REAL

### A. Almost None Of The $43.6 Billion In Claimed Private Cost Synergies Can Be Recognized Under the Public Interest Standard

While the Applicants claim $43.6 billion in "total net present value cost synergies by 2024,"[201] their experts rightly do not treat almost any of these claimed savings as consumer benefits. Except for **{{BEGIN HCI END HCI}}** in non-network marginal costs, the $43.6 billion consists of claimed fixed cost savings, most of which, **{{BEGIN HCI END HCI}}** is to be gained "by eliminating the duplication of T-Mobile's and Sprint's existing networks."[202]

The Commission has consistently found that fixed cost reductions do not offset anticompetitive harms: "we therefore recognize efficiencies and cost savings that do not involve marginal cost savings, but assign them less weight than reductions in marginal cost, and do not

[199] Horizontal Merger Guidelines § 10 n.15.

[200] *United States v. Anthem, Inc.*, 855 F.3d 345, 360 (D.C. Cir. 2017) ("The longer it takes for an efficiency to materialize, the more speculative it can be . . . .") (citing Horizontal Merger Guidelines § 10 & n.15).

[201] Application at 15.

[202] Opposition at 43.

consider them to offset any current anticompetitive harms."[203] As the Commission previously stated, it "will more likely find marginal cost reductions to be cognizable than reductions in fixed cost [because] in general, reductions in marginal cost are more likely to result in lower prices for consumers."[204]

This is in line with economic theory. As one of the Applicants' expert economists previously explained:

> Suppose that a group of sellers jointly undertakes conduct that reduces their fixed costs by $1 while simultaneously (and inextricably) raising their prices by $10. Suppose, further, that their output remains constant because demand is perfectly inelastic in the relevant range. In this case, true consumer welfare would fall while producer welfare would rise by $1 more than the consumer loss, and therefore aggregate economic welfare would rise on balance (i.e., by $1). It is unlikely that a court or antitrust enforcement agency would permit the fixed cost-savings of the producers (and the resulting increase in aggregate economic welfare) to trump the direct consumer harm.[205]

It is for that reason that the Applicants do not claim that these cost savings will result in lower prices. They only maintain that these savings "free up financial resources that can be

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[203] AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16281 ¶ 228.

[204] Applications of Atlantic Tele-Network, Inc. and Cellco Partnership D/B/A Verizon Wireless, *Memorandum Opinion and Order*, 25 FCC Rcd. 3763, 3782-83 ¶ 39 (2010); *see also* AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16281 ¶ 62 ("The Commission is more likely to find reductions in marginal costs cognizable as compared to reductions in fixed costs, because reductions in marginal or variable costs are more likely to result in lower prices."); *EchoStar HDO*, 17 FCC Rcd. at 20639 ¶ 191 ("Since, in general, reductions in marginal cost are more likely to result in lower equilibrium prices, we will more likely find marginal cost reductions to be cognizable than reductions in fixed cost.").

[205] Steven C. Salop, *Question: What Is the Real and Proper Antitrust Welfare Standard? Answer: The True Consumer Welfare Standard* Loyola Consumer Law Review, Volume 22 Issue 3 (2010); *see also* Luke Froeb, Steven Tschantz, and Gregory J. Werden, *Pass-Through Rates and The Price Effects Of Mergers* at 19 (2003), http://www2.owen.vanderbilt.edu/lukefroeb/froeb.papers/Merger/2004.IJIO.pdf ("Merger policy in both the US and Europe gives little or no weight to fixed cost-reductions from merger synergies because they are not expected to be passed through.").

invested back in new network technology, innovation, and operations."[206] This is also the reason why the Applicants' economic analysis uses only marginal cost savings to purportedly offset the anticompetitive effects. These marginal cost savings include two categories: the aforementioned **{{BEGIN HCI END HCI}}** in non-network marginal cost savings; and alleged network marginal cost savings, with a total net present value of **{{BEGIN HCI END HCI}}** which flow from the revised Ray network model. As demonstrated below, this last category of costs is significantly exaggerated, and in fact almost all of them are illusory.

Not only are the Applicants' reductions in fixed costs not cognizable as merger benefits, but the expenditures required to achieve them appear to reduce the money that T-Mobile could otherwise be spending on 5G. The Applicants will spend **{{BEGIN HCI END HCI}}**[207] to decommission existing Sprint sites. As discussed below, this estimate may be low; among other things, a review of Sprint's tower agreements suggests that **{{BEGIN HCI END HCI}}** By comparison, T-Mobile has said that its expenditures for 5G deployment will total around $5 billion for 2018.[208]

### B. Compass Lexecon Mistakenly Views The Harm To Some Consumers As Offset By The Benefit To Others

While the Compass Lexecon analysis confines itself to marginal rather than fixed cost savings, it uses a so-called "nested logic" methodology whose premise is that one consumer's benefit can offset another's harm. In the language of economists, the Compass Lexecon analysis

[206] Opposition at 44; Declaration of G. Michael Sievert ¶ 15 (Appendix C to Application).

[207] Opposition at 44.

[208] Declaration of Neville Ray ¶ 8 (Appendix B to Application) ("Ray Declaration"); T-Mobile Q2 2018 Earnings Call Transcript (Aug. 1, 2018), https://seekingalpha.com/article/4193405-t-mobile-us-inc-tmus-ceo-john-legere-q2-2018-resultsearnings-call-transcript?page=2.

does not consider whether the result of the merger is "Pareto-improving." The merger would be a Pareto improvement if the savings that resulted were so great that no customers experienced price increases.[209] But the Applicants' nested logic method does not do that, "borrowing" from some customers to "lend" to others. Under the logic of Compass Lexecon's model, it is all right for Sprint customer prices to increase while T-Mobile customer prices decrease, so long as the two are sufficiently balanced and there is no decrease in aggregate consumer welfare. This is in fact what happens in the Compass Lexecon merger simulation. But this "rough justice" does not satisfy the Commission's public interest standard.

And even the Applicants' attempt at quantifying cross-subsidies is not enough. Compass Lexecon understates the price effects (by not using porting diversion numbers),[210] overstates the marginal cost savings (by various devices analyzed below),[211] and glosses over some consumers' harm by offsetting it against others' benefits. All of this still does not suffice to avoid cases where prices would increase. Under Compass Lexecon's "market equilibrium" model, the adverse price impact exceeds the marginal cost savings by **{{BEGIN HCI END HCI}}** per subscriber per month in one specification, and by as much as **{{BEGIN HCI END HCI}}** per subscriber per month in another specification.[212] That is a price increase pure and simple, even under assumptions that are unduly rosy for the Applicants.

[209] Brattle Reply at 23.

[210] *See* above at § III.A.

[211] *See* below at § X.G.2.

[212] Compass Lexecon Declaration ¶ 115.

### C. The Applicants Do Not Demonstrate That the Claimed Decline In Price Per Capacity Unit Is A Real Consumer Benefit

The Applicants do not allege that prices for any New T-Mobile plan—including unlimited plans—will go down. While they make frequent references to lower costs, a decrease in cellular data prices, and competitors lowering their own prices,[213] the price reduction they generally refer to is a claimed fall in price per unit of capacity or throughput.[214] That, of course, is a wholly different proposition.

Take T-Mobile's current price for its unlimited ONE plan—$70 a month.[215] Then assume New T-Mobile increases the price by 10% to $77 a month. In explaining this price increase, imagine that New T-Mobile says: you get more than two times the capacity, for a price increase in the plan of only 10%, meaning you effectively experience a 50% reduction in the per-GB cost. This is precisely the showing made by Dr. Evans in his Reply Declaration.[216] In Professor Evans's words, the DISH economists' estimate of a 10.4% increase in APRU would not matter at all because the capacity made available to consumers would increase by 220%, meaning that the price per gigabyte will decrease by 50%.[217] But "ARPU" is a fancy way of describing the price the consumer pays each month. If ARPU goes up by 10.4%, that means the price for the consumer has risen dramatically. But Dr. Evans believes this is more pro-competitive if the capacity increase exceeds the price increase.

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[213] Application at 15-18; Opposition at 2-6.

[214] Application at 51-55; Opposition at 8.

[215] *Choose Your Lines. See What You'll Pay.*, T-Mobile, https://www.t-mobile.com/cell-phone-plans (last visited Oct. 24, 2018). The quoted price is for one line.

[216] *See* Evans Reply Declaration ¶¶ 14-17.

[217] *Id.* ¶ 14.

Compass Lexecon resorts to the same syllogism, using throughput rather than capacity.[218] As mentioned, Compass Lexecon's high estimates of marginal costs are still not enough to offset its low estimates of the price impact that would result from the merger. To cover the gap, Compass Lexecon resorts to the merger's supposed "quality improvements." But Compass Lexecon cannot prove that its estimates of quality improvements are actual consumer benefits, and many of them are obviously not.

Under Compass Lexecon's theory, price increases should be ignored because consumers are willing to pay more for higher quality. Compass Lexecon bases that view on self-evident but irrelevant truths. It cites consumer surveys for the proposition that many consumers name network quality or coverage as the reason they deactivate.[219] It invokes the carriers' pricing decisions: carriers charge more, the Compass Lexecon experts say, for speeds allowing High Definition ("HD") streaming than for speeds allowing only Standard Definition ("SD") streaming.[220] Therefore, in their view, "[t]he fact that mobile wireless network operators charge substantially higher prices for higher quality plans further confirms that many consumers place high value on network quality today."[221]

And Compass Lexecon goes a telling step further, claiming that consumers care more about quality than about price. In the same consumer surveys, Compass Lexecon says, "network quality is given as a reason for departure more frequently than the cost of monthly service. . ."[222]

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[218] Compass Lexecon Declaration ¶¶ 124-25.

[219] *Id.*

[220] *Id.* ¶ 132.

[221] *Id.* ¶ 130.

[222] *Id.* ¶ 124.

That effort is understandable: only in a world where price is relatively unimportant can the merger, as currently proposed, be shown to be procompetitive. But the Commission should not accept that premise, and should not brush aside the importance of the large price increases that would result if this merger is consummated.

Next, Compass Lexecon turns to a paper co-authored by Aviv Nevo, which sought to quantify consumers' valuation of quality improvements. But, this paper examines the benefit of improved speeds for wireline services whose speeds averaged 14.68 Mbps. From the value to consumers of speed improvements in that realm, Compass Lexecon seeks to quantify the value of speed improvements in the area of hundreds of megabits per second, starting with **{{BEGIN HCI END HCI}}** in 2021 and increasing to **{{BEGIN HCI END HCI}}** in 2021.[223] But Compass Lexecon is comparing apples to oranges. And, by the same token, consumers' desire to move from SD to HD cannot be equated with the extent of consumers' need to supposedly upgrade from **{{BEGIN HCI END HCI}}** to **{{BEGIN HCI END HCI}}** Mbps in 2024.[224]

Compass Lexecon also makes other methodological errors. First, in some of the cases it estimates, it cuts approximately in half the usage estimates flowing from the Applicants' network model. This reduction in usage generally boosts the marginal cost savings and therefore lessens the quality improvements needed to offset the price impact. But the Applicants' experts do not explain why they make that dramatic usage reduction. Second, for one of its adjustments to the Nevo paper, Compass Lexecon assumes "that the value of doubling throughput from 25 Mbps to

[223] *Id.* ¶ 142, Table 21.

[224] *Id.*

50 Mbps in the first case has the same value as doubling throughput from 50 Mbps to 100 Mbps in the second case."[225] But this, of course, is a large leap. In addition, the Brattle Reply explains that the Nevo model is very sensitive to the selection of parameters. Thus, a different selection than the one made by the Applicants easily leads to absurd results—such as a type of consumer willing to pay more than **{{BEGIN HCI END HCI}}** times the current price of T-Mobile for better quality.[226]

A phrase from the Compass Lexecon Declaration sums up the Applicants' "quality-beats-price-hikes" approach: "[I]mprovements in network quality might be more important to consumers than modest changes in the level of their monthly bill."[227] But then again, they might not be (even setting aside the fact that the price increases here are anything but modest).

Will the consumer agree with the Applicants that the price increase for her plan is a good thing because of the steep increase in data made available to her? Some will, and some will not. Unlimited wireless data plans that charge a higher price and offer a more-than-proportionate increase in average data consumption (so the per-GB price of data declines) can reduce the welfare of consumers who use relatively little data. And even those who can agree in principle that a price increase is worth paying for a proportionately greater capacity increase will likely have a threshold beyond which this is no longer true, as the 500th gigabyte is not as valuable as the 300th gigabyte. The law of diminishing utility, established by theorists such as Bentham, Bernoulli, and Gossen, is Economics 101: the first unit of consumption of a good or service yields more utility than the second and subsequent units.

[225] *Id.* ¶ 141.

[226] *See* Brattle Reply Declaration at 90.

[227] *Id.* ¶ 124.

While 5G applications promise a cornucopia of benefits, this technology will not be the end of economics. The incremental data and improved speeds allegedly to be made available by this deal will be less important to consumers than their "predecessor" data amounts. And so, the 45% decline in the per-GB price of wireless data predicted by Professor Evans in this case[228] does not imply a 45% increase in consumer welfare.[229] The calculation of the public welfare would require explicit specification of consumer demand functions. The Applicants do not make an attempt to calculate it and hence have yet to show whether and how much of their claimed benefits will be passed through to consumers.

Finally, even the flawed attempt made by Compass Lexecon to show that price increases will be offset by quality improvements does not succeed. In two of its scenarios, the price increases for Sprint customers would not be offset by corresponding quality increases in the year 2021.[230] Finally, the Brattle Reply shows that the "critical quality frontier" that needs to be met to neutralize even this residual gap moves to the "right" of the consumer when marginal efficiencies are adjusted. This means essentially that consumers do not view the higher quality as being worth the higher price.[231]

### D. 5G Deployment Is Not A Merger Benefit

Critically, the alleged decline in price per unit (upon which the Applicants base their case) is illusory, as it depends on the premise that this merger is necessary for fast, broad, and deep 5G deployment. In the Applicants' words, the merger is necessary "to create a robust 5G

[228] Evans Reply Declaration, Exhibit 6.

[229] Sappington Reply Declaration at 8.

[230] *See* Compass Lexecon Declaration ¶ 140 ("the Sprint quality valuation is slightly below it"); *id.* at ¶ 144 ("[T]he Sprint quality valuation is below the threshold in 2021").

[231] *See* Brattle Reply Declaration at 40-43.

network that can deliver the broad coverage, deep capacity, high data rates, and the first truly robust nationwide mobile network… , which cannot be developed on a standalone basis by either company."[232] But the fundamental flaw in the Applicants' entire benefit case is that, in reality, each of the Applicants is capable of fast, broad, and deep 5G deployment. This is proven by each of the Applicant's own prior statements that each will be the first and best in 5G, statements that the Applicants do not even seek to rebut. It is proven even more conclusively by statements made by the Applicants in internal documents. And, in a remarkable admission, it is proven by the revised version of the engineering model submitted by the Applicants. In addition, adjustments to the model show that each standalone company has even greater capabilities than the revised model reflects.

### 1. The Applicants' Prior Public Statements

In their Opposition, the Applicants do not address their prior statements that each will be the first and best at 5G. They ignore them and instead criticize commenting parties for "insist[ing] that T-Mobile and Sprint each have all the spectrum and cell site resources they need to deploy robust standalone 5G networks and, therefore, that the merger is not needed."[233] But, if anything, the commenters' insistence is less emphatic than the Applicants' own prior statements, including:

- "It's why last week we reiterated our commitment to launch 5G nationwide by 2020, starting in 2019 in 600 MHz. We were encouraged by confirmed chipset and OEM plans to deliver 5G smartphones in 2019. And we will of course be leveraging our mmW assets to drive not just great 5G mobility but also enhanced speeds and latency.

[232] Opposition at 37-38.

[233] *Id.* at 38.

> We also announced our NB-IoT plans and our 600 MHz 5G strategy will enable future evolution on IoT solutions."[234]

- "The best way to launch a new technology is new, clear spectrum like 600 MHz, then re-use other spectrum bands for 5G over time. We are in a best position to execute on this strategy, and will drive the network evolution to 5G."[235]

- T-Mobile will be the first to deploy "the truly transformative, nationwide 5G network . . . ."[236]

- Sprint has "the BEST spectrum and assets to build an incredible nationwide #5G network that our customers will love."[237]

- "I have never seen a company with such a rich spectrum which is a sweet spot for 5G, I guess that gives us a tremendous opportunity for the years to come."[238]

Sprint, for one, has not stopped saying it can transition to 5G alone notwithstanding the merger. Just a few weeks ago, Sprint's CFO described Sprint's standalone transition of the 2.5 GHz band (described as prohibitively cumbersome by the Applicants) as something that can be accomplished at the "flick of the switch,"[239] explaining:

> We've just started to deploy Massive MIMO. Very, very pleased with the progress so far. Where we've deployed that technology, we are seeing quadruple the speeds compared to

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[234] Neville Ray, *5G Reality vs 5G Hype: The Un-Carrier vs the Carriers*, T-Mobile Blog (Jan. 16, 2018), https://www.t-mobile.com/news/5g-ces-wrap-up.

[235] *Id.*

[236] Alex Scroxton, *MWCC 2018: 5G Collaboration Dominates Agenda at Annual Mobile Fair*, Computer Weekly (Feb. 28, 2018), https://www.computerweekly.com/news/252435888/MWC-2018-5G-collaboration-dominates-agenda-at-annual-mobile-fair.

[237] Marcelo Claure (@marceloclaure), Twitter (Mar. 9, 2018 12:24 PM), https://twitter.com/marceloclaure/status/972206391858483201.

[238] Michael Combes, Sprint President and Chief Financial Officer, Remarks at Deutsche Bank 2018 Media, Telecom & Business Services Conference (Mar. 7, 2018), https://www.nasdaq.com/aspx/call-transcript.aspx?StoryId=4154284&Title=sprint-s-s-management-presents-at-deutsche-bank-2018-media-telecom-business-services-conference-transcript-.

[239] Transcript, Sprint Presentation at Deutsche Bank Leveraged Finance Conference, Fair Disclosure Wire (Oct. 2, 2018).

> the previous technology as well as providing a little bit of coverage, benefit and some improvement in cell edge performance as well. So really pleased with the Massive MIMO. Focusing obviously on then deploying the 2.5 GHz across all of the network. Again, making solid progress there. The intention being, which we are currently on track for, that by the end of this year, the vast majority of our macro sites will be tribanded. 2.5 GHz is great spectrum for us. We can deploy it and still allow it to carry both LTE and 5G traffic. The technology itself is software-upgradable. ***So as the 5G standards become definitized, it is literally flick the switch to convert to 5G rather than having to reclaim the tower one more time et cetera, et cetera***. So again, really pleased with the 2.5 rollout. Fundamentally -- more fundamentally, we see we can gain competitive advantage by being the first operator to offer a truly mobile 5G network, and we are still on track to be able to do a commercial launch of that by middle of next year.[240]

> And this past August, Sprint declared that:

> Massive MIMO technology is a key part of Sprint's award-winning 5G strategy. Sprint's first 5G-ready Massive MIMO cell sites are capable of delivering up to 10 times the capacity of current LTE systems, significantly increasing data speeds for more customers in high-traffic locations. With Massive MIMO at the foundation of Sprint's Gigabit LTE and 5G service, Sprint can keep meeting its customers' demand for unlimited data and high-bandwidth applications, such as television in high definition and virtual reality.[241]

> And just today, Sprint confirmed that the company is on track for a 5G rollout in the first half of 2019, highlighting the benefits of massive MIMO on its 2.5 GHz spectrum. Sprint explained that early results are "very encouraging" and feature "7x improvement in capacity, at least 4x improvement in speed."[242] Once in place, these massive MIMO sites will require a "software and line-cut upgrade only" and will allow the company to "enable both LTE and 5G simultaneously on the same sites."[243]

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[240] *Id.*

[241] Press Release, Sprint Corp., *Sprint and LG Working Together to Bring First 5G Smartphone to U.S. in First Half 2019* (Aug. 14, 2018), https://newsroom.sprint.com/sprint-and-lg-working-together-to-bring-first-5g-smartphone-to-us-in-first-half-2019.htm.

[242] Transcript, Sprint Corp., Q2 2018 Earnings Call, S&P Global (Oct. 31, 2018).

[243] *Id.*

To be sure, actions speak even louder than words, and Sprint's recent actions are consistent with these bullish statements. On August 14, 2018, Sprint announced it will deploy the first 5G smartphone in the U.S. ahead of the nation's other three carriers. With justifiable pride, Sprint noted that it "is moving fast on the road to 5G and we are thrilled to announce the first 5G smartphone with the innovative team at LG."[244]

As recently as yesterday, T-Mobile issued a press release stating: "T-Mobile is building out 5G in six of the Top 10 markets, including New York and Los Angeles, and hundreds of cities across the U.S. in 2018. This network will be ready for the introduction of the first 5G smartphones in 2019. We plan on the delivery of a nationwide 5G network in 2020."[245]

And T-Mobile has committed to spending $25.9 billion in CapEx through 2022 and at least $4.9 billion in 5G expenditures alone in 2018.[246] The planned combined capital expenditures of both firms for 5G are yet another sign of their standalone strengths. Furthermore, **{{BEGIN HCI** **END HCI}}**[247] These are

[244] Press Release, Sprint Corp., Sprint Corporation, Sprint and LG Working Together to Bring First 5G Smartphone to U.S. in First Half 2019 (Aug. 14, 2018), https://newsroom.sprint.com/sprint-and-lg-working-together-to-bring-first-5g-smartphone-to-us-in-first-half-2019.htm (quoting Sprint Chief Technology Officer).

[245] Press Release, T-Mobile, T-Mobile Delivers Its Best Financials Ever and Strong Customer Growth in Q3, at 5 (Oct. 30, 2018), https://s22.q4cdn.com/194431217/files/doc_financials/2018/q3/TMUS-Q3-2018-Earnings-Release_FINAL.PDF.

[246] *See* Ray Declaration ¶ 8; T-Mobile, Q2 2018 Earnings Call Transcript (Aug. 1, 2018), https://seekingalpha.com/article/4193405-t-mobile-us-inc-tmus-ceo-john-legere-q2-2018-resultsearnings-call-transcript?page=2.

[247] Ray Declaration ¶ 8; Letter from Regina M. Keeney, Counsel for Sprint Corp., to Marlene Dortch, Secretary, FCC, WT Docket No. 18-197, Attachment 1 at 7 (July 31, 2018).

not the actions of standalone companies that plan to deploy only a limited 5G network.[248] In fact, the Applicants' projected combined capex spend appears to be merely the sum of what each intended to spend on its own.

The Applicants also complain that it will be "difficult to incentivize equipment vendors to expedite the design and sale of 5G devices"[249] because Sprint and T-Mobile are the only domestic providers using 2.5 GHz and 600 MHz. But equipment vendors seem incentivized enough already: just a few days before the Applicants filed their Opposition, Apple announced that 2018 iPhone models will operate on both T-Mobile's 600 MHz band and Sprint's "High Performance User Equipment" using Sprint's 2.5 GHz spectrum.[250] T-Mobile's CEO celebrated the news, tweeting: "Of course we're going to carry the new iPhones!! BEST PART?! They are the first iPhones ever to INCLUDE our 600MHz Extended Range LTE!!"[251]

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[248] Comments of AT&T Services, Inc., WT Docket No. 18-197, at 3 (Aug. 27, 2018) ("The wireless industry is engaged in an 'early 5G arms race,' and this rush to deploy the best 5G service the fastest will continue with or without the T-Mobile/Sprint merger. AT&T is fully engaged in that arms race and is leading the industry. AT&T already offers '5G Evolution in more than 140 markets, covering nearly 100 million people with theoretical peak speeds of at least 400 Mbps,' and AT&T plans to serve more than 400 markets by the end of 2018.").

[249] Opposition at 45.

[250] Ed Hardy, *Why T-Mobile and Sprint Customers Should get a 2018 iPhone,* Cult of Mac (Sept. 13, 2018), https://www.cultofmac.com/576207/why-t-mobile-and-sprint-customers-should-get-a-2018-iphone. *See* John Saw, *New Report Shows Sprint HPUE Dramatically Improves Network Coverage and Speed*, Sprint Blog (Feb. 21, 2018), https://newsroom.sprint.com/new-hpue-report.htm.

[251] John Legere (@JohnLegere), Twitter (Sept. 12, 2018 11:36 AM), https://twitter.com/JohnLegere/status/1039945870437900288. *See also* Transcript, T-Mobile Q3 2018 Earnings Call, S&P Global (Oct. 30, 2018) ("Just last week we crossed 21 devices now with 600 megahertz capability, including the new range of iPhones and even the tablets that were announced today. So we are making tremendous progress on generating and creating a 600-megahertz ecosystem as T-Mobile.") (comments of Nils Paellmann, VP of Investor Relations).

### 2. The Applicants' Internal Documents

The standalone capabilities of each company are also proven by a large number of internal documents. T-Mobile's internal 5G plans **{{BEGIN HCI**

**END HCI}}**[252] Indeed, T-Mobile **{{BEGIN HCI**

**END HCI}}**[253] For fixed broadband, **{{BEGIN HCI**

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Further, **{{BEGIN HCI**

**END HCI}}**[255] The presentation **{{BEGIN HCI**

**END HCI}}**[256] The document **{{BEGIN HCI**

[252] TMUS-FCC-00660878 at TMUS-FCC-00660890 **{{BEGIN HCI**
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[253] *Id.* at TMUS-FCC-00660893.

[254] *Id.* at TMUS-FCC-00660899.

[255] TMUS-FCC-00537735 at TMUS-FCC-00537748, TMUS-FCC-00537751 **{{BEGIN HCI**

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[256] *Id.* at TMUS-FCC-00537757.

**END HCI}}**[257]

Sprint, for its part, admits that it plans to invest at least **{{BEGIN HCI**

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Sprint explains that this plan includes the deployment of **{{BEGIN HCI END HCI}}** 5G sites, which will use 5G NR equipment incorporating massive MIMO technology.[259] Of course, Sprint further admits it has been testing 5G NR equipment with vendors including Ericsson, Nokia, and Samsung.[260] In addition, Sprint states it has been working with leading device manufacturers on 5G-capable devices and "currently has commitments from several top-tier device manufacturers, with their first 5G devices expected to be available in the first half of 2019."[261] According to Sprint, "[t]hese radios are cost-effective because they can be used to simultaneously enhance 4G LTE at 2.5GHz and deploy 5G in this spectrum, and because they are software-upgradeable to 5G without additional tower climbs."[262]

What is more, Sprint has also considered (and may still be considering) a more aggressive 5G deployment: **{{BEGIN HCI**

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[257] TMUS-FCC-02471886 at TMUS-FCC-02471895 **{{BEGIN HCI**

**END HCI}}**

[258] Sprint RFI Response at 21-22.

[259] *Id.* at 24.

[260] *Id.*

[261] *Id.*

[262] *Id.*

**END HCI}}** which would increase coverage to 200 million POPS instead of 150 million.[263]

Sprint attempts to discount the relevance of this analysis, describing it as distinct from "its current plan of record,"[264] and as a mere "sensitivity analysis to reflect potential risks, including increased competition from cable entry and the potential that 5G deployments from competitors become deeper and broader following U.S. Tax Reform."[265] These attempts are unconvincing. Tellingly, the Applicants do not claim that Sprint's Board of Directors has rejected this plan.

### 3. The Applicants' Revised Engineering Model

Most remarkably, DISH's argument that "[e]ach of Sprint and T-Mobile appear to have access to enough spectrum—in quantity and in kind—to deploy 5G networks today" has been confirmed by the Applicants' revisions of the crucial engineering model on which their Application had relied.[266] The original Ray model made the following predictions:

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[263] *Id.* at 20, 24; Letter from Regina M. Keeney, Counsel for Sprint Corporation, to Marlene Dortch, WT Docket No. 18-197, Attachment 1 at 19 (July 31, 2018).

[264] Sprint RFI Response at 24.

[265] *Id.* at 20.

[266] *See* DISH Petition to Deny at 25.

**END HCI}}**[267]

The Applicants' revised model shows that none of these predictions is correct. On September 5, 2018, the Applicants acknowledged that "since the filing of the PIS, the engineering model was extended to incorporate the logic from T-Mobile's ordinary-course LTE capacity-planning model and to provide certain functionality that will be required for the economic declarations to be submitted with the Joint Opposition to Petitions to Deny."[268] On September 17, 2018, they submitted yet another revision to the model, providing an update in what they described as an effort to ensure that solutions for congestion are addressed in a consistent fashion.[269]

What happened? The Applicants discovered that the original model's predictions of available capacity for each standalone company suffered from a serious flaw: the original model assumed that each company would simply give up in the face of any congestion anywhere, even if curing the congestion was possible in the ordinary course within each company's standalone capabilities, and even if each standalone company *would* in fact solve the congestion problems. By contrast, each company's ordinary course model assumed more accurately that each company would use its own devices to deploy "incremental solutions" such as "deployment of additional spectrum and cell splits" to avoid congestion.[270] And so, after undergoing some changes, the

[267] Response of T-Mobile US, Inc.. to General Information and Document Request, WT Docket No. 18-197, at 43 (Sept. 5, 2018) ("T-Mobile RFI Response").

[268] *Id.* at 30.

[269] *See* Letter from Nancy Victory, Counsel to T-Mobile US, Inc., to Marlene Dortch, Secretary, FCC, WT Docket No. 18-197 (Sept. 26, 2018).

[270] Compass Lexecon Declaration at 62; T-Mobile RFI Response at 32.

original Ray model became **{{BEGIN HCI**

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**END HCI}}**[272] **{{BEGIN HCI**

**END HCI}}**[273]

**{{BEGIN HCI**

**END HCI}}**[274]

[271] T-Mobile RFI Response at 31.

[272] Letter from Nancy Victory, Counsel to T-Mobile US, Inc., to Marlene Dortch, Secretary, FCC, WT Docket No. 18-197, Attachment B at 29 (Oct. 11, 2018).

[273] *Id.*

[274] *Id.* at 38-39.

*The results contradict the core of the Applicants' case.* It turns out that each Applicant has much greater capacity standing alone than originally projected by the model. Each Applicant is capable of delivering full 5G without experiencing any, or almost any, congestion during the duration of the model's life. The necessary revisions to a model intended to show that the merger was necessary to avoid the congestion the standalone companies would have faced instead illustrate that the merger is unnecessary. Below are the standalone capacity and congestion forecasts implicit in the revised Ray model:

- Standalone Sprint will have **{{BEGIN HCI**

  **END HCI}}**
- Standalone T-Mobile will have **{{BEGIN HCI**

  **END HCI}}**
- Standalone Sprint will not experience congestion except in at most a tiny **{{BEGIN HCI END HCI}}** of sectors in any of the years predicted by the model.[275]
- T-Mobile will not experience congestion except in at most a mere **{{BEGIN HCI END HCI}}** of sectors in any of the years predicted by the model.
- In all of 2022, 2023, and 2024, T-Mobile will experience almost no congestion.
- In addition to virtually no congestion, the user throughput for the standalone companies meets the expected levels of throughput for 5G.[276]

The comparison of the original and revised models is illustrated in the following chart:[277]

[275] Network Capacity Model, filename "Montana Capacity Analysis_Sprint.xlsx" (Sept. 17, 2018).

[276] Brattle Reply Declaration at 48, Table 13, 53, Table 17, and 61-62.

[277] **{{BEGIN HCI END HCI}}** to New T-Mobile, but they are far more relevant for the standalone predictions, as they show each standalone firm to be fully capable of deploying 5G.

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**END HCI}}**

### 4. The Prospect of the Merger as a Constraint on 5G Deployment

Instead of boosting each company's standalone capabilities, the merger appears to have actually **{{BEGIN HCI**

**END HCI}}** The Merger

Agreement between the Applicants limits Sprint's ability to enter into or renew "Material Contracts," as further defined in a non-public side letter.[278] The side letter states that:

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**END HCI}}**[279]

Sprint's plans for **{{BEGIN HCI**

**END HCI}}**[280]

This limitation required Sprint to strategize about how **{{BEGIN HCI**

**END HCI}}**[281] Although Sprint had already committed to deploying 5G using massive MIMO technology at **{{BEGIN**

[278] *See* Business Combination Agreement by and among T-Mobile US, Inc., Sprint Corporation, et al. at 70-84 (Apr. 29, 2018), https://www.sec.gov/Archives/edgar/data/101830/000110465918028087/a18-12444_1ex2d1.htm.

[279] SPR-FCC-02223320 at SPR-FCC-02223411 **{{BEGIN HCI**
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[280] *See* SPR-FCC-08654533 at SPR-FCC-08654543 **{{BEGIN HCI**
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[281] SPR-FCC-06482514 **{{BEGIN HCI**
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**HCI END HCI}}** sites before 2020, **{{BEGIN HCI**

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Sprint executives decided to tell **{{BEGIN HCI**

**END HCI}}**[283] Rather, the goal was to **{{BEGIN HCI**

**END HCI}}**[284] But Sprint was vigilant **{{BEGIN HCI**

**END HCI}}**[285] This resulted in **{{BEGIN HCI**

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[282] SPR-FCC-06666357 **{{BEGIN HCI**
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[283] SPR-FCC-06656467 at SPR-FCC-06656470-71 **{{BEGIN HCI**
**END HCI}}**

[284] *Id.* at SPR-FCC-06656469-71 **{{BEGIN HCI**

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[285] *See id.* at SPR-FCC-06656467 **{{BEGIN HCI**

**END HCI}}**; SPR-FCC-07998251 **{{BEGIN HCI**

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[286] *See* SPR-FCC-06658937 **{{BEGIN HCI**

**END HCI}}**; SPR-FCC-06652700 **{{BEGIN HCI**
**END HCI}}**; SPR-FCC-06658654 **{{BEGIN HCI**

### E. The Applicants Overstate the Merger's Benefits By Disregarding Other Spectrum The Standalone Companies Plan to Acquire

Another fundamental shortcoming of the Applicants' engineering model is that it does not account for any spectrum to be acquired during the model's life (2021 to 2024) by each standalone company. This omission is inconsistent with each company's existing plans and creates a dramatic overstatement of the claimed merger benefits.

Sprint and T-Mobile's plans to acquire millimeter wave spectrum are no secret. The Application states that "T-Mobile may participate in [the millimeter wave] auctions . . . ."[287] Indeed, both Sprint and T-Mobile requested a waiver to participate in the imminent 28 GHz and 24 GHz auctions. In September, T-Mobile duly applied to participate in both auctions, while Sprint applied to participate in the 24 GHz auction.[288] **{{BEGIN HCI**

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**END HCI}}**

[287] Application at 22.

[288] Public Notice, Auctions of Upper Microwave Flexible Use Licenses For Next-Generation Wireless Services, Status of Short-Form Applications to Participate in Auctions 101 (28 GHz) AND 102 (24 GHz), AU Docket No. 18-85, DA 18-1035 (Oct. 10, 2018). Sprint is participating in the auction through "ATI Sub LLC." *See* Exhibit 21 to Sprint 2018 Annual Report (listing ATI Sub LLC as subsidiary of Sprint).

Internal documents, of course go into more detail than what the Applicants have publicly disclosed in describing each company's plans. They demonstrate that **{{BEGIN HCI**

**END HCI}}** They show **{{BEGIN HCI**

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Sprint thus proposes to **{{BEGIN HCI**

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T-Mobile, for its part, **{{BEGIN HCI**

**END HCI}}**[290] T-Mobile contemplates **{{BEGIN HCI**

**END HCI}}**[291]

[289] SPR-FCC-11847563 at SPR-FCC-11847581, SPR-FCC-11847583 **{{BEGIN HCI**

**END HCI}}**

[290] TMUS-FCC-01177184 at TMUS-FCC-01177185 **{{BEGIN HCI**
**END HCI}}**

[291] Opposition at 54; TMUS-FCC-00660878 at TMUS-FCC-00660896 **{{BEGIN HCI**
**END HCI}}**

With respect to the not-yet-auctioned mid-band spectrum, the Applicants' assertions that it "cannot be relied upon for standalone development of a robust 5G network"[292] are contradicted by these internal documents. The Applicants dismiss the 3.5 GHz CBRS spectrum as not "practical" and charge that it "suffers from a number of significant drawbacks."[293]

But T-Mobile does not think so. Just yesterday, T-Mobile's CTO reiterated the company's interest in CBRS spectrum, explaining that the company is "laying down the foundational layer" for 5G "outside of the deal discussion itself."[294] Among other spectrum opportunities, T-Mobile noted that CBRS presents "real opportunities for commercial deployment… as we move into probably mid-2019 timeframe. As the [SAS] systems gets matured and certified so that we can start to deploy in the unlicensed space ahead of any licensed spectrum [auctions] on the CBRS."[295] T-Mobile's CTO wrote a blog post declaring "3.5 GHz Is Great Mid-Band Spectrum for 5G."[296] T-Mobile's **{{BEGIN HCI**

**END HCI}}**[297] shows that T-Mobile considers 3.5 GHz to be a valuable and unique resource. T-Mobile even contemplates that **{{BEGIN HCI**

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[292] Opposition at 55.

[293] *See id.* at 57; Reply Declaration of Neville Ray ¶¶ 56-57 (Appendix B of Opposition) ("Ray Reply Declaration").

[294] Transcript, T-Mobile Q3 2018 Earnings Call (Oct. 30, 2018), https://seekingalpha.com/article/4216251-t-mobile-us-tmus-q3-2018-results-earnings-call-transcript?part=single.

[295] *Id.*

[296] Neville Ray, *Maintaining US Leadership in 5G with Smart Spectrum Policy*, T-Mobile Blog (June 29, 2017), https://www.t-mobile.com/news/5g-mid-band-spectrum.

[297] TMUS-FCC-01121383 **{{BEGIN HCI**
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**END HCI}}**[298] The presentation describes the **{{BEGIN HCI** **END HCI}}**[299] In T-Mobile's view, **{{BEGIN HCI**

**END HCI}}**[300] T-Mobile has moreover found that **{{BEGIN HCI**

**END HCI}}**[301] Regarding the "complicated sharing system" cited as an obstacle to use of the band,[302] the presentation finds that **{{BEGIN HCI**

**END HCI}}**[303] And, while the Applicants claim that "the technology development for this band has been focused on LTE, not 5G,"[304] **{{BEGIN HCI**

**END HCI}}**[305]

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[298] *Id.* at TMUS-FCC-01121385.

[299] *Id.* at TMUS-FCC-01121387, TMUS-FCC-01121390.

[300] *Id.* at TMUS-FCC-01121387.

[301] *Id.* at TMUS-FCC-01121400-01.

[302] Ray Reply Declaration ¶ 56.

[303] TMUS-FCC-01121383 at TMUS-FCC-01121403 **{{BEGIN HCI** **END HCI}}**

[304] Opposition at 57.

[305] TMUS-FCC-00484331 **{{BEGIN HCI** **END HCI}};** TMUS-FCC-01722344 at

**{{BEGIN HCI**

**END HCI}}**[306] While the C-band is currently not available for mobile voice/broadband services, the Commission is seriously considering freeing some of that spectrum for 5G, and **{{BEGIN HCI**

**END HCI}}**[307]

The Applicants' internal estimates show that **{{BEGIN HCI**

**END HCI}}**[308]

Nor do the Applicants convincingly explain why unlicensed spectrum is unsuitable for any 5G use case. The unlicensed 5 GHz band is now incorporated into Apple's iPhone.[309] Further, T-Mobile has been deploying LAA ("Licensed Assisted Access"), which uses unlicensed 5GHz spectrum to supplement licensed spectrum. Specifically, T-Mobile is pairing AWS and PCS spectrum with 5 GHz unlicensed spectrum and achieving speeds of 500 Mbps in markets such as New York City. T-Mobile plans to upgrade its existing small cells using a "new

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TMUS-FCC-01722348 **{{BEGIN HCI** **END HCI}}**

[306] TMUS-FCC-01177184 at TMUS-FCC-01177193 **{{BEGIN HCI** **END HCI}}**

[307] *Id.*

[308] SPR-FCC-11847563 at SPR-FCC-11847568 **{{BEGIN HCI** **END HCI}}**

[309] iPhone Xs, Apple, https://www.apple.com/iphone-xs/specs (last visited Oct. 23, 2018).

modular solution" that offers a single touch point.[310] This plan, combined with software upgrades to cell sites and software upgrades to phones, will enable T-Mobile to deliver speeds of over 500 Mbps.[311]

DISH's experts have used T-Mobile's own logic and revised model to calculate the additional effect of additional spectrum on T-Mobile's available capacity. They have simply added to the model 200 MHz of millimeter wave spectrum to each standalone company and 400 MHz of such spectrum in selected nodes across the country. They have found that this addition would vastly increase capacity for the standalone companies,[312] and that increase would have a far greater benefit for the standalone companies than it would for New T-Mobile.[313] It would thus make congestion relief even less frequent and costly for each company. As a result, the capacity increases from the proposed merger would fall from **{{BEGIN HCI**

**END HCI}}**[314] All in all, the merger would end up reducing the net present value of the claimed marginal cost savings by about **{{BEGIN HCI** **END HCI}}**[315]

[310] Monica Alleven, *T-Mobile to focus on LAA rollout in Q1 of 2018*, FierceWireless (Nov. 13, 2017), https://www.fiercewireless.com/wireless/t-mobile-to-accelerate-rollout-laa-q1-2018.

[311] Press Release, T-Mobile, Nokia and T-Mobile Achieve 1.3 Gbps Speeds Using Licensed Assisted Access (Feb. 22, 2018), https://www.t-mobile.com/news/nokia-gigabit-laa; Karl Bode, *T-Mobile Offering 500 Mbps in LAA Tests in New York City*, DSL Reports (Mar. 7, 2018), http://www.dslreports.com/shownews/TMobile-Offering-500-Mbps-in-LAA-Tests-in-New-York-City-141370.

[312] Brattle Reply Declaration at 55-59.

[313] *Id.*

[314] *Id.* at 58-59.

[315] *Id.* at 36-37.

### F. Fixed Broadband Is Not A Merger Benefit

Fixed broadband is an important part of the Applicants' case. Setting aside the Applicants' attempt to conflate the markets involved in this transaction, there is no doubt that the Commission recognizes three separate markets: the mobile/voice broadband market,[316] the wireline broadband market,[317] and the multichannel video market.[318]

The Applicants are seeking to justify the merger's undeniable adverse effects on competition in the first of those markets—mobile/voice broadband—in the name of hypothetical benefits in the other two markets. **{{BEGIN HCI**

[316] Applications of Deutsche Telekom AG, T-Mobile USA, Inc., and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 28 FCC Rcd. 2322, 2332 ¶ 28 (2013) ("[W]e find that T-Mobile USA and MetroPCS provide services in the combined mobile telephony/broadband services product market and therefore use the product market definition that the Commission has applied in recent transactions: a combined "mobile telephony/broadband services" product market that is comprised of mobile voice and data services, including mobile voice and data services provided over advanced broadband wireless networks (mobile broadband services).").

[317] The Commission "disagree[s] . . . that mobile services are currently full substitutes for fixed service," as "there are salient differences between the two technologies." Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *2018 Broadband Deployment Report*, 33 FCC Rcd. 1660, 1666 ¶ 18 (2018).

[318] Applications of AT&T Inc. & DirecTV, 30 FCC Rcd. 9131, 9159 ¶ 65 (2015) ("In previous transactions involving video providers, the Commission defined the relevant product market as 'multichannel video programming service' as offered by all MVPDs."); Applications of Charter Communications, Inc., Time Warner Cable Inc., and Advance/NewHouse, 31 FCC Rcd. 6327, 6397-98 ¶ 152 ("Consistent with Commission findings in prior transactions, we conclude that the relevant product market for evaluating the record on market concentration is "multichannel video programming service" as offered by all MVPDs.").

**END HCI}}**[319] This kind of quid pro quo is questionable in the first place. Antitrust courts have had reason to evaluate this kind of benefit and generally reject it. Thus, courts do not allow benefits in one market to offset harms in another: "a restraint that causes anticompetitive harm in one market may not be justified by a greater competition in a different market."[320] The Supreme Court has rejected "the concept of 'countervailing power,'" explaining that "if anticompetitive effects in one market could be justified by procompetitive consequences in another, the logical upshot would be that every firm in an industry could, without violating section 7, embark on a series of mergers that would make it in the end as large as the industry leader."[321] Thus, competition "cannot be foreclosed with respect to one sector of the economy because certain private citizens or groups believe that such foreclosure might promote greater competition in a more important sector of the economy."[322]

But, in any event, fixed broadband is not a merger-specific benefit. The Applicants argue that the merger is necessary for New T-Mobile to provide a bandwidth intensive fixed broadband service, compete against wireline ISPs, and cause those ISPs in turn to improve their offerings. In the Applicants' words, in-home broadband "would not be possible without the merger, as neither T-Mobile nor Sprint on its own has the spectrum assets, scale, or other resources necessary to deploy networks with the capabilities required to support the quality of streaming

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[319] SPR-FCC-04382213 at SPR-FCC-04382213 **{{BEGIN HCI**

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[320] *United States v. American Express Co.*, 88 F. Supp. 3d 143, 229 n.54 (E.D.N.Y. 2015), reversed on other grounds sub nom. *Ohio v. American Express Co.*, 138 S.Ct. 2274 (2018).

[321] *United States v. Philadelphia National Bank,* 374 U.S. 321, 370 (1963).

[322] *United States v. Topco Assocs., Inc.*, 405 U.S. 596, 610 (1972).

HD and 4K video and other key applications in-home broadband customers will demand."[323] All in all, the merger's supposed deployment of fixed broadband accounts for about **{{BEGIN HCI END HCI}}** of benefits in the Applicants' telling. None of these **{{BEGIN HCI END HCI}}** claimed benefits is real.

The Applicants' internal documents show that the merger is neither necessary nor adequate to allow the provision of a true competitive fixed broadband service. The Applicants understand that the large throughputs required for fixed broadband in turn require large quantities of spectrum, and that the service therefore likely requires the use of millimeter wave frequencies—spectrum to which, with a minor exception, neither company has access to today. The desire to provide fixed broadband to the home is in fact one of the key driving forces for each Applicant's interest in the millimeter wave bands. As a T-Mobile Board Presentation explains, **{{BEGIN HCI**

**END HCI}}**[324] Another T-Mobile document **{{BEGIN HCI**

**END HCI}}** Witness the following chart prepared by T-Mobile:

[323] Application at 60.

[324] TMUS-FCC-00537735 at TMUS-FCC-00537741, TMUS-FCC-00537753 **{{BEGIN HCI END HCI}}**

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Sprint holds the same views despite its greater spectrum reserves. A review of Sprint's business plans from January 2018 recognizes **{{BEGIN HCI**

**END HCI}}**[325]

Sprint's review of competitors' 5G plans **{{BEGIN HCI**

**END HCI}}**[326]

[325] SPR-FCC-00708028 SPR-FCC-00708178 **{{BEGIN HCI**
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[326] *Id.* at SPR-FCC-00708188.

In short, the benefits of true fixed broadband cannot be credited to the merger. Each standalone company will only be able to provide fixed broadband by purchasing spectrum that it does not have. And, the combined company would also need to purchase such spectrum.

Even if the Applicants' claim of a fixed broadband benefit did not suffer from this disqualification, the Applicants' plan to compete with fixed home broadband ISPs also lacks significant detail and thus render it not credible. The claim that consumers view fixed and mobile broadband as functional substitutes, on which the Applicants rely,[327] has been rejected by the Commission itself.[328] Even if they become such substitutes, which is not likely, this will not occur before 2024 at the earliest, far enough in the future to require discounting the alleged benefit.[329]

Further, T-Mobile seeks credit for merger benefits that are already accruing to consumers in the marketplace. T-Mobile's Mike Sievert states that "New T-Mobile's entry into the in-home broadband marketplace will cause incumbent providers to lower their prices and invest in their networks—benefitting all in-home broadband customers."[330] But cable providers are already investing in their networks through DOCSIS 3.1 upgrades and are offering higher speeds and

[327] Opposition at 69.

[328] *2018 Broadband Deployment Report*, 33 FCC Rcd. 1660, 1666 ¶ 18 ("[The Commission] disagrees with those that argue that mobile services are currently full substitutes for fixed service" because "there are salient differences between the two technologies."); *see also 19th Wireless Competition Report*, 31 FCC Rcd. 10534, 10625 ¶ 133 (2016).

[329] See above § IX.

[330] Reply Declaration of G. Michael Sievert ¶ 5 (Appendix H to Opposition) ("Sievert Reply Declaration").

better in home WiFi services. These investments are ongoing and will not be a direct result of New T-Mobile's entry.[331]

For instance, in 2017, well before the merger was announced, Charter started to roll out a new DOCSIS 3.1 with gigabit-speed Internet connections. Charter has now rolled out gigabit-speed connections featuring DOCSIS 3.1 Internet services to over 95 percent of its 41-state footprint, reaching approximately 41 million U.S. homes, with plans to further expand this service in 2018.[332] Comcast recently announced that it has deployed gigabit-capable DOCSIS 3.1 to nearly all 58 million homes and businesses that it serves.[333] Indeed, at least one Sprint analysis on the subject has concluded that **{{BEGIN HCI**

**END HCI}}**[334]

Mr. Sievert goes on to state that New T-Mobile "expects to utilize caching and other network optimization techniques to increase the number of households that can be served."[335]

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[331] Declaration of Peter Tenerelli and Vijay Venkateswaran ¶ 11 (attached as Exhibit 3) ("Tenerelli and Venkateswaran Declaration").

[332] Press Release, Charter Communications, Spectrum Internet Gig is Driving to the End Zone (Oct. 10 2018), https://newsroom.charter.com/news-views/spectrum-internet-gig-is-driving-to-the-end-zone.

[333] Letter from Michael D. Hurwitz, Counsel for Comcast Corp., to Marlene H. Dortch, FCC, Responses of Comcast Corp. to Information and Document Request, at 4 (Oct. 22, 2018).

[334] SPR-FCC-11257955 at SPR-FCC-11257971 **{{BEGIN HCI**
**END HCI}}** *See also* SPR-FCC-04382213 at SPR-FCC-04382214 **{{BEGIN HCI**

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[335] Sievert Reply Declaration ¶ 6.

Network caching is a common technique whereby a dedicated network server or network service acting as a server saves web pages or other internet content locally in geographic proximity to a user population.[336] Caching speeds up access to content (for example 4K/HD video streams, or large video game downloads) and can reduce demand on network bandwidth by placing previously requested information in network server's storage. This capability, however, is already available to all mobile operators, including T-Mobile and Sprint today, and the merger cannot plausibly be credited with its availability or use.

Mr. Sievert also notes that New T-Mobile's average download speeds will be 100 Mbps in 2021, and that by 2024, New T-Mobile will supposedly be able to cover more than 250 million people with data rates greater than 300 Mbps and more than 200 million people at greater than 500 Mbps, far exceeding the speeds contemplated by Verizon or AT&T for their proposed 5G services, and matching or exceeding the offerings of most traditional ISPs.[337] As a point of reference, Verizon's "5G Home" service, launched in Houston, Indianapolis, Los Angeles, and Sacramento in October 2018, features "typical" speeds of 300 Mbps, going up to 940 Mbps.[338] The service comes bundled with a choice of Apple 4K TV or a Google Chromecast Ultra. Verizon is offering three months of service for free to early adopters, and then $50 a month to Verizon customers, and $70 a month to new subscribers.[339]

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[336] Tenerelli and Venkateswaran Declaration ¶ 12.

[337] Sievert Reply Declaration ¶ 9.

[338] Press Release, Verizon Wireless, Verizon Turns on World's First 5G Network (Oct. 1, 2018), https://www.verizon.com/about/news/verizon-turns-worlds-first-5g-network; Verizon 5G Home FAQs, https://www.verizonwireless.com/support/5g-home-faqs (last visited Oct. 19, 2018).

[339] Verizon, 5G Home FAQs, https://www.verizonwireless.com/support/5g-home-faqs (last visited Oct. 19, 2018).

Moreover, even if true fixed broadband were a merger-specific benefit, the Applicants do not credibly estimate its magnitude. The Applicants' expert Dr. Furchtgott-Roth has not estimated the price reductions that the Applicants and their competitors will supposedly initiate. He has simply assumed these reductions without evidence. First, he assumes that consumers will pay **{{BEGIN HCI END HCI}}** less per month for switching to New T-Mobile without cord-cutting, that they will reap a benefit of up to **{{BEGIN HCI END HCI}}** if they cut the cord, and that they will pay **{{BEGIN HCI END HCI}}** per month less even if they do not switch to New T-Mobile. He then multiplies these assumed savings by subscriber and by months to arrive at his estimate of a **{{BEGIN HCI END HCI}}** a year surplus. But, as his method assumes what needs to be proven, and does not even attempt to estimate these future benefits econometrically, these conclusions cannot be credited by the Commission.

Importantly, the Applicants also do not explain how they plan to become credible competitors in the multichannel video distribution market. One of the most significant impediments to entry in that market is the difficulty of securing affordably and competitively priced programming rights without the scale of an existing multichannel video subscriber base. Companies as large as Google, Apple, and Sony have faced challenges for that reason. The merger does nothing to alleviate that difficulty.

Indeed, to the extent that T-Mobile's plans are viable, the merger does nothing to enhance them. T-Mobile has planned to enter the video market independently of the proposed merger. **{{BEGIN HCI**

**END HCI}}**[340] Perhaps for these reasons, the Applicants, who promoted emphatically their plans to enter the video distribution market in their Application, relegated their video plans to a footnote in their Opposition.[341]

### G. The Applicants Understate the Merged Company's 5G Upgrade Costs, and Overstate Those Of Standalone Sprint

The Applicants' claimed benefits are further eroded by several understatements of New T-Mobile's costs and corresponding overstatements of those for standalone Sprint in connection with the required 5G upgrades.

#### 1. The New T-Mobile Transition Compared to the Sprint Standalone Transition

Generally, a transition is more costly if it requires tower construction, modification, reinforcement, or rent increases than if it requires only the shipment of new phones or, even more simply, the movement of the users to other bands that legacy phones are already equipped to access. The transition contemplated by the Applicants requires all of the above, and the Applicants seem to underestimate the cost of each and every one. Take handsets for example: the Applicants still do not know how many Sprint devices are incompatible and therefore not susceptible to software upgrades (they say approximately 37 million).[342]

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[340] TMUS-FCC-01811958 at TMUS-FCC-01811959-60 **{{BEGIN HCI**
**END HCI}}**

[341] *Compare* Application at 76-80 *with* Opposition at 66 n.250.

[342] Opposition at 47.

By comparison, the transition necessary for standalone Sprint would be more modest—Sprint's CFO recently characterized it as something that can occur at the "flick of the switch" due to Sprint's use of "software-upgradeable technology."[343]

As to Sprint legacy phones that are not upgradable, each of them is likely to be capable of accessing all of Sprint's lower bands. In light of Sprint's low utilization of its capacity, it seems likely that Sprint will be able to route these legacy devices to its lower spectrum bands without causing any congestion, or by applying ordinary course "incremental solutions" to resolve such congestion. Alternatively (or concurrently), Sprint can refarm the 2.5 GHz spectrum by shipping new 5G NR smartphones and devices to the legacy LTE users with incompatible 2.5 GHz smartphones and devices, while, again, resolving any congestion of the 2.5 GHz band by implementing the incremental solution that is most relevant here—5G upgrades.

It is precisely these 5G upgrades that appear to be significantly cheaper for Sprint than they would be for New T-Mobile. While of course refarming 2.5 GHz for 5G would require equipping Sprint cell sites with Massive MIMO antennas, that would likely be a less complex and cheaper process than what New T-Mobile would have to undergo. For one thing, Sprint would not have to decommission any sites. For another, it would require a more modest swapping of antennas on its 2.5 GHz sites, replacing the current equipment with the Massive MIMO antennas. By contrast, New T-Mobile would need to add the Massive MIMO antennas to most of its towers alongside existing 600 MHz equipment, and decommission the majority of Sprint's cell sites.

[343] Transcript, Sprint Presentation at Deutsche Bank Leveraged Finance Conference, Fair Disclosure Wire (Oct. 2, 2018).

What are the implications of these different 5G upgrades for the costs of Sprint and New T-Mobile? DISH's experts, Peter Tenerelli and Vijay Venkateswaran, both with decades-long experience in designing, deploying or operating wireless networks, have examined assumptions underlying the Applicants' network model. DISH's experts conclude that the substitution of a Massive MIMO antenna for Sprint's existing equipment will generally not require additional space on a tower, and therefore not result in a rent increase. This means that standalone Sprint would be subjected to limited, if any, rent increases for additional space on the towers that it uses.

A review of Sprint's lease agreements with major tower companies reveals that, in at least one such agreement, Sprint has successfully negotiated the weight limits for **{{BEGIN HCI END HCI}}** Specifically, the agreement between Sprint and **{{BEGIN HCI END HCI}}** specifies a weight limit of **{{BEGIN HCI END HCI}}** for **{{BEGIN HCI END HCI}}**[344] This weight limit will accommodate most Massive MIMO systems, meaning there would likely be no rent increase for the swap of a Massive MIMO system for Sprint's existing configuration.[345] As for **{{BEGIN HCI END HCI}}** the rent increase resulting from such a swap will likely be small in the aggregate.[346] Similarly, while a Massive MIMO antenna is heavier than Sprint's existing 2.5 GHz equipment, the weight

[344] Tenerelli & Venkateswaran Declaration ¶ 7.

[345] *Id.*

[346] *Id.*

difference resulting from replacement will generally not require strengthening the tower used by standalone Sprint.

By contrast, the addition of Massive MIMO antenna system in addition to T-Mobile's existing equipment will often require an extra "radiation center."[347] This will increase the rent (by as much as 100%).[348] DISH's experts also estimate that the additional weight would require New T-Mobile to strengthen as many as 25-40% of its cell sites, at a cost of $35,000 to $200,000 per cell site.[349]

Furthermore, New T-Mobile will incur significant decommissioning expenses. A review of Sprint's tower lease agreements shows that in at least one of these agreements, Sprint has struck a bargain that facilitates the standalone Sprint transition to 5G, but would make New T-Mobile's 5G transition more difficult.[350] Specifically, **{{BEGIN HCI**

**END HCI}}**[351] This bargain impedes the New T-Mobile transition plan. New T-Mobile would need greater flexibility to **{{BEGIN HCI** **END HCI}}** since it plans to decommission all but 11,000 of Sprint's sites.[352] By contrast, T-Mobile needs less

[347] *Id.* ¶ 8.

[348] *Id.*

[349] *Id.*

[350] *Id.* ¶ 9.

[351] SPR-FCC-12475007 at SPR-FCC-12475014 **{{BEGIN HCI** **END HCI}}**

[352] Tenerelli and Venkateswaran Declaration ¶ 9.

flexibility to **{{BEGIN HCI END HCI}}**[353] This means that, **{{BEGIN HCI END HCI}}** including many of the **{{BEGIN HCI END HCI}}**[354] The Applicants have not shown to what extent their **{{BEGIN HCI END HCI}}**[355] estimate of the decommissioning cost takes such obligations into account.[356] Of course, the Applicants may have access to more precise figures, and should disclose their own calculations of these costs, something that they have not yet done. But, regardless of the precise amounts, the point is that, directionally, the cost to be incurred by New T-Mobile in 5G upgrades will be greater than standalone Sprint's because New T-Mobile will be adding whereas Sprint will be swapping. And, only New T-Mobile will incur the cost of decommissioning.

### 2. The Applicants' Misalignment of New T-Mobile and Standalone Sprint 5G Upgrade Costs

Instead of recognizing the high 5G upgrade costs of New T-Mobile and the lower costs for standalone Sprint, the Applicants mistakenly assume the opposite: that the 5G upgrade costs of New T-Mobile will be lower than those of Sprint. Not only is there no reason for this discrepancy; as shown above, the differences are actually in the opposite direction—it is New T-Mobile's costs that should be higher. But even ignoring that New T-Mobile's 5G upgrade costs

[353] SPR-FCC-12475007 at SPR-FCC-12475014.

[354] *See* T-Mobile RFI Response, Specification 16 Donor Sites.xlsx.

[355] Opposition at 44.

[356] Tenerelli and Venkateswaran Declaration ¶ 11. As T-Mobile explained, their analysis of which Sprint sites to retain "did not undertake either a financial review of the sites or a site structural analysis, so the Company does not have site specific information on expected cost and timeframes for obtaining access to the sites." T-Mobile RFI Response at 38.

should be higher and simply increasing New T-Mobile's 5G upgrade costs to Sprint's level causes serious consequences for the Applicants' case. Re-running the Applicants' model based on that assumption reduces the claimed marginal cost savings by **{{BEGIN HCI**

**END HCI}}**

### 3. A Faster Standalone Sprint 2.5 GHz Refarming

The lower costs of a Sprint transition to allow 2.5 GHz refarming have another important implication. The Applicants rely heavily on the idea that, without the merger, Sprint needs to earmark a large portion of the 2.5 GHz spectrum, as much as **{{BEGIN HCI**

**END HCI}}** With the merger, they say, New T-Mobile will be able to move these legacy LTE subscribers to its own spectrum and therefore quickly use the 2.5 GHz spectrum for 5G. The Sprint CFO's assessment that the Sprint transition is straightforward is plainly at odds with the snail's pace assumed by the model for Sprint's refarming of the 2.5 GHz spectrum. A faster refarming of the 2.5 GHz spectrum by standalone Sprint further reduces the merger's claimed marginal cost savings by **{{BEGIN HCI END HCI}}**[357]

## H. Compass Lexecon Has Arbitrarily Boosted Marginal Cost Savings By Reducing Usage Estimates

Compass Lexecon has cut approximately by half the usage estimate made in the Applicants' network model. This has generally boosted the claimed marginal cost savings, as shown by a comparison of Compass Lexecon's Table 12, which assumes reduced usage, to Table

[357] Brattle Reply Declaration at 36.

14, which does not.[358] Brattle observes that the reduction in usage estimates increases the net present value of Compass Lexecon's estimated marginal cost savings.

### I. The Applicants Understate the Spectral Efficiency Factor, Inflating Their Benefit Claims

While the revised model shows that each company can deploy full 5G without experiencing **{{BEGIN HCI END HCI}}** congestion, the model still understates Sprint's and T-Mobile's standalone capabilities. For one thing, the model understates spectral efficiency. The Applicants use a factor of 3.8 bits/second/Hz ("b/s/Hz") for the 2.5 GHz spectrum but do not appear to take into account the multiplier effect from the capacity gains of Massive MIMO antenna deployments in that spectrum.[359]

While the Applicants seem to have accounted for that effect **{{BEGIN HCI**

**END HCI}}** DISH's engineering experts believe that an effective spectral efficiency multiplier of three is reasonable. When used with Sprint's own baseline number, that multiplier results in 11.4 b/s/Hz.[360] Properly accounting for spectral efficiency shows a significantly enhanced capacity for Sprint's standalone system. Using the Applicants' revised model, a higher spectral efficiency means that solutions for congestion relief would become less necessary, and correspondingly the cost of congestion for standalone Sprint would fall. DISH's experts have run the Applicants' current model using a spectral efficiency of 11.4 b/s/Hz. The results? The marginal cost savings would

[358] *See* Compass Lexecon Declaration ¶¶ 110, 112.

[359] Brattle Reply Declaration at 82-83.

[360] *Id.*

be reduced by **{{BEGIN HCI END HCI}}** from the **{{BEGIN HCI END HCI}}** estimated by the applicants.[361]

## XI. THE APPLICANTS' COMPARISON OF THE NEW T-MOBILE AND T-MOBILE/METROPCS TRANSITIONS IS MISGUIDED

New T-Mobile faces transition challenges that cannot be fairly compared to the transition of MetroPCS to the T-Mobile platform.[362] MetroPCS was a regional carrier with significant market share in only a limited number of markets. It had limited spectrum, much of it greenfield and the rest of it compatible with T-Mobile radios and user equipment. In the MetroPCS integration, there was no need to construct, modify, or strengthen towers for the integration; rather, the transition involved primarily transitioning MetroPCS customers to LTE-compatible handsets.[363] T-Mobile decommissioned only **{{BEGIN HCI END HCI}}**[364] Here, by contrast, the need to reinforce towers, pay additional rent, decommission approximately **{{BEGIN HCI END HCI}}** Sprint sites, *and* transition millions of users with incompatible devices, compounded with the larger spectrum amounts involved, the Massive MIMO antennas (that, when added to the totality of the installation, are likely to overburden towers), and the project's national scale, make this an endeavor of an entirely different scale.

A closer comparison of the transition and its costs is likely Sprint's takeover of Nextel. As with this merger, that transaction involved a combination of two mavericks and equals. As

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[361] Brattle Reply Declaration at 36-37.

[362] The Applicants claim that the integration playbook for New T-Mobile "will be similar and utilize the expertise gained from the MetroPCS transition …. a proven methodology that delivered cost savings ahead of schedule, with synergies better than expected and without any customer disruption." Opposition at 52.

[363] T-Mobile RFI Response at 13.

[364] *Id.* at 13.

with this merger, that transaction involved two nationwide, facilities-based carriers. As with this merger, that transaction involved two carriers with different spectrum bands. As with this merger, that transaction involved a company taking over the responsibilities for reconfiguration of the 800 MHz band, a task that was only supposed to take 36 months and is unfinished 14 years after the *800 MHz Order* was released.[365] As with this merger, that transaction involved combining incompatible devices that cannot be readily made to work on different networks.[366]

The Sprint-Nextel merger was a failure for both the companies and the public interest. In fact, the integration was basically abandoned after Sprint wrote off more than $30 billion, representing the entire Nextel network.[367] Consumers lost the innovative offerings Nextel brought to the marketplace. None of the purported synergies ever actually happened. And the 800 MHz reconfiguration, designed to facilitate public safety communications, was delayed beyond any reasonable point. The merger failed to realize its claimed benefits and harmed the public interest.

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[365] Improving Public Safety Communications in the 800 MHz Band, *Third Memorandum Opinion and Order*, 22 FCC Rcd. 17209, 17217-18 ¶¶ 28-32 (2007).

[366] *See* Marguerite Reardon, *The Sprint Nightmare is Far from Over*, CNet (Feb. 28, 2008), https://www.cnet.com/news/the-sprint-nightmare-is-far-from-over ("Moving forward, Hesse emphasized that keeping current customers on the Sprint Nextel network is the priority. As part of this effort, Sprint is changing course slightly in how it plans to handle migrating customers from the old Nextel network, which uses the iDEN technology, to Sprint's CDMA network. Previously, the company had been trying to move customers away from iDEN, but Hesse seems to be embracing that technology and network."); *see also* Kent German, *What Exactly is Sprint Doing?*, CNet (Feb. 6, 2008), https://www.cnet.com/news/what-exactly-is-sprint-doing ("In some surprising developments since November of last year, after all the promises of ending voice calls on the iDEN network, Sprint introduced two new handsets that are pure Nextel phones.").

[367] David Goldman, *Sprint's Nextel network gets its death date: June 30, 2013*, CNN Money (May 29, 2012), https://money.cnn.com/2012/05/29/technology/sprint-nextel-shutdown/index.htm.

## XII. THE APPLICANTS' CLAIMS OF COVERAGE EXPANSION ARE EXAGGERATED

Finally, the Applicants understate the cost of deploying 5G in rural America. As they acknowledge, Sprint has not undertaken rural deployment using the 2.5 GHz spectrum to date on the grounds that it is too expensive. The challenges that need to be overcome to achieve fixed broadband include the density of towers that is due to the greater signal attenuation and more limited propagation of the 2.5 GHz frequencies compared to below-1 GHz spectrum. **{{BEGIN HCI**

**END HCI}}**[368] And as Sprint's Chief Strategy Officer wrote, **{{BEGIN HCI**

**END HCI}}**[369] Sprint likewise considered **{{BEGIN HCI**

**END HCI}}**[370] And **{{BEGIN HCI**

[368] SPR-FCC-00635703 at SPR-FCC-00635704 **{{BEGIN HCI**

**END HCI}}**

[369] *Id.* **{{BEGIN HCI**

**END HCI}}**

[370] SPR-FCC-04218748 at SPR-FCC-04218762, SPR-FCC-04218809 **{{BEGIN HCI**

**END HCI}}**

**END HCI}}**[371]

DISH is not arguing that these challenges are insurmountable. But the Applicants do not explain how these factors will abate with the merger. Sprint's lack of rural coverage is not due to the shortage of spectrum, and therefore the ability of New T-Mobile to marshal 600 MHz and 2.5 GHz in the same network node will matter little. Rather, it is almost entirely due to the lack of apparent economic justification for the required investment. This is reflected in the well-known phenomenon of rural spectrum being much less expensive than urban spectrum, even after adjusting for the population differences.[372] The combination of 2.5 GHz and 600 MHz spectrum will do nothing to improve the propagation characteristics of 2.5 GHz transmissions or reduce the number of sites needed. A pre-merger assessment conduct by Sprint recognized that **{{BEGIN HCI**

**END HCI}}**[373]

DISH's experts identify the roughly **{{BEGIN HCI END HCI}}** nodes in the New T-Mobile model that are added to the standalone T-Mobile model. Any improvements in the network's coverage must come from these added nodes. For these incremental nodes to improve the coverage of the standalone T-Mobile network, it must be the case that they are

[371] SPR-FCC-00635703 at SPR-FCC-00635705 **{{BEGIN HCI END HCI}}**

[372] Coleman Bazelon & Giulia McHenry, *Spectrum Value*, The Brattle Group (2012) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2032213&download=yes.

[373] SPR-FCC-11257955 at SPR-FCC-11257963 **{{BEGIN HCI END HCI}}**

added to areas where T-Mobile does not already have network coverage. Brattle reports the distribution of distances of the incremental nodes added to the New T-Mobile network from the closest existing legacy T-Mobile node. Because this is the distance between towers, the radii of the two nodes would not be more than half this distance. The median distance from an incremental rural node to an existing one is about 4.4 km (or about 2.2 km cell radius) and more than three quarters of the incremental rural nodes are less than 7.8 km (or about 3.9 km cell radius).

Brattle has assumed a radius of 10 kilometers for 5G mobile broadband using T-Mobile's mid-band spectrum. At a 10 kilometer cell coverage, sites would be placed about 20 km apart to extend coverage. But only **{{BEGIN HCI END HCI}}** incremental nodes (about **{{BEGIN HCI END HCI}}** ) are placed outside of the 10 km coverage areas of the existing network nodes. The Applicants' placement of incremental nodes suggests that they severely overstate New T-Mobile's ability to improve 5G deployment in rural areas.

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**END HCI}}**

Indeed, an internal Sprint analysis **{{BEGIN HCI**

**END HCI}}**[374]

DISH's experts have also calculated the population coverage of all cell sites in the Applicants' model that the Applicants characterize as rural based on census data. DISH's experts have concluded New T-Mobile rural coverage would be much less than the 59.4 million people claimed by the Applicants for outdoor coverage.[375]

The Applicants claim that they will provide outdoor 5G services to more than 95% of rural customers.[376] To test this proposition, Brattle identified the nodes in the standalone Sprint and New T-Mobile models that deploy 2.5 GHz spectrum.[377] Although 600 MHz spectrum will be deployed in the New T-Mobile network, the Applicants maintain that standing alone, 600 MHz frequencies would not be adequate for 5G service. Rather, the Applicants plan to combine the 600 MHz spectrum with the higher capacity provided by mid-band (and possibly millimeter wave) frequencies. Brattle has conservatively calculated the rural and urban population that resides within 7.5 kilometers and 10 kilometers of these network nodes in the models submitted by the Applicants.[378] It has found that little more than half the rural population in the U.S. will

[374] SPR-FCC-04660823 **{{BEGIN HCI** **END HCI}}**

[375] Opposition at 94.

[376] Application at 66 ("Increasing outdoor wireless coverage to reach 59.4 million rural residents, or 95.8 percent of the estimated 62 million rural residents."). It is unclear how Applicants derive the 62 million rural residents figure.

[377] The standalone T-Mobile network does not deploy any 2.5 GHz spectrum.

[378] Brattle Reply Declaration at 64; Tenerelli & Venkateswaran Declaration ¶ 15.

be within 10 km of a node in the New T-Mobile network.[379] This means that the Applicants' claim that New T-Mobile will reach almost 96% of rural residents is exaggerated by a factor of nearly two.

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**END HCI}}**

Moreover, DISH's experts explain that, assuming significant self-installations, a cell radius that ranges between 2.5 and 5.6 kilometers would be appropriate for 2.5 GHz 5G broadband indoor coverage in rural areas.[380] Brattle has conservatively mapped the rural population expected to receive such service from New T-Mobile based on a 5.6 kilometer

[379] Brattle Reply Declaration at 65.

[380] Tenerelli & Venkateswaran Declaration

radius.[381] The result? **{{BEGIN HCI END HCI}}** rural Americans would be covered, only **{{BEGIN HCI END HCI}}**[382] of the 31 million rural residents that the Applicants claim will be reached.[383]

And, while the prospect of fixed broadband to the home may arguably change the economic calculus for rural deployment, neither company today appears to have the spectrum necessary for that service, as shown above.[384] In addition, neither Sprint nor T-Mobile has the physical presence and ability to send trucks and installation crews that both Verizon and AT&T can marshal.[385] While the Applicants claim that they will add 600 new stores to serve rural Americans, they have been unwilling to commit to where those stores will be located, claiming that doing so is unnecessary.[386] To all of this, the Applicants vaguely cite "scale." But deployment and its costs are necessarily site-specific. The Applicants do not point to anything New T-Mobile will be doing in New York that will make it easier for New T-Mobile to provide 5G in Topeka than it is for Sprint today.[387]

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[381] Brattle Reply Declaration at 65.

[382] *Id.* at 65.

[383] Application at 66.

[384] *See* above at § IX.F.

[385] On the contrary, a portion of the claimed merger synergies will be massive job cuts. Communications Workers of America, WT Docket No. 18-197, at i (Aug. 27, 2018) ("[T]he merger would result in the loss of more than 28,000 jobs across the United States and combine two companies with a long history of labor and employment law violations. Contrary to the Applicants' unsubstantiated claims of merger-related job creation, leading Wall Street analysts predict that massive job cuts from the elimination of duplicative retail stores and headquarters functions at the New T-Mobile will contribute significantly to the billions of dollars in projected merger 'synergies.'").

[386] Opposition at 96 n.362.

[387] Common Cause et al. Petition at 41-42 ("There are several reasons to believe that any '5G revolution' will only happen in densely-populated urban areas, leaving rural and suburban

The Applicants also make contradictory claims. For instance, they claim that, post-transaction, New T-Mobile will continue to work with rural carriers, including "partnering [with them] through attractive roaming agreements."[388] But on the very next page, the Applicants claim that the transaction will increase competition in rural areas because New T-Mobile will have "significant" incentives to build out its 5G network.[389] The Applicants ignore that, in such a scenario, New T-Mobile will be competing against rural carriers too. Instead of "sparking" such competition, the envisioned transaction will place even more financial pressure on small businesses.

## XIII. CONCLUSION

In sum, the Applicants' revised model shows that there is no problem to solve: each company can deploy full 5G without **{{BEGIN HCI**

**END HCI}}** In addition, adjusting the Applicants' revised model to reflect the acquisition of millimeter wave frequencies, similar Sprint and New T-Mobile costs for common incremental solutions, a slightly faster refarming of 2.5 GHz spectrum by standalone Sprint, and more realistic spectral efficiency, reduces the claimed benefits by a full **{{BEGIN HCI**

**END HCI}}** The resulting benefits, if any, are dwarfed by any reasonable estimate of the merger's price impact: higher prices, even on a per unit basis. Such price increases are clearly not in the public interest.

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communities largely unreached. Although the Applicants tout their focus on 5G, the reality is that many parts of America are still waiting for 4G service. The effort to bring 4G LTE service to rural areas is still ongoing.").

[388] Opposition at 93.

[389] *Id.* at 94.

For the foregoing reasons, the Commission should deny the transaction as currently proposed.

Respectfully submitted,

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October 31, 2018

# Appendix A: The Applicants' Admissions and Omissions

Among other admissions and omissions, the Applicants have conceded the following:

**Competitive Effects.**

- ***Price Impact.*** The Applicants concede that the effects of the transaction on competition, without taking into accrual their benefit claims, will be about **{{BEGIN HCI END HCI}}** times what DISH estimated: they admit that "all of [DISH's] merger simulations require **{{BEGIN HCI END HCI}}** of efficiencies for the proposed merger to be competitive," while the Compass Lexecon analysis "finds that all of the variants of the alternative merger simulation require **{{BEGIN HCI END HCI}}**[390]
- ***Diversions of Customers Between the Applicants***. The Applicants admit that they do not rely on "porting" diversion data, which show simply and accurately where subscribers are coming from and where they are going, for their analysis, even though the Commission has correctly determined those data to be the most accurate method for calculating diversions.[391] Rather, they rely on the Harris Mobile Insights Survey, which shows a lower proportion of customers moving between Sprint and T-Mobile. Replacing the Harris data with porting data in the Applicants' model shows the price impact to be **{{BEGIN NRUFL/LNP HCI END NRUF/LNP HCI}}** times greater than DISH had estimated.

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[390] Compass Lexecon Declaration at ¶ 6.

[391] *See* Compass Lexecon Declaration ¶¶ 173-76; AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16255 ¶ 149 (2011) ("Porting data measures substitution patterns directly, based on data reported from each wireless provider.").

- ***Increased Concentration***. DISH has shown that the merger would increase the HHI concentration index by 451 points to 3,265, and New T-Mobile would exceed the Commission's spectrum screen in 532 out of 734 CMAs.[392] The Applicants do not deny the existence or magnitude of either effect. As explained below, they also do not carry their burden of rebutting the presumption created by an HHI concentration increase or of showing why the spectrum concentrations in excess of the screen should be countenanced by the Commission.
- ***Other 4-3 Mergers***. The Applicants do not dispute that the 4-to-3 transactions cited by DISH have brought about price increases, stating instead that rebutting such evidence is pointless.[393]
- ***Ineffectiveness of Non-Facilities-Based Competition***. The Applicants do not specifically deny disadvantages non-facilities-based competitors face, instead repeating the uncontroversial but not probative fact that "Comcast and Charter are now each offering a wireless service."[394]
- ***DISH's Entry***. DISH explained that the transaction could hamper and delay DISH's entry into the 5G market.[395] Notwithstanding the crucial importance of market entry to alleviating the effects of this proposed 4-to-3 merger, the Applicants have no answer for this point. In fact, the Applicants concede the challenges faced by a new carrier seeking to obtain roaming agreements from established carriers in two ways.

[392] *See* DISH Petition to Deny at 71, 74.

[393] Opposition at 22-23.

[394] *Id.* at 31-32.

[395] DISH Petition to Deny at 51-53.

First, when questioning the feasibility of less restrictive alternatives to a merger, the Applicants point out, correctly, that "customers may suffer from being blocked from or throttled on the networks on which they are roaming if traffic reached certain congestion thresholds." Second, Sprint has revealed the **{{BEGIN HCI**

**END HCI}}**[396]

- ***Coordinated Price Pressure Index***. The Applicants' experts do not make their own calculation of the elevated coordinated price pressure risk under the "Coordinated Price Pressure Index" method they themselves devised. Nor do they contest the calculations of DISH's experts. They object only, and incorrectly, that their method is inapplicable.
- ***Coordination*.** DISH explained that certain industry characteristics—transparency of pricing, lack of buyer-side power, elimination of long-term contracts and barriers to entry—make the industry suitable for coordination. The Applicants do not contest either that these characteristics exist or that they make the industry suitable for coordination. They also do not contest that the transaction would remove or lower certain barriers to coordination—for example, that a collusive arrangement among New T-Mobile, AT&T, and Verizon would bring more capacity to the table, and effectively leave no capacity outside it.[397] Instead, they allege, incorrectly, that coordination risk will be kept in check by other factors, primarily the benefits they claim will result from their consolidation.

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[396] Sprint RFI Response at 44-46.

[397] *See* Brattle Declaration at 81.

**Benefits**

- ***Each Applicant's Prior Statements.*** The Applicants take DISH to task for "insist[ing]" that T-Mobile and Sprint each have all the spectrum and cell sites they need to deploy robust standalone 5G networks.[398] But they are silent on a contradiction pointed out by DISH between the Applicants' premise that the merger is necessary for broad, deep, and fast 5G deployment and the Applicants' own statements. They do not explain Sprint's prior statement that it expects "to launch mobile 5G, a true 5G mobile network in 2019"[399] and that it has "the BEST spectrum and assets to build an incredible nationwide #5G network that our customers will love."[400] They likewise say nothing about T-Mobile's own statements that its spectrum holdings "position[] T-Mobile to deliver a 5G network that offers BOTH breadth and depth nationwide," and that it would "accelerate our 600 megahertz rollout in 2018, while laying the foundation for the country's first nationwide 5G network by 2020."[401]

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[398] Opposition at 53.

[399] Sprint Corp., Q3 2017 Earnings Call Transcript, Fair Disclosure Wire (Feb. 2, 2018).

[400] Marcelo Claure (@marceloclaure), Twitter (Mar. 9, 2018 12:24 PM), https://twitter.com/marceloclaure/status/972206391858483201.

[401] Application at 21 n.63; Neville Ray, *Setting the 5G Record Straight: Announcing Plans for Nationwide 5G from T-Mobile*, T-Mobile Blog (May 1, 2017), https://www.t-mobile.com/news/nationwide-5g-blog; T-Mobile US, Inc., Q4 2017 Earnings Call Transcript (Feb. 8, 2018), https://seekingalpha.com/article/4145138-t-mobile-uss-tmus-ceo-john-legere-q4-2017-results-earnings-call-transcript *see also* Comments of AT&T Services, Inc., WT Docket No. 18-197, at 10 (Aug. 27, 2018) ("T-Mobile and Sprint claim that they are currently competitively disadvantaged vis-à-vis AT&T and Verizon in terms of market share, spectrum holdings, and access to capital, and that the merger will enable them to attain similar footing on these metrics that will result in aggressive, disruptive competition that will trigger a competitive response. In fact, T-Mobile and Sprint both have more MHz of spectrum per connection than

- ***Standalone 5G Capabilities***. The Applicants' own revised engineering model shows the merger is not necessary for robust 5G network deployment. The Applicants' original engineering model showed Sprint and T-Mobile as having capacity of **{{BEGIN HCI END HCI}}** They also concluded that 5G would cause T-Mobile's capacity to be exhausted in 2024, when demand would exceed capacity by **{{BEGIN HCI END HCI}}**[402] They now concede none of this is correct. Under their revised engineering model, standalone Sprint's available capacity for 2021 increases from **{{BEGIN HCI END HCI}}** and standalone T-Mobile's capacity for the same year goes up from **{{BEGIN HCI END HCI}}** Even more important, the provision of 5G would not cause congestion for either applicant in any year, with the exception of a tiny percentage of Sprint's sectors. Overall, in 2021, Sprint could deploy 5G using only **{{BEGIN HCI END HCI}}** As for standalone T-Mobile, it could deploy 5G in the same year using only **{{BEGIN HCI END HCI}}** The importance of this is hard to overstate: the Applicants' entire 5G benefit claim is contradicted by their own revised model. The model's predictions disprove Mr. Ewens' assertions that standalone T-Mobile's current planned OpEx and CapEx

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AT&T or Verizon; their parent companies, Deutsche Telekom AG and Softbank Group Corp., are among the largest telecommunications providers in the world, with substantial access to capital; and T-Mobile has previously argued that its lower market share, is a competitive advantage because it enables T-Mobile more flexibility and speed in transitioning to 5G.").

[402] T-Mobile RFI Response at 43.

levels for 2021-2024 would be insufficient to allow the company to meet 5G customer data demands while minimizing congestion on the network and maintaining an acceptable user experience.[403]

- ***Fixed Broadband.*** The Applicants have argued that the merger is necessary for New T-Mobile to provide fixed broadband.[404] But internal documentation proves that the merger is neither necessary nor adequate for true fixed broadband. Among other things, **{{BEGIN HCI**

**END HCI}}**[405] Likewise, a T-Mobile broadband presentation **{{BEGIN HCI**

**END HCI}}**[406]

- ***Each Applicant's Excess Capacity.*** The Applicants do not contest that "each has fewer subscribers per megahertz and per cell site than either AT&T or Verizon,"[407] countering only that it is difficult to refarm the excess spectrum.
- ***The Challenges Facing Sprint.*** DISH has provided many examples of Sprint's public statements contradicting the Applicants' allegation that "Sprint, as a stand-

[403] Reply Declaration of Peter Ewans at ¶ 31.

[404] *See* Opposition at 64-66.

[405] TMUS-FCC-00660878 at TMUS-FCC-00660883 **{{BEGIN HCI**
**END HCI}}**

[406] TMUS-FCC-00537735 at TMUS-FCC-00537741 **{{BEGIN HCI**
**END HCI}}**

[407] Opposition at 44.

alone entity, faces business challenges that will severely limit its ability to simultaneously make necessary network investments and also maintain the same level of aggressive promotional activities," and that "Sprint remains free cash flow constrained and without significant scale to achieve necessary returns on investment."[408] But recent comments from Sprint's CFO further confirm Sprint's turnaround, touting Sprint's "strengthened" balance sheet, "good funding," and "good liquidity."

- ***Sprint's 5G Transition Difficulties***. The Applicants contend that the refarming of the 2.5 GHz spectrum by standalone Sprint would be very difficult. In their words, "the standalone companies could [not] successfully refarm their spectrum to 5G without degrading LTE network performance for existing subscribers."[409] That claim, too, is contradicted by public and internal Sprint statements.

[408] *Id.* at 17, 19. *See* DISH Petition to Deny at 15-16.

[409] Opposition at 44.

**REDACTED—FOR PUBLIC INSPECTION**

## DECLARATION

The foregoing has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing, except for those facts for which official notice may be taken and those that other parties have submitted to the Federal Communications Commission confidentially under the protection of the *Protective Order* and the *NRUF/LNP Protective Order* in WT Docket No. 18-197, is true and correct to the best of my information, knowledge, and belief.

Executed on October 31, 2018

Jeffrey H. Blum
Senior Vice President, Public Policy and Government Affairs
**DISH Network Corporation**

# Exhibit 1

# Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas

# Reply Declaration of

**Joseph Harrington**
**The Wharton School, University of Pennsylvania**

**Coleman Bazelon**
**Principal, The Brattle Group**

**Jeremy Verlinda**
**Principal, The Brattle Group**

**and**

**William Zarakas**
**Principal, The Brattle Group**

October 31, 2018

# Table of Contents

# I. Introduction and Overview of Declaration

We previously submitted a declaration[1] in this proceeding that provided (a) an analysis of the merger's likely competitive effects, finding that it would lead to large increases in upward pricing pressure and therefore will likely increase prices for both retail and wholesale customers, and that HHI screens indicated that the merger would be presumptively harmful; (b) an assessment of the network modeling presented by the Applicants, finding that the Applicants' claims of large increases in offered capacity were significantly overstated; (c) an analysis of the merger's potential to increase the likelihood of coordinated conduct, finding that T-Mobile would lose its incentives for maverick behavior and that the incentives to coordinate would increase, leading to large potential increases in prices; and (d) a spectrum screen evaluation of the merger, finding that New T-Mobile would exceed the spectrum screen in over 60% of counties in the United States.

Counsel for DISH has asked us to review the Applicants' response to our declaration and to respond to comments and criticisms of our analysis of likely unilateral and coordinated effects stemming from the merger. In their reply, the Applicants submitted several declarations. Dr. Mark Israel, Professor Michael Katz, and Dr. Bryan Keating ("IKK") submitted a declaration responding to our assessment of the merger's unilateral effects.[2] Professor Steven Salop and Dr. Yiannis Sarafidis submitted a declaration responding to our assessment of the merger's coordinated effects, and also included a critique of our analysis of unilateral effects in the wholesale market.[3]

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1 Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, Exhibit B to Petition to Deny of DISH Network Corporation, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, August 27, 2018 (henceforth "HBVZ Declaration" or "*HBVZ*").

2 Declaration of Compass Lexecon, Mark Israel, Michael Katz, and Bryan Keating, Appendix F to Joint Opposition of T-Mobile US, Inc. and Sprint Corporation, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, September 17, 2018 (henceforth "IKK Declaration").

3 Joint Supplemental Declaration of Professor Steven C. Salop and Dr. Yianis Sarafidis, Appendix H to Joint Opposition of T-Mobile US, Inc. and Sprint Corporation, *In the Matter of Applications of T-*

Continued on next page

IKK claim that our prior declaration ignored marginal cost efficiencies, which, they allege, are sufficiently large that, if properly accounted for, would neutralize the Applicants' post-merger incentives to raise prices.[4] They further claim that, to the extent there is any residual upward pricing pressure caused by the merger, any potential harm from the resulting price increases would be more than offset by subscribers' valuations of the claimed improvements in network quality.

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Continued from previous page

*Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, September 17, 2018 (henceforth "Salop and Sarafidis Reply Declaration").

[4] IKK and the Salop and Sarafidis reply declaration describe both marginal cost efficiencies and "quality efficiencies." The former are the type of merger efficiency that might be expected to be passed through to consumers via lower prices, and potentially can reduce upward pricing pressure incentives induced by the merger. Quality efficiencies, however, may be associated with price increases, and, all else equal, potentially can increase consumer welfare. Each of these efficiencies can be distinct from claimed merger "synergies," which may include longer-term fixed cost savings such as plant decommissions, overhead, and capital cost reductions.

For example, the Applicants claim $43.6 billion in "synergies" from the merger. See Declaration of G. Michael Sievert, Appendix C to Description of Transaction, Public Interest Statement, and Related Demonstrations, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, June 18, 2018, ¶ 12. However, to the extent that these are not passed through to consumers, the Federal Communications Commission and the Department of Justice have tended to place less weight on these synergies, focusing more on marginal cost savings and, potentially, quality efficiencies. See, *e.g.,* Staff Analysis and Findings, *In the Matter of Applications of AT&T Inc. and Deutsche Telkom AG for Consent to Assign or Transfer Control of Licenses and Authorizations*, WT Docket No. 11-65, FCC, November 29, 2011, ¶¶ 226-228, accessed October 27, 2018, https://apps.fcc.gov/edocs_public/attachmatch/DA-11-1955A2.pdf (henceforth "FCC Staff Report"): "We therefore recognize efficiencies and cost savings that do not involve marginal cost savings, but assign them less weight than reductions in marginal cost, and do not consider them to offset any current anticompetitive harms."

See also Froeb, Luke, Steven Tschantz, and Gregory J. Werden. "Pass-through rates and the price effects of mergers." *International Journal of Industrial Organization* 23, no. 9-10 (2005): 714. "Merger policy in both the US and Europe gives little or no weight to fixed cost-reductions from merger synergies because they are not expected to be passed through."

Finally, the Applicants' own economist, Professor Salop, previously has emphasized the importance of placing the greatest weight on efficiencies that pass-through to consumers: "Efficiency benefits count under the true consumer welfare standard, but only if there is evidence that enough of the efficiency benefits pass through to consumers so that consumers (i.e., the buyers) would directly benefit on balance from the conduct." Salop, Steven C. "Question: What Is the Real and Proper Antitrust Welfare Standard? -Answer: The True Consumer Welfare Standard." *Loy. Consumer L. Rev.* 22, no. 3 (2010): 336-337.

We address this criticism in several ways: (1) we examine the disaggregated pricing forecasts and efficiency *thresholds* that are embedded in IKK's modeling to assess how IKK's own model would predict prices to change, both with and without the threshold and the claimed efficiencies; (2) we review the sensitivity of the IKK modeling and price forecasts to the magnitude of both diversion information and marginal cost efficiencies; (3) we evaluate the magnitude of the claimed marginal cost efficiencies by investigating the effect of various input assumptions in the Applicants' network model; and (4) we review the claims on improvements in network quality and consumers' possible valuation of the claimed network quality changes.

Salop and Sarafidis criticize our prior declaration's findings on the increased risk of tacit collusion for failing to account for the effects of both the merger's claimed efficiencies and the technological change wrought by the 5G transition. They also claim that our use of the CPPI as a measure of the increase in risk of coordination is inappropriate because it "was developed to gauge incentives of coordinated conduct solely between two leading firms."[5] Finally, Salop and Sarafidis respond to our analysis of vertical upward pricing pressure in the wholesale market by claiming that our calculations were incorrect and that our wholesale market analysis failed to account for the claimed efficiencies.

We address Salop and Sarafidis' criticisms of our coordinated effects analysis by examining the effect of the claimed efficiencies and technological innovation on collusive conduct following the merger. We also refute the alleged inapplicability of the CPPI to this proceeding. We address Salop and Sarafidis' criticisms of our wholesale market analysis by re-evaluating the vertical upward pricing pressure, including the data offered by the Applicants, both with and without the claimed efficiencies.

Finally, counsel for DISH has asked us to further evaluate the Applicants' network modeling and the claims of significant improvements in 5G capacity associated with the merger. Among other things, we consider the influence of assumptions in the Applicants' network model regarding: (a) including reasonable amounts of millimeter wave frequencies; (b) spectral efficiency of 2.5 GHz spectrum; and (c) the refarming of Sprint's 2.5 GHz spectrum. We examine the effects of these and other assumptions on the Applicants' network model outputs.

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[5] Salop and Sarafidis Reply Declaration, ¶ 5.

# A. Summary of Findings

The additional analyses undertaken and summarized in this declaration reinforce the main conclusions that we presented in our prior declaration. Specifically, we conclude that:

- Retail price effects in the IKK model are significant and larger even than those reported in *HBVZ*, by as much as **{{BEGIN HCI END HCI}}** the price effects reported in *HBVZ*. Moreover, if diversion information from porting data are used in place of the Applicants' survey data, the likely price effects are greater still, by as much as **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** the price effects reported in *HBVZ*.
- Salop and Sarafidis' discussion of the vertical upward pricing pressure on wholesale prices mischaracterizes the likely effect on MVNO and reseller input costs as "de minimis." Using the Applicants' own data, and correcting their calculations, the merger creates significant upward pricing pressure on the wholesale prices of the Applicants' MVNO and reseller affiliates, of at least **{{BEGIN HCI END HCI}}**.
- The methodology behind IKK's calculation of "critical marginal cost efficiencies" is flawed to the extent that it would result in a merger review policy that would clear a merger if some of the merging products experience price increases while others experience price decreases, so long as the aggregate consumer welfare across all consumers is held neutral (*i.e.*, does not decrease as a result of the merger).
- IKK calculate a "critical marginal cost efficiency" that would result in price increases for Sprint subscribers, and, moreover, would result in price increases for prepaid subscribers of both Sprint and T-Mobile.
- IKK estimate marginal cost efficiencies that, under the IKK merger simulation model, would result in significant retail price increases for Sprint subscribers (postpaid and prepaid).
- The Applicants' claimed marginal cost efficiencies are insufficient to offset the vertical upward pricing pressure induced by the merger, indicating that the merger would cause wholesale prices to increase even when efficiencies are accounted for.
- The marginal cost efficiencies estimated by IKK are vastly overstated due to reliance on unrealistic network modeling assumptions.
  - The Applicants' 5G network model calculates the sectors which, if left unaddressed, will experience congestion. The model then prioritizes incremental solutions (based on cost) in order to relieve congestion. The costs of these solutions are the basis for estimating marginal costs for the standalone Sprint and T-Mobile, as well as the marginal costs for New T-Mobile. The level of congestion is driven by both demand and spectrum resources.
  - As explained in our prior declaration, the Applicants' 5G network model does not include the likely acquisition of millimeter wave spectrum by standalone

Sprint and T-Mobile. This significantly reduces the marginal cost savings calculated by the Applicants' economists. In particular, where IKK reports a range of network-related marginal cost efficiencies of {{BEGIN HCI END HCI}}, we show that {{BEGIN HCI END HCI}} results in network-related marginal cost efficiencies that are just a fraction of the claimed efficiencies, or about {{BEGIN HCI END HCI}}.

- The Applicants' 5G network model inputs for spectral efficiency (of 2.5 GHz spectrum), the costs of 5G upgrades (for New T-Mobile) and the refarming of Sprint's 2.5 GHz spectrum each overstate the merger's marginal cost savings. The level of 5G demand also has a large influence on the merger's marginal cost savings, where the significantly lower demand levels used by IKK (than the levels of demand projected by Ray) drive lower marginal cost savings.

- Applying the adjusted marginal cost efficiencies to the IKK merger simulation model results in likely price increases across all segments for both the Sprint and T-Mobile brands.

- IKK's critical quality efficiency threshold is insufficient to make up for the price increases that are predicted by their model. Sprint customers are predicted to suffer harm from merger-related price increases under IKK's critical quality thresholds. Additionally, IKK's assessments of consumer valuations of the merger's alleged network quality improvements are unreliable and, in any event, insufficient to offset harm resulting from the merger.

- Regarding the potential for coordinated effects, the merger increases the likelihood that the three leading firms – AT&T, Verizon and New T-Mobile – will have a much higher incentive to engage in coordinated pricing than exists absent the merger. New T-Mobile would be expected to abandon T-Mobile's historical maverick strategy (to gain market share) and instead exploit the increased market power from the merger to focus on short-term profits (given that it will have a market share in line with AT&T and Verizon).

- The CPPI is a relevant tool for assessing the potential increase in incentives to collude resulting from the merger.

- Even if merger efficiencies were sufficiently large so as to neutralize the (unilateral) upward pricing pressure induced by the merger, the merger would still significantly increase the incentives for collusion in the market for mobile voice/broadband services.

- The Applicants' economists, IKK, rejected the network usage projections put forth by Ray and replaced those projections with significantly reduced user demands. These lower demands applied to the Ray model significantly reduce the carried traffic. In addition, by putting much less pressure on the network than the level it was

apparently designed for, the reduced demand assumptions significantly reduce the networks' marginal cost estimates, and generally boost marginal cost savings.

- The Applicants' revised network model shows that each standalone company will have significantly more capacity than the Applicants had originally estimated, and also shows that neither standalone company will experience congestion in any of the years estimated by the model except in a very small percentage of sectors.
- The Applicants' 5G models are artificially spectrum constrained. Modestly relaxing the spectrum constraint significantly reduces the merger related offered capacity increases.
  - Adjusting the Ray model for conservative millimeter wave spectrum acquisitions reduces the predicted merger-related offered capacity increases in 2024 from {{BEGIN HCI
    END HCI}}.
  - Refarming just an additional 20 MHz of 2.5 GHz spectrum in the standalone Sprint network model reduces the 2024 offered capacity increases in the revised Ray models from combining the networks from {{BEGIN HCI
    END HCI}}.
- Finally, the Applicants claims about improved rural coverage are not supported by the incremental sites added to the New T-Mobile network.

## B. Overview of Declaration

Our Declaration is presented in three sections, in addition to this introductory section. In Section II, we show that the merger's unilateral effects will lead to increased prices for consumers and a deterioration of consumer welfare. Much of the calculation of marginal costs are dependent upon the need for expenditures on incremental network solutions to meet 5G demand, so we discuss the structure and deficiencies of the Applicants' network model in Section III. We show that the Applicants' model understates the capacity in the standalone Sprint and T-Mobile networks and overstates the gains in capacity (above the standalone companies) from a New T-Mobile network. Correcting for this significantly reduces the Applicants' claims of marginal cost savings. Finally, we turn to the possibility of coordinated effects in Section IV. There, we show that New T-Mobile will no longer have the incentive to take on a maverick posture and, instead, have an incentive to coordinate pricing with AT&T and Verizon.

# II. The Competitive Effects of the Merger are Significant and the Applicants' Efficiencies Claims are both Overstated and Insufficient to Offset the Likely Price Increases Resulting from the Merger

As we indicated in *HBVZ*, assessment of the unilateral effects of the Sprint/T-Mobile merger focuses ultimately on the merger's effects on consumer prices and welfare, as approximated by estimates of upward pressures on prices. In our initial declaration, we presented modeling forecasts based on public information, which demonstrated likely price effects of approximately 5% to 9% for the Applicants' postpaid subscribers and approximately 3% to 16% for the Applicants' prepaid subscribers.[6] This was driven by the upward pricing pressure induced by the loss of competition between the Applicants' products, before consideration of any cost efficiencies that might be passed-through to subscribers.

We have reviewed the report by the Applicants' economists Mark Israel, Michael Katz, and Bryan Keating and find that the Applicants' data on diversion and profit margins indicate substantially higher upward pricing pressure than we had found in *HBVZ*, and therefore price increases before consideration of cost efficiencies are also substantially higher than those we described in *HBVZ*. Specifically, we find that, using IKK's modeling and data inputs, prices would increase by approximately **{{BEGIN HCI END HCI}}** for the Applicants' postpaid subscribers and approximately **{{BEGIN HCI END HCI}}** for the Applicants' prepaid subscribers. Across segments, Sprint prices would increase by approximately **{{BEGIN HCI END HCI}}** and T-Mobile prices would increase by approximately **{{BEGIN HCI END HCI}}**. These figures rely on the Applicants' survey data to inform diversion ratios; if they had used porting data instead, the price increases would have been approximately 50% larger, with Sprint prices increasing by approximately **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** and T-Mobile prices increasing by approximately **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}**. In subsection A below, we provide further details on the price increase effects that are embedded in the IKK modeling and data.

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[6] HBVZ Declaration, Table 1.

In contrast to the approach taken in our initial declaration, the IKK declaration does not directly present the increased prices that their model would predict to result from a merger of Sprint and T-Mobile. Instead, IKK purport to show that the merger will create marginal cost and quality efficiencies that are sufficiently large that the aggregate welfare change across the collection of Sprint and T-Mobile subscribers will be neutral. Specifically, IKK combine non-network and network-related marginal cost efficiencies, with values ranging from **{{BEGIN HCI**

**END HCI}}** per subscriber per month, depending on the brand and segment.[7] There are at least two concerns with this analysis. The first is that we would question the appropriateness of applying an aggregate welfare standard across all consumers in a market. We show, in subsection B below, that IKK's own model (including all claimed efficiencies) results in price increases for current Sprint customers. That is, the gains for T-Mobile customers (that IKK predict) come at the expense of Sprint customers. We argue that the relevant merger policy standard is that the merger not raise prices for any customer segments of the market.

Second, we demonstrate that, consistent with our findings that the Applicants' network capacity improvements are significantly overstated, their calculated marginal cost efficiencies are similarly overstated. In particular, where IKK reports a range of network-related marginal cost efficiencies of **{{BEGIN HCI END HCI}}** per subscriber per month,[8] we show that adjusting the network modeling millimeter wave assumptions results in network-related marginal cost efficiencies that are just a fraction of the claimed efficiencies, or about **{{BEGIN HCI END HCI}}** per subscriber per month, and that further adjustments to the network modeling cause the efficiencies to decline even further. Under these adjusted marginal cost efficiencies, the IKK modeling would predict price increases for all of the Applicants' brands and segments. Subsection B below discusses these findings in further detail.

## A. Pricing Effects Based on IKK Data and Merger Simulation Modeling

In the discussion below, we first examine the retail price forecasts that are present in the IKK merger simulation model before consideration of marginal cost efficiencies and show that these

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7 See IKK Declaration, Table 12.

8 See IKK Declaration, Table 12. For comparison purposes to the changes in the network modeling, we omit the claimed roaming savings of approximately $1.00 per subscriber per month for Sprint postpaid.

substantially exceed the values presented in *HBVZ*. We then present critical cost efficiencies and implied price forecasts based on porting data diversion information, which reveal yet higher price effects from the merger than what are implied by the IKK model. Finally, with regard to the IKK model's implications for price effects, we show the effects on wholesale prices that are embedded in the IKK merger simulation, none of which was overtly discussed in the IKK report.

# 1. Retail Market

IKK state that their merger simulation model is "more conservative" than the models described in *HBVZ*, at least insofar as (implied) critical cost efficiency thresholds are concerned (and where "conservative" is defined such that the Applicants' model predicts greater merger harm).[9] As we discuss in more detail below, this "conservatism" has more to do with the profit equation than the demand system, since it includes the value of diversion across product segments semi-additively (and whereas the discussion in *HBVZ* focused on the prepaid and postpaid segments in isolation).

However, the IKK claims of "conservatism" are likely overstated for at least two reasons. First, the nested-logit demand model is not necessarily "more conservative" than the models presented in *HBVZ*. In particular, although the nested logit demand system will tend to yield greater price effects (all else equal) in comparison to the Antitrust Logit Model ("ALM"), it will not necessarily show greater price effects than the Proportionally Calibrated Almost Ideal Demand System ("PC-AIDS") (even absent the extra upwards pricing pressure from combining product segments). Second, IKK use diversion information that, while greater than either the "proportional to shares of subscribers" and "share of gross additions" data considered in *HBVZ*, is less than the diversion ratios observed in porting data.

## *a. Retail price forecasts in the IKK Nested-Logit model*

Table 1 of our initial declaration provided a summary of price change forecasts for the prepaid and postpaid segments of Sprint and T-Mobile. With the two segments analyzed separately, we calculated postpaid price forecasts of 4.6% to 5.0% for the ALM and 8.5% to 9.1% for PC-AIDS. And we calculated prepaid price change forecasts of 2.8% to 7.3% for the ALM and 8.2% to 15.5% for PC-AIDS. Although IKK do not show the relevant figures, the merger simulation

[9] See, *e.g.*, IKK Declaration, ¶¶ 6, 29, 32-36.

model that they employ, with nested-logit demand and multiproduct firms, can also output price forecasts (both with and without marginal cost efficiencies). Table 1 below shows the results of the IKK merger simulation model before consideration of any marginal cost efficiencies,[10] which can be interpreted as a target level of price increases resulting from the merger that would require marginal cost and other efficiencies to eliminate or offset.

**Table 1: Retail Price Changes Associated with IKK Nested-Logit Model before Marginal Cost Efficiencies**

{{BEGIN HCI

END HCI}}

Sources and Notes: Calculations based on IKK Backup Materials for Merger Simulation.

As shown in Table 1, the price forecasts of the IKK merger simulation model are considerably greater than the results we reported for the single-product ALM in *HBVZ*. For example, on average the price increase across brands and segments under the ALM was more than 4%, while the average price increase across brands and segments under the IKK merger simulation model is more than {{BEGIN HCI END HCI}} the ALM forecast.[11]

The IKK merger simulation forecasts are not, however, uniformly greater than the results we reported for the single-product PC-AIDS model. For example, Sprint postpaid prices are forecasted to increase by {{BEGIN HCI END HCI}} under the IKK merger

[10] The corollary scenario in the IKK report is Table 2, row 1.

[11] HBVZ Declaration, Table 1.

simulation model, whereas the PC-AIDS model predicted a 9.1% price increase.[12] Yet, for T-Mobile, postpaid prices are forecasted to increase by {{BEGIN HCI END HCI}} under the IKK merger simulation model, whereas the PC-AIDS model predicted a slightly higher price increase of 8.5%.[13] Likewise, for prepaid plans, the PC-AIDS forecasts are slightly higher than the IKK merger simulation forecasts for Sprint and slightly lower for T-Mobile.[14]

Why do the IKK merger simulation results differ so much between the ALM model presented in *HBVZ* and the nested logit model presented in the IKK Declaration? There are three key differences. First, the model presented by IKK considers the fact that the Applicants offer both postpaid and prepaid products, which will lead to greater price effects relative to the *HBVZ* merger simulations.[15] Second, IKK use the Applicants' own information on subscriber costs to estimate margins across segments, which will affect both the value of recaptured sales and the model's estimate of subscriber price sensitivity. Finally, IKK use different diversion information compared to the merger simulations in *HBVZ*. In our first report, the diversion in the ALM model is implicitly proportional to market shares (separately for each segment). In contrast, IKK's nested logit model is calibrated to the diversion information as calculated from the Harris Mobile Insights Survey for January - April 2018 ("Harris Survey"). Because the Harris Survey diversion ratios exceed the values calculated based on shares alone (*i.e.*, Sprint and T-Mobile are closer substitutes than their share data alone would suggest),[16] the value of recaptured sales will be greater in the IKK merger simulations, leading to higher price effects.

IKK suggest that the Harris Survey, which provides greater brand- and segment-level detail, should be used instead of porting data.[17] Although they calculate different diversion ratios based on the Harris survey data than what is calculated based on actual porting data, they do not provide sufficient support for the Harris survey being superior aside from that which may be

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[12] HBVZ Declaration, Table 1.

[13] HBVZ Declaration, Table 1.

[14] HBVZ Declaration, Table 1.

[15] In the IKK merger simulations, the carriers choose optimal prices jointly for postpaid and prepaid products. In comparison to the merger simulation models in *HBVZ*, where these segments are considered independently, joint optimization will account for the greater value of recaptured sales for an increase in price of any given product, and the greater the value of recaptured sales, the greater the price increases following a merger.

[16] See IKK Declaration, Table 28.

[17] IKK Declaration, ¶¶ 175-176.

inferred from its greater brand and segment detail. In fact, we do not have sufficient information about the survey's design or execution to evaluate such critical aspects as its sampling techniques, if its sample size is sufficient, if its questions are unambiguous, or whether its approach of asking about switching in the past year is sufficient or appropriate.

More importantly, IKK justify the use of the Harris survey diversion information on grounds that the share of "switch-ins" in the Harris survey data more closely align with the share of gross adds, whereas the share of "port-ins" in the porting data "systematically overstate Sprint and T-Mobile switches relative to total gross additions and deactivations."[18] There is, however, no reason to see the proposed condition of similar shares as either necessary or sufficient for reliable determination of diversion. As Commission Staff described in the AT&T/T-Mobile merger review, "…diversion ratios based on market shares only track true diversion ratios to the extent that the second choices of customers are proportional to first choice."[19] The relevant inquiry is not whether Sprint and T-Mobile are over- or under-represented as a share of "port-ins" versus gross additions, but whether Sprint and T-Mobile are closer substitutes to each other than mere substitution proportional to share would indicate. In their review of the AT&T/T-Mobile merger, FCC Staff determined that diversion information from porting data provided relevant evidence that customers substituted between the merging parties at a rate greater than proportional to their share of gross additions, and consequently dismissed those Applicants' submissions based on gross additions.[20] The matching to share of gross additions is, we believe, an irrelevant test.

### *b. Price Forecasts and Marginal Cost Efficiency Thresholds under Porting-Data Diversion Information*

In *HBVZ*, in addition to our segment level analyses, we presented an "all connection" analysis of price pressure tests based on porting data, where we documented diversion ratio estimates of **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** from Sprint to T-Mobile and **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** from T-Mobile to Sprint, which was combined with margin and price information across all connections to calculate Gross Upward Pricing Pressure Index ("GUPPI") values of approximately **{{BEGIN NRUF/LNP HCI END**

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18 IKK Declaration, ¶ 176.

19 FCC Staff Report, Appendix C at ¶ 12.

20 FCC Staff Report, Appendix C at ¶ 12.

NRUF/LNP HCI}} for both brands.[21] IKK have also considered the porting data as a potential source of diversion information, which they summarize in Table 28 of their technical appendix.[22] As the Commission Staff have previously indicated, porting data is a reliable data source summarizing diversion in the mobile voice/broadband services market.[23]

We have updated our "all connection" analysis, based on porting-data based diversion calculations, to include Compensating Marginal Cost Reductions ("CMCRs") and price forecasts, which are reflected in Table 2 below.[24]

**Table 2: CMCR and Price Increases**
**Based on IKK Inputs and Porting Diversion**
**($/Subscriber/Month)**
{{BEGIN NRUF/LNP HCI

END NRUF/LNP HCI}}

Sources & Notes:
IKK Tables 25, 26, 28. Table 1 and Table 4. IKK Backup Materials - Maintain Usage Inputs.

[21] HBVZ Declaration, pp. 46-47, Table 19. See also Farrell, Joseph and Carl Shapiro. "Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition." *The BE Journal of Theoretical Economics* 10 no. 1 (2010).

[22] IKK Declaration, ¶¶ 173-178, Table 28.

[23] FCC Staff Report, ¶ 55.

[24] Table 2 also incorporates the pricing and margin information in IKK Tables 25 and 26, respectively.

Local Number Portability ("LNP") Diversion Ratios are weighted to exclude diversion to MVNOs.

CMCR values based on single-product ownership following Werden, Gregory J. "A Robust Test for Consumer Welfare Enhancing Mergers Among Sellers of Differentiated Products." *The Journal of Industrial Economics* (1996): 409-413.

CMCR ($) and Price Increase ($) are $/Subscriber/Month.

As shown in Table 2, the marginal cost efficiencies (or CMCRs) required to eliminate this upward pricing pressure are significantly greater than the critical marginal cost efficiency thresholds presented in IKK (and reproduced in Table 4 below).[25] On a percentage basis, the Applicants would need to realize cost efficiencies ranging from approximately **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** (*i.e.*, they would need to reduce costs by approximately **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** their current marginal costs). On a dollar basis, the Applicants would need to realize cost efficiencies ranging from **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** in order to potentially offset the upward pricing pressure resulting from the merger, or more than **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** than the critical efficiencies that IKK reported when using the Harris data diversion instead of porting data diversion.[26] Thus, porting-data based diversion reveals critical cost efficiencies that are more than **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** than the critical efficiencies that IKK inferred from the *HBVZ* analysis,[27] and far in excess of the efficiencies that IKK claim the merged firm will be able to achieve.[28]

Finally, the price effects (before efficiencies) shown in Table 1, when combined with the CMCRs associated with the same diversion and margin information, provide a measure of the implied pass-through rates in IKK's nested logit model (*i.e.*, the rate at which a change in marginal costs would be passed through to subscribers in the form of lower or higher subscription prices). The CMCR values in Table 2 can be combined with this pass-through rate information to predict possible price effects based on the porting data diversion. These values are shown in bottom of Table 2, with price increases of approximately **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** for Sprint and **{{BEGIN NRUF/LNP HCI END NRUF/LNP HCI}}** for T-Mobile.

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[25] See IKK Declaration, Tables 12 and 14.

[26] See Table 2.

[27] See IKK Declaration, Table 1.

[28] See IKK Declaration, Tables 12 and 14.

# 2. Wholesale Market

In *HBVZ*, we presented an analysis of the wholesale market for providing facilities-based coverage to resellers such as MVNOs. We found that the vertical upward pricing pressure, without input substitution, was 26.8% for T-Mobile and 55.4% for Sprint.[29]

The Salop and Sarafidis reply introduces the distinction of the vGUPPIu, which measures the increases in incentives by upstream firms to raise intermediate prices (such as the incentives of T-Mobile to raise the wholesale price paid by TracFone) following a vertical merger, and the vGUPPIr, which measures the incentives of the downstream firm to raise final, downstream (wireless subscription) prices as a result of experiencing a wholesale price (input cost) increase (*i.e.*, the vGUPPIr would measure the incentives of TracFone to raise subscription prices following a wholesale price increase by T-Mobile).[30] The vGUPPI calculations in *HBVZ*, and in this reply, are vGUPPIu calculations and are not vGUPPIr calculations. While we generally agree with the proposition that merger review should examine effects on downstream prices, we assert that merger reviews should also examine effects on intermediate prices. We have presented calculations that show that the merger is likely to result in significant increases in wireless subscription prices. In addition, the vGUPPI (*i.e.*, vGUPPIu) analysis indicates that wholesale prices are likely to increase,[31] and in fact the IKK merger simulations simply assume that wholesale prices increase based on the vGUPPI.[32]

Moreover, we strongly disagree with the statement in the Salop and Sarafidis reply that "[p]ut simply, even if New T-Mobile engaged in input foreclosure, [*HBVZ*'s] (corrected) analysis shows that TracFone's *input costs* would rise by a de minimis amount" (emphasis added).[33] Salop and

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29 See HBVZ Declaration, Table 25.

30 Salop and Sarafidis Reply Declaration, ¶ 49.

31 See Table 3.

32 IKK Declaration, ¶¶ 19, 37; IKK Merger Simulation.

33 Salop and Sarafidis Reply Declaration, ¶ 49. Salop and Sarafidis also ignore Sprint's vertical upwards pricing pressure vis-à-vis its resellers, noting instead that because Sprint has a modest relationship with TracFone, its vertical upwards pricing pressure toward TracFone is irrelevant (Salop and Sarafidis Reply Declaration, ¶ 48 at footnote 69). This may be true, but it is also irrelevant insofar as Sprint would have increased incentives to raise wholesale prices for its reseller affiliates. In contrast, the IKK merger simulations do recognize the potential for wholesale price increases between Sprint and its resellers.

Sarafidis identify a "vGUPPIu" of 5.5% for T-Mobile's wholesale prices to TracFone (under input substitution).[34] And, as indicated above, they do not dispute the vGUPPI without input substitution calculation in *HBVZ*, a value of 26.8% for T-Mobile.[35] Neither value qualifies as "de minimis." To the extent that the Applicants' economists may have been considering as "de minimis" the 0.18% value they calculate for the vGUPPIr for TracFone's *subscription prices*, it is unrelated to the statement regarding TracFone's *input costs*, and in any event, the vGUPPIr is not a forecast of the merger's effects on wireless wholesale prices.[36]

In addition, Salop and Sarafidis argue that the merger-induced incentives to raise wholesale prices must account for cost efficiencies.[37] Yet none of the Applicants' economists present the results of vGUPPI calculations based on the Applicants' data, whether with or without comparison to any cost efficiencies. In Table 3 below, we present revised vGUPPI (or, in the Moresi and Salop nomenclature,[38] "vGUPPIu") calculations under both substitution scenarios (with and without input substitution), based on the Harris Study diversion ratios, margin, and price information contained in the IKK report. To the extent that efficiencies should be considered, they can be compared directly against the vGUPPI values below (such calculations are presented in subsection B of this report).

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[34] Salop and Sarafidis Reply Declaration, ¶ 48.

[35] HBVZ Declaration, Table 25.

[36] {{BEGIN HCI

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[37] Salop and Sarafidis Reply Declaration, ¶ 49.

[38] Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring Unilateral Pricing Incentives in Vertical Mergers." *Antitrust LJ* 79 (2013): 185-214.

**Table 3: vGUPPI Calculations with IKK Merger Simulation Inputs (2021)[39]**
**($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Sources: Prices, margins, shares obtained from IKK Backup Materials, Maintain Usage Inputs. Diversion ratios are based on IKK Harris Diversion Ratios estimates (see IKK Table 28 and IKK Backup Materials), are calculated for all carriers and segment, and include diversion to an outside good.

Notes: Calculation is outlined in Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring Unilateral Pricing Incentives in Vertical Mergers." *Antitrust LJ* 79 (2013): 185. $E_{sr}$ and $E_p$ are approximated as outlined in Moresi and Salop (2013). More detailed calculations are in Appendix A.

As shown in Table 3, the vGUPPI for T-Mobile's wholesale prices with TracFone are {{BEGIN HCI END HCI}} without input substitution and {{BEGIN HCI END HCI}} with input substitution. For Sprint's wholesale prices with its resellers, the vGUPPI values are {{BEGIN HCI END HCI}} without input substitution and {{BEGIN HCI END HCI}} with input substitution.[40] The smaller vGUPPI values associated with input substitution would translate to vertical upward pricing pressure of {{BEGIN HCI END HCI}} for TracFone and {{BEGIN HCI END HCI}} for Sprint's resellers.[41] Without input substitution, these values are {{BEGIN HCI END HCI}} for T-Mobile's wholesale prices with TracFone and {{BEGIN HCI END HCI}} for Sprint's wholesale prices with its resellers.

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[39] Calculating the vGUPPI using approximations outlined in Moresi and Salop (2013) requires the downstream rival's pass-through rate. {{BEGIN HCI

END HCI}} Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring unilateral pricing incentives in vertical mergers." *Antitrust LJ* 79 (2013): 185-214.

[40] To the extent that Sprint resellers have fewer options to affiliate with alternative MNOs when faced with wholesale price increases, the calculation of vGUPPI with input substation may be irrelevant.

[41] Calculated as wholesale price multiplied by the relevant vGUPPI.

# B. Efficiencies Claims

The Applicants' economists claim that the benefits associated with combining Sprint and T-Mobile will be sufficient to offset any merger induced harms. They present the following sequential argument:

1. Mergers that combine products with positive diversion and positive profit margins will exhibit upward pricing pressure on the merging firms' products.
2. This upward pricing pressure can be offset by marginal cost efficiencies achieved by the merger, and a critical value of such merger-related efficiencies can be calculated (*i.e.*, the critical value is the break-even level of efficiencies that "given the impact of the loss of competition between the Parties, would still result in the transaction's having a neutral effect on consumer welfare").[42]
3. To the extent that merger-related marginal cost efficiencies do not exceed the cost-efficiency threshold, there may be residual upward pricing pressure (*i.e.*, prices would be predicted to increase following the merger). These price increases, absent any remaining benefits of the merger, would be harmful.
4. The merged firm's customers also value any quality improvements that are achieved as a result of the merger, and a critical valuation of such quality improvements can be calculated that would just offset any merger-related price increases (after accounting for any marginal cost efficiencies).
5. Valuations of these quality improvements can be compared against the quality valuation thresholds, and if these calculated valuations exceed the thresholds, the merger would benefit consumers. Conversely, if it did not, then the merger would harm consumers.

In an attempt to prove their case, the Applicants' economists focus exclusively on steps 2 through 5 above. (They acknowledge point 1, but never show these values; we reported the upwards pricing pressure induced by this merger in Table 1). IKK present their calculated critical merger efficiencies in Table 2 of their report, which range (in their baseline model) from **{{BEGIN HCI** **END HCI}}**, depending on the year considered. They then combine non-network and network-related marginal cost efficiencies, with values ranging from **{{BEGIN HCI** **END HCI}}**,[43] depending on the

[42] IKK Declaration, ¶ 44.

[43] IKK Declaration, Table 12.

brand and segment considered.[44] In subsection 2 below, we challenge these merger efficiency claims and demonstrate that, consistent with our findings that the Applicants' network capacity improvements are significantly overstated, their calculated marginal cost efficiencies are similarly overstated.

In addition, to the extent the marginal cost efficiencies claimed by the Applicants are insufficient to eliminate the merger's upward pricing pressure in some of their reported scenarios, IKK calculate critical quality improvement valuation thresholds in Tables 16-17. Based on their claimed marginal cost efficiencies, many, but not all, of the scenarios would implicitly result in merger-related price decreases on a per-capacity unit basis. In those cases with insufficient marginal cost efficiencies to offset the merger's upward pricing pressure, IKK calculate critical quality improvement valuation thresholds ranging from {{BEGIN HCI END HCI}}. They then present analyses purporting to demonstrate that the merger-related improvements in network quality (*e.g.*, increased throughput following the results of the Applicants' network modeling) would likely be valued by wireless customers at values that exceed the critical quality valuation thresholds. For example, in IKK Tables 20-21, they present calculations of willingness to pay for the claimed network improvements that range from {{BEGIN HCI END HCI}}. We consider the implications of these efficiencies claims and the extent to which they actually offset harm. We also consider how these efficiencies claims compare to revised quality thresholds that account for IKK's overstatement of the marginal network cost efficiencies.

[44] As we elaborate further below, the claimed merger efficiencies are not immediately comparable to the critical efficiency thresholds in IKK Table 2 because IKK do not report brand/segment-specific critical efficiencies. This omission does not allow for immediate assessment of whether the claimed efficiencies for each specific brand/segment products would be sufficient to eliminate the merger's upward pricing pressure.

# 1. Critical Efficiency Thresholds

IKK explain that any upward pricing pressure calculations as induced by the Sprint/T-Mobile merger must also account for possible merger-related marginal cost efficiencies.[45] They present a *nested logit* demand model, which they use to calculate critical marginal cost efficiency thresholds such that, if the merger's marginal cost efficiencies exceed these thresholds, consumer welfare will increase.[46] This approach to consideration of marginal cost efficiencies for merger review policy fails to consider whether the resulting market outcomes are "Pareto improving." A Pareto improving outcome is one that generates at least some economic benefits from the merger while causing no harm to any subscribers. For example, if the cost efficiencies for both Sprint and T-Mobile subscribers (and across all segments) were sufficiently great that no subscribers experienced price increases, the merger would be a Pareto improvement. However, if the result of the merger was such that Sprint subscriber prices increase while T-Mobile subscriber prices decrease, then Sprint subscribers would be harmed even as T-Mobile subscribers benefit. In other words, the gains that T-Mobile subscribers would enjoy come at the expense of Sprint subscribers. This outcome is not Pareto improving, even if, in the calculus of (aggregate) consumer welfare analysis, the benefits to T-Mobile subscribers are equal to or exceed the harm suffered by Sprint subscribers. In effect, the harm to Sprint subscribers would be subsidizing the gains to T-Mobile subscribers. This is, in fact, what happens in the IKK merger simulation model under the Applicants' claimed efficiencies—Sprint prices are predicted to increase and T-Mobile prices decrease. The critical marginal cost efficiency threshold determined by IKK would also similarly harm some of the Applicants' subscribers while benefitting others.[47]

There is a simpler solution to the problem of identifying the conditions needed to ensure that a merger does not harm consumers: calculate the critical cost efficiency thresholds *for each product* that ensure that the merger does not lead to increased prices for any consumer. This concept is well-documented in the antitrust literature and has an added beneficial feature that, because prices are not supposed to change following a merger that achieves these critical

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45 See, *e.g.*, IKK Declaration, ¶ 2.

46 IKK Declaration, ¶¶ 31, 44.

47 At the solutions shown in Table 2 of the IKK report, Sprint prices would generally increase while T-Mobile prices would generally decrease (further details are provided below). Solutions along the critical efficiency frontier shown in Figure 2 would result in potential reversals of this pattern.

marginal cost efficiency thresholds, such threshold values are invariant to the demand system.[48] In the antitrust literature, this is generally referred to as the CMCR, a nomenclature that we adopt for the remainder of this report.

Why then does the IKK nested-logit model yield different CMCRs than those calculated under the demand systems (ALM and PC-AIDS) that were employed in *HBVZ*? The difference is not the demand system, per se, but the acknowledgement in the IKK merger simulation profit equations that Sprint and T-Mobile are multiproduct firms with margins that vary by brand/segment (*e.g.*, prepaid, postpaid, or wholesale sales to MVNOs or resellers). It is unsurprising, then, that the CMCRs calculated by IKK exceed those implied by *HBVZ* because the *HBVZ* model considers the two main product segments separately. This is discussed further below.

The *Antitrust* software package developed by the U.S. Department of Justice provides a simple procedure for calculating CMCRs that can accommodate multiproduct firms, and requires as inputs the diversions among the products and the corresponding margins.[49] Table 4, below, presents the corresponding CMCRs for each of Sprint's and T-Mobile's products, as well as share-weighted aggregate values that can be used for comparison to the critical marginal cost efficiency values reported in IKK Table 2.

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[48] That is, all else equal, one should expect the same threshold value calculations regardless of the underlying demand system, whether it has relatively flat curvature like the ALM or relatively steep curvature like PC-AIDS. See Werden, Gregory J. "A Robust Test for Consumer Welfare Enhancing Mergers Among Sellers of Differentiated Products." *The Journal of Industrial Economics* 44, no. 4 (1996): 409-413.

[49] This software package is freely available and is located at https://cran.r-project.org/web/packages/antitrust/index.html.

**Table 4: Compensating Marginal Cost Reductions Required to Offset Merger-Induced Price Increases**

{{BEGIN HCI

END HCI}}

Sources & Notes:

IKK Backup Materials, Merger Sim – Maintain Usage for Margins, Prices. Diversion ratios are based on IKK Harris Diversion Ratios estimates (see IKK Table 28 and IKK Backup Materials), are calculated for all carriers and segment, and include diversion to an outside good.

Sprint Prepaid Prices and Margins are weighted averages of Sprint Prepaid and Boost.

T-Mobile Prepaid Prices and Margins are weighted averages of T-Mobile Prepaid and MetroPCS.

"Combined" calculations are weighted averages by shares.

CMCR ($) = CMCR (%) x Marginal Costs, where Marginal Costs = Prices x (1 - Margins).

CMCR ($) is $/Subscriber/Month.

As shown in Table 4, the multi-product CMCRs that we calculate are, after (share-weighted) aggregation across brands and segments, very close to the critical cost efficiency threshold values reported by IKK. In addition, however, we also calculated CMCRs on a disaggregate basis for each of the prepaid and postpaid segments for Sprint and T-Mobile. As shown above, analysis at this level reveals that, in general, the CMCRs for Sprint exceed those of T-Mobile, and the CMCRs for prepaid exceed those of postpaid. This contrasts sharply with the marginal cost efficiency thresholds calculated by IKK, which are equal for each of the Applicants' brands and segments, and, therefore, insufficient to offset price increases in those instances where the CMCR exceeds the IKK threshold value.

### *a. The Applicants' claimed marginal cost efficiencies fail to offset incentives to raise prices created by the merger*

We have also examined whether the claimed marginal cost efficiencies in IKK Tables 12 and 14 are sufficient to offset the price effects of the merger. We find that, even crediting IKK's reported marginal cost efficiencies as accurate (which we challenge below), the claimed marginal cost efficiencies are below the CMCR thresholds in a sizable number of instances. In Table 5 below, we report the differences between the CMCRs and IKK's claimed marginal cost efficiencies.

**Table 5: Compensating Marginal Cost Reductions Minus Claimed Efficiencies ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Sources: Table 4 and IKK Tables 12, 14.
Maintain Usage Restrictions: Table 4 - IKK Table 12.
Relax Usage Restrictions: Table 4 - IKK Table 14.

As shown in the table, the Applicants' claimed marginal cost efficiencies for both the prepaid and postpaid segments for Sprint would be insufficient to offset the merger's upward pricing pressure. (Positive values in Table 5 indicate that marginal cost savings are less than upward pricing pressure.) In 2021, under the "maintain usage restriction" case, in which subscribers are assumed to use a much lower amount of gigabits than assumed in the Revised Network Model submitted by Neville Ray ("Ray Network Model"),[50] the CMCR for Sprint postpaid products exceeds IKK's claimed efficiencies by {{BEGIN HCI END HCI}}. Under the "relaxes usage restrictions" case in 2021, in which subscribers use more gigabits per month (equal to the levels in the Ray network model), the CMCR exceeds IKK's claimed efficiencies by {{BEGIN HCI END HCI}}. The difference is wider still for Sprint prepaid products in

[50] See Table 16 for usages assumed in Ray Network Model.

2021 under the "relaxes usage restrictions" case, where the CMCR exceeds the claimed efficiencies by {{BEGIN HCI END HCI}}. These differences cover a range of {{BEGIN HCI END HCI}} across Sprint's product segments and across years, depending on the usage-restriction scenario considered. For T-Mobile, with some exceptions, the claimed cost efficiencies typically exceed the CMCR across scenarios, years, and segments.

We provide projected changes in retail prices using IKK's merger simulation model and their claimed marginal cost efficiencies (as shown in Tables 12 and 14 in the IKK report) for the "maintain usage restrictions" and "relax usage restrictions" cases in Table 6 below. Projected price changes are shown in percentage terms, with positive signs indicating expected price increases.

**Table 6: Retail Price Changes Associated with IKK Nested-Logit Model and Claimed Marginal Cost Efficiencies under (a) Maintain Usage Restrictions or (b) Relax Usage Restrictions**

{{BEGIN HCI

END HCI}}

Sources & Notes: Pre-Merger prices from IKK Backup Materials. Post-Merger IKK Merger Simulation solutions.

The results of these merger price forecasts are entirely consistent with the CMCR and efficiency comparisons shown in Table 5. As shown in the left panel under the "maintain usage restrictions" scenario, for Sprint, where the claimed marginal cost efficiencies were less than the CMCR threshold, the IKK merger simulation model predicts *price increases* ranging from {{BEGIN HCI END HCI}} for postpaid service and ranging from {{BEGIN HCI END HCI}} for prepaid service. The left panel also shows that the claimed marginal cost efficiencies, if true, would offset the Applicants' incentives to raise T-Mobile prices, with

predicted price decreases of **{{BEGIN HCI END HCI}}** for postpaid service and **{{BEGIN HCI END HCI}}** for prepaid service.

Similar conclusions hold under the "relax usage restrictions" scenario, shown in the right panel. After accounting for the adjusted marginal cost efficiencies, prices for Sprint's postpaid services would be predicted to *increase* by **{{BEGIN HCI END HCI}}** and prices for Sprint prepaid services would be predicted to *increase* by **{{BEGIN HCI END HCI}}**. For T-Mobile, postpaid service prices would be predicted to decrease by **{{BEGIN HCI END HCI}}** and prepaid services prices would be predicted to decrease by **{{BEGIN HCI END HCI}}**, depending on the year considered.

These results also highlight an important potential area of concern with the IKK critical efficiencies analysis: conducting their analysis at an aggregate level masks the variances in results across brands and segments. That is, even assuming IKK's claimed levels of marginal cost savings, the prices for Sprint brands and segments are expected to increase substantially over each year in the 2021-2024 timeframe. In this manner, the mechanism by which aggregate consumer welfare losses are minimized is through balancing the harm from the merger to Sprint subscribers with the potential (claimed) benefits of the merger to T-Mobile subscribers. Even though aggregate consumer welfare may help to inform merger review policy, it is not a sufficient condition, since, as occurs in the IKK merger model with all of the claimed efficiencies, the price outcomes are not Pareto efficient.

### *b. The Applicants' claimed quality efficiencies fail to offset the harm created by price increases predicted under their own assumptions*

Similar to their marginal cost efficiencies analysis, IKK calculate critical quality efficiency thresholds such that, if (given a level of marginal cost efficiencies) subscribers value the improvement in quality at least as much as the threshold value, aggregate consumer welfare would not decrease following the merger.[51] Again, as in the case of IKK's use of a marginal cost threshold, they calculate a single value that they apply to both Sprint's and T-Mobile's postpaid and prepaid customers.

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[51] Such threshold calculations are shown in Tables 16 and 17 of the IKK report, where the assumed level of marginal cost efficiencies matches the claimed marginal cost efficiencies as calculated by IKK (see Tables 12 and 14 of the IKK report).

As we showed above, IKK's claimed marginal cost efficiencies result in price decreases for T-Mobile and price increases for Sprint.[52] To the extent that the *aggregate* consumer welfare (across all Sprint and T-Mobile subscribers) is reduced at these price changes, the critical quality threshold that IKK calculate would be positive.[53] Under IKK's approach, regardless of the usage restriction scenario, Sprint subscribers are worse off following the merger. This means that the quality efficiency thresholds calculated by IKK are insufficient to make up for the price increases projected to be realized by Sprint customers. That is, Sprint subscribers would continue to be harmed even after taking quality adjustments into account.

Despite the disparities between Sprint and T-Mobile customers, IKK rely on the calculated critical quality thresholds as a basis for comparison for their assessment of the claimed improvements in network quality resulting from the merger. For this comparison, IKK derive an estimate of the "willingness to pay" by Sprint and T-Mobile subscribers for the increase in network throughput (*i.e.*, speed) that allegedly results from the merger. If the willingness to pay for the claimed quality improvement exceeds the threshold value, then IKK claim that *on net*, the merger benefits consumers. *On net*, however, is a broad-reaching caveat and does not account for the fact that Sprint subscribers are projected to be harmed by the merger. Offsetting the harm would require correspondingly *larger* increases in their valuation of the network quality improvements, all else equal, while IKK's willingness to pay calculations find *lower* increases in valuation for Sprint. For example, in IKK Table 20, the quality improvement for Sprint is valued at **{{BEGIN HCI END HCI}}** per subscriber per month, compared to T-Mobile subscribers' valuation of **{{BEGIN HCI END HCI}}** per subscriber per month. Against this "benefit" of **{{BEGIN HCI END HCI}}** increase in value of network quality, those Sprint subscribers suffer an increase in prices from the merger of more than **{{BEGIN HCI END HCI}}** per month.[54]

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[52] See Table 6.

[53] The opposite is also true: to the extent that the aggregate consumer welfare (across all Sprint and T-Mobile subscribers) is increased at these price changes, the critical quality threshold that IKK would calculate would be negative.

[54] The ARPU for the Sprint postpaid segment is **{{BEGIN HCI END HCI}}** in 2021, following IKK Report Table 25, and Table 6 shows a price increase of **{{BEGIN HCI END HCI}}** under IKK's claimed efficiencies. This is likely a lower bound, since prices should increase slightly further due to the claimed quality improvement.

We find that there are additional reasons to doubt the reliability of IKK's claimed quality efficiencies, even if IKK's claimed throughput improvements are true (which we dispute in Section III below). IKK relies on an academic study by *Nevo et al.* (2016) that is inapposite, and not applicable, to the case at hand.[55] The Nevo study examines consumer choices of wireline broadband plans and data usage throughout the billing cycle in order to understand demand for data.[56] The Nevo study provides estimates of structural demand parameters for throughput which allows for an assessment of consumer's willingness to pay for residential wireline broadband, a market segment that is quite different from the mobile broadband sector. Also, the throughput speeds in the Nevo study average just 14.68 Mbps for usage based plans and 6.40 Mbps for unlimited plans[57] while the Applicants estimate New T-Mobile to have throughput speeds ranging anywhere from {{BEGIN HCI END HCI}}.[58] Thus, the Nevo study is simply inapplicable to the circumstances associated with this merger review.[59] As such, we conclude that IKK's willingness to pay estimates are inapplicable to the case at hand. We discuss further issues with the quality efficiencies thresholds below.

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55 See, *e.g.*, IKK Declaration, ¶¶ 133-134.

56 Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 411-443.

57 Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 417.

58 IKK Declaration, Table 20.

59 In order to utilize the Nevo study, IKK must contort the Nevo study parameter estimates by rescaling the network modeling throughput values to resemble those in the Nevo study and changing other Nevo study parameters, such as those which determine data usage per user. The choice of which parameters to scale—and which to preserve—is seemingly ad hoc and results in a set of parameter values that make up an exceptionally small proportion of the distribution of the set of consumer types estimated by Nevo. See Appendix A at Section IV for details.

## 2. The Applicants' Marginal Cost Efficiency Claims Are Overstated

The Applicants significantly overstate the marginal cost savings resulting from this merger, largely because they overstate the improvements in offered and carried capacity that result from jointly optimizing Sprint and T-Mobile's combined spectrum deployment. Notably, the Applicants' network modeling did not include any additional millimeter wave spectrum for either the standalone firms or for New T-Mobile over the course of the entire study period. Other omissions in the Applicants' network model also added to this overstatement. These include inaccurate inputs or treatments concerning:

- The Applicants' 5G network model inputs for spectral efficiency (of 2.5 GHz spectrum) to reflect use of Massive MIMO antennas;
- The costs of "5G upgrades" incremental solutions (for New T-Mobile); and
- The refarming of Sprint's 2.5 GHz spectrum.

In Table 7 and Table 8, below, we recreate Tables 12 and 14 of the IKK declaration, replacing the marginal cost savings with the results from revising the Applicants' financial model to account for the acquisition of additional millimeter wave spectrum by the standalone carriers and by New T-Mobile.

**Table 7: Summary of Marginal Cost Savings, Revised IKK Table 12, New T-Mobile Maintains Usage Restriction and LTE/5G Mix ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Source: Brattle Calculations based on IKK Table 12, IKK Financial Backend Model and IKK Revised Network Engineering Model.

Notes: IKK includes roaming efficiencies along with other marginal network cost efficiencies. Network models have been updated to include additional millimeter wave spectrum deployed for 5G.

Table 7 shows the marginal cost efficiencies after adjusting the network model to account for the addition of millimeter wave spectrum, under the scenario where New T-Mobile "maintains usage restrictions" (*cf.* IKK Table 12). As shown in the table, the marginal cost efficiencies shrink to a fraction of the values claimed by IKK. For example, whereas IKK claimed marginal network cost efficiencies of {{BEGIN HCI END HCI}} for Sprint postpaid wireless services in 2021, the adjusted marginal network cost efficiency is just {{BEGIN HCI END HCI}}. Even there, more than {{BEGIN HCI

END HCI}}.[60] Still starker are the reductions in marginal cost efficiencies associated with T-Mobile wireless services. For T-Mobile postpaid

[60] {{BEGIN HCI

END HCI}} See IKK backup materials for IKK Table 12.

service in 2021, IKK's claimed marginal network cost efficiencies were {{BEGIN HCI END HCI}} per subscriber-month. In contrast, the adjusted marginal network cost efficiencies are just {{BEGIN HCI END HCI}} per subscriber-month; in 2024 the corresponding values are {{BEGIN HCI END HCI}} per subscriber-month in the Applicants' model and {{BEGIN HCI END HCI}} per subscriber-month in the adjusted model.

**Table 8: Summary of Marginal Cost Savings, Revised IKK Table 14, New T-Mobile Relaxes Usage Restrictions ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Source: Brattle Calculations based on IKK Table 14, IKK Financial Backend Model, and IKK Revised Network Engineering Model.

Notes: IKK includes roaming efficiencies along with other marginal network cost efficiencies. Network models have been updated to include additional millimeter wave spectrum deployed for 5G.

Table 8 shows the marginal cost efficiencies after adjusting the network model to account for the addition of millimeter wave spectrum, under the scenario where New T-Mobile "relaxes usage restrictions" (*cf.* IKK Table 14). As with the "maintains usage restrictions" scenario, in comparison to the marginal cost efficiencies claimed by the Applicants, the cost efficiencies are seen to be just a fraction of the values in the IKK report. IKK's claimed marginal network cost efficiencies were {{BEGIN HCI END HCI}} for Sprint postpaid wireless services in 2021. The adjusted marginal network cost efficiency is just {{BEGIN HCI END HCI}}, more than

{{BEGIN HCI

END HCI}}. For T-Mobile postpaid service in 2021, whereas IKK claimed marginal network cost efficiencies of {{BEGIN HCI END HCI}} per subscriber-month, the adjusted marginal network cost efficiencies are just {{BEGIN HCI END HCI}} per subscriber per month; in 2024 the corresponding values are {{BEGIN HCI END HCI}} per subscriber per month in the Applicants' model and {{BEGIN HCI END HCI}} per subscriber per month in the adjusted model.

We have also calculated the network marginal cost savings that result from several modeling adjustment scenarios. These include: {{BEGIN HCI

END HCI}}

The effects that each of these adjustments to the network model have upon marginal cost savings under the "maintains usage restrictions" scenario,[63] both individually and in combination, are shown in Table 9.[64]

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[61] Declaration of Peter Tenerelli and Vijay Venkateswaran, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, October 31, 2018.

[62] Declaration of Peter Tenerelli and Vijay Venkateswaran, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, October 31, 2018.

[63] We provide results for the "relax usage restrictions" scenario in the appendix.

[64] Table 9 restricts focus to *network* marginal cost savings, since non-network marginal cost savings would be unaffected by these adjustment scenarios. It also does not consider IKK's estimated roaming cost savings of approximately {{BEGIN HCI END HCI}} for Sprint postpaid service, which is also unaffected by these adjustment scenarios.

**Table 9: Summary of Network Marginal Cost Savings by Adjustment Scenario ($/Subscriber/Month) (Maintains Usage Restrictions)**

{{BEGIN HCI

END HCI}}

Source: IKK Table 12 and Brattle Calculations based on IKK Financial Backend Model and IKK Revised Network Engineering Model.

Notes: IKK also estimate that Sprint will save approximately **{{BEGIN HCI END HCI}}** in reduced roaming costs for its postpaid service. Note that the spectral efficiency adjustment is made to all sectors that deploy 2.5 GHz spectrum. While this may overstate the capacity gain associated with adjusting spectral efficiency for massive MIMO, it will not have any effect on marginal cost because sectors without MIMO **{{BEGIN HCI END HCI}}** In the Sprint stand-alone model, for example, there are **{{BEGIN HCI END HCI}}** sectors in 2021 that face congestion and do not have massive MIMO deployed.

Table 9 shows that the marginal cost savings calculated by IKK are much higher than is the case when simple additions or adjustments are made to the network model. IKK's calculated marginal cost savings for Sprint range from {{BEGIN HCI END HCI}}, depending on the year. By itself, adding millimeter wave spectrum to the standalone and New T-Mobile network models reduces the marginal cost savings to {{BEGIN HCI END HCI}} for Sprint customers and to {{BEGIN HCI END HCI}} for T-Mobile customers.

Each adjustment to the Applicants' network flows through to a significant reduction in marginal cost savings. Combining each of the above four adjustments, the new marginal cost savings are {{BEGIN HCI END HCI}} for Sprint customers and {{BEGIN HCI END HCI}} for T-Mobile customers. This reduction in marginal cost savings is large and significant and materially changes IKK's claimed levels of merger-related efficiencies.

We have also considered the sensitivity of the network marginal cost savings to the assumed level of 5G user demand, as revealed in the reduced demand levels ("maintains usage restrictions") that IKK examine in comparison to the Ray model ("relaxes usage restrictions"). As shown in the IKK declaration, the higher demand level in the Ray model leads to generally lower marginal cost savings.[65]

IKK (and we) presented marginal cost savings on a per subscriber per month basis. Another way to gauge the size of these savings is on a total (present value discounted-) dollar basis, which can be estimated by multiplying the annual marginal cost savings by the number of affected subscribers. We completed this calculation for the network related marginal cost savings. On a total dollar present value basis, the marginal cost savings calculated by IKK amounts to **{{BEGIN HCI END HCI}}**.[66] Applying more accurate inputs into the underlying network model significantly reduces this savings amount.[67]

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**END HCI}}**

Combining these individual adjustments results in a reduction of IKK's initial marginal cost savings by **{{BEGIN HCI END HCI}}**, which is less than the sum of the effects of

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[65] Compare Table 12 ("maintains usage restrictions") to Table 14 ("relaxes usage restrictions") in the IKK Declaration. For example, marginal cost savings for T-Mobile postpaid in 2021 are **{{BEGIN HCI END HCI}}** under the lower demand scenario and **{{BEGIN HCI END HCI}}** in the higher demand scenario.

[66] A discount rate of **{{BEGIN HCI END HCI}}** is used to calculate the present value of these savings, consistent with the Applicants' financial model.

[67] Each of these calculations is performed independently relative to IKK's claimed marginal cost savings.

the adjustments taken individually because of overlapping effects. This would reduce the cumulative value of IKK's claimed level of network related marginal cost savings from **{{BEGIN HCI END HCI}}**

IKK's marginal cost savings calculations are also significantly influenced by the level of demand assumed in the network model. Accordingly, we considered the sensitivity of marginal cost savings to levels of 5G demand. As we discuss further in Section III below, the Applicants' network model **{{BEGIN HCI**

**END HCI}}**.[68] Based on its analysis of network costs, IKK reduced these usage levels by roughly half in its marginal cost savings calculations. The ranges of demand options in the model and the considerable difference between the Applicants' network model and the demand level used by IKK in its marginal cost savings model also indicated the wide range of demand possibilities in projected 5G demand. However, review of the marginal cost savings calculations indicated that relatively lower levels of demand tend to result in higher marginal cost savings (on a net present value basis). Thus, IKK's use of a lower level of 5G demand had the effect of increasing marginal cost savings compared to if they had used the higher demand levels included in the Ray network model.

## 3. Adjusted Marginal Cost Efficiencies are Insufficient to Offset the Merger's Price Effects

Using the adjusted network model input has a significant effect on the calculation of the difference between the CMCRs and the marginal cost efficiencies. As shown above, adding millimeter wave spectrum to standalone Sprint and T-Mobile's and New T-Mobile's spectrum deployments reduces marginal cost savings significantly. We also showed that adding in the other three adjustments **{{BEGIN HCI**

**END HCI}}** reduce the calculated marginal cost savings still further. Below, we conservatively show the CMCR less the adjusted marginal cost efficiencies calculations from revising the Applicants' financial model to account for only the acquisition of additional millimeter wave spectrum in Table 10.

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[68] See Table 16.

**Table 10: Compensating Marginal Cost Reductions Minus Adjusted Efficiencies ($/Subscriber/Month)**

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Sources: Table 4, Table 7, Table 8.
Maintain Usage Restrictions: Table 4 - Table 7.
Relax Usage Restrictions: Table 4 - Table 8.

The results summarized in the table indicate that the adjusted marginal cost efficiency from the addition of millimeter wave spectrum is insufficient to offset the merger's upward pricing pressure across every product segment for the Applicants, typically by a considerable amount. For example, in 2021, for Sprint postpaid products, the CMCR exceeds the claimed efficiency by {{BEGIN HCI END HCI}} per subscriber per month in the scenario that "maintains usage restrictions" (IKK Table 12) and by {{BEGIN HCI END HCI}} per subscriber per month in the scenario that "relaxes usage restrictions" (IKK Table 14). The difference is wider still for Sprint prepaid products in 2021, where the CMCR exceeds the claimed efficiency from the addition of millimeter wave spectrum by {{BEGIN HCI END HCI}} per subscriber per month for "maintains usage restrictions" and "relaxes usage restrictions," respectively. The gap between CMCR and this single adjustment to the marginal cost efficiency spans a range of {{BEGIN HCI END HCI}} per subscriber per month across Sprint's product segments and across years, depending on the usage-restriction scenario considered.

Similar conclusions may be drawn for T-Mobile's product segments, which is all the more notable considering the large claimed efficiencies for T-Mobile. In 2021, for T-Mobile postpaid products, the CMCR exceeds the adjusted millimeter wave spectrum efficiency by {{BEGIN HCI END HCI}} per subscriber per month in the scenario that "maintains usage restrictions" (IKK Table 12) and by {{BEGIN HCI END HCI}} per subscriber per month in the scenario that "relaxes usage restrictions" (IKK Table 14). The difference is wider still for T-Mobile prepaid products in 2021, where the CMCR exceeds the adjusted efficiencies by {{BEGIN HCI END HCI}} per subscriber per month for "maintains usage restrictions" and "relaxes usage

restrictions," respectively. These differences cover a range of {{BEGIN HCI END HCI}} per subscriber per month across T-Mobile's product segments and across years, depending on the usage-restriction scenario considered.

Based on this analysis, we conclude that the marginal cost efficiencies that result from the Applicants' adjusted network and financial models are insufficient to offset the upward pricing pressure resulting from the merger. As a consequence, the Applicants' own analysis, appropriately corrected, predicts that both Sprint and T-Mobile prices are likely to increase, for all segments, as a result of the merger.

### *a. IKK's Merger Simulation Model Predicts Price Increases for Sprint and T-Mobile Subscribers Under the Adjusted Marginal Cost Efficiencies*

We provide retail price forecasts from the IKK merger simulation model, but with the adjusted marginal cost efficiencies including the millimeter wave spectrum adjustment in Table 11. We also show the two usage scenarios considered by IKK.

**Table 11: Retail Price Changes Associated with IKK Nested-Logit Model and Adjusted Marginal Cost Efficiencies Under (a) Maintain Usage Restrictions or (b) Relax Usage Restrictions**

{{BEGIN HCI

END HCI}}

Sources: IKK Backup Material Nested Logit Merger Simulations Model and Table 8

In contrast to the claimed efficiencies in the IKK report, Table 11 indicates prices are projected to increase following a merger of Sprint and T-Mobile for both Sprint and T-Mobile postpaid and prepaid customers. In other words, after adjusting for the overstated marginal cost efficiencies, the IKK merger simulation model predicts price increases across the board. Under the "maintain

usage restrictions" scenario, Sprint postpaid services would be predicted to increase by **{{BEGIN HCI END HCI}}** and Sprint prepaid services would be predicted to increase by **{{BEGIN HCI END HCI}}**. For T-Mobile, postpaid service prices would be predicted to increase by **{{BEGIN HCI END HCI}}** and prepaid services prices would be predicted to increase by **{{BEGIN HCI END HCI}}**, depending on the year considered.

The table also shows that, under the "relax usage restrictions" scenario, after adding the single millimeter wave adjustment, Sprint postpaid services would be predicted to increase by **{{BEGIN HCI END HCI}}** and Sprint prepaid services would be predicted to increase by **{{BEGIN HCI END HCI}}**. For T-Mobile, postpaid service prices would be predicted to increase by **{{BEGIN HCI END HCI}}** and prepaid services prices would be predicted to increase by **{{BEGIN HCI END HCI}}**, depending on the year considered.

### *b. Consumer Welfare Harm to both Sprint and T-Mobile Subscribers from the Merger's Predicted Price Effects Exceeds any Benefits from IKK's Estimated Network Quality Improvements*

After adjusting the marginal cost efficiencies, we also find that the willingness to pay for the network quality improvements reported by IKK is insufficient to offset even just the aggregate consumer welfare impacts of the merger. Furthermore, not only are the Applicants' claimed quality improvements insufficient to offset the harm to Sprint subscribers from price increases (as described above under the claimed marginal cost efficiencies), the claimed quality improvements are insufficient to achieve the so-called welfare-neutral quality efficiency thresholds.

IKK present a "critical quality frontier" that represents the set of all possible T-Mobile and Sprint quality improvements that would leave consumer welfare unchanged after the merger.[69] The concept of the critical quality frontier is such that any quality improvements for both T-Mobile and Sprint that lie on a point *below* the curve of the frontier are *insufficient* to offset the harm to

[69] See IKK Report, Figures 18 and 19.

consumer welfare caused by the merger's price effects.[70] In Figure 1, we have augmented the critical quality frontier calculated by IKK (for 2021) to also show, in addition to the IKK-calculated frontier under IKK's claimed efficiencies, the critical quality frontier that would arise under the adjusted efficiencies.

**Figure 1: Critical Quality Frontier with IKK Efficiencies and Adjusted Efficiencies: No Usage or Mix Change (2021)**

{{BEGIN HCI



END HCI}}

Sources: IKK Backup materials and Table 7.

The figure shows that the critical quality frontier for the adjusted marginal cost efficiencies (upper curve, in dark blue) is much further out than that calculated by IKK (lower curve, in light

[70] Any points that lie above the frontier would increase aggregate welfare, but would not necessarily improve welfare for all consumers.

blue).[71] The figure also shows IKK's estimated Sprint and T-Mobile subscriber valuations of the improvements in network quality. For example, in the point labeled "Unadjusted Nevo WTP," IKK have calculated that Sprint subscribers would value the (claimed) network improvement by {{BEGIN HCI END HCI}} and T-Mobile subscribers value the improvement at {{BEGIN HCI END HCI}}. IKK explain that, because these points are outside their calculated frontier, the merger would improve welfare on aggregate. However, their conclusion is highly sensitive to the analysis of marginal cost efficiencies. As shown in Figure 1, with adjusted efficiencies the Applicants' estimated willingness to pay for claimed network improvements is in the region where aggregate consumer welfare falls after the merger.[72]

To summarize, we have shown that under the adjusted marginal cost efficiencies, both Sprint and T-Mobile subscribers are expected to pay higher prices after the merger. Figure 1 shows that, even under the questionable estimates of Sprint and T-Mobile subscribers' willingness to pay for the claimed network quality improvements, those quality improvements are insufficient to offset the harm caused by the merger-induced price increases. This conclusion holds across other years and usage restriction scenarios as well. Figure 2 presents the critical quality frontiers in 2024. Here, too, the effect of adjusting the marginal cost efficiencies is to shift out significantly the critical quality frontier, reversing IKK's conclusion of unambiguous improvement in aggregate welfare.

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[71] As in our discussion of price effects above, for this chart we consider only the adjustments to the millimeter wave assumption of the network model. Any further adjustments would be expected to further shift out the critical quality frontier.

[72] We explain below that the Applicants' have overstated the improvements in network offered capacity. It is also likely that the adjustments to the network model would affect IKK's calculations of improvements in network speed. To the extent that the improvements in network speed would reduce following adjustment, the decline in consumer welfare as shown in relation to the critical quality frontier would be greater still.

**Figure 2: Critical Quality Frontier with IKK Efficiencies and Adjusted Efficiencies: No Usage or Mix Change (2024)**

{{BEGIN HCI



END HCI}}

Sources: IKK Backup materials and Table 7.

Figure 2 also reveals a concerning feature in IKK's approach to assessing the merger's potential harmful effects. IKK's claimed efficiencies in 2024 are much larger than in 2021. This is reflected in their calculated critical quality frontier, with negative values for the critical quality efficiency for Sprint subscribers that is needed in order to reach aggregate welfare neutrality. That is, IKK's claimed cost efficiencies are so large that Sprint subscribers can suffer a *loss* in network quality and still offset the aggregate welfare effects of the merger. In other words, in this IKK merger scenario, T-Mobile service prices fall so much that even though Sprint service prices increase in expectation, Sprint's network quality can decrease and still maintain consumer welfare neutrality.

# 4. The Effect of Marginal Cost Efficiencies on Wholesale Market Prices

In Table 3, above, we presented the vGUPPI calculations that demonstrated the increased incentives for the Applicants' to raise wholesale prices for their affiliate MVNOs and resellers. The Salop and Sarafidis reply criticized *HBVZ* for failing to address how marginal cost efficiencies might reduce the vertical upward pricing pressure. In this section we compare the level of the vGUPPI calculations from Table 3 to the claimed wholesale efficiencies as calculated in the IKK model. We do this for Sprint in relation to its resellers and T-Mobile in relation to its MVNO affiliates (*e.g.*, TracFone). We also consider the comparison both including and excluding input substitution scenarios, noting that IKK assumes that Sprint resellers do not have the option of substitution away from Sprint.[73]

**Table 12: vGUPPI a) With Input Substitution and b) Without Input Substitution Comparison with IKK Model MVNO Efficiencies ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Sources & Notes:

Appendix A.III.

vGUPPI ($) = vGUPPI (%) (as reported in Table 27) x Wholesale Prices (IKK Backup Materials, Merger Sim - Maintain Usage).

MVNO Efficiencies reported are assuming that New T-Mobile relaxes usage assumptions.

As shown in Table 12, IKK calculates wholesale marginal cost efficiencies of {{BEGIN HCI END HCI}} for T-Mobile and {{BEGIN HCI

[73] IKK Declaration, ¶ 162.

**END HCI}}** for Sprint.[74] Across all scenarios, the vGUPPI exceeds IKK's claimed marginal cost efficiency, such that the merger would be expected to increase wholesale prices for the Applicants' MVNO and reseller affiliates. In the case of Sprint without input substitution, the net vertical upwards pricing pressure is more than **{{BEGIN HCI END HCI}}** across all four years, or more than **{{BEGIN HCI END HCI}}** wholesale price between Sprint and its resellers.[75] In the case of T-Mobile *with* input substitution, the net vertical upwards pricing pressure is greater than **{{BEGIN HCI END HCI}}** across all four years, or approximately **{{BEGIN HCI END HCI}}** wholesale price between T-Mobile and TracFone. In the case of T-Mobile *without* input substitution, the net vertical upwards pricing pressure is more than **{{BEGIN HCI END HCI}}** across years, or more than **{{BEGIN HCI END HCI}}** wholesale price between T-Mobile and TracFone.

# III. Network Modeling of 5G Capacity Shows that Applicants Vastly Overstate both the Potential Offered and Carried Capacity Increases Resulting from the Merger

## A. Evolution of Network Models

In support of their Public Interest Statement and subsequent data requests, the Applicants submitted the network engineering models they used to calculate the capacity and average throughput for the LTE and 5G networks of the stand-alone firms as well as for New T-Mobile.[76]

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[74] We present IKK's "relaxes usage" scenario, which shows slightly higher claimed wholesale provision efficiencies compared to IKK's "maintain usage" scenario. For that scenario, IKK estimate wholesale marginal cost efficiencies of **{{BEGIN HCI END HCI}}** for T-Mobile and **{{BEGIN HCI END HCI}}** for Sprint.

[75] See IKK Backup Materials, Merger Sim – Maintain Usage for the Sprint and T-Mobile's wholesale prices to their resellers.

[76] Description of Transaction, Public Interest Statement, and Related Demonstrations, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, June 18, 2018; General Information and Document Request for Sprint, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for*

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According to the models submitted, New T-Mobile would have a higher capacity (*i.e.* offered traffic) and average throughput than the combination of the two stand-alone firms.

The models initially submitted in support of the PIS, however, were insufficient. On September 5th 2018, the Applicants submitted revised network engineering models.[77] The initial models did not include any normal course of business assumptions that would address network congestion issues. They calculated offered traffic and average throughput at the cell site level given available and deployed spectrum, but they did not include any demand side effects on network performance.[78] The revised models take into account demanded traffic, carried traffic, and offered traffic. This allows the model to identify sectors that are expected to be congested, and then to apply normal course of business solutions to alleviate the projected congestion. Note that these models are still network engineering models that take the demanded traffic as given – they do not have any interactions between network quality and number of subscribers served.

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*Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, FCC, August 15, 2018, Request 13(a); General Information and Document Request for T-Mobile, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, FCC, August 15, 2018, Request 13(a).

77 The applicants submitted another set of revised network models on September 17th in order to correct a mistake in how the models were implementing incremental network solutions. This technical change resulted in a negligible change in the output of the models. See T-Mobile Supplemental Response, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, September 17, 2018. See also Overview of Network Model Presentation Deck, Attachment B to Notification of *Ex Parte* Presentation, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, October 11, 2018 for description of network models as presented by Neville Ray to the FCC.

78 The models allocate spectrum between LTE and 5G to reflect demanded traffic at the sector level.

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There are some key differences between the original models presented in the PIS and the revised models produced in response to the FCC's data request in terms of model construction and inputs. {{BEGIN HCI

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Table 20 provides an overview of the maximum spectrum deployed by band in the revised version of the network models.

The revisions to the network models result in different outputs. Namely, the revised network models present a different set of carried traffic, offered traffic, and average throughput estimates. See Table 13, which shows the evolution of offered traffic, Table 14, which shows the evolution of carried traffic, and Table 15, which shows the evolution of average throughput.

Table 13 presents 5G offered traffic in 2021 and 2024. In the PIS, the Applicants claim that the merger will result in roughly a {{BEGIN HCI END HCI}} in offered traffic. In the

[79] Sprint, T-Mobile, and New T-Mobile do not implement the same set of network solutions.

[80] HBVZ Declaration, Table 3.

revised network models, it becomes clear that the Applicants overstate the merger benefits in the PIS. {{BEGIN HCI

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**Table 13: 5G Offered Traffic, 2021 and 2024**

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Sources: Applicants' Network Engineering Models.

Notes: **{{BEGIN HCI**

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**Table 14: 5G Carried Traffic, 2021 and 2024**

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Sources: Applicants' Network Engineering Models, IKK Revised Network Engineering Models, Evans' Declaration, Public Interest Statement.

Notes: **{{BEGIN HCI**

**END HCI}}**

**Table 15: 5G Average Throughput, 2021 and 2024**

{{BEGIN HCI

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Sources: Applicants' Network Engineering Models.

Notes: **{{BEGIN HCI**

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In response to our original declaration, Compass Lexecon submitted its own versions of the network models, which they used to calculate costs associated with network upgrades. Although these models are based on the updated network models submitted by the Applicants, Compass Lexecon adjusts assumptions related to usage. See Table 16 for the differences in assumptions between the Compass Lexecon models and the revised models submitted by the applicants. One main deviation in the Compass Lexecon models from the Applicants' models is that Compass Lexecon removes the subscriber growth projected for New T-Mobile over what Sprint and T-Mobile are projected to achieve as standalone companies. Compass Lexecon also significantly adjusts downward (by about half) the projected quantity of data used by the average subscriber per month. This downward demand adjustment has significant impacts on the model. As noted in Table 14, the 2024 carried traffic is much lower than in the Applicants' revised models. These much lower levels of carried traffic mean the network does not get as congested and, therefore, the network related marginal costs are lower. This results in larger claimed marginal cost savings.

**Table 16: Compass Lexecon Adjustments to Network Models, 2021 and 2024**

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Sources: Applicants' Network Engineering Models and IKK Revised Network Engineering Models. See "1. Subscriber and Traffic Forecast.xlsx" and "Sum_of_Standalones_Subs_and_Usage.xlsx."

Notes: Compass Lexecon adjustments to New T-Mobile assumptions are those made in the version of the network models in which they maintain usage restrictions.

## B. The Network Models *as Submitted* Show Standalone Sprint and T-Mobile will be able to Provide 5G

The Applicants claim that the stand-alone firms will not be able to provide robust 5G; their own models submitted in this proceeding contradict this statement. 5G, as defined by the International Telecommunication Union, is expected to, among other things, provide a minimum downlink user experience data rate of 100 Mbps.[81] Output from the stand-alone models shows that both meet the 5G standard. Given the Applicants' own user throughput assumptions, there is almost no congestion in any of their models, meaning that these benchmarks are being met for virtually their entire subscriber bases. Table 17, below, shows the number of congested sectors, the percentage of congested sectors, as well as the number and percentage of subscribers who fall in congested sectors for each of the three models. As Table 17 shows, the purported improvement in subscribers in congested sectors that result from the combined network is very small. In 2024, the change in congested sectors resulting from combining networks would only affect less than **{{BEGIN HCI**

**END HCI}}**[82]

[81] International Telecommunication Union, "Minimum requirements related to technical performance for IMT-2020 radio interface(s)," Report ITU-R M.2410-0, November 2017, p. 3, accessed October 26, 2018, https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2410-2017-PDF-E.pdf.

[82] Calculation: **{{BEGIN HCI** **END HCI}}** additional subscribers in congested sectors in non-merger scenario. **{{BEGIN HCI** **END HCI}}**.

**Table 17: 5G Congestion in Network Models, 2021 and 2024**

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.

Notes: **{{BEGIN HCI**

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In addition to virtually no congestion, the user throughput from the standalone models meets the expected levels of throughput for 5G.[83] Table 18, below, shows that all three models project 5G average user throughput above the levels that define 5G. This materially undermines the Applicants' claim that the stand-alone firms will not be able to provide 5G service. In fact, the

[83] International Telecommunication Union, "Minimum requirements related to technical performance for IMT-2020 radio interface(s)," Report ITU-R M.2410-0, November 2017, p. 3, accessed October 26, 2018, https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2410-2017-PDF-E.pdf.

Applicants' own model demonstrates that the stand-alone firms can provide adequate throughput with almost zero congestion.

**Table 18: 5G Average User Throughput (Mbps) in Network Models, 2021 - 2024**

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## C. Corrections to and Sensitivities of Assumptions in the Applicant's Network Models

The network models submitted by the Applicants also have a number of assumptions that potentially bias the results. After correcting for these potentially biased inputs in the network models, as well as showing how sensitive these models are to various assumptions, it becomes clear that the alleged gains from the merger with respect to network performance are far less significant than claimed.

A central driver of any wireless network model is the amount of spectrum deployed. In the current case, it is the increase in spectrum available for 5G to the merged firm over what could be deployed by the standalone firms separately that drives the majority of claimed benefits from the merger. Consequently, the merger benefits are sensitive to assumptions about the availability of spectrum. This section shows that small, sensible changes in those assumptions can have large impacts on the measured benefits of the merger.

# 1. Millimeter Wave Spectrum

As noted in our initial comments, all three versions of the models submitted by the merging parties (standalone Sprint, standalone T-Mobile, and New T-Mobile) are based on the spectrum holdings that Sprint and T-Mobile have today.[84] This is still true for the revised models. None of the models include any of the new frequencies Sprint and T-Mobile have publicly announced they are contending for. Most importantly, none of these models incorporate any of the substantial amount of millimeter wave spectrum coming to market in the near future.

Not including *any* of these new millimeter wave frequencies is unreasonable. Both Sprint and T-Mobile have made public statements indicating that they are planning on deploying millimeter wave spectrum they do not own today. Prior to announcing the proposed merger, T-Mobile announced that Ericsson and Nokia were going to build a 5G network in 30 cities during 2018. Ericsson has stated that they are supplying 600 MHz, 28 GHz, and 39 GHz equipment to T-Mobile in Los Angeles, Las Vegas, and New York, while Nokia has said that they are supplying 600 MHz and 28 GHz equipment in Dallas.[85] Clearly, to meet the 30 city 5G goal with millimeter wave spectrum, T-Mobile would have to acquire additional frequencies in many cities. Sprint CEO Marcelo Claure, when asked in early May whether Sprint would participate in the FCC's millimeter-wave spectrum auction in November, stated, "millimeter wave spectrum is an important part of our strategy going forward." Sprint's CTO also mentioned how "millimeter wave…complements our 2.5 GHz, sub-6 GHz solution really well in areas where you need a lot of capacity, hot zones and hotspots… we view millimeter wave as something that we can add on as an overlay to 2.5 for hot zone purposes and hotspot purposes."[86] A few months before, Sprint's CTO mentioned how the FCC may open up the auction for 28 GHz spectrum, and stated, "we

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[84] HBVZ Declaration, pp. 15-16, 20.

[85] Mike Dano, "T-Mobile to build—but not necessarily sell—5G in 30 cities this year," *Fierce Wireless*, February 27, 2018, accessed October 27, 2018, https://www.fiercewireless.com/5g/t-mobile-to-build-but-not-necessarily-sell-5g-30-cities-year.

[86] Mike Dano, "Sprint: Millimeter wave spectrum is 'important part of our strategy going forward,'" *Fierce Wireless*, May 3, 2018, accessed October 27, 2018, https://www.fiercewireless.com/5g/sprint-millimeter-wave-spectrum-important-part-our-strategy-going-forward?utm_source=internal&utm_medium=rss.

would certainly be interested in that."[87] In fact, both companies filed applications for the upcoming millimeter wave auctions at the FCC.[88]

It is unsurprising that both companies have touted millimeter wave frequencies in their 5G strategies. High-band spectrum is expected to be an important component of 5G spectrum deployments. While low-band spectrum will be able to provide broad coverage, and mid-band spectrum will be used for deployments that require both coverage and capacity, high-band spectrum, including millimeter wave, will provide capacity in dense, high-demand areas. This capacity will be used for short-range communications that require fast data rates and low latency.[89] Millimeter wave spectrum is also touted in the FCC's recently released 5G spectrum strategy.[90]

Although we do not know exactly how many additional millimeter wave frequencies Sprint and T-Mobile would acquire and deploy if they continue as standalone operators, we are confident that amount is not zero. But ignoring the additional millimeter wave frequencies they will deploy significantly distorts the analysis the merging parties present. This is because the

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87 Corinne Reichert, "Sprint CTO at MWC: We have the best 5G spectrum," *ZDNet*, February 28, 2018, accessed October 27, 2018, https://www.zdnet.com/article/sprint-cto-at-mwc-we-have-the-best-5g-spectrum/.

88 T-Mobile signed up for both, while Sprint signed up for Auction 102. See 28 GHz Band Auction Incomplete Applications, Attachment B to Public Notice, Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services, Status of Short-Form Applications to Participate in Auctions 101 (28 GHz) and 102 (24 GHz), DA 18-1035, FCC, October 10, 2018, accessed October 28, 2018, https://docs.fcc.gov/public/attachments/DA-18-1035A3.pdf; 24 GHz Band Auction Incomplete Applications, Attachment D to Public Notice, Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services, Status of Short-Form Applications to Participate in Auctions 101 (28 GHz) and 102 (24 GHz), DA 18-1035, FCC, October 10, 2018, accessed October 28, 2018, https://docs.fcc.gov/public/attachments/DA-18-1035A5.pdf.

Sprint appears to be registered for Auction 102 as ATI Sub LLC. See Monica Alleven, "Here's who is bidding in the FCC's first-ever millimeter-wave spectrum auctions," *Fierce Wireless*, October 10, 2018, accessed October 28, 2018, https://www.fiercewireless.com/wireless/here-s-who-s-bidding-fcc-s-first-ever-millimeter-wave-spectrum-auctions.

89 "5G Spectrum," GSMA Public Policy Position, June 2016, accessed October 22, 2018, http://www.gsma.com/spectrum/wp-content/uploads/2015/04/5G-Spectrum-Policy-Position-FINAL-2016-update-.pdf; see also "5G Radio Access," Ericsson White Paper, April 2016, p. 6, accessed October 22, 2018, http://www.ericsson.com/res/docs/whitepapers/wp-5g.pdf.

90 FCC, "The FCC's 5G FAST Plan," September 28, 2018, accessed October 22, 2018, https://docs.fcc.gov/public/attachments/DOC-354326A1.pdf.

modelling for the standalone networks is artificially spectrum constrained, which causes the impact of refarming to create a disproportionate benefit from network output and performance to New T-Mobile.

To illustrate the impact of ignoring additional frequencies, we present an updated set of network models with additional millimeter wave frequencies deployed. We assume that Sprint and T-Mobile would acquire 200 MHz of millimeter wave frequencies on a nationwide basis. Although we do not intend to forecast specific future acquisitions, 200 MHz nationwide seems reasonable (if not conservative) in light of the fact {{BEGIN HCI

END HCI}}.[91] That auction will offer seven 100 MHz blocks of 24 GHz spectrum (just a portion of the millimeter wave frequencies) in geographic licenses that together make the spectrum available on a nationwide basis, suggesting that Sprint and T-Mobile acquiring 200 MHz each is eminently reasonable.[92]

Millimeter wave spectrum will not be deployed on all nodes in the three network models. Rather, it will only be deployed where demand is high enough to justify such deployments, mostly in higher density, urban areas. We do not have access to all of the Applicants' decision-making tools that would be necessary to decide on a node by node basis where they would deploy additional millimeter wave frequencies, if available. Consequently, we had to approximate this more complicated decision-making process. To do so, we examined the output of this decision-making process by identifying the characteristics of where the existing millimeter wave spectrum is deployed in the standalone T-Mobile network model. We considered both the population and population density at the census tract level of cell sites deployed for millimeter wave in 2021. To determine if a census tract is suitable for millimeter

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[91] 24 GHz Band Auction Incomplete Applications, Attachment D to Public Notice, Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services, Status of Short-Form Applications to Participate in Auctions 101 (28 GHz) and 102 (24 GHz), DA 18-1035, FCC, October 10, 2018, accessed October 28, 2018, https://docs.fcc.gov/public/attachments/DA-18-1035A5.pdf; Monica Alleven, "Here's who is bidding in the FCC's first-ever millimeter-wave spectrum auctions," *Fierce Wireless*, October 10, 2018, accessed October 28, 2018, https://www.fiercewireless.com/wireless/here-s-who-s-bidding-fcc-s-first-ever-millimeter-wave-spectrum-auctions; HBVZ Declaration, Table 6.

[92] {{BEGIN HCI

END HCI}} See HBVZ Declaration, Table 6 and FCC, "Auction 102: Spectrum Frontiers – 24 GHz," accessed October 30, 2018, https://www.fcc.gov/auction/102/factsheet.

wave deployment, we adopted the rule that the tract has to have both a population greater than 700 people and a population density greater than 200 people per square mile.[93] We use these criteria to determine if cell sites that are not currently deployed in the network models would be deployed if additional millimeter wave spectrum was available for them. We updated the two standalone network models to deploy 200 MHz of spectrum at nodes in each similar tract nationwide and to deploy 400 MHz in the New T-Mobile model.[94]

As noted in our initial comments, the relevance of this exercise relates to the *increase* in offered traffic that results from the combination of the Sprint and T-Mobile wireless assets. When each firm has more spectrum, and therefore capacity, on a standalone basis, the benefits from combining networks are reduced. We illustrate this by focusing on the **{{BEGIN HCI END HCI}}** offered traffic. As can be seen in Table 19, what was presented in the PIS as a merger related **{{BEGIN HCI END HCI}}** improvement in offered traffic in 2024, and was reduced to an improvement of **{{BEGIN HCI END HCI}}** improvement in the revised models, falls to only a **{{BEGIN HCI END HCI}}** improvement in **{{BEGIN HCI END HCI}}** offered traffic when more realistic standalone millimeter wave spectrum deployments are included. In other words, over **{{BEGIN HCI END HCI}}** of the merger related benefit in network offered traffic – the key variable used by Dr. Evans in his analysis in support of the PIS – vanishes with a more detailed model and just 200 MHz and 400 MHz of millimeter wave spectrum added to the standalone companies and New T-Mobile respectively.

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[93] We recognize that there are some cell sites deployed for 5G that fall in tracts that do not meet these requirements (such as stadiums or airports). We also assume millimeter wave deployment to be constant across years. See Appendix A for details of how we developed these criteria and the additional areas covered.

[94] For nodes that already had millimeter wave spectrum we deployed the maximum of their existing holdings and 200/400 MHz.

**Table 19: 5G Offered Traffic with Additional Millimeter Wave Spectrum, 2021 and 2024**

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.

Notes: Sectors that merit millimeter wave deployment in the two stand-alone models have a minimum of 200 MHz deployed. Sectors that merit millimeter wave deployment in New T-Mobile's model have 400 MHz deployed.

## 2. Refarming 2.5 GHz Spectrum

As noted, in the network models submitted by the merging parties, the gains in performance that are claimed as a result of the merger are largely driven by the increase in spectrum that results from increased refarming achieved by New T-Mobile. As seen in Table 20, a large amount of the additional spectrum available to New T-Mobile compared to the sum of the two standalone networks – {{BEGIN HCI END HCI}} in 2024 – is in the 2.5 GHz band. This amount of refarmed 2.5 GHz spectrum is limited by the amount needed to serve Sprint's LTE customers that would use 2.5 GHz frequencies. Consequently, the results presented by the merging parties are sensitive to the analysis of the amount of 2.5 GHz frequencies standalone Sprint needs to reserve for its legacy customers.

**Table 20: Maximum Spectrum Available by Network Model for 5G**
**2021 and 2024**
**(MHz)**

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.
Notes: Maximum spectrum forecast across all nodes by model.

The calculation of how much spectrum is needed for legacy customers is, of course, driven by the assumptions of how quickly those legacy customers can be transitioned off the LTE portions of

the 2.5 GHz band. In the New T-Mobile model, the legacy LTE Sprint customers are transitioned to alternative frequencies allowing all of the 2.5 GHz band to be refarmed for 5G.[95] For standalone Sprint, the relevant transition of LTE customers is to 5G on 2.5 GHz instead of to other legacy LTE frequencies. Consequently, the merger benefits claimed are sensitive to how quickly standalone Sprint can transition its new or existing LTE customers to 5G.

We cannot precisely specify how much more quickly a standalone Sprint could transition customers, or exactly what the additional costs of doing so would be. Nevertheless, we can demonstrate the sensitivity of the claimed merger benefits to an accelerated refarming of standalone Sprint's 2.5 GHz frequencies. A sensitivity of refarming 2.5 GHz spectrum is reasonable because the distribution of 2.5 GHz spectrum in the Sprint standalone model is driven by balancing the costs and benefits of refarming additional spectrum. If the current balance of legacy LTE and refarmed spectrum is the result of an optimization, the costs and benefits of a little more or less should be roughly balanced, which suggests that a small error in the analysis could tip the amount of spectrum refarmed. We test this refarming sensitivity by allocating spectrum in 2021 such that a maximum of 40 MHz of 2.5 GHz is available for LTE service at each sector. In 2024, we allocate spectrum such that a maximum of 20 MHz is available for LTE service at each sector. This results in a maximum of an additional 20 MHz refarmed for 5G service in 2021 and 2024, respectively. As such, our sensitivity analysis is not intended to be a reoptimization of the entire business and network choices put forward by the Applicants.

Table 21 shows that the traffic offered in the Sprint standalone network model would increase from {{BEGIN HCI END HCI}} if a maximum of 20 MHz of 2.5 GHz spectrum was refarmed for 5G in 2021. As can be seen, refarming additional spectrum for 5G in 2024 increases Sprint's standalone capacity such that the capacity increase from the merger *decreases* from {{BEGIN HCI END HCI}} from this correction alone. Consequently, the purported merger benefits are very sensitive to the Applicants' assumptions about the speed of refarming.

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[95] Declaration of Neville Ray, Appendix B to Description of Transaction, Public Interest Statement, and Related Demonstrations, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, June 18, 2018, ¶¶ 33-42, 61-72 (henceforth "Ray Declaration").

**Table 21: 5G Offered Traffic, Effect of 2.5 GHz Refarmed in Sprint Standalone, 2021 and 2024**

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.

Note: Results are meant to be interpreted as directional. In 2021, a maximum of 40 MHz of 2.5 GHz is maintained for LTE service. In 2024, a maximum of 20 MHz of 2.5 GHz spectrum is maintained for LTE service.

# D. Rural Issues

The lack of rural wireless deployments is not because of a lack of spectrum in rural areas. In fact, given the lower population density, demand for spectrum in rural areas tends to be much lower than in urban areas. This is reflected in the well-known phenomenon of rural spectrum being

much less expensive than urban spectrum, even after adjusting for the population differences.[96] Consequently, any lack of rural deployments is grounded in the likely unprofitability of rural spectrum networks.

The Applicants claim that the merger will significantly improve the deployment of their broadband network in rural areas.[97] Since legacy T-Mobile owns the 600 MHz spectrum that New T-Mobile will deploy and is in a position to already reach most of America with these frequencies, any broadband service deployed with this spectrum cannot be claimed as a merger specific benefit. Consequently, any merger specific benefits will come from the claimed additional coverage from mid-band frequencies. To examine this proposition, we identify the roughly {{BEGIN HCI END HCI}} nodes in the New T-Mobile model that are added to the standalone T-Mobile model. Any improvements in the network's coverage must come from these added nodes. For these incremental nodes to improve the coverage of the standalone T-Mobile network it must be the case that they are added to areas where T-Mobile does not already have network coverage.

Table 22 reports the distribution of distances of the incremental nodes added to the New T-Mobile network from the closest existing legacy T-Mobile node. Because this is the distance between towers, the radii of the two nodes would not be more than half this distance. As can be seen, the median distance from an incremental node to an existing one is about {{BEGIN HCI END HCI}}) and more than three quarters of the incremental nodes are less than {{BEGIN HCI END HCI}} Spectrum deployed in a rural network is designed to maximize coverage and cells are not typically split to achieve capacity improvements. Assuming a 10 km radius (from cell sites) for T-Mobile's mid-band spectrum, sites would be placed about 20 km apart to extend coverage.[98] But only about {{BEGIN HCI END HCI}} incremental nodes are placed further than 20 km apart. The Applicants' placement of incremental nodes suggests that they severely

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96 Coleman Bazelon & Giulia McHenry, "Spectrum value," *Telecommunications Policy* (2013): Section 4.1.2.

97 Ray Declaration, Section VIII.

98 Of course, the maximum reach of a cell site depends on many factors including the technology deployed, terrain, height of site, and specific frequency. The use of 10 km is only meant to be approximate. The conclusions of the analysis – that the incremental sites are near the existing sites – would not change with a somewhat larger or smaller radius.

overstate New T-Mobile's ability to improve coverage in rural areas over what T-Mobile could provide on its own.

**Table 22: Distribution of Distance of Incremental Nodes from Existing Nodes**

{{BEGIN HCI

END HCI}}

Sources: "35. Site and sector coordinates.xlsx."

Notes: Distances reflect the minimum distance from each incremental site acquired by New T-Mobile from any site previously owned by T-Mobile. Count of nodes and percentiles are inclusive.

The Applicants also claim that they will cover a significant number of rural customers with broadband service as a result of the merger. Although the T-Mobile and New T-Mobile networks will likely have a ubiquitous reach by deploying 600 MHz frequencies, indoor services will require deployment of denser network with frequencies that do not travel as far. To test the Applicants' 5G coverage claims, we calculated the population covered by their network that falls outside of urban areas. The U.S. population of 312.5 million is divided between 266.1 million people in areas designated as urban by the Census Bureau and 46.4 million people in rural (*i.e.*, non-urban) areas.[99]

To test the Applicants' claims about rural coverage, we identified the geographic location of all of the nodes in the three network models. We then identified the population the network covered as the population that was within a fixed distance of each network node.[100] The cell site radii we considered were 5.6 km, 7.5 km and 10 km.[101] The results are reported in Table 23. The

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[99] All population data from 2010 Census Bureau. Urban areas are made up of metropolitan statistical areas. All other areas are considered rural.

[100] We created shape files of the network coverage for each set of nodes and each assumption about cell radii and measured the urban and rural population within each constructed network footprint. Consequently, no populations are double counted.

[101] Declaration of Peter Tenerelli and Vijay Venkateswaran, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT

Continued on next page

Applicants claim that they will provide outdoor broadband services to 59.4 million rural people (more than 95% of rural population).[102] In fact, a little more than {{BEGIN HCI END HCI}} the rural population in the U.S. is within 10 km of a node in the New T-Mobile network, suggesting the Applicants' claims about rural coverage are exaggerated (or not merger specific if they are based on 600 MHz deployments). Similarly, the Applicants claim they will provide indoor coverage to 31 million of the rural population. Only {{BEGIN HCI END HCI}} of the rural population live within 5.6 km of a New T-Mobile node.

**Table 23: Population Coverage by Sprint and New T-Mobile 2.5 GHz Cell Sites**

{{BEGIN HCI

END HCI}}

Sources: "35. Site and sector coordinates.xlsx", Applicants' Network Engineering models, 2010 Census Bureau population designation. Urban areas are made up of metropolitan statistical areas. All other areas are considered rural.

Continued from previous page

Docket No. 18-197, October 31, 2018, ¶¶ 14-15. We conservatively use 5.6 km as the radius for indoor coverage. We conservatively use 7.5 and10 km as the radius for outdoor coverage.

[102] In his declaration, Neville Ray states that by 2024, "New T-Mobile will provide service to 59.4 million outdoor rural POPs out of 62 million available rural POPs." Ray Declaration, ¶ 74.

Calculation: 95.81% = 59.4 million POPs / 62 million POPs.

A rural population of 62 million does not align with the Census Bureau's 2010 designation(s) of urban and rural population.

# IV. Coordinated Effects

In their rebuttal to *HBVZ*, the Salop-Sarafidis reply declaration claims that our analysis does not take account of: 1) the "large expected efficiencies" from investment in a 5G network; 2) the effects of customer persistence in demand (referred to as dynamic demand); 3) the disruptive effects of the transition from 4G LTE to 5G; 4) firm asymmetries in product offerings and the differentiation of products; and 5) the constraining influence of expansion by MVNOs and cable companies. They also claim that we examine only "selected" factors relevant to collusion and that our use of CPPI is invalid.[103]

Our original declaration had two parts related to coordinated effects. First, we noted that the merger would alter the incentives for T-Mobile to act as a maverick and, as a result, New T-Mobile would no longer find it optimal to use a maverick strategy. More specifically, the merged firm would put more weight on growing profit margins than on growing market share. Second, our declaration found that the merger would have coordinated effects with regards to price. As explained below, our original analysis stands up to the criticisms in the Salop-Sarafidis rebuttal report; consequently, our central conclusions are unchanged: New T-Mobile would be less motivated to use a maverick strategy, and a merger between Sprint and T-Mobile would have coordinated effects.

## A. New T-Mobile will not use a maverick strategy

The Salop-Sarafidis reply declaration argues that the combination of projected efficiencies and dynamic demand will result in New T-Mobile acting as a maverick as it seeks to grow its subscriber base and market share.

[103] Salop and Sarafidis Reply Declaration, ¶¶ 2, 31, 50-55.

# 1. An examination of the sources and significance of dynamic demand

Prior to directly addressing the question of whether T-Mobile would continue to use a maverick strategy after a merger with Sprint, let us first examine the matter of dynamic demand, which plays a significant role in the Salop-Sarafidis rebuttal report.

"Dynamic demand" refers to a causal effect that a firm's past sales have on a firm's current demand. The Salop-Sarafidis original and reply declarations mention three sources of dynamic demand: word-of-mouth advertising, signaling effects, and switching costs. In principle, every product in every market has its demand impacted by word-of-mouth advertising (consumers who bought in the past and liked the product say good things about it) and signaling (past purchases by other customers signal that a product is worth buying). The issue is not whether these effects exist but whether they are sufficient in magnitude to be relevant. For most products, economists do not consider word-of-mouth advertising and signaling to be relevant, as reflected by the absence of these factors when estimating demand. Products for which they are likely to be relevant are those for which many consumers do not know of the product's existence (which makes word-of-mouth advertising valuable) or there is significant uncertainty about the product's traits and quality (which makes word-of-mouth advertising and signaling valuable). Neither of those conditions pertains to wireless service. It is widely known that AT&T, Verizon, T-Mobile, and Sprint offer wireless services. Furthermore, the traits and qualities of these wireless services are likely to be well known given they have been in the market for some time. The Salop-Sarafidis reports provide no argument—much less evidence—that word-of-mouth advertising and signaling are substantive factors in the demand for wireless service. We are unaware of any such arguments and evidence, and thus did not consider word-of-mouth advertising and signaling in our original analysis; we continue to believe that they are not relevant factors.

However, switching costs are indeed a source of dynamic demand. The Salop-Sarafidis reply declaration claims that our original declaration suggests that "switching costs have been substantially eliminated," which we disagree with.[104] Rather, our point was that switching costs have declined due to the end of long-term contracts and termination fees. In fact, our report cites

[104] Salop and Sarafidis Reply Declaration, ¶ 39.

a study that estimates switching costs being between $40 and $88.[105] Customers of wireless services do face switching costs when they change providers, but those costs are moderate in size. There is little basis for concluding that they are an impediment to collusion because the theoretical effect of switching costs is ambiguous (as noted in both our original declaration and the Salop-Sarafidis rebuttal report) and their magnitude is not large. A prudent position to take is that switching costs are not determinative of the ability of companies to sustain a collusive arrangement with regards to price.

The Salop-Sarafidis reply declaration claims that the indeterminacy of the theoretical effect of switching costs on collusion is not present in the current context: "[T]he existence of switching costs *in this merger* likely reduces the likelihood of successful coordination" (italics in original).[106] Professor Salop and Dr. Sarafidis argue that switching costs would contribute to New T-Mobile using a maverick strategy. In our initial declaration (and again later in this declaration), we observed that New T-Mobile would likely abandon a strategy of growing market share to one of growing profit margins, which implies a desire not to compete aggressively in price. Moderate switching costs resulting in moderate dynamic demand effects do not undermine the much bigger forces driving the decision to grow profit margins, rather than grow market share.

Relevant to the issue of the magnitude of switching costs, the Salop-Sarafidis reply declaration notes the low churn rates in recent years and considers them to be evidence that switching costs still exist.[107] As stated above, we believe switching costs do exist and are moderate in size. However, one should be careful in drawing conclusions from low churn rates. Low churn rates are fully consistent with low switching costs as much as they are consistent with high switching costs. If a consumer prefers the wireless service of AT&T today, that same consumer is very likely to prefer the wireless service of AT&T tomorrow. Even if switching costs are zero, that consumer would continue to buy from AT&T; there would be no churn. Consumers do not switch just because it is cheap to do so; they switch because they are not satisfied with the product. A consumer would have a reason to change providers when the consumer's situation changes (*e.g.*, they now have teenagers and want to change to a provider with a better multi-line plan or a rise in income induces them to switch to a provider offering a higher-quality, higher-price plan) or the consumer learns new information about the product-price offerings. Thus, low

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[105] HBVZ Declaration, p. 61 at footnote 89.

[106] Salop and Sarafidis Reply Declaration, ¶ 38.

[107] Salop and Sarafidis Reply Declaration, ¶ 40.

churn rates can occur because of stability in consumers' situations and in product-price offerings, rather than because switching costs are high. As explained in our original declaration,[108] the convergence of price and quality across providers and better dissemination of information on product quality can explain why churn rates have remained low even though switching costs have declined. In sum, low churn rates are consistent with stable consumer preferences, stable products and plans, and low switching costs. To gain an assessment of the magnitude of switching costs, it is best to estimate them directly rather than try to draw inferences from churn rates. Those estimates reveal there are switching costs and they are moderate in size.

## 2. New T-Mobile would focus on growing profit margins, not growing market share

Let us now turn to the question of whether New T-Mobile would use a maverick strategy that focuses on growing market share. The Salop-Sarafidis reply declaration claims that New T-Mobile would use a maverick strategy.[109] Their argument is based on two factors. First, projected future efficiencies imply high future profits from selling to a consumer (assuming that New T-Mobile retains most of those efficiencies rather than pass them on to consumers). Second, attracting a customer today is likely to result in that consumer being a customer tomorrow because of switching costs. As this argument goes, New T-Mobile would price aggressively to attract consumers in order to lock in those consumers (due to switching costs) and those consumers would yield a high future profit stream.

It is true that if these future efficiencies are realized, the profit stream associated with a customer would be higher and, assuming persistence in customer demand, it becomes more attractive to acquire a customer prior to the realization of those efficiencies. However, if profit and customer persistence were all that determined how a firm sets prices, then AT&T and Verizon would be mavericks. AT&T and Verizon earn a higher profit per customer than T-Mobile[110] and have greater customer persistence.[111] Should AT&T and Verizon price aggressively to lock in customers and earn a higher profit on them in the future? Of course, that argument is fallacious

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[108] HBVZ Declaration, pp. 63-64.

[109] Salop and Sarafidis Reply Declaration, ¶¶ 25, 27.

[110] Table 24 Backup Materials.

[111] In 2016, Verizon's and AT&T's churn rates were 1.25%-1.5%, while T-Mobile's churn rate was 1.7%. See HBVZ Declaration, p. 62.

because profit is endogenous to a company's pricing strategy, but the point is that profit per customer and customer persistence are not the whole story.

The critical factor that the analysis in the Salop-Sarafidis reply declaration ignores is a company's current subscriber base and market share. Due to the presence of moderate switching costs, market share is a critical factor in determining pricing incentives. When a firm considers setting a low price to attract new customers, it incurs a cost in the form of foregone profit that it could have earned on its existing ("loyal") customers from setting a higher price. The smaller is a firm's market share, the higher is the ratio of potential new customers to existing customers. Hence, a maverick strategy of pricing low to grow market share is more attractive when a firm's market share is lower because the gains from acquiring new customers is likely to exceed the foregone profits (by not pricing high) from current customers. The factor that distinguishes T-Mobile from AT&T and Verizon, and that would most likely explain why T-Mobile is the maverick, rather than AT&T or Verizon, is T-Mobile's smaller market share. However, the merger would change this. New T-Mobile's market share would be comparable to that of AT&T and Verizon and, as a result, New T-Mobile would have an incentive to price like AT&T and Verizon. It would have more incentive to decide not to price low to attract new customers and instead price high to earn more profit from existing customers.

While market shares would be similar after the merger, New T-Mobile's profit margins (as measured by EBITDA) would be much lower than those of AT&T and Verizon *if it continues to price like a maverick*. As explained in our original declaration, a maverick strategy is an investment—foregoing some short-run profit to increase market share that will pay off with higher profit in the future.[112] Thus, the issue is not *if* a firm should stop being a maverick but rather *when* it should stop being a maverick. At some point, the market share goals are reached and it becomes time to focus on growing profit margins, rather than market shares. A merger with Sprint is a natural time for T-Mobile to discontinue its maverick strategy because it will have reached a market share comparable to the market's leading firms. New T-Mobile would be less interested in aggressive price competition; it would be more interested in higher profit margins.

New T-Mobile would also face higher costs in pursuing a maverick strategy as a result of the merger. In the current market, T-Mobile has successfully acquired market share through

[112] HBVZ Declaration, p. 68.

aggressively competing in prices and plans. These gains in market share have largely come from Sprint, not from AT&T and Verizon.[113] Furthermore, AT&T and Verizon have accommodated T-Mobile in that they have not sought to match T-Mobile's aggressiveness.[114] That situation would change with the merger. A maverick strategy designed to grow market share would require New T-Mobile to acquire market share from AT&T and Verizon, which has proven more difficult than acquiring market share from Sprint. Furthermore, if New T-Mobile were to price low enough to gain market share from AT&T and Verizon, it is unreasonable to expect that AT&T and Verizon would idly stand by while they lose market share. Instead, they are likely to respond with lower prices, which would depress New T-Mobile's profits and reduce the extent of their market share gains. This rival response would further reduce the value to New T-Mobile of continuing any maverick strategy.

In sum, New T-Mobile would likely find a maverick strategy less profitable because of the foregone profit on its now large customer base, the lower prices that would need to be charged in order to gain customers from AT&T and Verizon as opposed to Sprint, and the even lower prices necessary once AT&T and Verizon respond to protect their market share. Having achieved a market share comparable to AT&T and Verizon, New T-Mobile would have an incentive to focus on growing profit margins rather than continuing to compete through lower prices as a maverick.

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[113] Between 2012 and 2017 AT&T and Verizon's market shares have remained flat, while T-Mobile has gained market share at the cost of Sprint's market share. See HBVZ Declaration, Figure 5.

[114] T-Mobile's prices have consistently been below those of AT&T and Verizon, and the larger carriers have proven unwilling to match T-Mobile's lower price. See AT&T/T-Mobile Staff Report, 26 FCC Rcd. at 16198-16201 ¶¶ 21-25; Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, *Twentieth Report*, 32 FCC Rcd. 8968, 9002-04 (2017), Table III.A.1.

# B. The merger between Sprint and T-Mobile will likely have coordinated effects

Our original declaration concluded that a merger between Sprint and T-Mobile would create a serious risk of collusion in the post-merger market.[115] In this section, we evaluate the likelihood that the merger will lead to coordinated effects, and detail why, after taking account of the criticisms in the Salop-Sarafidis rebuttal report, our conclusions remain intact.

## 1. Merger efficiencies could make collusion more likely

With regards to coordinated effects, merger-related efficiencies matter in two ways. First, they could affect whether T-Mobile continues to use a maverick strategy after a merger with Sprint. We have noted here that the conclusion from our original declaration—that New T-Mobile would not use a maverick strategy—is robust to allowing for the higher future profit associated with projected merger-related efficiencies. Second, merger-related efficiencies can affect firm asymmetries and thereby affect the ease with which AT&T, Verizon and New T-Mobile can collude. It is this issue we will now address.

As discussed in our original declaration, there are differences in coverage and service quality between AT&T and Verizon on one hand and Sprint and T-Mobile on the other hand. In particular, the coverage and service quality of Sprint and T-Mobile have been lower than that of AT&T and Verizon, though the differences have been declining.[116] Those differences make collusion more difficult compared to the case in which the firms' services are identical but, as explained in our original declaration, collusion can still occur. For example, firms with heterogeneous services can increase profits by coordinating on a common percentage increase in price.

How do merger-related efficiencies that improve coverage and service quality influence coordinated effects? If Sprint and T-Mobile had coverage and service quality that were superior to that of AT&T and Verizon, merger-related efficiencies would increase firm asymmetry,

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115 HBVZ Declaration, Section IV.C.3.

116 HBVZ Declaration, pp. 62-63, 87.

making collusion more difficult. However, this is not the case. Any merger-related efficiency gains would make New T-Mobile's coverage and service quality more similar to that of AT&T and Verizon. This reduction in firm asymmetries would make collusion *easier*.

Of course, if the merger-related efficiencies were so massive that New T-Mobile's services were now significantly superior to those of AT&T and Verizon, firm asymmetries could be exacerbated. However, such a proposition seems speculative.

**Table 24: The Coordinated Price Pressure Test Using HBVZ Inputs**
**(a) No Efficiency Assumptions**

| Pre-Merger Coalition [A] | Pre-Merger CPPI [B] | Post-Merger CPPI [C] | Delta CPPI [D] |
|---|---|---|---|
| T-Mobile - Verizon | 6.8% | 21.9% | 15.1% |
| T-Mobile - AT&T | 8.8% | 29.3% | 20.5% |
| Sprint - Verizon | 6.8% | 21.9% | 15.1% |
| Sprint - AT&T | 8.8% | 29.3% | 20.5% |
| AT&T - Verizon | 17.2% | | |

**(b) CMCR as Efficiencies**

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Sources & Notes:
HBVZ Declaration. FCC Mobile Wireless, 20th Report and UBS Wireless Telecommunications report released February 22nd, 2017. Values are taken from 2017.
Using a weighted average of Sprint and T-Mobile margins by shares for New T-Mobile.
[A]: Two-firm coalition.
[C]: CPPI for listed firm pair after Sprint/T-Mobile merger.
[D]: Change in CPPI for listed firm pair due to Sprint/T-Mobile merger.

In our original declaration, a Coordinated Price Pressure Test ("CPPI") provided quantitative evidence to substantiate the arguments for coordinated effects.[117] We have re-run that test assuming that, as a result of the merger, Sprint and T-Mobile's marginal costs would decrease by the same percent as the CMCR (*i.e.* the amount by which marginal costs need to be reduced for upwards pricing pressures, due to the merger, to be mitigated). Both sets of results are shown in Table 24. As discussed in our original declaration, the CPPI measures the highest coordinated price increase that two firms can support.[118] In Table 24(a) we can see that in the absence of a merger between Sprint and T-Mobile, Verizon and T-Mobile (or Verizon and Sprint) would be able to coordinate on a price increase as high as 6.8%, and AT&T and T-Mobile (or AT&T and Sprint) would be able to coordinate on a price increase as high as 8.8%. Assuming no merger-related efficiencies, these coordinated price increases rise to 21.9% (for Verizon and New T-Mobile) and 29.3% (for AT&T and New T-Mobile). Let us now assume that the merger results in cost efficiencies as large as the CMCR. An efficiency gain of this size is approximately similar to the (aggregate) critical cost efficiencies that IKK report, although larger for Sprint than for T-Mobile. Nevertheless, even under this assumption, Table 24(b) reports the post-merger CPPIs are **{{BEGIN HCI END HCI}}** for Verizon and New T-Mobile, and **{{BEGIN HCI END HCI}}** for AT&T and New T-Mobile, increases relative to pre-merger CPPI of **{{BEGIN HCI END HCI}}** and **{{BEGIN HCI END HCI}}** respectively. Furthermore, a merger-induced rise in the CPPI is also found if we use the IKK data, encompass the claimed efficiencies, extend the market to include prepaid as well as postpaid, and take account of the predicted post-merger prices that would prevail under competition (see Appendix). In sum, under many different specifications, we reach the same conclusion: the merger will substantively raise the CPPI, which is evidence supportive of the merger having coordinated effects.

## 2. Collusion is possible with investment in a 5G network and heterogeneity in product and plan offerings

The Salop-Sarafidis reply declaration argues that collusion would be difficult in the post-merger market because of heterogeneity in the firms' product offerings (which also encompasses product

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[117] HBVZ Declaration, p. 85 at Table 27.

[118] Moresi, Serge X., David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011): 3, p. 3.

differentiation). They claim that this heterogeneity would be exacerbated by the transition from 4G LTE to 5G as some areas would have 5G and some not. They comment that "it will be difficult, if not impossible, to reach and enforce a common understanding…across the wide area of local areas" and that "product differentiation will continue to hinder reaching and maintaining a common understanding that is necessary for successful coordination."[119]

In our original declaration, we addressed the challenges that heterogeneity in plans and services created and described how simple forms of collusion are still implementable. We summarize the main points here and refer the reader to our original declaration. First, products and plans can differ in many ways that are not relevant in consumers' decisions. Competition is intense only on those dimensions that matter to consumers and thereby affect a firm's demand, and it is not necessary for firms to coordinate on dimensions over which they do not actively compete. Second, while it may be ideal to coordinate on every dimension on which firms actively compete, it is not necessary for firms to do so for collusion to be profitable and stable. Collusion is more profitable when firms collude on more dimensions, but collusion is often profitable and stable when firms collude on just one critical dimension. Even the most sophisticated cartels rarely coordinate their conduct on all variables over which they compete. Most cartels collude only on price, even though customers' decisions are almost always based on additional, non-price dimensions.

In their reply declaration, Professor Salop and Dr. Sarafidis state that "a common understanding would need to be achieved on a significant number of important dimensions" if collusion is to succeed.[120] That is simply not right. While a collusive plan designed to extract the maximum profit from consumers would indeed have to be fine-tuned and tailored on many dimensions, colluding firms need not be so ambitious, as collusion is rarely so pervasive. It is enough for firms to coordinate on a common price or a common price increase and thereby weaken price competition. Due to firm asymmetries, some firms will gain more from collusion than other firms, but it is enough that all firms gain for them to persist with collusion. They will still compete on other dimensions, which will reduce, but not eliminate, the profitability of collusion. Details on this argument are provided in our original declaration.[121]

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[119] Salop and Sarafidis Reply Declaration, ¶ 23.

[120] Salop and Sarafidis Reply Declaration, ¶ 33.

[121] HBVZ Declaration, Section IV.C.3.

## 3. MNVOs and cable companies would not undermine collusion

The Salop-Sarafidis reply declaration claims that collusion would be difficult because MVNOs could destabilize it.[122] Though they do not provide a detailed argument for this claim, it appears to be as follows: Suppose the three network operators—AT&T, Verizon and New T-Mobile—coordinate on a retail price in the market. Each of them is tempted to undercut that price and sell more, but any deviation would be observed which might then cause collusion to collapse. The threat of that shift to lower competitive prices would induce all three companies to abide by the collusive retail price. However, as the argument in the Salop-Sarafidis reply declaration goes, a company could deviate by signing an MVNO to a wholesale contract that would result in them being able to offer a lower quality-adjusted price than the three network operators. Effectively, a company would be deviating through an MVNO. As the terms of the wholesale contracts are private information, this deviation is not directly detected. According to this argument, a network operator's inclination to deviate without being detected would undermine collusion.

It is true that wholesale prices are private. However most collusion is sustained without firms being able to observe the prices charged by other firms, as most cartels involve intermediate goods for which contracted prices are private information. The monitoring challenge associated with a network operator "cheating" through a wholesale contract is then common in many successful cartels. [123]

How do those cartels solve this monitoring challenge? They monitor compliance in terms of sales or market shares. A deviation by a network operator through an MVNO would be detected by a loss of market share for the other network operators. Thus, a deviation would be indirectly detected through a shift in market share to the MVNO. Any substantive loss in market share for a network operator could undermine collusion. Thus, AT&T, Verizon and New T-Mobile still face the same trade-off: increase market share through an MVNO by offering a low wholesale price, but risk the collapse of collusion in retail prices. While detection is not as direct—it is through market shares rather than prices—or as immediate, any substantive deviation will result in market share losses that could cause a return to retail price competition. Recognizing this

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[122] Salop and Sarafidis Reply Declaration, Section IV.D.

[123] Numerous examples can be found in Marshall, Robert C. and Leslie M. Marx, *The Economics of Collusion: Cartels and Bidding Rings* (Cambridge, MA: MIT Press, 2012).

possibility, a network operator will be disinclined to cheat through a low wholesale price to an MVNO and thereby risk a return to competing in retail price.

Turning to the constraint on collusion posed by cable companies, our discussion about the control of MVNOs by the network operators in our original declaration[124] also applies to cable companies. While a cable company may have more capabilities than an MVNO like TracFone Wireless, a cable company would not be able to effectively compete without access to the network of AT&T, Verizon, or New T-Mobile. Cable companies cannot be a viable constraint on collusion as long as AT&T, Verizon and New T-Mobile control the quality and range of services and costs of cable companies.

## 4. All relevant factors for collusion were considered

The Salop-Sarafidis reply declaration notes that there are "'checklist' factors that may make a market more or less vulnerable to coordination" and that antitrust practitioners consider.[125] This is true. Professor Salop and Dr. Sarafidis also claim that our original declaration only "analyzes a selected number of these factors".[126] This is not true. We considered all of the relevant factors for this market, including market concentration and asymmetries in firms' market shares,[127] price transparency,[128] buyer power,[129] entry barriers and fringe supply,[130] switching costs,[131] product differentiation,[132] and heterogeneity in offerings.[133] These are all of the same factors considered in Section III of the Salop-Sarafidis reply declaration.

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124 HBVZ Declaration, p. 60-61.

125 Salop and Sarafidis Reply Declaration, ¶ 30.

126 Salop and Sarafidis Reply Declaration, ¶ 31.

127 See, *e.g.,* HBVZ Declaration, pp. 80-84.

128 HBVZ Declaration, pp. 58-59.

129 HBVZ Declaration, p. 60.

130 HBVZ Declaration, pp. 60-61.

131 HBVZ Declaration, pp. 62-64.

132 HBVZ Declaration, pp. 59-60, 88-92.

133 HBVZ Declaration, pp. 88-92.

# 5. CPPI is a valid index for any two firms

The Salop-Sarafidis reply declaration claims that our use of CPPI is "invalid" because the CPPI "only gauges coordination incentives between two leading firms".[134] In our original declaration, we showed that the merger would cause the CPPI to significantly increase. Based on these estimates, we concluded that New T-Mobile would have a distinctly stronger incentive to coordinate with either AT&T or Verizon, compared to the incentives of either T-Mobile or Sprint to coordinate with either AT&T or Verizon in the pre-merger market.

We are surprised by the statement in the Salop-Sarafidis reply declaration that the CPPI is appropriate only when applied to two leading firms. While the paper that introduces and describes CPPI considers the case of two leading firms, it does *not* state that the CPPI is only appropriate for the two leading firms.[135] Nor does it ever define a "leading" firm. If the CPPI were intended only for firms that are "leading," it would be essential to define what it means for a firm to be "leading." Statements in the paper suggest that the *focus* of the paper is on CPPI for two leading firms, but the paper does not state that CPPI is a concept which applies exclusively to two leading firms; for example: "In this note, we focus on potential parallel accommodating conduct by two leading firms."[136] (Parallel accommodating conduct refers to price leadership and matching, which is the form of tacit collusion that CPPI is designed to measure.)

Rather than engage in a semantic critique, let us examine the economic content of the CPPI and explain why its relevance is not limited to "leading" firms. For our discussion, it will be assumed that the term "leading" makes reference to market share and, more specifically that the two leading firms are the two firms with the largest market shares.

The CPPI is relevant to assessing an upper bound on the possible price increase from a particular form of coordination (price leadership and matching) for any two firms. In constructing the CPPI for firms A and B, one calculates the highest price increase that firm A is willing to initiate and firm B is willing to subsequently match, and the highest price increase that firm B is willing to

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134 Salop and Sarafidis Reply Declaration, ¶ 52.

135 Moresi, Serge X., David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011).

136 Moresi, Serge X., David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011): 3 at footnote 3.

initiate and firm A is willing to subsequently match. The CPPI is the minimum of those two price increases. A higher CPPI means that it is feasible for firms to coordinate on a higher price increase. CPPI is properly interpreted as an index of the power of the incentives to collude, as it measures how much price could increase should firms succeed in colluding (at least in the manner assumed in constructing the CPPI). It can be used to evaluate the coordinated effects of a merger by measuring how the CPPI between hypothetical firms A and B changes if firm A acquires firm C. If the change in the CPPI due to the merger—referred to as Delta CPPI—is positive, the merger could result in collusion having a higher coordinated price increase than would occur without the merger. A positive Delta CPPI is supportive of the hypothesis that a merger would have coordinated effects.

In that description of the CPPI, there is nothing to suggest that firms A and B have the highest market shares. Of course, their market shares should matter in determining the value of the CPPI if it is to measure what it is supposed to measure. For example, if firms A and B have small market shares, then a non-trivial coordinated price increase should be unprofitable because they will lose a lot of demand to the other firms in the market. On the other hand, if their combined market share is large then they could consummate a large price increase without losing much demand to other firms. (The CPPI assumes the prices of the other firms are held fixed.) The CPPI should depend on the market shares of the two firms, and it does. The effect just described is captured in the diversion ratio, which enters the CPPI formula. If the two firms have high market shares, then they will generally have a high diversion ratio, which will contribute to a high CPPI. If instead one firm has a high market share and the other firm has a low market share, they will have a lower diversion ratio which will contribute to a lower CPPI.

To exemplify this point, Table 24 provides the pre-merger CPPI from Table 27 of our original declaration and adds the pre-merger CPPI for AT&T and Verizon. The CPPI for AT&T and Verizon is 17.2%, which is higher than when AT&T is coordinating with Sprint or T-Mobile (with a CPPI of 8.8%) and when Verizon is coordinating with Sprint or T-Mobile (with a CPPI of 6.8%). Because Verizon has a higher market share than T-Mobile, Verizon can coordinate on a higher price increase with AT&T than can T-Mobile with AT&T, which is reflected in the CPPI for AT&T and Verizon exceeding that for AT&T and T-Mobile. The CPPI is sensitive to the market shares of the two coordinating firms and, as a result, is an appropriate index regardless of those market shares and, in particular, regardless of whether the two firms have the highest market shares.

In summary, CPPI depends on the magnitude of the firms' market shares and not how the firms rank in market shares. This point is implicit in Example 3 of Professor Salop's and Dr. Sarafidis' paper with Serge X. Moresi and David Reitman.[137] In that example, the CPPI is calculated when firms A and B each have market share of 20% and one of them is acquiring firm C with a 10% market share. The CPPI is calculated without making any assumption as to how the remaining 50% of the market is distributed among the other firms. It could be that firms D and E each have 25% market share, in which case firms A and B—the firms for which the CPPI is calculated—are the third and fourth largest firms; thus, neither firm A nor firm B is a leading firm. Or, the remaining 50% market share could be distributed among ten firms, each having 5% market share, in which case the CPPI is calculated for the first and second largest firms. What matters for the CPPI is firms' market shares, not whether they are "leading."

CPPI is an index relevant to measuring the extent of coordinated price increases but it is not a predictor of coordinated price increases, which is a point made in the Salop-Sarafidis reply declaration.[138] Indeed, CPPI does not capture all of the factors relevant to collusion. Once those other factors are taken into account, we believe that coordination between AT&T and Verizon is more likely than coordination between T-Mobile and Verizon in the pre-merger market. However, it is wrong to say "it makes no economic sense to hypothesize successful coordination between T-Mobile and Verizon under the assumption that AT&T would not be part of the coordinating coalition."[139] Any subset of firms can improve their joint profits by coordinating a (not too large) price increase. This is true whether other firms' prices are held constant (as is done in calculating the CPPI) or other firms' prices are allowed to adjust (which, given they would raise their prices, would make the coordinated price increase even more profitable for the two firms). Though phrased differently, that same point is made in Professor Salop's and Dr. Sarafidis' article with Serge Moresi and David Reitman: "[B]eginning at the pre-merger Bertrand equilibrium point, the CPPI always suggests that the two firms have an incentive to engage in [parallel accommodating conduct]."[140] In other words, if the market is in a competitive

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[137] Moresi, Serge X., David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011): 24-25.

[138] Salop and Sarafidis Reply Declaration, Section V.B.

[139] Salop and Sarafidis Reply Declaration, ¶ 53.

[140] Moresi, Serge X., David Reitman, Steven C. Salop, and Yianis Sarafidis, "Gauging Parallel Accommodating Conduct Concerns with the CPPI," (2011): 6.

equilibrium, then there exists a coordinated price increase by any two firms (whether leading or not) that is profitable for those two firms.

In conclusion, whether a firm is "leading" is relevant to determining the firm's ability to collude; however, it is irrelevant in regards to measuring the CPPI. The CPPI measures how high a price increase *could* be consummated *if* the two firms mutually understood they were colluding. When firm A raises its price, will firm B take this as an invitation to collude? One might imagine it is more likely for firm B to draw that inference if firm A is a leading firm than if firm A is not. Thus, the question of whether or not a firm is a leader could be relevant to the likelihood that a price increase will be interpreted as an invitation to collude. Given that it is understood to be an invitation to collude (which is the assumption made in calculating the CPPI), the CPPI tells us how high price can go. It is an index relevant to measuring the incentives to collude, and it is an index that depends on market shares and not whether a firm is leading.

# Appendix A

# I. Network Modeling

## A. Spectral Efficiency

Table 25 shows the assumed efficiency levels of the spectrum in the Applicants' revised models.

**Table 25: Average Spectral Efficiency Assumptions in Network Models (bps/Hz)**

| | LTE | 5G |
|---|---|---|
| Low band | 2.1 | 2.5 |
| Mid band | 2.5 | 3.8 |
| mmWave | n/a | 7 |

Sources: Applicants' Network Engineering Models.

In their Declaration, Peter Tenerelli and Vijay Venkateswaran observe that the Applicants do not account for Massive MIMO capacity gains for 5G.[141] We have accordingly revised the spectral efficiency of 2.5 GHz deployed for 5G from 3.8 bits/hertz/second to 11.4 bits/hertz/second.

The higher spectral efficiency for mid-band spectrum means that all three network models show significantly more offered traffic. However, the New T-Mobile has more mid-band frequencies available for 5G than the sum of the two standalone companies. As a consequence, the models show that the relative increase in capacity offered by New T-Mobile is greater with the more efficient technologies.[142] But, since all three models have significantly more capacity, they all

[141] Declaration of Peter Tenerelli and Vijay Venkateswaran, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations,* WT Docket No. 18-197, October 31, 2018.

[142] This modeling exercise does not adjust the **{{BEGIN HCI END HCI}}** and, may therefore overstate or understate the relative gain from combining networks. That each model will offer more capacity would remain true.

have lower marginal costs. Therefore, the relative reduction in marginal costs for New T-Mobile compared to the standalone networks decreases.[143]

## B. Millimeter Wave Deployment

In order to decide which sectors merit millimeter wave deployment, we tested population/population density metrics against the characteristics of census tracts in which T-Mobile plans to deploy its current millimeter wave spectrum or has such spectrum but does not currently plan to deploy it. First, there are {{BEGIN HCI END HCI}} census tracts in which T-Mobile has nodes on which it plans to deploy its licensed millimeter wave spectrum in 2024. The universe of census tracts that have a population density of at least {{BEGIN HCI

END HCI}} Second, according to our estimates of current T-Mobile spectrum holdings, there are {{BEGIN HCI END HCI}} tracts where T-Mobile has millimeter wave frequencies (whether it plans to use them by 2024 or not) and a cell site. Of these tracts, {{BEGIN HCI End HCI}} are deployed for millimeter wave in 2024.[144] Using the {{BEGIN HCI END HCI}} of these tracts are shown in the Applicants' models as suitable for millimeter wave deployment. Consequently, the {{BEGIN HCI END HCI}} produces accurate estimates and balances false positives and false negatives.

[143] T-Mobile does not deploy any 2.5 GHz spectrum. Therefore, the marginal cost savings from the adjustment in spectral efficiency increase for T-Mobile. Sprint, which does deploy 2.5 GHz spectrum incurs a decrease in marginal cost savings from the spectral efficiency adjustment. In aggregate, marginal cost savings decrease. See Section 2.

[144] {{BEGIN HCI

END HCI}}

# II. Marginal Cost Efficiencies from Adjusted Network Modeling

In Table 9, we presented a summary of the adjusted network marginal cost efficiencies under IKK's "maintain usage restrictions" scenario. Below we present the corresponding summary of adjusted marginal cost efficiencies under IKK's "relax usage restrictions" scenario.

**Table 26: Summary of Network Marginal Cost Savings by Adjustment Scenario (Relaxes Usage Restrictions) ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Source: IKK Table 14 and Brattle Calculations based on IKK Financial Backend Model and IKK Revised Network Engineering Model.

Notes: IKK also estimate that Sprint will save approximately **{{BEGIN HCI END HCI}}** in reduced roaming costs for its postpaid service. Note that the spectral efficiency adjustment is made to all sectors that deploy 2.5 GHz spectrum. While this may overstate the capacity gain associated with adjusting spectral efficiency for massive MIMO, it will not have any effect on marginal cost because sectors without MIMO **{{BEGIN HCI**

**END HCI}}** In the Sprint stand-alone model, for example, there are **{{BEGIN HCI END HCI}}** sectors in 2021 that face congestion and do not have massive MIMO deployed.

The table shows that the marginal cost savings calculated by IKK are much higher than is the case when simple additions or adjustments are made to the network model. IKK's calculated marginal cost savings for Sprint range from {{BEGIN HCI

END HCI}} and the marginal cost savings for T-Mobile range from {{BEGIN HCI

END HCI}}, depending on the year. By itself, {{BEGIN HCI

END HCI}} to the standalone and New T-Mobile network models reduces the marginal cost savings to {{BEGIN HCI

END HCI}} for Sprint customers and to {{BEGIN HCI

END HCI}} for T-Mobile customers.

The additional adjustments to the Applicants' network also influence the calculated marginal cost savings. Combining each of the four adjustments, the new marginal cost savings are from **{{BEGIN HCI END HCI}}** for Sprint customers and from **{{BEGIN HCI END HCI}}** for T-Mobile customers. These are material reductions from the marginal cost savings claimed by IKK.

# III. Vertical Gross Upward Pricing Pressure Calculations

In Table 3 we presented a summary of the results for the vGUPPI for 2021. In the table below we present the underlying details of the calculation, plus results for 2022-2024.

**Table 27: vGUPPI Calculations (%/subscriber/month)**

{{BEGIN HCI

END HCI}}

Source: IKK Backup Materials and Moresi, Serge, and Steven C. Salop. "vGUPPI: Scoring Unilateral Pricing Incentives in Vertical Mergers." *Antitrust LJ 79* (2013): 185.

# IV. The Valuation of Throughput Improvements and the Application of *Nevo et al.*

IKK uses findings from *Nevo et al.* in an attempt to compute the consumer valuation of the merger induced improvements in network quality.[145] Given these valuations, IKK compares these numbers to the critical quality frontier generated from the merger simulation model to argue that the willingness to pay for merger induced improvements are in the region in which the merger is welfare-enhancing. However, separate from the estimation of the critical quality frontier, there are a number of issues with the methodology and the argument is ultimately flawed.

## A. General Concerns

The key parameters which *Nevo et al.* consider are structural parameters that determine the consumer's demand elasticity and the non-price cost of consuming content on a *wired* broadband service. IKK adapts *Nevo et al.* by taking a single point from the parameter distribution estimates and calculates the willingness to pay for *wireless* service. However, the parameters for these two markets could be very different. For example, consider the non-pecuniary marginal cost of consuming content wirelessly on a mobile phone while waiting for a bus versus at home through a streaming service on a larger screen in the evening. These two scenarios are likely to generate very different opportunity costs and dis-utilities from consuming content. This does not mean that the *Nevo et al.* methodology could not be adapted to the mobile broadband market, but it would require an adaptation and doing so would require, at minimum, re-estimation of the distribution of the parameters using the relevant wireless usage data and plan characteristics. However, IKK inappropriately applies the parameters from *Nevo et al.* without re-estimating their distributions. Below we discuss more technical concerns that arise from the way IKK used *Nevo et al.*

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[145] Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 411-443.

## B. IKK's "Adjustments" to *Nevo et al.* are misguided

IKK, in Tables 21 and 23 of their report, make adjustments to the throughput data from their network model to account for the different throughputs seen in the *Nevo et al.* data versus the 5G speeds that the Applicants' claim to be able to achieve. IKK scales down the throughputs calculated from the Applicants' network model to match the mean throughput in *Nevo et al.* and then recalibrates one[146] of the five parameters in the *Nevo et al.* model that determines usage. This process results in inconsistencies that invalidate the interpretation of the willingness to pay calculations.

Taking the *Nevo et al.* parameters and distribution estimates as given (as IKK have) and recalibrating a single parameter transforms the consumer that IKK are calculating the willingness to pay for into a different type of consumer. In other words, "the most common type"[147] that IKK started off with in the non-adjusted model is no longer the type of consumer being examined. More specifically, Table 28 shows the recalibrated parameter in IKK's methodology. Comparing this with the joint distribution reported in *Nevo et al.*, replicated in Figure 3,[148] it is revealed that there is only a small proportion of consumers with the newly calibrated parameter values. In other words, even if we were to accept the parameters, the willingness to pay calculations in the "adjusted" tables represent a tiny proportion of consumers which are not representative of the population.

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[146] This parameter is $\mu_h$ which is represents the mean of log-normal time varying shocks in the *Nevo et. al.* model.

[147] The assumptions and simplifications that IKK makes are outlined in the IKK declaration fn. 153. *Nevo et al.* estimate a distribution of consumer "types" parameterized by 5 key parameters that jointly determine a consumer type. IKK chooses one value for each of the 5 parameters from the distribution estimated on a grid. These values correspond to the "most common" type which only accounts for 28% of the total mass. Assuming there are no other issues, computing willingness to pay figures based on the parameters corresponding to only 28% of the subscribers is itself misleading.

[148] $\beta_h$ is the parameter that determines the curvature of the utility function and is held fixed at **{{BEGIN HCI END HCI}}** of *Nevo et al.*

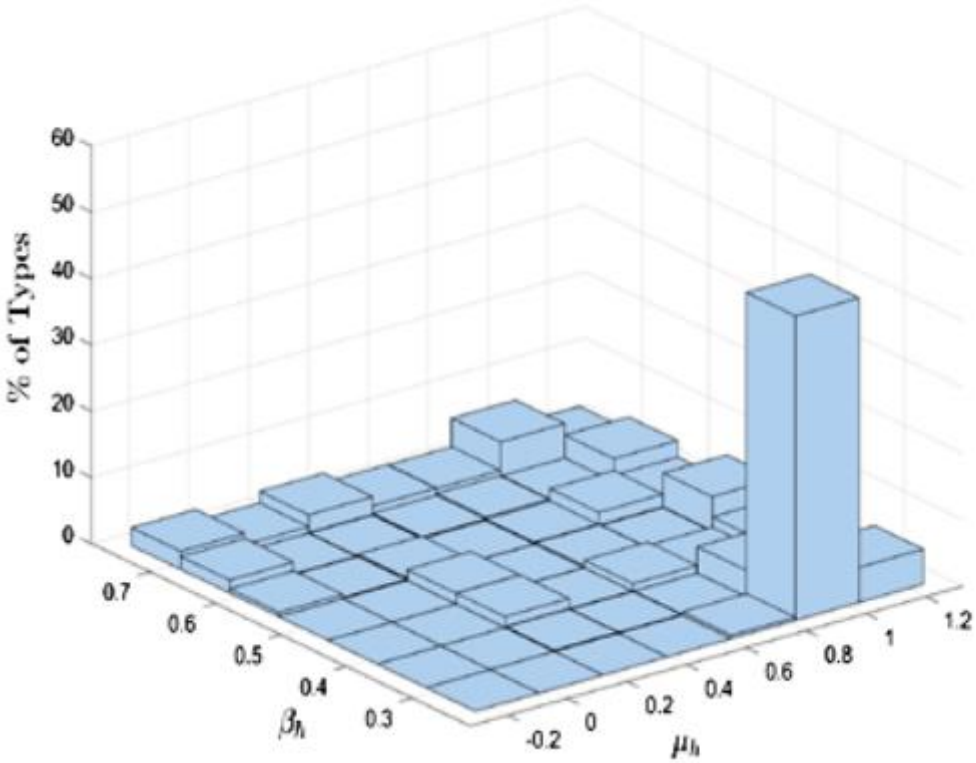
**Table 28: Calibrated $\mu$ with Adjusted Throughput**

{{BEGIN HCI

END HCI}}

Source: IKK backup materials

**Figure 3: The Joint Distribution of the IKK Recalibrated Parameter and the Utility Function Curvature Parameter**




Source: Replicated from Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 411-443.

## C. Willingness to pay values are sensitive to choice of customer-type parameters in *Nevo et al.*

Table 29 shows how sensitive the willingness to pay values are for the top four types of consumers reported in *Nevo et al.* following the IKK methodology.

**Table 29: Willingness to Pay for Throughput Improvements Calculations Using Different Parameter Selections from *Nevo et al.* (Unadjusted, No Usage or Mix Change) ($/Subscriber/Month)**

{{BEGIN HCI

END HCI}}

Sources & Notes: IKK Backup materials. Top four types reported in Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Supplement to 'Usage-Based Pricing and Demand for Residential Broadband': Appendix," *Econometrica* 84, no. 2 (2016).

The table shows that the non-selected willingness to pay figures are of different orders of magnitude from the selected parameters. Relative to the ARPUs we observe, the willingness to pay calculations could be considered absurd; if "passed through" these would imply anywhere from a doubling to a quadrupling of current wireless pricing. For example, in 2024, Type 2 customers are willing to pay up to {{BEGIN HCI END HCI}} more for the improvements in quality claimed in IKK, or approximately {{BEGIN HCI END HCI}} than the current ARPU for T-Mobile. Rather than constituting evidence that IKK might have attempted

conservative estimates for the willingness to pay calculations, Table 29 instead shows the inappropriateness of adapting *Nevo et al.* to this issue.

If we were to take the demand system and the parameters established in *Nevo et al.* as correct, the results in Table 29 would imply that New T-Mobile would have large incentives to raise prices. IKK's nested logit model, unlike *Nevo et al.,* does not account for the different types of consumers that respond differently to changes in the market. If IKK were to build a model where the firms set prices given the demand system estimated in *Nevo et al.*, the merged firm would have significantly greater incentives to raise prices in order to capture the consumers' increased willingness to pay, shown in Table 29.

## D. IKK's Willingness to Pay ignores the role of shadow prices in the *Nevo et al.* Model

In *Nevo et al.*, shadow prices play a crucial role in identifying the distribution of consumer types.[149] Intuitively, the shadow price is the change in future utility that arises from content consumption in the present. In *Nevo et al.*, the shadow price is either the 'overage charge' that the consumer needs to pay once their usage allowance is exhausted or the effect of their content consumption today on future consumption (for example, increased consumption today implies a higher likelihood of paying overage charges later in the month).

IKK assumes that the shadow price is non-existent in their willingness to pay calculations. One could argue that most wireless plans don't have overage charges and hence this assumption is innocuous. However, this is not true. Usage allowances and penalties from exhausting such allowances exist in various forms (data simply being cut off, speeds being throttled to 2G or 3G speeds) imply that the shadow price of day-to-day usage is non-zero. IKK's implementation of *Nevo et al.* implicitly assumes that all consumers are using a truly unlimited data service. This assumption poses technical issues regarding the applicability of the parameters reported in *Nevo et al.* The parameter distribution estimates of *Nevo et al.* rely on consumers responding to

[149] See Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 428-430.

changes in the shadow price of usage over a billing cycle.[150] Given this, if we were to evaluate the parameter distribution with a data set with no positive probability of incurring some sort of overage charge (monetary or otherwise) the estimates would likely change, possibly significantly. In fact *Nevo et al.* emphasizes the importance of usage over the billing cycle in the determination of the joint distribution of consumer types.[151] Taking the most common type of consumer as estimated by *Nevo et al.* and subsequently doing away with a crucial source of variation in the data used to estimate how common the particular consumer is ultimately an inconsistent application of the model.

# V. Coordinated Effects

Table 30 shows CPPI calculations using the IKK merger simulation model inputs and efficiencies. We see that the Delta CPPI's are higher than the calculations shown in Table 24. Below we describe the differences between the data used in *HBVZ* (and in Table 24) and the data used in Table 30.

**Table 30: CPPI with IKK Inputs from Merger Simulation and with IKK Efficiencies**

{{BEGIN HCI

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Sources & Notes:
IKK Backup Materials, Maintain Usage Inputs; IKK Merger Simulation with Maintain Usage Inputs. Inputs for 2021. Using a weighted average of Sprint and T-Mobile margins by shares for New T-Mobile. Diversions from Harris Study.
[A]: Two-firm coalition.

[150] See Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage-Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 419.

[151] See Nevo, Aviv, John L. Turner, and Jonathan W. Williams. "Usage- Based Pricing and Demand for Residential Broadband." *Econometrica* 84, no. 2 (2016): 430.

[B]: CPPI for listed firm pair before Sprint/T-Mobile merger.
[C]: CPPI for listed firm pair after Sprint/T-Mobile merger.
[D]: Change in CPPI for listed firm pair due to Sprint/T-Mobile merger.

In the post-merger CPPI calculations in Table 30 we incorporate both the claimed merger cost efficiencies and the post-merger price changes that result from IKK's nested logit merger simulation model.[152] These price changes are shown in Table 6 above and have been discussed in Section II.B.3. In summary, we saw that the Applicants' claimed efficiencies were insufficient to offset the upward pricing pressure on Sprint prices, such that the IKK model predicts price increases for Sprint products and price decreases for the T-Mobile products. These price changes imply that the IKK model predicts, relative to the CMCR-induced margin changes in Table 24, smaller margin increases for Sprint products and larger margin increases for T-Mobile products.[153]

We observe that, even under the Applicants' claimed efficiencies, the CPPI experiences an increase as a result of the merger and, furthermore, this increase is greater mostly than what is reported in Table 24. The mostly higher Delta CPPI is driven mainly by two factors. Firstly, the estimated margins in the IKK model are somewhat lower than the estimates in *HBVZ*, which enhances the incentive for firms to implement a coordinated price increase. Secondly, the market shares used to determine the number of total connections for each brand from the IKK model are more symmetric across New T-Mobile, Verizon, and AT&T. This implies that the merging parties can absorb a lot of the diversion from the other member of the coordinating coalition once they match the price increase. This increases the profit from enacting a coordinated price increase.

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[152] For the CPPI calculations here we collapse the segments to the brand level by taking share weighted averages and use pre-merger shares to calculate the number of total connections (an input to the CPPI calculation) for each product. In *HBVZ* we considered the CPPI for just the postpaid segment. Because the IKK diversion information covers a broader set of brands and segments, brands with a larger prepaid presence will recapture more lost sales following a price increase. All else equal, this will increase incentives to coordinate.

[153] We use the calibrated marginal costs to calculate margins.

*  *  *  *

The foregoing declaration has been prepared using facts of which we have personal knowledge or based upon information provided to us. We declare under penalty of perjury that the foregoing is true and correct to the best of our current information, knowledge, and belief.

Executed on October 31, 2018

William P. Zarakas
Principal
The Brattle Group

Jeremy A. Verlinda, Ph.D.
Principal
The Brattle Group

Coleman Bazelon
Principal
The Brattle Group

Joseph Harrington
Patrick T. Harker Professor
Business Economics and Public Policy
Wharton School
University of Pennsylvania

# Exhibit 2

# Reply Declaration of David E.M. Sappington

**REDACTED—FOR PUBLIC INSPECTION**

# Reply Declaration of David E. M. Sappington

## I. Introduction

My name is David Sappington. I submitted a declaration on behalf of DISH Network Corporation in this proceeding ("Sappington Declaration"),[1] exposing some of the major flaws in the declaration filed by Dr. David Evans ("Evans Declaration").[2] The primary purpose of the present declaration is to explain why, after reviewing Dr. Evans' response to my critique ("Evans Reply"),[3] my assessment of Dr. Evans' work has not changed. Even in its amended state, Dr. Evans' work remains compromised by its unquestioning acceptance of the original projections prepared by T-Mobile and Sprint ("the Applicants"). Dr. Evans' work also continues to be undermined by its reliance on critical assumptions that are not fully supported. In addition, Dr. Evans' work remains incomplete and biased, for the reasons identified in the Sappington Declaration.

The present declaration also provides support for my earlier observation that increased industry concentration can reduce industry investment, rather than expand investment, as the Applicants and Dr. Evans predict.[4] This declaration also clarifies that reductions in the per-GB price of wireless data, should they arise, do not necessarily translate into commensurate increases in consumer welfare.

The present declaration proceeds as follows. Section II explains how Dr. Evans' work remains compromised by its unquestioning acceptance of the Applicants' original estimates of the extent to which the proposed merger would increase their combined capacity. Section III reviews why Dr. Evans' work continues to be undermined by its reliance on critical assumptions that are not fully supported. Section IV identifies the ways in which Dr. Evans' work remains incomplete and

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1 Declaration of David E. M. Sappington, August 27, 2018 (attached to Petition to Deny of DISH Network Corporation, Aug. 27, 2018 ("DISH Petition")).

2 Declaration of David S. Evans, June 18, 2018 (attached to T-Mobile and Sprint's Description of the Transaction, Public Interest Statement, and Related Demonstration, filed June 18, 2018).

3 Reply Declaration of David S. Evans, September 17, 2018 (attached to T-Mobile and Sprint's Joint Opposition, filed September 17, 2018).

4 The Sappington Declaration (p. 11) observes that "Dr. Evans fails to consider the reduced competitive intensity fostered by increased industry concentration. Just as reduced competitive intensity can promote higher prices, it can also dull incentives for innovation and investment."

biased. Section IV also cites econometric evidence that contrasts sharply with Dr. Evans' prediction regarding the relationship between industry concentration and industry investment. Section V notes the important distinction between changes in the per-GB price of data and changes in consumer welfare. Section VI provides my conclusions.

## II. Dr. Evans Continues to Accept T-Mobile's Original Projections Without Question

Dr. Evans predicts that the proposed merger of T-Mobile and Sprint would produce a substantial decline in the unit price of wireless data. The methodology that underlies this prediction ("the Evans methodology") essentially estimates the unit price of wireless data to be the ratio of predicted industry revenue to predicted industry (practical) capacity.[5] Consequently, the Evans' methodology predicts that, holding other factors constant, the proposed merger will reduce the unit price of wireless data to a greater extent the more the merger increases industry capacity and associated network traffic.

It follows that, in order to cast the most favorable light on the proposed merger, Dr. Evans would adopt the most optimistic forecast of the extent to which the merger would increase industry capacity and network traffic. Dr. Evans does just that by continuing to adopt without question the original capacity forecasts prepared by the Applicants.[6]

It seems apparent that these forecasts were prepared with full knowledge that they would be reviewed by the Department of Justice and the Federal Communications Commission in the present proceeding. The forecasts were also likely prepared knowing that they could potentially be employed by an economist to support optimistic predictions regarding the benefits of the proposed merger. Consequently, there are clear reasons to suspect the forecasts may be unduly optimistic.

Indeed, the Applicants' own updated analysis effectively acknowledges the undue optimism of the original forecast.[7] The updated analysis reduces sharply the Applicants' estimate of the extent

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5 Practical capacity reflects "the amount of data that a cellular network provides to users as a proportion of its [.] total capacity, given the engineering and business practicalities of running the network" (Evans Declaration, ¶ 209).

6 Dr. Evans admits that "My analysis is based on the Applicants' forecasts of network performance for New T-Mobile and the stand-alone companies" (Evans Reply, ¶ 6).

7 *See* Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, § III-A-B, October 31, 2018 (Exhibit 1 to DISH Reply, filed October 31, 2018) ("Harrington/Brattle Reply Declaration").

to which the proposed merger would increase the traffic on the combined networks of T-Mobile and Sprint. As the Harrington/Brattle Reply Declaration explains, the Applicants' updated analysis reduces **{{Begin HCI End HCI}}** their original estimate of the increase in network traffic the merger would engender.

The Harrington/Brattle Reply Declaration also demonstrates that even this sharply reduced estimate of the extent to which the merger will increase network capacity and network traffic likely overstates substantially the true impact of the merger. The Harrington/Brattle Reply Declaration points out that the Applicants' original and updated analyses both fail to account for important factors that will allow T-Mobile and Sprint to expand their network capacities and traffic in the absence of a merger. These factors include the acquisition of millimeter wave spectrum – spectrum that the Applicants have indicated they would acquire independently in the absence of a merger.[8] The Harrington/Brattle Reply Declaration demonstrates that "over **{{Begin HCI End HCI}}** of the merger related benefit in network offered traffic – the key variable used by Dr. Evans in his analysis in support of the [Applicants' Public Interest Statement] – vanishes with a more detailed model and just 200 MHz and 400 MHz of millimeter wave spectrum added to the standalone companies and New T-Mobile respectively."[9]

In summary, Dr. Evans' continued reliance on the Applicants' original estimate of the impact of the merger on network capacity exaggerates the likely impact of the merger on the unit price of wireless data in two distinct ways. First, this reliance fails to account for the Applicants' admission that their initial estimate greatly exaggerated the likely impact of the merger on network capacity. Second, this reliance fails to account for important additional factors (such as millimeter wave spectrum) that are likely to reduce substantially the impact of the merger on industry capacity and thus on the unit price of wireless data.

## III. Dr. Evans' Work Continues to Rely on Unsupported Assumptions

Accepting without question the Applicants' original estimates of the impact of the proposed merger on their combined capacity is not the only means by which Dr. Evans secures an unduly rosy estimate of the merger's impact on the unit price of wireless data. He also assumes that AT&T

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8 See the Harrington/Brattle Reply Declaration, § III.C.8.a, for details.

9 Harrington/Brattle Reply Declaration, § III.C.8.a.

Wireless ("AT&T") and Verizon Wireless ("Verizon") will operate with the same practical capacity per subscriber as New T-Mobile following the merger. Consequently, Dr. Evans assumes that if the merger increases the practical capacity per subscriber of New T-Mobile, it will automatically increase the corresponding capacities of AT&T and Verizon.

This assumption is of fundamental importance in Dr. Evans' analysis, as Exhibits 1A and 3B in the Evans Reply make apparent. The exhibits compare the extent to which the proposed merger would reduce the unit price of wireless data in two settings: one where a "capacity match" occurs, so AT&T and Verizon match New T-Mobile's expanded practical capacity per subscriber, and one where this capacity match does not take place. Exhibit 1A projects nearly a 50% price reduction in the event of a capacity match.[10] Exhibit 3B projects a dramatically smaller price reduction in the absence of the capacity match. The projected decline is approximately 5%,[11] a mere one-tenth of the decline predicted in the event of a capacity match. Thus, Dr. Evans' assumption that the capacity match will occur is crucially important in his analysis.

Given the fundamental importance of this assumption, it is incumbent upon Dr. Evans to establish its accuracy. In principle, one might attempt to establish the accuracy of the assumption by: (i) securing reliable data on the practical capacity per subscriber of wireless carriers that operate in settings like those under consideration in the present proceeding; and (ii) establishing through careful econometric analysis and associated statistical significance tests that the capacity matching presumed by Dr. Evans prevails in practice. Dr. Evans presents no such econometric evidence. Instead, he presents some data on historic industry investment patterns, along with examples of "back-and-forth marketing claims,"[12] presentations at the Applicants' board meetings,[13] blog posts,[14] and press reports.[15]

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[10] The projected price decline is 49.88%.

[11] The projected price decline is 5.02%. It warrants emphasis that both of these projections reflect the Applicants' rosy original estimates of the extent to which the merger would increase their combined capacity. Both projections also fail to account for the likely coordinated effects of the merger. (This failure is discussed more fully in Section IV below.) Consequently, both estimates likely overstate the extent to which the merger would reduce the unit price of wireless data in the absence of capacity matching.

[12] Evans Declaration, ¶ 128.

[13] *Ibid*, ¶ 141.

[14] *Ibid*, ¶ 145.

This information can be taken into account. However, it does not constitute the thorough econometric analysis required to establish the accuracy of Dr. Evans' critical assumption. Indeed, even a thorough econometric analysis based on historic U.S. data may not be sufficient to establish the accuracy of Dr. Evans' critical assumption. The assumption pertains to how AT&T and Verizon will respond to an alleged substantial increase in capacity by a new carrier (New T-Mobile) in a setting with only three major wireless carriers, each serving a similar number of subscribers. Investment behavior observed in distinct, historic industry settings may well differ substantially from the behavior that will arise in the setting of primary interest in the present proceeding.

Dr. Evans claims that the "extensive empirical evidence" he presents supports his critical assumption.[16] The information Dr. Evans presents is not the thorough econometric analysis required to fully support his assumption.[17] Such analysis may be difficult to produce. However, it is not apparent how T-Mobile and Sprint can meet their burden of demonstrating that their proposed merger would serve the public interest without providing this analysis.

It is noteworthy that recent econometric analysis of the impact of industry consolidation on industry investment in European mobile telecommunications sectors does not confirm the dramatic increase in industry investment that the Applicants and Dr. Evans predict will arise in the United States. A 2017 econometric study of the experience in the mobile telecommunications sector in 33 OECD countries between 2002 and 2014 concludes that although a hypothetical 4-to-3 symmetric merger would increase investment per operator, "total industry investment does not change significantly."[18] Thus, the conclusions drawn in this thorough econometric analysis differ markedly from the predictions offered by the Applicants and Dr. Evans.[19]

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15 *Ibid*, ¶ 163.

16 Evans Reply, ¶ 10.

17 Dr. Evans clearly appreciates the importance of thorough econometric analysis. He criticizes my earlier declaration for not presenting such analysis, noting that "Professor Sappington says that increases in concentration could reduce investment but does not cite any econometric evidence that is particular to mergers among cellular carriers let alone that are particular to the United States." (Evans Reply, note 39).

18 Christos Genakos, Tommaso Valletti, and Frank Verboven, "Evaluating Market Consolidation in Mobile Communications," CESIFO Working Paper 6509, May 2017 (available at http://www.cesifo-group.de/ifoHome/publications/docbase/DocBase_Content/WP/WP-CESifo_Working_Papers/wp-cesifo-2017/wp-cesifo2017 -05/12012017006509.html) ("CESIFO Study") (p. 4). The study further observes "it is not clear whether efficiencies from coordinating total industry investment among fewer firms only stem from

## IV. Dr. Evans' Work Remains Incomplete and Biased

### A. Dr. Evans' Work Remains Incomplete

The Sappington Declaration (p. 5) explains that the Evans Declaration is incomplete because it fails "to account for the fact that a substantial increase in industry concentration is likely to place upward pressure on the price of wireless data." The Evans Reply (Section II) acknowledges this incompleteness by accounting for estimated unilateral effects of the merger. As the Harrington/Brattle Declaration explains, such unilateral effects arise because increased industry concentration generally leads to higher prices even if industry suppliers choose prices independently.[20]

The Harrington/Brattle Declaration also observes that the proposed merger is likely to enhance the ability of industry suppliers to coordinate their prices rather than choose them independently. Industry prices will be higher when suppliers set them in a coordinated fashion, rather than independently.[21] Consequently, the merger is likely to increase industry prices more than the consideration of unilateral effects alone would suggest.

Despite the potential importance of the coordinated effects of the proposed merger, the Evans Reply makes no attempt to account for their impact on the price of wireless data. Consequently, Dr. Evans' work remains incomplete.

A full accounting for the coordinated effects of the proposed merger could lead to predictions that are more in line with documented experience. For example, the aforementioned econometric analysis of the experience in OECD mobile telecommunications sectors concludes that "more concentrated markets lead to higher end user prices" and that "a hypothetical 4-to-3

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fixed costs savings, or whether they also involve marginal cost savings and quality improvements that benefit consumers" (p. 4).

[19] A recent econometric study of the relationship between competition and investment in a broad set of industries finds that reduced industry competition is systematically associated with reduced industry investment. *See* Germán Gutierrez and Thomas Philippon, "Declining Competition and Investment in the U.S.," CEPR Discussion Paper No. DP12536, December 2017 (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3095586).

[20] Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, August 27, 2018 (attached to DISH Petition), Section III.

[21] Harrington/Brattle Declaration, Section IV.

symmetric merger would increase the bill of end users by 16.3% on average."[22] Another recent (2016) econometric study of the effects of consolidation in the mobile telecommunication sectors of 25 countries finds that "removing a disruptive player from a four player market … could increase prices by between 17.2% and 20.5%% [*sic*] on average, all else being equal."[23]

### B. Dr. Evans' Work Remains Biased

The Sappington Declaration (pp. 1-2) explains that "Dr. Evans' study is biased because its methodology predicts the proposed merger between T-Mobile and Sprint would substantially reduce the price of wireless data in the U.S. even if the merger did not increase the combined capacity of T-Mobile and Sprint, change the number of smartphone subscribers that any carrier serves, or change the industry-wide average revenue per smartphone subscriber." The Evans Reply makes no effort to correct this bias. Instead, the Evans Reply (belatedly) attempts to explain the bias, relying on assumptions about capacity matching that are not fully supported (for the reasons identified above). Thus, the identified bias in Dr. Evans' work persists.

## V. Price Reductions Differ from Increases in Consumer Welfare

I offer one apparent observation before concluding: price reductions of a given magnitude do not imply increases in consumer welfare of a corresponding magnitude. Specifically, in the present context, the 5% decline in the per-GB price of wireless data predicted in Exhibit 3B in the Evans Reply does not imply a 5% increase in consumer welfare.[24] Indeed, a 5% decline in the per-GB price of wireless data does not even guarantee that every consumer is better off. Unlimited wireless data plans that entail a higher price and a more-than-proportionate increase in average data consumption (so the per-GB price of data declines) can reduce the welfare of consumers who use relatively little data.[25]

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[22] CESIFO Study, Abstract and p. 4.

[23] Ofcom, "A Cross-Country Econometric Analysis of the Effect of Disruptive Firms on Mobile Pricing," Research Document, March 15, 2016 (available at https://isportal.berec.europa.eu/view-doc/a-cross-country-econometric-analysis-of-the-effect-of-disruptive-firms-on-mobile-pricing), p. 17.

[24] Recall that this 5% decline is predicted to arise when the merger expands the combined capacity of T-Mobile and Sprint to the extent originally predicted by the Applicants, but AT&T and Verizon do not match this increase in capacity.

[25] The identified 5% decline in the per-GB price of wireless data reflects an increase in the price of wireless service that is outweighed by a presumed increase in wireless data usage. Absent the increased data usage,

To be clear, this observation is not a criticism of Dr. Evans' work. Rather, it is a clarification of the appropriate interpretation of his work. Dr. Evans' predictions regarding the percentage change in the per-GB price of wireless data are not predictions about percentage changes in consumer welfare. Predictions regarding such welfare changes would require explicit specification of consumer demand functions, which Dr. Evans does not provide.

## VI. Conclusions

Even in its revised state, Dr. Evans' work remains compromised by its unquestioning acceptance of the Applicants' original projections and its reliance on assumptions that are not fully supported. Dr. Evans' work also remains incomplete and biased. These limitations of his work may help to explain why Dr. Evans' predictions differ sharply from actual experience in the mobile telecommunications sector, as assessed through econometric analysis.

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the higher price of wireless service would harm consumers. Similarly, absent the higher price of wireless service, the increased data usage would benefit consumers. The magnitude of this benefit remains to be established.

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The foregoing declaration has been prepared using facts of which I have personal knowledge or based upon information provided to me. I declare under penalty of perjury that the foregoing is true and correct to the best of my current information, knowledge, and belief.

Executed on October 31, 2018

_____

David Sappington
Director, Robert F. Lanzillotti Public Policy Research Center
University of Florida

# Exhibit 3

# Declaration of Peter Tenerelli and Vijay Venkateswaran

## Declaration of Peter Tenerelli and Vijay Venkateswaran

1. Peter Tenerelli is an electrical engineer with over 25 years of experience in designing, deploying and operating wireless networks throughout the world. He is an expert in spectrum management and sharing, and has implemented spectrum reallocation programs. He has served many mobile network operators by designing and executing plans for improving their operational and spectral efficiency. He has also worked on the development of a spectrum sharing technology for 4G LTE networks, an airborne spectrum monitoring system, and was instrumental in the adoption of automation tools for spectrum management.

2. Vijay Venkateswaran is a business executive and electrical engineer with over 25 years of experience in the mobile data/broadband industry. He has served as Senior Director, Wireless Strategy and Business Development for Time Warner Cable; Vice President, Mobile Product Management for SkyTerra Communications; and Executive Director, New Product Innovation and Development for Verizon. Mr. Venkateswaran currently serves as a consultant in a number of areas, including spectrum policy and strategy, as well as mobile products and industrial Internet of Things applications.

3. Their qualifications and experience are set forth in greater detail in the attached biographical notes.

**Assignment**

4. Based on our backgrounds, we have been asked by DISH to review certain claims made by Sprint and T-Mobile (together, the "Applicants") regarding the claimed synergies and benefits resulting from their proposed merger.

**Spectral Efficiency**

5. The Applicants' revised engineering model still understates Sprint's and T-Mobile's standalone capabilities. Specifically, the model understates spectral efficiency. The Applicants use a factor of 3.8 bits/second/Hertz ("b/s/Hz") for the 2.5 GHz 5G spectrum,[1] which does not appear to take into account Massive MIMO deployment in that spectrum. Sprint is deploying the Massive MIMO systems on its LTE network and will use the same Massive MIMO systems in its 5G deployments.[2]

6. While the Applicants seem to **{{BEGIN HCI**

**END HCI}}** Properly accounting for spectral efficiency shows a significantly enhanced capacity for Sprint's standalone system. Using the Applicants' revised model, a higher spectral efficiency means that solutions for congestion relief would become less necessary and correspondingly the cost of congestion for standalone Sprint would fall. We believe that an effective spectral efficiency multiplier of three is reasonable.[3] When used with Sprint's own baseline number, that multiplier results in 11.4 b/s/Hz for Massive MIMO 5G deployment in the 2.5 GHz band. In fact, Sprint's

[1] Sprint Information Request Response at 24.

[2] Sue Marek, *Sprint Spent $1B on Massive MIMO for Its 5G Network in Q2*, SDX Central (June 22, 2018), https://www.sdxcentral.com/articles/news/sprint-spent-1b-on-massive-mimo-for-its-5g-network-in-q2/2018/06.

[3] *See* Applicants' Revised Network Capacity Model, filename "Montana Capacity Analysis_Sprint.xlsx" (Sept. 17, 2018); Press Release, Sprint Corp., Sprint and Ericsson Conduct First U.S. Field Tests for 2.5 GHz Massive MIMO (Sept. 12, 2017), https://newsroom.sprint.com/sprint-and-ericsson-conduct-first-us-field-tests-for-25-ghz-massive-mimo.htm; Brian Cho, Nokia - Enabling Technologies for 5G - The Next Generation Network at 14 (June 1, 2018), https://www.waseda.jp/fsci/giti/assets/uploads/2018/04/9a607d4a8a42f9d20f62fff260db6117.pdf.

own testing of Massive MIMO antenna systems for its 2.5 GHz spectrum has shown a capacity increase of not three, but approximately four, times when compared to an 8T8R antenna.[4] Sprint's own testing therefore would yield a spectral efficiency factor of 15.2 b/s/Hz.

**5G Upgrade Costs**

7. The use of Massive MIMO antennas also has implications for the 5G upgrade costs that New T-Mobile will incur. The substitution of a Massive MIMO antenna for Sprint's existing equipment will generally not require additional space on a tower, and therefore not result in a rent increase. This means that standalone Sprint would be subjected to limited, if any, rent increases for additional space on the towers that it uses. Likewise, while a Massive MIMO antenna is heavier than Sprint's existing 2.5 GHz equipment, the weight difference resulting from replacement will generally not require strengthening the towers used by standalone Sprint. Our review of Sprint's lease agreements with major tower companies reveals that, at least in one such agreement, Sprint has successfully negotiated the weight limits for **{{BEGIN HCI**

**END HCI}}**[5] We believe this weight limit will accommodate most Massive MIMO systems. This means there would likely be no rent increase for the swap of a Massive MIMO system for Sprint's existing configuration. As for **{{BEGIN HCI**

[4] Press Release, Sprint Corp., *Sprint and Ericsson Conduct First U.S. Field Tests for 2.5 GHz Massive MIMO* (Sept. 12, 2017), https://newsroom.sprint.com/sprint-and-ericsson-conduct-first-us-field-tests-for-25-ghz-massive-mimo.htm.

[5] SPR-FCC-12475007 at SPR-FCC-12475017 **{{BEGIN HCI**
**END HCI}}**

**END HCI}}**[6] the rent increase resulting from such a swap will likely be small in the aggregate.

8. By contrast, the addition of Massive MIMO antenna systems to T-Mobile's existing equipment will often require an extra "radiation center," and will also result in a significant weight increase for each antenna/radio unit, in addition to any mounting platform hardware.[7] We believe that this will increase the rent (by as much as 100%). We also estimate that the additional weight would require New T-Mobile to strengthen as many as 25-40% of its cell sites, at a cost of $35,000 to $200,000 per cell site.

9. Furthermore, New T-Mobile will incur significant decommissioning expenses. Sprint has struck a bargain that facilitates the standalone Sprint transition to 5G, but would make New T-Mobile's 5G transition more difficult. Specifically, **{{BEGIN HCI**

**END HCI}}**[8] This bargain impedes the New T-Mobile transition plan. New T-Mobile would need greater flexibility to *terminate* leases, since it plans to decommission all but 11,000 of Sprint's sites.[9] By contrast, New T-Mobile needs less flexibility to "port" Sprint's agreement to new sites. This means that, **{{BEGIN HCI**

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[6] *Id.*

[7] *See* Ericsson, Antenna Integrated Radio Unit Description – AIR 6468 at 8; Press Release, Sprint Corp., Sprint and Ericsson Conduct First U.S. Field Tests for 2.5 GHz Massive MIMO (Sept. 12, 2017), https://newsroom.sprint.com/sprint-and-ericsson-conduct-first-us-field-tests-for-25-ghz-massive-mimo.htm.

[8] *Id.* at SPR-FCC-12475014.

[9] *See* Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197, at 29 (June 18, 2018).

**END HCI}}** including the **{{BEGIN HCI** **END HCI}}**[10] The Applicants have not shown to what extent their **{{BEGIN HCI** **END HCI}}**[11] estimate of the decommissioning cost takes such obligations into account.

10. In short, the cost to be incurred by New T-Mobile in 5G upgrades will be greater than standalone Sprint's because New T-Mobile will be adding whereas Sprint will be swapping. This is contrary to the Applicants' **{{BEGIN HCI**

**END HCI}}** In addition, only New T-Mobile will incur the cost of decommissioning.

**Fixed Broadband and Video**

11. The Applicants seek to credit to the merger benefits that are already accruing to consumers in the marketplace. T-Mobile's Mr. Sievert states that "New T-Mobile's entry into the in-home broadband marketplace will cause incumbent providers to lower their prices and invest in their networks"—benefitting all in-home broadband customers.[12] But cable providers are already investing in their networks through DOCSIS 3.1 upgrades and are offering higher speeds and better in-home WiFi services. These investments are ongoing and independent of New T-Mobile's entry. For instance, in 2017, well before the merger was announced, Charter started to roll out a new DOCSIS 3.1 with gigabit-speed Internet connections. Charter has rolled out gigabit-speed connections featuring DOCSIS 3.1 Internet services to over 95 percent of its

[10] *See* T-Mobile RFI Response, Specification 16 Donor Sites.xlsx.

[11] Joint Opposition of T-Mobile US, Inc. and Sprint Corporation, WT Docket No. 18-197 at 44 (Sept. 17, 2018).

[12] Reply Declaration of G. Michael Sievert ¶ 5 (Appendix H to Opposition) ("Sievert Reply Declaration") ¶ 5.

41-state footprint, reaching approximately 41 million U.S. homes, with plans to further expand this service in 2018.[13] Comcast recently announced that it has deployed gigabit-capable DOCSIS 3.1 to nearly all 58 million homes and businesses that it serves.[14] Indeed, at least one Sprint analysis on the subject has concluded that **{{BEGIN HCI**

**END HCI}}**[15]

12. Mr. Sievert goes on to state that New T-Mobile "expects to utilize caching and other network optimization techniques to increase the number of households that can be served."[16] Network caching is a common technique whereby a dedicated network server or network service acting as a server saves web pages or other internet content locally in geographic proximity to a user population. Caching speeds up access to content (for example 4K/HD video streams, or large video game downloads) and can reduce demand on network bandwidth by placing previously requested information in network server's storage. This capability is already currently available to all mobile operators,[17] including each of T-Mobile and Sprint, and the merger cannot be credited with its availability or use.

13. Mr. Sievert also claims that New T-Mobile's average download speeds will be 100 Mbps in 2021, and that by 2024, New T-Mobile will supposedly be able to cover more than

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[13] Press Release, Charter Communications, *Spectrum Internet Gig is Driving to the End Zone* (Oct. 10 2018), https://newsroom.charter.com/news-views/spectrum-internet-gig-is-driving-to-the-end-zone.

[14] Letter from Michael D. Hurwitz, Counsel for Comcast Corp., to Marlene H. Dortch, FCC, Responses of Comcast Corp. to Information and Document Request at 4 (Oct. 22, 2018).

[15] SPR-FCC-01348045 at SPR-FCC-01348061 **{{BEGIN HCI**
**END HCI}}**

[16] Sievert Reply Declaration ¶ 6.

[17] Cisco, Network Caching Technologies, http://docwiki.cisco.com/wiki/Network_Caching_Technologies (last visited Oct. 27, 2018).

250 million people at data rates greater than 300 Mbps and more than 200 million people at data rates greater than 500 Mbps, far exceeding those contemplated by Verizon or AT&T for their proposed 5G services, and matching or exceeding the offerings of most traditional ISPs.[18] As a point of reference, Verizon's "5G Home" service,[19] recently launched in October 2018 in Houston, Indianapolis, Los Angeles, and Sacramento, features "typical" speeds of 300 Mbps, going up to 940 Mbps.[20] The service comes bundled with a choice of Apple 4K TV or a Google Chromecast Ultra. Verizon is offering three months' service free to early adopters, and then $50 a month to Verizon customers, and $70 a month to new subscribers.[21]

[18] Sievert Reply Declaration ¶ 9.

[19] Verizon, 5G is Here (Sept. 11, 2018), https://www.verizon.com/about/node/913893.

[20] Verizon, 5G Home FAQs, https://www.verizonwireless.com/support/5g-home-faqs (last visited Oct. 30, 2018).

[21] *Id.*

**Network Coverage Radii for Rural Outdoor and Indoor Coverage**

14. Due to the propagation characteristics of Sprint's 2.5 GHz spectrum for 5G mobile broadband, we believe that a radius of less than 7.5 kilometers from a network node would be reasonable for 5G mobile broadband outdoor coverage in rural areas. For simulation purposes, the radii of 7.5 and 10 kilometers were used by Brattle. The more optimistic radius of 10 kilometers may overstate outdoor coverage for mobile broadband and give the Applicants the benefit of the doubt.

15. Based on two different propagation models (not tuned), and assuming a significant number of self-installations with high-powered (33 dBm EIRP) CPE devices, a cell radius that ranges between 2.5 and 5.6 kilometers would be appropriate for 2.5 GHz 5G broadband indoor coverage in rural areas.[22]

[22] The actual radius required can vary based on key variables such as frequencies used, antenna height, correction factor, and antenna gain. Our review considered (1) the extended Hata model for rural deployment (https://www.researchgate.net/publication/262294517_Propagation_measurements_and_modelling_at_1800_MHz_in_Lagos_Nigeria); and (2) the Standard Propagation Model (http://www.teletopix.org/4g-lte/lte-standard-propagation-model), along with the typical parameters from the technical guide of the Atoll radio planning and optimization tool (www.forsk.com).

*  *  *  *

The foregoing declaration has been prepared using facts of which we have personal knowledge or based upon information provided to us. We declare under penalty of perjury that the foregoing is true and correct to the best of our current information, knowledge, and belief.

Executed on October 31, 2018

Peter Tenerelli

Vijay Venkateswaran

## CERTIFICATE OF SERVICE

I, Travis West, hereby certify that on October 31, 2018, I caused true and correct copies of the foregoing public, redacted version to be served by electronic mail upon the following:

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