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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*”).

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

In the Matter of)	
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Applications of T-Mobile US, Inc.)	WT Docket No. 18-197
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and)	
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Sprint Corporation)	
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Consolidated Applications for Consent to)	
Transfer Control of Licenses and)	
Authorizations)	
)	

REPLY OF DISH NETWORK CORPORATION

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October 31, 2018

Table of Contents

I.	INTRODUCTION AND SUMMARY	1
II.	THE APPLICANTS CONCEDE, OR FAIL TO ADDRESS, KEY HARMS OF THE TRANSACTION	10
III.	THE APPLICANTS DO NOT DENY THE MERGER WILL UNILATERALLY INCREASE PRICES, LEAD TO EXCESSIVE CONCENTRATION, AND HARM CONSUMERS	11
A.	The Applicants Admit That The Unilateral Effects Of The Merger On Consumer Prices Will Be Even Greater Than DISH Previously Estimated	12
B.	Prepaid And Postpaid Voice Services Are Separate Submarkets And The Merger Will Likely Cause Price Increases In Both	18
C.	The Applicants Avoid Addressing Other 4-to-3 Deals And Their Upwards Effects On Prices	22
D.	By Facilitating Coordination, The Proposed Merger Would Have Worse Effects Than Those Of The Previously Proposed AT&T/T-Mobile Deal	26
E.	The Applicants Also Concede That The Merger Will Produce Upward Price Pressure on MVNOs, But Incorrectly Calculate Its Magnitude	27
F.	Meaningful Facilities-Based Market Entry Is Far From Ensured By The Transaction As Currently Structured	29
G.	New T-Mobile Is Unlikely To Charge Lower Prices In Light Of Its Excess Capacity	33
IV.	THE APPLICANTS ARE WRONG IN THEIR CHARACTERIZATION OF THE HHI AND SPECTRUM SCREEN ANALYSES	34
V.	SPRINT IS NOT A FAILING FIRM	36
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	47
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	49

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VIII.	THE COMMISSION’S STANDARD EXAMINES EFFECTS BEFORE BENEFITS AND ANTICOMPETITIVE EFFECTS CANNOT BE REFUTED SOLELY BY INVOKING A TRANSACTION’S BENEFITS	51
IX.	THE APPLICANTS ALLEGE BENEFITS THAT ARE TOO REMOTE IN TIME TO BE CREDITED.....	56
X.	MANY OF THE APPLICANTS’ CLAIMED BENEFITS ARE NOT CONSUMER BENEFITS, NOT MERGER SPECIFIC, OR NOT REAL.....	58
A.	Almost None Of The \$43.6 Billion In Claimed Private Cost Synergies Can Be Recognized Under the Public Interest Standard	58
B.	Compass Lexecon Mistakenly Views The Harm To Some Consumers As Offset By The Benefit To Others.....	60
C.	The Applicants Do Not Demonstrate That the Claimed Decline In Price Per Capacity Unit Is A Real Consumer Benefit	62
D.	5G Deployment Is Not A Merger Benefit.....	66
	1. The Applicants’ Prior Public Statements	67
	2. The Applicants’ Internal Documents	72
	3. The Applicants’ Revised Engineering Model	74
	4. The Prospect of the Merger as a Constraint on 5G Deployment	78
E.	The Applicants Overstate the Merger’s Benefits By Disregarding Other Spectrum The Standalone Companies Plan to Acquire	81
F.	Fixed Broadband Is Not A Merger Benefit.....	87
G.	The Applicants Understate the Merged Company’s 5G Upgrade Costs, and Overstate Those Of Standalone Sprint.....	95
	1. The New T-Mobile Transition Compared to the Sprint Standalone Transition	95
	2. The Applicants’ Misalignment of New T-Mobile and Standalone Sprint 5G Upgrade Costs	99
	3. A Faster Standalone Sprint 2.5 GHz Refarming.....	100
H.	Compass Lexecon Has Arbitrarily Boosted Marginal Cost Savings By Reducing Usage Estimates	100
I.	The Applicants Understate the Spectral Efficiency Factor, Inflating Their Benefit Claims	101

XI.	THE APPLICANTS’ COMPARISON OF THE NEW T-MOBILE AND T-MOBILE/METROPCS TRANSITIONS IS MISGUIDED.....	102
XII.	THE APPLICANTS’ CLAIMS OF COVERAGE EXPANSION ARE EXAGGERATED	104
XIII.	CONCLUSION.....	110

Appendix A: The Applicants’ Admissions and Omissions

Exhibit 1: Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas

Exhibit 2: Reply Declaration of David E.M. Sappington

Exhibit 3: Declaration of Peter Tenerelli and Vijay Venkateswaran

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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

END HCI}}³

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

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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.

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

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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

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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

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
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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}}

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

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
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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.

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.

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

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

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 reports⁴⁶ and generally treat the two services as separate markets. {{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

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END HCI}}⁵¹ In the talks leading up to the merger announcement, **{{BEGIN HCI**

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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

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

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

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

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

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

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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

⁷⁵ *Id.* at 46. The T-Mobile rate to Sprint **{{BEGIN HCI
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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,

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.

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

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another route on account of the larger *private* benefits to Sprint. {{BEGIN HCI

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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

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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

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

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 that 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 metrics¹¹⁰ 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 history¹¹¹

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

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.

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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.

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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

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:

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

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.”).

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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.

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

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_Accommodating_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

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_Accommodating_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

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.

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

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

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

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

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

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

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

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.

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

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 case²²⁸ 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.

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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

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

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

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

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Further, {{BEGIN HCI

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presentation {{BEGIN HCI

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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.

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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

²⁵⁷ TMUS-FCC-02471886 at TMUS-FCC-02471895 {{BEGIN HCI

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²⁵⁸ Sprint RFI Response at 21-22.

²⁵⁹ *Id.* at 24.

²⁶⁰ *Id.*

²⁶¹ *Id.*

²⁶² *Id.*

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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.

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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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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.

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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

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- Standalone T-Mobile will have {{BEGIN HCI

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- Standalone Sprint will not experience congestion except in at most a tiny {{BEGIN HCI
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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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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Sprint’s plans for **{{BEGIN HCI**

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This limitation required Sprint to strategize about how **{{BEGIN HCI**

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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

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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
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²⁸⁴ *Id.* at SPR-FCC-06656469-71 {{BEGIN HCI

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²⁸⁵ *See id.* at SPR-FCC-06656467 {{BEGIN HCI

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07998251 {{BEGIN HCI

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²⁸⁶ *See* SPR-FCC-06658937 {{BEGIN HCI

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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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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).

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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

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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

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²⁸⁹ SPR-FCC-11847563 at SPR-FCC-11847581, SPR-FCC-11847583 {{BEGIN HCI

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²⁹⁰ TMUS-FCC-01177184 at TMUS-FCC-01177185 {{BEGIN HCI
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²⁹¹ Opposition at 54; TMUS-FCC-00660878 at TMUS-FCC-00660896 {{BEGIN HCI
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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

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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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{{BEGIN HCI

END HCI}}²⁹⁹ In T-Mobile’s view, {{BEGIN

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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

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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
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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

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The Applicants' internal estimates show that {{BEGIN HCI

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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

TMUS-FCC-01722348 {{BEGIN HCI
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³⁰⁶ TMUS-FCC-01177184 at TMUS-FCC-01177193 {{BEGIN HCI
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³⁰⁷ *Id.*

³⁰⁸ SPR-FCC-11847563 at SPR-FCC-11847568 {{BEGIN HCI
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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 Allevan, *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

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
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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

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Sprint's review of competitors' 5G plans {{BEGIN HCI

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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

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
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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

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).

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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.

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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

³⁴⁰ TMUS-FCC-01811958 at TMUS-FCC-01811959-60 {{**BEGIN HCI**
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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

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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.*

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

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

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
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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.*

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

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.

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,

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END HCI}}³⁶⁹ Sprint likewise considered {{BEGIN HCI

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³⁶⁸ SPR-FCC-00635703 at SPR-FCC-00635704 {{BEGIN HCI

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³⁶⁹ *Id.* {{BEGIN HCI

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³⁷⁰ SPR-FCC-04218748 at SPR-FCC-04218762, SPR-FCC-04218809 {{BEGIN HCI
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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

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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

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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
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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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Indeed, an internal Sprint analysis {{BEGIN HCI

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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
HCI}}

END

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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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

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.

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.

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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 account 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 NRUF/LNP HCI END NRUF/LNP HCI}} times greater than DISH had estimated.

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.”).

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- ***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.

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

³⁹⁸ Opposition at 53.

³⁹⁹ Sprint Corp., Q3 2017 Earnings Call Transcript, Fair Disclosure Wire (Feb. 2, 2018).

⁴⁰⁰ Marcelo Claire (@marceloclaire), Twitter (Mar. 9, 2018 12:24 PM), <https://twitter.com/marceloclaire/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

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.

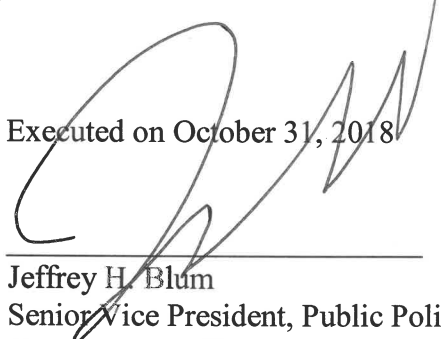
⁴⁰⁹ Opposition at 44.

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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	4
A.	Summary of Findings	7
B.	Overview of Declaration.....	9
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.....	10
A.	Pricing Effects Based on IKK Data and Merger Simulation Modeling.....	11
1.	Retail Market.....	12
2.	Wholesale Market.....	18
B.	Efficiencies Claims	21
1.	Critical Efficiency Thresholds.....	23
2.	The Applicants’ Marginal Cost Efficiency Claims Are Overstated	31
3.	Adjusted Marginal Cost Efficiencies are Insufficient to Offset the Merger’s Price Effects	37
4.	The Effect of Marginal Cost Efficiencies on Wholesale Market Prices	44
III.	Network Modeling of 5G Capacity Shows that Applicants Vastly Overstate both the Potential Offered and Carried Capacity Increases Resulting from the Merger	45
A.	Evolution of Network Models	45
B.	The Network Models <i>as Submitted</i> Show Standalone Sprint and T-Mobile will be able to Provide 5G.....	52
C.	Corrections to and Sensitivities of Assumptions in the Applicant’s Network Models.....	54
1.	Millimeter Wave Spectrum.....	55
2.	Refarming 2.5 GHz Spectrum	60
D.	Rural Issues	62
IV.	Coordinated Effects.....	66
A.	New T-Mobile will not use a maverick strategy.....	66
1.	An examination of the sources and significance of dynamic demand.....	67
2.	New T-Mobile would focus on growing profit margins, not growing market share.....	69
B.	The merger between Sprint and T-Mobile will likely have coordinated effects	72
1.	Merger efficiencies could make collusion more likely	72

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2. Collusion is possible with investment in a 5G network and heterogeneity in product and plan offerings.....	74
3. MNVOs and cable companies would not undermine collusion.....	76
4. All relevant factors for collusion were considered	77
5. CPPI is a valid index for any two firms	78
Appendix A	82
I. Network Modeling	82
A. Spectral Efficiency	82
B. Millimeter Wave Deployment.....	83
II. Marginal Cost Efficiencies from Adjusted Network Modeling.....	84
III. Vertical Gross Upward Pricing Pressure Calculations	85
IV. The Valuation of Throughput Improvements and the Application of <i>Nevo et al.</i>	87
A. General Concerns	87
B. IKK’s “Adjustments” to <i>Nevo et al.</i> are misguided	88
C. Willingness to pay values are sensitive to choice of customer-type parameters in <i>Nevo et al.</i>	90
D. IKK’s Willingness to Pay ignores the role of shadow prices in the <i>Nevo et al.</i> Model	91
V. Coordinated Effects	92

I. Introduction and Overview of Declaration

We previously submitted a declaration¹ 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

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-*

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.

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 Telekom 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.

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

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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.

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

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 **1.5%** 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

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

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.

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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.

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 vGUPPI_u, 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 vGUPPI_r, 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 vGUPPI_r 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 vGUPPI_u calculations and are not vGUPPI_r 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.*, vGUPPI_u) 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

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.

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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).

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.

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 substitution 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

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.

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}} for postpaid service and {{BEGIN 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}} and prices for Sprint prepaid services would be predicted to *increase* by {{BEGIN HCI}}. For T-Mobile, postpaid service prices would be predicted to decrease by {{BEGIN HCI}} and prepaid services prices would be predicted to decrease by {{BEGIN 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.

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

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 plans⁵⁷ 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.

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

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

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.

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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
HCI
END HCI}}.⁶⁶ Applying more accurate inputs into the underlying network model significantly reduces this savings amount.⁶⁷

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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

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.

⁶⁸ See Table 16.

**Table 10: Compensating Marginal Cost Reductions Minus Adjusted Efficiencies
(\$/Subscriber/Month)**

{{BEGIN HCI

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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 $\{\text{BEGIN HCI}, \text{END HCI}\}$ 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
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
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

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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.

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)**

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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

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*

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

END HCI}}

Table 13: 5G Offered Traffic, 2021 and 2024

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.

Notes: {{BEGIN HCI

END HCI}}

Table 14: 5G Carried Traffic, 2021 and 2024

{{BEGIN HCI

END HCI}}

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

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END HCI}}

Sources: Applicants' Network Engineering Models.

Notes: {{BEGIN HCI

END HCI}}

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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END HCI}}

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: $\{\{\text{BEGIN HCI}$ $\text{END HCI}\}$ additional subscribers in congested
sectors in non-merger scenario. $\{\{\text{BEGIN HCI}$ $\text{END HCI}\}$.

Table 17: 5G Congestion in Network Models, 2021 and 2024

{{BEGIN HCI

END HCI}}

Sources: Applicants' Network Engineering Models.

Notes: {{BEGIN HCI

END HCI}}

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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Notes: {{BEGIN HCI
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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

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

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 Allevan, “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

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 Allevan, "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.

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.

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

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

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

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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 and 10 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

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-Mobile¹¹⁰ 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

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.

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,

¹¹⁵ HBVZ Declaration, Section IV.C.3.

¹¹⁶ HBVZ Declaration, pp. 62-63, 87.

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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

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

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

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 declaration¹²⁴ 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.

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

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

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

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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)**

Table 26 content placeholder

Table 26 content placeholder

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}} 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

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}}

and the marginal cost savings for T-Mobile range from \${{BEGIN HCI}} to \${{BEGIN HCI}}, depending on the year. By itself, \${{BEGIN HCI}} to the standalone and New T-Mobile network models reduces the marginal cost savings to \${{BEGIN HCI}} for Sprint customers and to \${{BEGIN 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}} for Sprint customers and from {{BEGIN 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.

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Table 27: vGUPPI Calculations (%/subscriber/month)

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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.*

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 one¹⁴⁶ 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.

¹⁴⁶ This parameter is μ_h which 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.

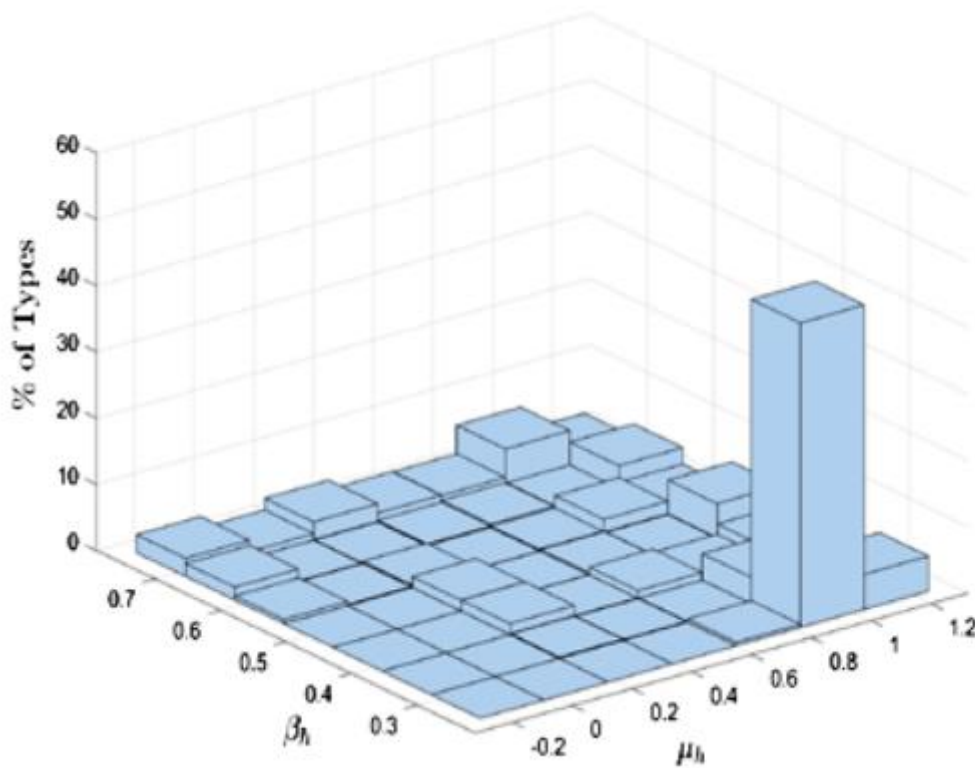
¹⁴⁸ β_h is the parameter that determines the curvature of the utility function and is held fixed at **BEGIN HCI** **END HCI** of *Nevo et al.*

Table 28: Calibrated μ with Adjusted Throughput
{{BEGIN HCI

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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

END HCI}}

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.

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[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.

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.

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* * * *

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



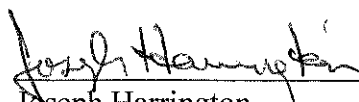
William P. Zarakas
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Coleman Bazelon
Principal
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Joseph Harrington
Patrick T. Harker Professor
Business Economics and Public Policy
Wharton School
University of Pennsylvania

Exhibit 2

Reply Declaration of David E.M. Sappington

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

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

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

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

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

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

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

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.

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

A handwritten signature in black ink, appearing to read 'DS', with a long horizontal line extending to the right.

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

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).

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The Applicants have not shown to what extent their {{BEGIN HCI

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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

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
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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

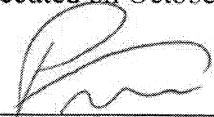
²² The actual radius required can vary based on key variables such as frequencies used, antenna height, correction factor, and antenna gain. Our review considered (1) the extended Hata model for rural deployment (https://www.researchgate.net/publication/262294517_Propagation_measurements_and_modeling_at_1800_MHz_in_Lagos_Nigeria); 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).

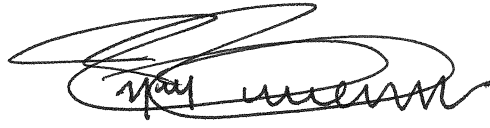
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* * * *

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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