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March 28, 2019

By ECFS

Marlene 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* in the above-captioned proceeding, DISH Network Corporation (“DISH”) submits the enclosed public, redacted version of its Comments in response to the *Public Notice*.¹ DISH has denoted with {{**BEGIN HCI END 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*.²

Please contact me with any questions.

Respectfully submitted,

_____/s
Pantelis Michalopoulos
Andrew Golodny
Counsel to DISH Network Corporation

¹ Commission Announces Receipt of Additional Analysis and Information from T-Mobile and Sprint; Establishes Comment Deadline, *Public Notice*, WT Docket No. 18-197, DA 19-161 (Mar. 7, 2019).

² 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).

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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)	
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COMMENTS IN RESPONSE TO PUBLIC NOTICE

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March 28, 2019

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Attachment B: Declaration of Peter Tenerelli and Vijay Venkateswaran

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COMMENTS IN RESPONSE TO PUBLIC NOTICE

DISH submits these comments in response to the Commission’s Public Notice requesting comment on two filings containing “significant additional information” about the Applicants’ post-merger plans.¹ The first is a February 21 filing regarding the Applicants’ network model for the years 2019-2021.² The second is a March 6 filing about T-Mobile’s proposed in-home broadband product.³ As explained below and in the accompanying reports from the Brattle Group and DISH’s engineering experts, both filings rely on highly problematic assumptions about the combined company and fail to rebut the significant evidence in the record of this proceeding showing that the proposed transaction is not in the public interest.

¹ Public Notice, Commission Announces Receipt of Additional Analysis and Information from T-Mobile and Sprint, WT Docket No. 18-197, DA 19-161 (March 7, 2019).

² Letter from Nancy Victory, Counsel for T-Mobile, to Marlene Dortch, FCC, WT Docket No. 18-197 (Feb. 21, 2019) (“T-Mobile Feb. 21 Letter”).

³ Letter from Nancy Victory, Counsel for T-Mobile, to Marlene Dortch, FCC, WT Docket No. 18-197 (March 6, 2019) (“T-Mobile March 6 Letter”).

I. SUMMARY

The Applicants’ early years (2019-2020) model. For months, the Applicants have carefully avoided any claim that the merger will benefit consumers of LTE service in the near term—the years 2019 and 2020. Only with their February 21 submission did they shed that caution. Eight months after first making their public interest case, they now claim that “consumers begin benefitting from network improvements immediately in the first year following the merger close.”⁴ The reason for the sudden discovery of these benefits: the Commission asked about their absence.⁵ Indeed, the Applicants had given so little credence to the possibility of such short and medium-term benefits that they had not even developed a plan to capture them. As T-Mobile’s Vice-President of Network Technology acknowledges, it was only “[i]n response to requests by the agencies considering the transaction” that the Applicants “accelerated the development of a national deployment plan for New T-Mobile in 2019 and 2020.”⁶

Presumably on account of these changes, the Applicants have once again revised their engineering model, and the Compass Lexecon model that flows from it. While this is the first time the model incorporates 2019 and 2020, the model also reflects changes for the later years (2021 to 2024). This makes it the *third* model the Applicants present in their effort to show that the merger will produce marginal cost savings supposedly offsetting the merger’s likely price increases. The third model is incapable of making that showing, even accepting the numerous flawed assumptions on which it is based. As with the Applicants’ prior efforts, the new revised

⁴ T-Mobile Feb. 21 Letter at 1.

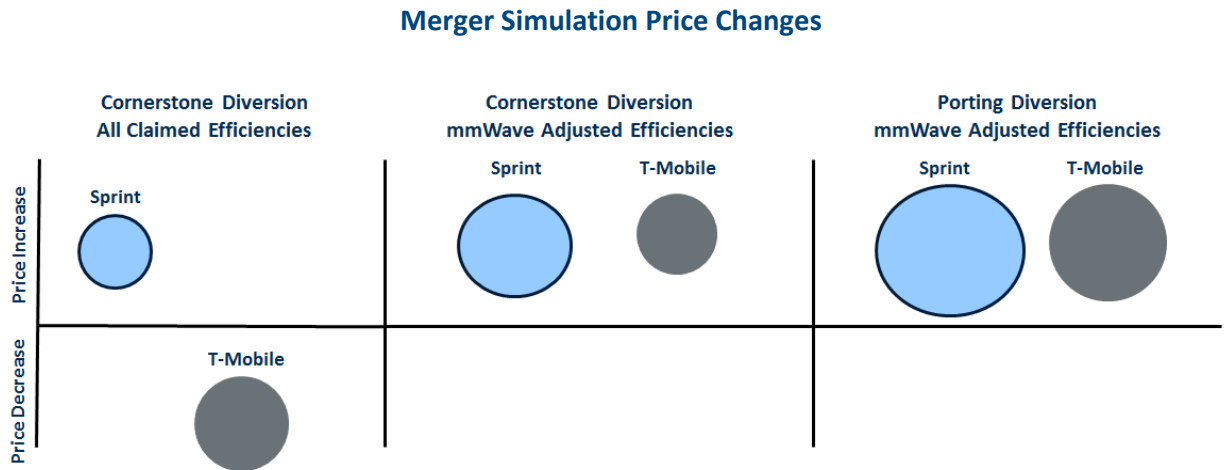
⁵ *Id.* (“The purpose of this submission is to address Commission’s questions regarding the merger’s effects during the 2019-2021 period...”).

⁶ Declaration of Ankur Kapoor ¶ 9 (Feb. 21, 2019) (Attachment D to T-Mobile Feb. 21 Letter).

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model produces price increases for all Sprint customers if the Applicants' cost savings claims are accepted at face value, and price increases for both Sprint and T-Mobile customers if the Applicants' cost savings are duly corrected.

Because the Applicants have unjustifiably hidden the merger's expected price effects behind highly confidential designations, DISH has been constrained in quantifying in public the price increases that the Applicants' own experts concede, as well as the—larger still—increases that will likely flow from the merger based on the analysis of DISH's experts. DISH offers for the public record a visual representation of these effects that illustrates their relative magnitude, even as it does not quantify them in absolute terms. Specifically, the following chart shows the merger's likely price effects under three scenarios: (1) accepting Cornerstone's diversion estimates and *all* of Compass Lexecon's claimed marginal cost savings as well as the claimed willingness of consumers to pay for alleged quality improvements; (2) accepting Cornerstone's diversion estimates, reducing the Applicants' claimed savings only to reflect the addition of millimeter wave spectrum, and accepting Compass Lexecon's willingness-to-pay claims; and (3) using porting data to estimate diversion, reducing the Applicants' claimed savings only to reflect the addition of millimeter wave spectrum, and again accepting Compass Lexecon's willingness-to-pay claims. None of the scenarios reflects the upward price pressure that would likely result from the merger's coordinated effects, and all of them accept the Applicants' multi-year ramp (through 2024).



Notes: Cornerstone diversion as used in the Compass Lexecon model.

As shown by the chart, prices increase for Sprint subscribers in all scenarios, and for all subscribers in the second and third scenarios.

Neither the newest submission, nor the once-again-revised model, proves the merger will benefit consumers in 2019-2020, or ever. Among other flaws:

- The Applicants assume that prices will not increase simply because T-Mobile has said they will not, pursuant to its so-called price freeze commitment. The result? Even one penny of claimed benefits would justify this merger, as well as any merger, including one to monopoly. Compass Lexecon's own model shows that eliminating the price freeze assumption produces price increases in 2019 and 2020 for everyone—increases that are not nearly offset by the Applicants' own claimed benefits, even when accepted at face value.
- The Applicants' economists acknowledge that under one of two methods they use, the quality of Sprint's service will actually go down in 2019 and 2020 (in other words, Sprint subscribers would only be willing to pay less, not more, for the reduced quality level of the new service). At the same time, Compass Lexecon's merger simulation model shows that prices in 2019-2020 will increase for all customers. Thus, Sprint customers face a potential worst of all worlds scenario—higher prices for lower quality service.
- Without explanation, Compass Lexecon has increased the demand forecasts that drive network use and the purported need for incremental solutions. Brattle finds that this increased demand is responsible for the majority of the changes in estimated marginal cost savings between Compass Lexecon's September 17 and February 20 declarations. That is, because the model is artificially spectrum-constrained, higher demand requires more incremental solution costs to be incurred, and Compass Lexecon now estimates significantly higher marginal costs for the standalone T-Mobile network, leading to much

greater purported marginal cost savings from combining networks. For example, Compass Lexecon now estimates 27% higher usage per user in 2021 for T-Mobile than in its original model. This highly speculative and unverifiable approach should not be given credence. What is to stop the Applicants from issuing yet another model that supposedly discovers yet more savings? Reducing the demand back to the levels applied in the earlier versions of the Network Build Model eliminates most of Compass Lexecon's newfound increases in marginal costs savings.

- Despite the revisions, the model continues to show the merger is not necessary for 5G—each company has sufficient bandwidth for it standing alone.
- In their attempt to gloss over the harms from the merger, the Applicants now switch from a bad (Harris) to a worse (Cornerstone) method for estimating diversion. Porting data, which show what actually happened, are superior to the Harris survey data, which show what people say happened, and to the Cornerstone data, which show virtually nothing but the carriers' shares of aggregate postpaid and prepaid subscribers.
- The Applicants still do not defend their failure to address the elephant in the room: millimeter wave frequencies. As DISH has repeatedly explained, the Applicants' engineering model assumes that neither standalone company nor New T-Mobile would acquire any additional spectrum. Adding a modest amount of millimeter wave frequencies to the spectrum portfolio of the standalone companies and New T-Mobile guts the Applicants' efficiency claims, which stem from the engineering model.
- The Applicants suggest they will integrate the Sprint and T-Mobile networks quickly and simply. But, as DISH's engineering experts explain, the Applicants understate both the costs and the difficulties of integrating the T-Mobile and Sprint networks.⁷

In-home broadband. In its March 6 Letter, T-Mobile provides a “more detailed description of New T-Mobile's proposed in-home broadband service.”⁸ But, review of this additional detail demonstrates that:

- The service would be provided to a fraction of the number of households that T-Mobile claims, even if it becomes financially and technically viable. T-Mobile specifically says that the proposed service will be available to {{BEGIN HCI
END HCI}} “eligible households,” of which {{BEGIN HCI
END

⁷ Declaration of Peter Tenerelli and Vijay Venkateswaran ¶¶ 7-20 (March 28, 2019) (Attachment B to these Comments) (“March 28 Tenerelli Venkateswaran Declaration”). Reply of DISH Network Corp., WT Docket No. 18-197, at 95-100 (Oct. 31, 2018) (“DISH Reply”)

⁸ T-Mobile March 6 Letter at 1.

HCI}} will be rural eligible households.⁹ The problem is that most of these households do not exist. T-Mobile defines eligible households as the number of households that New T-Mobile would be *capable* of serving, whether they exist or not.¹⁰ T-Mobile claims that eligible households “are the equivalent of homes passed.”¹¹ But this is not true: “homes passed” refers to existing, actual households to which a service is available. In reality, even according to T-Mobile, the service will be available only to “supported households”— {{BEGIN HCI END HCI}} instead of {{BEGIN HCI END HCI}} in total, and only {{BEGIN HCI END HCI}} rural households.¹² It is the “supported households” numbers, not the larger “eligible household” numbers, that are the equivalent of “homes passed.” All in all, New T-Mobile’s in-home service will reach only {{BEGIN HCI END HCI}} of rural homes (or {{BEGIN HCI END HCI}} rural households).¹³

- T-Mobile engages in unrealistic speculation by assuming that most—9.5 million {{BEGIN HCI END HCI}} of the customers to whom the service is available would sign up for it by 2024.¹⁴ A more realistic penetration rate substantially lowers the claimed benefits of the proposed in-home service.
- The March 6 Letter provides the key to the kind of public interest case the Applicants are trying to build by invoking the in-home broadband service plan: T-Mobile explains, “the benefits to consumers of both of these services are inextricably linked because they are derived from the improved wireless network made possible by the transaction. Consequently, the Commission must consider the merger’s *overall* effects on competition and the public interest and not just consider its constituent parts in isolation from each other.”¹⁵ “Overall,” like “net,” is another code word used by the Applicants. It means that the harms to consumers of one service (mobile voice/broadband) are a reasonable sacrifice on the altar of supposedly creating competition in another, separate market. But the Communications Act and antitrust precedent both frown on this kind of bargain. And even if the two were to be put on a scale, *the transaction’s immediate negative effects on the Applicants’ 104 million combined mobile wireless subscribers far outweigh the 9.5 million people (at most) who the Applicants claim will use their in-home broadband service by 2024.*

⁹ *Id.* at 10.

¹⁰ *Id.*

¹¹ *Id.* at 11.

¹² *Id.* at 13.

¹³ *Id.*

¹⁴ *Id.* at 10.

¹⁵ *Id.* at 1 (emphasis added).

- As even the Applicants acknowledge, in-home broadband will come at the expense of the supposed efficiencies the merger would create for New T-Mobile’s 5G service.¹⁶ This “cannibalization” of one service by the other has one more implication: it provides additional proof that New T-Mobile would in fact not rely on the Applicants’ existing frequencies for any in-home broadband service, but rather would use millimeter wave spectrum to be acquired in the future. But this in turn means that in-home broadband is not a benefit of this merger. Millimeter wave frequencies, which are especially relevant here—still remain unaddressed. The Applicants try to credit the merger with a benefit—in-home broadband—that neither stand-alone party likely has the spectrum necessary to achieve. The Applicants suggest that their proposed in-home broadband service will be provided by exclusive resource to the frequencies they now bring to the table.¹⁷ But this idea is sharply contradicted by the Applicants’ own documents. For example, one T-Mobile document, among several cited below, states that **{{BEGIN HCI**

END HCI}}¹⁸ And another document produced by the Applicants reveals that Compass Lexecon considered **{{BEGIN HCI**
END HCI}} as one of the vulnerabilities of its analysis.¹⁹

After briefly mentioning in-home broadband in their initial Application as a supposed merger benefit,²⁰ the Applicants failed to provide any additional detail or data about this claim in the ensuing nine months. Now the Applicants have filed a letter about in-home broadband in an attempt to distract from their failure to justify the merger using their previous theories. This is nothing more than a transparent attempt to turn an afterthought concept into a tangible, merger-specific benefit.

Income Estimates. To avoid flooding the Commission with tit-for-tat filings, DISH also takes this opportunity to respond to T-Mobile’s latest submission in connection with the

¹⁶ Declaration of Mark Israel, Michael Katz, and Bryan Keating, at 2 (March 6, 2019) (Appendix C to T-Mobile March 6 Letter) (“Compass Lexecon March 6 Declaration”).

¹⁷ T-Mobile March 6 Letter at 16.

¹⁸ TMUS-FCC-08172260 at TMUS-FCC-08172286.

¹⁹ TMUS-FCC-08089886 at TMUS-FCC-08089906.

²⁰ Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197, at 58-64 (June 18, 2018).

estimation of income by DISH’s experts, the Brattle Group, and the Applicants’ experts, Cornerstone. According to T-Mobile, “DISH now admits” that the Brattle economists estimated the incomes of the consumers in Cornerstone’s data set.²¹ This is false. Brattle simply repeated what it had disclosed from the start: “NMP panelist reported income is recorded as income intervals...necessitating use of interval regression techniques for the income estimation model.”²² Nor does Cornerstone refute that estimating specific income amounts for respondents and non-respondents alike was the only way for Brattle to determine the effect of changes to the income estimate without altering Cornerstone’s model, since that model requires a figure, not a range, for the income input.²³

To DISH’s point that Brattle’s estimates were in fact more accurate than Cornerstone’s uniform zip code-wide median income estimates, T-Mobile responds with the same myth—that Brattle had not made that disclosure. According to T-Mobile, the accuracy of Brattle’s estimates is questionable because Brattle “falsely claimed” it was using actual reported income; while the accuracy of Cornerstone’s estimates is not at issue because Cornerstone “explicitly stated that [it] used median income data.”²⁴ But the problem with that argument is the same: Brattle, too, had *explicitly disclosed* its regression method (which is statistically proper and accepted), and had done so more clearly than the terse description of Cornerstone’s method found in its report. It is

²¹ Letter from Nancy Victory et al., Counsel for T-Mobile, to Marlene Dortch, FCC, WT Docket No. 18-197, at 1 (Mar. 21, 2019) (“T-Mobile March 21, 2019 Letter”).

²² Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *Reply to Cornerstone’s Response to DISH and CWA Comments* at 25 n. 63 (Feb. 19, 2019) (attachment A to letter from Pantelis Michalopoulos, DISH Counsel, to Marlene Dortch, WT Docket No. 18-197).

²³ See Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *Reply to Cornerstone’s “Response to DISH’s February 19 and 25 Submissions”* at 5 (attached to March 18, 2019 letter from Pantelis Michalopoulos, DISH Counsel, to Marlene Dortch, WT Docket No. 18-197).

²⁴ T-Mobile March 21 Letter at 3.

therefore fair to compare the accuracy of the two. Tellingly, T-Mobile does not deny that Cornerstone’s income estimates are outside the income bracket ranges reported by respondents more than 80% of the time, and 95% outside the range for low-income subscribers.

T-Mobile proclaims with confidence that “no further analysis is necessary.”²⁵ It then produces two pie charts of prepaid and postpaid customers in the country, and prepaid and postpaid customers in the low-income group.²⁶ The charts are difficult to comprehend because of inadequate color-coding and definitions. But the obscurity is useful to T-Mobile, because the charts establish nothing but a trivial proposition—that there are more postpaid than prepaid subscribers. This does not change the fact that low-income consumers make up a dramatically higher percentage of prepaid customers than of postpaid customers.²⁷ And, the existence of more postpaid customers overall does not mean that the effect of the merger on the Applicants’ approximately 32 million prepaid subscribers can be disregarded.²⁸

II. THE MERGER WOULD RESULT IN PRICE INCREASES FOR THE EARLY YEARS (2019-2020)

A. Prices Will Rise Under the Applicants’ Model if They Are Not Simply Assumed to Stay the Same

The Applicants assume away the question to be answered: whether prices for consumers will increase. They reason that, because T-Mobile has committed to freeze rate plans, prices will

²⁵ *Id.*

²⁶ *Id.* at 5.

²⁷ Prepaid subscribers are far more likely to have the lowest incomes, and postpaid subscribers are far more likely to have the highest incomes—a fact revealed even in the census data despite its poor ability to estimate subscriber incomes. *See Brattle Response to Applicants’ February 7 Filings on Diversion Ratios*, at 10, Table 1 (March 25, 2019).

²⁸ T-Mobile claims that DISH does not dispute that Cornerstone’s use of reported income data makes the merger pro-competitive. But Cornerstone changed its model to arrive at its conclusions. DISH is still analyzing those changes.

not go up by definition, turning the central question to be investigated into an assumed fact. As DISH has previously explained, every economist will readily predict that prices will not increase based on the *assumption* that they will not increase. The boot-strapping nature of this reasoning is especially pronounced here: the Applicants' experts and T-Mobile's management rely only on each other for support, and neither holds on to any semblance of *terra firma*. The experts rely on T-Mobile's price freeze commitment for assurance that prices will not rise; yet when T-Mobile made that commitment, it stated it was unnecessary because assurance that prices will not rise had already been provided by the Applicants' experts, and it was offering the price freeze only out of the proverbial abundance of caution. Now this circular reasoning is exposed: it turns out the experts' assurance about prices in turn needed the crutch of T-Mobile's price freeze commitment.

This is not the stuff of economic analysis. Anyone, economist or lay person, can state, without the benefit of a single equation, that a merger will not increase prices because the parties have promised they will not do so. This means that even one penny of claimed benefits would justify this merger, as well as any merger, including one to monopoly.

Compass Lexecon explains that it performed a sensitivity analysis that relaxes the price freeze assumption, meaning that it allows prices to increase. That analysis is not included in the report. Brattle shows that, even under the Applicants' best case scenario, with all efficiencies claims, the understated Cornerstone diversion ratios, and Compass Lexecon's willingness to pay for supposed quality improvements, prices will rise by some {{BEGIN HCI
END HCI}} across their prepaid brands, and by some {{BEGIN HCI
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across their postpaid brands.²⁹ That is, the Applicants’ claims of LTE benefits will be even less adequate to offset these price increases. Because this model analyzes the years before the claimed 5G benefits will set in, the Applicants’ own cost saving claims are much smaller. This means that, even taking the Applicants’ benefit claims *and* quality improvements at face value, prices will rise for everyone, T-Mobile and Sprint customers alike, and prepaid and postpaid customers alike. The table below shows and compares the price changes for each category of customers for 2019 and 2020.

**Table 1: Merger Price Effects in the Integration Period
Results w/ Compass Lexecon’s Claimed Efficiencies, Wholesale Price Restrictions, and
Adjusted Nevo WTP [Site Specific] by Diversion Ratio Source***
{{BEGIN HCI

END HCI}}

Source: Compass Lexecon Revised Model Backup Materials.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions.

“Combined” values in porting diversion approximation scenario calculated using pre-merger shares to weight each respective brand for both pre- and post-merger price effects.

*Porting diversion scenario uses Jaffe and Weyl (2013) approximation of price effect.

²⁹ Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *Response to Compass Lexecon Feb 20, 2019 Declaration and Mark McDiarmid March 6, 2019 Declaration* at Table 1 (March 28, 2019) (Attachment A to these comments) (“March 28 Brattle Declaration”).

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These estimates flow directly from the Applicants’ model without any change, meaning that these numbers assume the Applicants’ efficiency claims are 100% correct. For comparison, the calculations also include diversion estimates based on the Harris Insight survey that show much less competition between the two Applicants than the porting data do. Substituting aggregate porting data for Harris data shows the price increases to be steeper still. As shown in the table, when using the more accurate porting data to estimate diversion ratios (and again accepting, *arguendo*, all of the Applicants’ efficiencies and willingness-to-pay claims), the Applicants prepaid prices would increase by **{{BEGIN HCI** **END HCI}}**, while postpaid prices would increase by **{{BEGIN HCI** **END HCI}}**.

Compass Lexecon’s early year modeling also sheds new light on a fundamental flaw of Cornerstone’s analysis. Cornerstone purported to examine the effect of the proposed merger on LTE prices. Cornerstone had incongruously claimed that the upward price pressure for LTE consumers would be offset by another separate service’s benefits—the marginal cost savings allegedly accruing to 5G service. As DISH pointed out, LTE consumers can find no comfort in efficiencies to be enjoyed by someone else, at some other time and place. Brattle had also pointed to this disconnect and noted that, while picking the enormous 5G savings claimed by Compass Lexecon as the appropriate counterweight for alleged price increases, it had ignored LTE savings claims for the later years, which also were reflected in the model. Accepting these claims at face value and using them as offsets to Cornerstone’s estimated price increases shows that prices would increase for everyone. Compass Lexecon now joins the chorus, further reinforcing through its early years modeling that Cornerstone’s LTE price increases cannot be offset by the 5G cost savings claimed by the Applicants. Compass Lexecon’s model now reflects LTE cost saving claims for 2019 and 2020, too. But, as Brattle shows, Compass

Lexecon's model reveals that, even if true, these saving claims are not nearly enough to offset price increases. After taking them into account, prices will increase for all subscribers.

B. The Applicants Admit That Quality May Go Down For Sprint Customers

Compass Lexecon reveals that use of the Applicants' own model resulted in throughputs that were too low, meaning deteriorated, not improved, LTE service. To avoid this outcome, the Applicants developed an ad hoc "loading curve" that purportedly "scales" these results based on T-Mobile's empirical experience, thus deviating from the model.³⁰ But even this scaling cannot mask the potential for deterioration in the quality to be experienced by Sprint customers.

Specifically, the Applicants' economists acknowledge that, under one of two scaling methods they use, the quality of Sprint's service will go down. Specifically, under one of the two methods Compass Lexecon uses to assess quality improvements, site-specific scaling, consumers' willingness to pay for the service would be negative {{BEGIN HCI

END HCI}} for Sprint customers. This means that Sprint customers would only be willing to pay less, not more, for the service in light of its reduced quality. In other words, the price would be higher than today even as customers would only be willing to pay less than they pay today, in a worst-of-all-worlds scenario projected by the Applicants' experts themselves. Even the other method used by Compass Lexecon (mean scaling) projects meager increases to the willingness of Sprint customers to pay {{BEGIN HCI

END HCI}} Compass Lexecon's calculations contradict the claims of T-Mobile's Mr. McDiarmid that most of the benefit will go to "the Sprint subscribers that currently

³⁰ Mark Israel, Michael Katz, and Bryan Keating, *Extension of the Israel, Katz, and Keating Analysis to 2019-2020* at 22-23 (Feb. 20, 2019) (Appendix B to T-Mobile Feb. 21 Letter).

have the greatest performance challenges.”³¹ According to Mr. McDiarmid, “these subscribers will see benefits even while they still have a Sprint SIM card and access to the Sprint network.”³²

C. The Applicants Artificially Increase Claimed Marginal Cost Savings in Later Years (2021-2024)

The Applicants also have changed key inputs and assumptions in their revised network model. With respect to revisions to the 2021-2024 period, Compass Lexecon has increased its demand forecast (meaning the estimated data a 5G subscriber will use a month) for T-Mobile. Compass Lexecon now estimates 27% higher usage per user in 2021 and 9% higher usage in 2022 for T-Mobile subscribers than in its original model dating from September 2018.³³ This change is highly consequential because, according to T-Mobile, the increased demand in turn requires the deployment of additional incremental solutions. But this highly speculative and unverifiable approach should not be given credence. What is to stop the Applicants from issuing yet another model with even higher demand forecasts that cause even greater incremental solutions and discover larger savings? The Applicants have not provided any evidence explaining why the revised demand estimates are appropriate. The original Compass Lexecon demand assumptions were supported by a declaration from T-Mobile Vice-President Peter Ewens, who stated that “these amounts represent a reasonable tradeoff between meeting financial expectations and consumer demands.”³⁴ Was that statement—made only six months ago—inaccurate or flawed in some way? The Applicants’ silence speaks volumes.

³¹ Declaration of Mark McDiarmid ¶ 7 (Feb. 21, 2019) (Attachment A to T-Mobile Feb. 21 Letter) (“Feb. 21 McDiarmid Declaration”)

³² *Id.*

³³ See March 28 Brattle Declaration at 22, Table 8.

³⁴ Reply Declaration of Peter Ewens at 33, Table 16 (Sept. 17, 2018).

As Brattle explains, these changes in data usage have significant effects on Compass Lexecon's estimated marginal costs savings.³⁵ When combined with Compass Lexecon's modifications to the costs of incremental solutions, Compass Lexecon claims that the revised marginal cost savings have increased since its last model runs. However, removing the effect of this artificially increased demand reverses any increases to marginal cost savings. Specifically, as Brattle explains, the effect of higher levels of demand upon marginal cost savings is pronounced because the Applicants' network models are artificially capacity-constrained. Increasing demand serves to further strain the Applicants' networks, and exaggerates the benefits of refarming spectrum that can be accomplished by New T-Mobile. Overall, this results in a gross exaggeration of benefits from combining the stand-alone networks into New T-Mobile.³⁶

Brattle also notes that the cost of low band overlays for the combined company is notably, and unaccountably, lower in the revised model than it was in the original engineering model, declining by over {{BEGIN HCI END HCI}} in capex, from roughly {{BEGIN HCI END HCI}} per overlay to less than {{BEGIN HCI END HCI}} per overlay.³⁷ The Applicants provide no evidentiary basis for that change.

D. The Applicants' Revised Network Continues to Confirm Each Standalone Company has Sufficient Capacity for 5G

Without justification, Compass Lexecon has increased the average throughput per user in its revised model. But Brattle Table 10, reproduced below, shows that, under both Compass Lexecon's original and revised models, stand-alone Sprint and T-Mobile will be able to provide

³⁵ March 28 Brattle Declaration at 23 ("The level of projected 5G usage should not be revised in such a casual manner.").

³⁶ See DISH Reply at 100-02; Petition to Deny of DISH Network Corp., WT Docket No. 18-197, at 22-43 (Aug. 27, 2018).

³⁷ March 28 Brattle Declaration at 23.

user throughput at 5G levels (i.e., average of at least {{BEGIN HCI END HCI}}) at Level 3 (i.e., after incremental solutions) in most years. Thus, Compass Lexecon’s revisions do not change the finding that a merger is not needed to reach 5G throughputs.

Table 2: 5G Average User Throughput (Mbps) in Network Models, 2021 – 2024
{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Network Models; 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.

Note: Average user throughputs reflect Level 3 levels (i.e. post incremental solutions).

E. The Applicants Switch to Even Less Defensible Diversion Estimates

With respect to the crucial question of diversion ratios—how many of the consumers who leave Sprint switch to T-Mobile and vice-versa—the Applicants continue to ignore the best available method for estimating them. Porting data, which show what actually happened, are superior to the Harris survey data, which show what people say happened, and to the Cornerstone data, which show virtually nothing but the carriers’ shares of aggregate postpaid and prepaid customers. In their attempt to obscure the harms from the merger, the Applicants have now switched from second best (Harris) to third best (Cornerstone). But as DISH has shown, Cornerstone’s diversion estimates produce results that are hard to credit on their face, such as the

notion that people leaving Boost, Sprint's prepaid service, disproportionately end up in Verizon's premium brand rather than another prepaid brand.³⁸

F. The Applicants Continue to Ignore Future Acquisition of Millimeter Wave Frequencies

Throughout all of their filings, including the most recent one, the Applicants have not defended their failure to incorporate millimeter wave frequencies. That failure is even more glaring in light of two developments: first, a document newly produced by the Applicants shows that, early on in this process, Compass Lexecon identified {{BEGIN HCI
END HCI}} as one of the vulnerabilities of its analysis.³⁹ What did the Applicants do to cure that vulnerability? Nothing. Second, T-Mobile's CEO, Mr. Legere, has candidly admitted T-Mobile plans to buy additional spectrum, even with the merger.⁴⁰

Nor have the Applicants rebutted any of the other ways in which DISH's experts pointed out their marginal cost saving claims are inflated: the spectral efficiency assumption for stand-alone Sprint is too low; the costs for the same solutions are assumed to be higher for Sprint than for New T-Mobile; and standalone Sprint's speed for the transition to 5G is too sluggish.⁴¹

³⁸ See Letter from Pantelis Michalopoulos, DISH Counsel, to Marlene Dortch, FCC, WT Docket No. 18-197, at 3 (March 25, 2019).

³⁹ TMUS-FCC-08089886 at TMUS-FCC-08089906.

⁴⁰ C-SPAN, T-Mobile/Sprint Proposed Merger, House Judiciary Committee (March 12, 2019), <https://www.c-span.org/video/?458695-1/sprint-mobile-executives-testify-impact-proposedmerger>. See also Monica Allevan, *New T-Mobile Will be in the Market for More Spectrum: Legere*, FierceWireless (March 13, 2019), <https://www.fiercewireless.com/wireless/new-t-mobile-will-be-market-for-more-spectrum-legere> ("There will be a lot more spectrum that's needed in addition to what we're going to get with . . . these two companies.").

⁴¹ Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, at 34-36 (Exhibit 1 to DISH Reply).

III. IN-HOME BROADBAND SHOULD NOT BE CREDITED TO THE MERGER, ITS BENEFITS ARE EXAGGERATED, AND EVEN IF TRUE, WOULD NOT OFFSET THE HARMS TO MOBILE VOICE/BROADBAND CONSUMERS

A. T-Mobile Overstates the Number Of Households Its Service Will Reach By Including Households That Do Not Exist

T-Mobile states that “the Home Internet Service will be offered to {{BEGIN HCI

END HCI}} “eligible households,” including {{BEGIN HCI END HCI}}

rural eligible households.⁴² A casual observer might overlook the fact that T-Mobile has overstated the number of households it could serve by some 385%. The Applicants’ numbers are inflated because most of the “eligible” households do not exist. T-Mobile claims that “eligible households, in traditional fixed wireline parlance, are the equivalent of ‘homes passed.’”⁴³ But they are not, because T-Mobile appears to define “eligible households” as the number of households that T-Mobile has the capability to serve, whether they exist or not. The key to understanding this is provided in the Declaration of Mr. McDiarmid, who explains that eligible households refer to “how many HHs [New T-Mobile’s] capacity could support.”⁴⁴ Mr. McDiarmid then explains how the “eligible households” are narrowed down into the “supported households”:

Having determined that there is in-home broadband coverage and capacity available in a particular area, we then determine the number of in-home Broadband Supported Households. In a simplistic way, this can be thought of as determining, for each specific In-Home Broadband Eligible Area, whether the limiting factor is the number of HHs in the area or the in-home broadband network capacity available in the area. By example, *if there is capacity to support ten HHs in a specific local geography, but there are only four HHs in that local geography, the in-home Broadband Supported HHs for that area would be only four.* Similarly, if there is capacity to support ten HHs in a specific local

⁴² T-Mobile March 6 Letter at 3.

⁴³ *Id.* at 11.

⁴⁴ March 6 McDiarmid Declaration ¶ 4.

geography with one hundred HHs, the In-Home Supported HHs for that area would only be ten.⁴⁵

But this means that the “eligible households” number includes households that literally do not exist in what Mr. McDiarmid refers to as “the local geography.” The Applicants thus incorrectly describe eligible households as “equivalent” to homes passed. Homes passed means the number of *existing* homes a system has the technical ability to serve promptly using its current facilities if a potential customer orders service.⁴⁶ The true equivalent of homes passed in this context is what the Applicants refer to as “supported” households. There are {{BEGIN HCI
END HCI}} supported households nationwide, and only {{BEGIN HCI
END HCI}} in rural areas. This means that the new service would only pass a mere {{BEGIN
HCI END HCI}} of the nation’s rural households.⁴⁷ Thus, T-Mobile’s claim that the in-home broadband service will cover “90 percent of the country by 2024” is a significant overstatement—{{BEGIN HCI
END HCI}} households is not 90% of the country.

B. The Service Is Unproven and Benefits Are Speculative

The Applicants assume that an unrealistically large percentage {{BEGIN HCI
END HCI}} of the customers to whom the service is available would sign up for it. Specifically, the Applicants estimate that the service will have 9.5 million subscribers in 2024, out of {{BEGIN HCI
END HCI}} supported households. This is unduly rosy and does not have sufficient evidentiary support. For example, it dwarfs the incumbents’ penetration

⁴⁵ *Id.* ¶ 5 (emphasis added).

⁴⁶ Petition for Reconsideration of Barden Cablevision of Certification of Detroit Cable Communications Commission to Regulate Basic Cable Rates, *Memorandum Opinion and Order*, 9 FCC Rcd. 4805, 4806 n.17 (1994).

⁴⁷ T-Mobile March 6 Letter at 13.

(about 44% for Comcast).⁴⁸ A more realistic penetration rate will result in a correspondingly lower number of subscribers.

For all the Applicants' proclamations about introducing in-home broadband to rural America, their own numbers show that this offering is not a rural bonanza. The Applicants claim that the in-home broadband service will only pass up to {{BEGIN HCI

END HCI}} homes passed. This means that only {{BEGIN HCI
END HCI}} (at most) of the in-home broadband customers will be rural consumers. And if the Applicants' inflated numbers are used here, the picture gets even worse. Using those numbers, {{BEGIN HCI

END HCI}} rural customers out of {{BEGIN HCI
END HCI}} eligible households, or only {{BEGIN HCI

END HCI}} of the in-home broadband customers, would be rural. Further, in contrast with the service as a whole, the Applicants do not even attempt to estimate how many rural consumers will actually take the service. Assuming the outlandish {{BEGIN HCI

END HCI}} penetration rate the Applicants claim for the overall service, that would translate into a mere {{BEGIN HCI

END HCI}} rural households actually served by T-Mobile, even fewer of whom would be in the "no choice" category the Applicants claim this service is designed to bring competition to. At more reasonable penetration rates, the potential rural subscriber numbers fall even further.

⁴⁸ This rate is approximate, as DISH has calculated it based on Comcast's residential home broadband subscribers as the numerator, and the number of homes and businesses passed by Comcast cable systems as the denominator. *See* Comcast 10-K at 2-3 (Feb. 1, 2019), <https://www.cmcsa.com/static-files/54b28afa-2286-46bc-bca0-e35c9a4be739>. Comcast also reports "market penetration" of 47%, and Verizon reports "market penetration" of 40%. *See* Transcript, Comcast Corp. at Deutsche Bank Media and Telecom Conference, Fair Disclosure Wire (Mar. 12, 2019) ("If you look at our own [broadband] penetration around approximately 47%...."). *See also* Transcript, Verizon Communications Inc. at Morgan Stanley Technology, Media, and Telecom Conference 2018, Fair Disclosure Wire (Feb. 27, 2018) ("We're above 40% penetration on broadband where we have Fios deployed.").

C. The Applicants' Plan for In-Home Broadband Is Not Merger-Specific Because it Ignores Millimeter Wave Spectrum

The Applicants try to credit the merger with a benefit—in-home broadband—that either stand-alone party today could accomplish without the merger. To provide a quality in-home broadband service, Sprint and T-Mobile do not need one another, but instead need access to millimeter wave frequencies.⁴⁹

As the Brattle Group explains, millimeter wave spectrum acquisitions by the standalone Applicants would enable Sprint and T-Mobile to offer fixed broadband services on their own, without a merger, meaning that the purported benefit of being able to offer an in-home service is not merger-specific. Brattle explains that a remarkable {{BEGIN HCI END HCI}} of the households that New T-Mobile claims it will provide home broadband to are in nodes where the standalone networks could most likely have millimeter wave spectrum deployed.⁵⁰ Consequently, many of the households that the Applicants claim will benefit from their home broadband offering could be served by the standalone networks.

The Applicants suggest that in-home broadband service will be provided by exclusively resorting to the frequencies they now bring to the table.⁵¹ But this idea is sharply contradicted by the Applicants' own documents. Specifically, a T-Mobile presentation {{BEGIN HCI

END HCI}}⁵² A presentation for T-Mobile's Board of Directors {{BEGIN HCI

⁴⁹ March 28 Tenerelli Venkateswaran Declaration ¶ 25.

⁵⁰ March 28 Brattle Declaration at 30.

⁵¹ T-Mobile March 6 Letter at 16.

⁵² TMUS-FCC-08172580 at TMUS-FCC-08172583 {{BEGIN HCI
END HCI}}

END HCI}}⁵³ Another T-Mobile document, {{BEGIN HCI

END HCI}}⁵⁴

What other carriers are doing is {{BEGIN HCI

END HCI}} and inconsistent with their supposed plan. Verizon, for example, is building a millimeter wave in-home broadband service focused on urban and suburban areas.⁵⁵

D. The Applicants Do Not Take Penetration Loss Into Account

The Applicants have dealt with building penetration loss by simply assuming it away. The Applicants expressly admit that their link budget does not allow for signal attenuation to penetrate buildings. T-Mobile’s Senior Vice President of Research and Development, Mr. Mark McDiarmid, explains that the analysis “does not factor in-building penetration losses,” because T-Mobile has “assume[d] that CPE will be placed in areas maximizing signal-strength, *e.g.* near windows.”⁵⁶ The signal attenuation that goes hand in hand with indoor reception is hardly an

⁵³ TMUS-FCC-07942214 at TMUS-FCC-07942231 {{BEGIN HCI
END HCI}}

⁵⁴ TMUS-FCC-08172260 at TMUS-FCC-08172286 {{BEGIN HCI
END HCI}}

⁵⁵ Press Release, Verizon, *5G is Here* (Sept. 11, 2018), <https://www.verizon.com/about/news/5g-here> (noting deployment in four cities using millimeter wave bands).

⁵⁶ March 6 McDiarmid Declaration ¶ 3.

insuperable obstacle in either mid-band or higher frequencies. But it should be budgeted for, as it affects the number of households that can receive the proposed in-home service. T-Mobile itself, in a document entitled {{BEGIN HCI

END HCI}}⁵⁷ As DISH’s engineering experts explain, the Applicants’ in-home broadband is likely to face challenges due to a combination of factors, including the imprecision of self-installation and undocumented customer support capabilities. DISH does not claim that these challenges cannot be overcome. But the Applicants do not give a plausible explanation about how they plan to overcome them.

E. The Applicants Resort To The Same Plea For The Commission To Balance Harms Improperly

The Applicants’ March 6 Letter provides the key to the kind of public interest case the Applicants are trying to build by invoking the in-home broadband service plan. The letter states: “the benefits to consumers of both of these services are inextricably linked because they are derived from the improved wireless network made possible by the transaction. Consequently, the Commission must consider the merger’s *overall* effects on competition and the public interest and not just consider its constituent parts in isolation from each other.”⁵⁸ “Overall,” like “net,” is another code word used by the Applicants. They refer to a kind of rough justice. “Net” means that acknowledged price increases for many should be deemed offset by claimed price reductions for others. Similarly, what “overall” really means is that the harms to consumers of one service (mobile voice/broadband) are a reasonable sacrifice on the altar of supposedly creating

⁵⁷ TMUS-FCC-07952392 at TMUS-FCC-07952393 {{BEGIN HCI
END HCI}}

⁵⁸ T-Mobile Mar. 6, 2019 Letter at 1 (emphasis added).

competition in another market. But the Communications Act and antitrust precedent both frown on this kind of bargain. The statute asks the Commission to approve a transaction only if it finds the “the public interest, convenience, and necessity will be served.”⁵⁹ This does not leave much room for compromise. Antitrust precedent is in accord.⁶⁰

The provision of one service at the expense of the other has one more implication: it provides additional proof that New T-Mobile would in fact not rely on the Applicants’ existing frequencies for any in-home broadband service, but rather would use millimeter wave spectrum to be acquired in the future. But this in turn means that in-home broadband cannot be claimed as a benefit of this merger.

IV. CONCLUSION

For the foregoing reasons, and the reasons DISH has previously identified as to why the transaction is not in the public interest,⁶¹ the Commission should deny the transaction as currently proposed.

⁵⁹ 47 U.S.C. § 310(d).

⁶⁰ See *United States v. Philadelphia National Bank*, 374 U.S. 321, 370 (1963) (“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.”).

⁶¹ See *generally* Petition to Deny of DISH Network Corp., WT Docket No. 18-197 (Aug. 27, 2018); DISH Reply.

Respectfully submitted,

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March 28, 2019

Attachment A

**Response to Compass Lexecon February 20, 2019 Declaration and
Mark McDiarmid March 6, 2019 Declaration**

Coleman Bazelon

Principal, The Brattle Group

Jeremy Verlinda

Principal, The Brattle Group

and

William Zarakas

Principal, The Brattle Group

(March 28, 2019)

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I. Introduction

A. Summary of Findings

On February 21, 2019, T-Mobile US, Inc. (“T-Mobile”) and Sprint Corporation (“Sprint”) (collectively, the “Applicants”) submitted declarations that provide further information about Sprint and T-Mobile’s network integration plans and the competitive effects of the proposed merger of Sprint and T-Mobile. Specifically, Compass Lexecon submitted a declaration¹ that amends its September 17, 2018 declaration² to include estimated merger effects in 2019 and 2020. In the updated declaration, Compass Lexecon concludes that the proposed merger “will benefit consumers in *each year* for the foreseeable future.”³ Compass Lexecon’s conclusion is predicated on a key assumption based on the Applicants’ recent price commitment claims that the merged firm (“New T-Mobile”) will not raise prices for three years following the close of the merger.⁴ That is, Compass Lexecon’s merger simulations for 2019-2020 simply *assume* that post-merger prices will match the prices that would exist absent the merger.⁵ This is a self-fulfilling prophecy since, absent this assumption, Compass Lexecon’s estimated merger efficiencies are insufficient to offset the harm from the merger. That is, when we modify Compass Lexecon’s merger simulation model for 2019-2020 to relax the price commitment assumption, we find that the Compass Lexecon model predicts significant price increases in 2019 and 2020, even if one accepts all of Compass Lexecon’s merger efficiencies claims.

¹ Mark Israel, Michael Katz, and Bryan Keating, “Attachment B: Extension of the Israel, Katz, and Keating Analysis to 2019-2020”, *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, February 21, 2019, (henceforth “Compass Lexecon February 20 Declaration”).

² Mark Israel, Michael Katz, and Bryan Keating, “Appendix F: Declaration of Compass Lexecon”, *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 “Compass Lexecon September 17 Declaration”).

³ Compass Lexecon February 20 Declaration, p. 2.

⁴ Letter from Nancy J. Victory, Counsel for T-Mobile US, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, *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, February 4, 2019, p. 2.

⁵ Compass Lexecon February 20 Declaration, p. 3.

Compass Lexecon’s February 20 declaration also modifies its original Network Build Model, including revisions to its marginal cost savings estimates associated with 5G service for 2021-2024. Compass Lexecon, however, fails to address, among other things, our ongoing criticism that the network model omits the standalone carriers’ expected millimeter wave spectrum acquisitions. Using Compass Lexecon’s updated Network Build Model, we again demonstrate that omission of reasonable millimeter wave spectrum acquisitions by the standalone carriers causes Compass Lexecon to significantly overstate the Applicants’ claimed marginal cost savings.

Compass Lexecon also fails to respond to our criticisms about the use of the Nevo wireline study (“Nevo et al.”)⁶ to assess subscriber valuations of the merger’s claimed network quality improvements. As we stated in our prior declarations, the findings in Nevo et al. are inapplicable for the purpose of the current merger review. That is, willingness to pay estimates for wireline broadband are inapplicable to wireless 5G service; Cornerstone’s use of the Nevo results in their merger simulation analysis is equally inapplicable.⁷

Nonetheless, even accepting all of Compass Lexecon’s claimed efficiencies, including the overstated marginal cost savings, Compass Lexecon’s updated merger simulation analysis still shows that wireless subscribers will be harmed by the proposed merger. Specifically, Compass Lexecon’s model estimates price increases for 2021-2024 in the range of {{BEGIN HCI

END HCI}} for Sprint’s postpaid brands and increases in the range of {{BEGIN HCI
END HCI}} for Sprint’s prepaid brands (see Table 5).

Moreover, we find that correcting the marginal cost savings calculations in the Network Build Model to account for likely millimeter wave spectrum acquisitions causes the Compass Lexecon merger simulations to estimate significant price increases for all of the Applicants’ brands. Specifically, the model estimates price increases in the range of {{BEGIN HCI
END HCI}} for Sprint’s postpaid brands and increases in the range of {{BEGIN HCI
END HCI}} for T-Mobile’s postpaid brands (see Table 4). The model estimates price

⁶ Nevo, Aviv, John L. Turner, and Jonathan W. Williams, “Usage- Based Pricing and Demand for Residential Broadband,” *Econometrica* 84, no. 2 (2016): 411-443.

⁷ Reply 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, October 31, 2018, Appendix IV, (henceforth “Brattle October 31 Declaration”).

increases in the range of {{BEGIN HCI}} for Sprint's prepaid brands and increases in the range of {{BEGIN HCI}} for T-Mobile's prepaid brands (see Table 4).

Review of Compass Lexecon's revised engineering model reveals additional flaws. In addition to neglecting to incorporate millimeter wave spectrum into their model, without explanation, Compass Lexecon has increased the demand forecasts that drive network congestion and the need for incremental solutions. We find that this increased demand accounts for the majority of the changes in estimated marginal cost savings between Compass Lexecon's September 17 and February 20 declarations. That is, because the model is artificially spectrum constrained, higher demand requires more incremental solution costs to be incurred, and Compass Lexecon now estimates significantly higher marginal costs for the standalone T-Mobile network, leading to much greater claimed marginal cost savings from combining networks. Reducing the demand back to the levels applied in the earlier versions of the Network Build Model eliminates most of Compass Lexecon's newfound increases in marginal costs savings.

The Applicants have also recently provided additional information about their plans to offer fixed broadband services (also referred to as "in-home broadband") to customers located in rural and underserved markets.⁸ The Applicants claim that they will be able to introduce competition and broadband infrastructure in areas where both are absent. Irrespective of any benefits from wireless carriers' entry into fixed broadband services, the Applicants fail to demonstrate how the proposed merger increases competition in that product market relative to the status quo, without the merger. In particular, millimeter wave spectrum acquisitions would enable Sprint and T-Mobile to offer fixed broadband services as standalone carriers.

Further, the Applicants' plan for offering fixed broadband services is far from compelling because their fixed broadband offering is enabled through spare capacity in their mobile network, and the extent of the offering will erode as demand for that excess capacity by the Applicants' mobile network increases. They make no showing that their in-home broadband service will make sense to provide when, inevitably, incremental capital investments are required to sustain the offering.

⁸ Letter from Nancy J. Victory, Counsel for T-Mobile US, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, *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, March 6, 2019, (henceforth "Applicants' March 6 Filing.").

Even while this capacity is available to serve a fixed broadband network, the Applicants’ fail to materially meet the needs of the rural market, as their claims imply that they are able to address only {{BEGIN HCI END HCI}} of the rural market.

Finally, fixed broadband services and mobile wireless broadband services are distinct product markets, and the alleged benefits to competition from entry into the market for fixed broadband services do nothing to address harm in the market for mobile wireless broadband services. Further, even absent a showing that fixed broadband services and mobile wireless broadband services are different product markets, we have previously explained that it is inappropriate to offset harm to customers of one service with alleged benefits to customers of another service. The antitrust agencies routinely challenge mergers that lead to price increases for well-defined sets of customers.⁹

B. Organization of Declaration

Section II of this report reviews Compass Lexecon’s modeling of the “integration period” years 2019-2020. Section III considers Compass Lexecon’s updated analysis of the LTE/5G transition period years 2021-2024. In Section IV we discuss how Compass Lexecon updated the Network Build Model. Finally, Section V reviews the Applicants’ explanation of their plans for offering fixed broadband services.

⁹ For example, the court sided with the FTC in Staples/Office Depot regarding targeted customer segments, finding that “antitrust laws exist to protect competition, even for a target group that represents a relatively small part of an overall market.” See *FTC v. Staples, Inc., et al.*, 44, 15-cv-02115 (D.D.C. May 17, 2016). The FTC also successfully blocked the Sysco/US Foods transaction, arguing that the merger would specifically harm “broadline” food-service distributors. See Complaint at 4-5, *FTC v. Sysco Corporation, et al.*, 1:15-cv-00256 (Feb. 20, 2015). One of the Applicants’ economists, Dr. Mark Israel, provided expert testimony for the FTC in Sysco/US Foods. And in its challenge of the GE/Electrolux merger (which the parties terminated during the trial), the DOJ and its expert, Dr. Michael Whinston, explained that specific customer segments (including separate contract and retail channels) would face targeted price increases following the merger, and described harm from the merger arising from price effects specific to the merging brands. For example, the DOJ complaint alleges that “[t]he proposed acquisition likely would lead Electrolux to profit by, among other things, raising the prices of major cooking appliances above pre-acquisition levels.” See Complaint at 28, *U.S. v. AB Electrolux, Electrolux North America, Inc., and General Electric, Co.*, 10, Case No. 15-01039-EGS (D.C. July 1, 2015). See also Trial exhibit of Michael Whinston in *U.S. v. AB Electrolux, Electrolux North America, Inc., and General Electric, Co.* Public version. <https://www.justice.gov/atr/us-v-ab-electrolux-et-al-trial-exhibits>.

II. Compass Lexecon's Model Shows that Consumers are Harmed in the Integration Period (2019-2020)

In its February 20, 2019 report, Compass Lexecon added 2019 and 2020 to its merger simulation analysis. Compass Lexecon concluded that the proposed merger “will benefit consumers in *each year* for the foreseeable future.”¹⁰ However, Compass Lexecon’s conclusion is based on its assumption that “New T-Mobile will face near-term price constraints.”¹¹ Thus, Compass Lexecon need not have conducted any merger simulation analysis for these years, because the end result was pre-ordained.

The Applicants’ offer to fix plan prices at February 2019 levels is further complicated by the fact that their economists predict that network quality will decrease in some scenarios for Sprint customers during the integration period. Specifically, one of several alterations to the original Compass Lexecon model was to change a set of technical model inputs called a “loading curve”.¹² This curve translates demand on a sector to the amount and quality of throughput on the sector. In applying the new loading curve to individual sectors, Compass Lexecon “scales” the results and presents two approaches to scaling. “Site-Specific Scaling” corrects for errors between the predicted and experienced usage at the site level; “Mean Scaling” calculates an average of the site-specific scaling errors and applies that average adjustment to all the sectors.¹³ When Site-Specific Scaling is used, Compass Lexecon’s reported analysis shows Sprint’s customers being worse off in the integration years.¹⁴

Sprint products that experience quality degradation because of the merger do not fit neatly within the confines of the Applicants’ price guarantee. Compass Lexecon addresses this by way of rough averaging across its “scaling” scenarios, and concludes that “a reasonable (indeed, conservative, given the omitted consumer benefits, including improvements in coverage and consistency) approach to using the results presented in Table 2 is to assume that, post-merger,

¹⁰ Compass Lexecon February 20 Declaration, p. 2.

¹¹ Compass Lexecon February 20 Declaration, p. 2.

¹² Compass Lexecon February 20 Declaration, p. 22

¹³ Compass Lexecon February 20 Declaration, pp. 26-27

¹⁴ Compass Lexecon February 20 Declaration at Table 2, p. 10.

Sprint customers would experience network performance in 2019-2020 that is approximately equal in value to that of the standalone Sprint network on average.”¹⁵ However, this analysis highlights the inadequacy of Applicants’ proposed behavioral remedy, rather than bolstering it.

Compass Lexecon also purported to consider a “polar case,” in which “retail price constraints have no effect at all.”¹⁶ We find this to be the more relevant analysis because it reflects the price effects that the merger would likely produce, absent *de facto* price regulation. More importantly, these price effects, and New T-Mobile’s relative profit sacrifice associated with not implementing them, demonstrate the economic motivation that the merged parties will face. As shown below, we find that, absent pricing guarantees, prices are likely to increase for subscribers in 2019 and 2020 even under the Applicants’ alleged marginal cost savings and quality improvements.

The Applicants’ recent claim that “economic analysis by [Compass Lexecon] finds that consumer welfare is enhanced in each year, and that the merger is welfare enhancing in [Compass Lexecon’s] baseline case and all sensitivity cases,”¹⁷ is predicated on the key assumption of forced price constraints. Absent that, the claimed marginal cost savings for the 2019 and 2020 time frame are insufficient to offset the proposed merger’s upward pricing pressures.

The key assumptions in Compass Lexecon’s integration period modeling include:

- a. **Retail Pricing Constraint Assumption.** Post-merger T-Mobile’s average revenue per user (ARPU) in 2019 and 2020 can be no higher than the 2019 and 2020 ARPU that the standalone companies would offer absent the merger;
- b. **Wholesale Pricing Constraint Assumption.** New T-Mobile will not increase wholesale prices above the levels that would exist absent the merger during 2019 and 2020;¹⁸

¹⁵ Compass Lexecon February 20 Declaration, p. 11.

¹⁶ Compass Lexecon February 20 Declaration, p. 3.

¹⁷ Letter from Nancy J. Victory, Counsel for T-Mobile US, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, *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, February 21, 2019, p. 1.

¹⁸ Compass Lexecon February 20 Declaration, p. 32.

- c. **Marginal Cost Savings Assumption.** The merger will allow the Sprint and T-Mobile brands to enjoy marginal cost savings ranging from {{BEGIN HCI}}END HCI and HCI}};¹⁹ and
- d. **Quality Effects Assumption.** The post-merger Sprint and T-Mobile brands will experience quality improvements/degradation, which they value at {{BEGIN HCI}}END HCI}}.²⁰

Compass Lexecon's February 20 Extension Analysis was developed, in part, as a response to a request from Commissions staff regarding the proposed merger's "effects on prices during the integration period."²¹ However, because Compass Lexecon adopts the retail pricing constraint assumption, its analysis fails to provide the Commission with any meaningful information on price effects (let alone the relevant aggregated consumer welfare calculations) for this period. Nevertheless, price effects for the integration period can be extracted from Compass Lexecon's merger simulations that it provides in its backup materials. Contrary to the Applicants' claims of merger benefits, we find that these merger simulations demonstrate large post-merger retail price increases for 2019 and 2020 in **all** scenarios that do not force the model to constrain retail prices.

Table 1 provides 2019 and 2020 post-merger price increases predicted by the Compass' Lexecon model. In the table we preserve Compass Lexecon's wholesale pricing, claimed marginal cost savings, and quality effects assumptions, but remove the retail pricing constraint assumption. We consider three separate scenarios for diversion information. For the Cornerstone and Harris survey diversion information, we estimate price effects directly from the Compass Lexecon demand model. For the Comlink porting data diversion information, we estimate price effects based on the Jaffe and Weyl (2013) approximation technique.²² The table shows that prices increase for all of the Applicants' brands, regardless of the diversion ratio input source.

¹⁹ Compass Lexecon February 20 Declaration at Table 1, p. 9.

²⁰ Compass Lexecon February 20 Declaration at Table 2, p. 10.

²¹ Compass Lexecon February 20 Declaration, p. 1.

²² We find that the Compass Lexecon demand model, with its specific nesting structure for prepaid and postpaid products, is incapable of calibrating parameters under the porting diversion information. We therefore estimate price increases under porting diversion information using the Jaffe and Weyl (2013) and Miller et al. (2016) first-order approximation that estimate merger price effects by multiplying (net) upwards pricing pressure by estimated pass-through rates. See Jaffe, Sonia, and E. Glen Weyl. "The first-order approach to merger analysis." *American Economic Journal: Microeconomics* 5, no. 4

* Porting diversion scenario uses Jaffe and Weyl (2013) approximation of price effect. See footnote 22 for details.

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assumption relied upon. Similarly, the prices paid by T-Mobile's prepaid subscribers are predicted to increase by {{BEGIN HCI END HCI}}. Sprint's postpaid prices are also predicted to increase by {{BEGIN HCI END HCI}}, while T-Mobile's postpaid prices are predicted to increase by {{BEGIN HCI END HCI}}. Therefore, even accepting all of Compass Lexecon's claimed efficiencies, and even accepting the significantly understated diversion ratios in the Cornerstone demand model, Compass Lexecon's merger simulation model predicts significant price increases.²³

These price effects are consistent with Compass Lexecon's own assessment of consumer welfare effects. Although Compass Lexecon claims to present a "polar case in which the retail price constraints have no effect at all,"²⁴ the results of this scenario appear nowhere in the text of the February 20 report, nor is any information provided about this "polar scenario." Nevertheless, Compass Lexecon's backup materials confirm that it performed merger simulations that do not impose the retail pricing constraint assumption.

We have reviewed Compass Lexecon's backup materials and examined the competitive effects associated with the "polar scenario," which are summarized in Table 2, below. According to the table, the output from Compass Lexecon's own merger simulation model shows that when the pricing constraint assumption is relaxed, consumer welfare falls in 2019 and 2020.

²³ The Appendix provides additional simulation results based on the Compass Lexecon model. All simulations predict large post-merger price increases.

²⁴ Compass Lexecon February 20 Declaration, p. 3.

Table 2: Change in Consumer Welfare (2019-2020, Per-Sub Per-Month) from Compass Lexecon Merger Simulation Model, With Claimed Marginal Cost Savings and Adjusted Nevo et. al. WTP Estimates for Quality Efficiencies (Maintain Case)

{{BEGIN HCI

END HCI}}

Source: Compass Backup Materials.

Notes: Results are for the Adjusted Nevo Model in the Maintain Case.

Thus, Compass Lexecon’s own backup materials refute its conclusion that its “simulation analysis demonstrates that, even if one maintains our conservative assumptions, the projected merger efficiencies will outweigh any adverse competitive effects from the loss of a competitor.”²⁵

It is also worth noting that Compass Lexecon constrains retail prices in 2019 and 2020, but not in 2021, the third year of the Applicants’ price guarantee. As shown in Table 5 in the next section, Compass Lexecon’s own merger simulation model (under its preferred assumptions concerning marginal cost savings) predicts that, in 2021, prices for Sprint’s retail subscribers will increase by {{BEGIN HCI END HCI}} for postpaid plans and {{BEGIN HCI END HCI}} for prepaid plans. We have demonstrated that T-Mobile prices will also increase and that the Sprint price

²⁵ Compass Lexecon February 20 Declaration, p. 11.

increases are significantly larger after correcting for Compass Lexecon's omission of millimeter wave spectrum acquisitions (see Table 4, below).

Compass Lexecon does not clarify why it does not impose the price commitment during 2021; nonetheless, this decision raises a number of questions regarding the underlying assumptions that are driving the merger simulation results for 2021 and subsequent years. For example, is it appropriate to assume that New T-Mobile's investments and 5G rollout are invariant to the reduction in 2021 wireless profits that would be incurred because of the price commitment?²⁶ Similarly, do Compass Lexecon's assumptions regarding customer adoption of 5G during 2021 and subsequent periods still apply if the price commitment extends into 2021?²⁷

III. Compass Lexecon's Updated Network Model Does Not Respond to Our Prior Criticisms and Does not Address Critical Issues in its Model

As explained in our prior declarations, among other concerns, the Applicants' 5G network model fails to account for the likely acquisition of millimeter wave spectrum by standalone Sprint and T-Mobile.²⁸ Our October 31, 2018 declaration described how this significantly reduced the marginal cost savings calculated by the Applicants' economists. In particular, we noted that where Compass Lexecon reported a range of network-related marginal cost efficiencies of {{BEGIN HCI}}
END HCI}},²⁹ we showed that adjusting the network model's {{BEGIN HCI}}
END HCI}} results in

²⁶ The price commitment would result in a profit sacrifice during all years in which it is claimed to be in play, generating strong economic incentives for New-T-Mobile to deviate from Mr. Legere's commitments. We calculate that New T-Mobile would sacrifice nearly {{BEGIN HCI}}
END HCI}} over just the two year price commitment (2019-2020) that is considered in the Compass Lexecon merger simulation model; extending the price commitment into 2021 would only further increase the loss. *See* Table 20 in Appendix.

²⁷ If the pricing commitment were to only extend to legacy LTE plans, for example, then one would expect slower adoption of 5G plans than would occur without the price commitment.

²⁸ *See*, for example, SPR-FCC-11891567, TMUS-FCC-01722351.

²⁹ Compass Lexecon September 17 Declaration at Table 12, p. 79.

network-related marginal cost efficiencies that are just a fraction of the claimed efficiencies, or about {{BEGIN HCI
END HCI}}.³⁰

As we elaborate in Section IV, below, the Applicants' purported updates to the Network Build Model and associated revised marginal cost savings continue to omit likely and reasonable millimeter wave spectrum acquisitions. As shown in Table 3, this omission causes Compass Lexecon to significantly overstate its calculated marginal cost savings.

Table 3: Marginal Cost Savings, Compass Lexecon Revised Model with mmWave Adjustment (\$/Subscriber/Month), Maintain Usage
{{BEGIN HCI

END HCI}}

Source: Brattle Calculations based on Compass Lexecon February 20 Declaration at Table 13, p. 34, Compass Lexecon Revised Financial Backend Model and Compass Lexecon Revised Network Build Model.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions. Compass Lexecon includes roaming efficiencies along with other marginal network cost efficiencies. Network models have been updated to include {{BEGIN HCI
END HCI}}.

³⁰ Brattle October 31 Declaration at Table 9, p. 35.

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Similar to the findings in our October 31, 2018 declaration, Table 3 again demonstrates that calculated marginal cost savings (after incorporation of millimeter wave spectrum) are just a fraction of the levels calculated by Compass Lexecon in its revised analysis. Specifically, Compass Lexecon now claims that network related marginal cost savings range from {{BEGIN HCI
END HCI}},³¹ whereas network marginal cost savings would be only {{BEGIN HCI
END HCI}} if millimeter wave spectrum were appropriately incorporated into the marginal cost savings calculations (see Table 3).

The Applicants' omission of millimeter wave spectrum acquisitions in the Network Build Model and marginal cost savings calculations continues to distort Compass Lexecon's assessment of the merger's competitive effects. As we have explained in our prior filings, and show in Table 4 and the Appendix, analysis that appropriately includes millimeter wave spectrum acquisitions indicates that the merger will harm wireless subscribers.

Compass Lexecon does not dispute the anticompetitive results that we demonstrated in our October 31, 2018 rebuttal. In that rebuttal, we showed that a simple calculation of compensating marginal cost reductions (CMCRs) reveals that exceptionally large marginal costs are required to offset the price increases induced by the merger.³² These marginal cost savings are lower still when millimeter wave spectrum acquisitions are incorporated into Compass Lexecon's model.³³

None of Compass Lexecon's updates to its model alter the qualitative findings of our original rebuttal. We continue to find that the merger will be anticompetitive and increase prices for all merging party's brands. Table 4 below shows the price effects for the 5G/LTE transition years 2021 and 2024 across various diversion scenarios. Table 19 in the Appendix provides the full set of price effects for all of the 5G/LTE transition years (2021 through 2024).

³¹ Compass Lexecon February 20 Declaration at Table 13, p. 34.

³² Brattle October 31 Declaration at Table 4, p. 25.

³³ For example, the CMCR for Sprint Prepaid is {{BEGIN HCI
END HCI}} in 2021 whereas the adjusted marginal cost savings for Sprint in 2021 is {{BEGIN HCI
END HCI}}. See Brattle October 31 Declaration Tables 4 and 7, pp. 25-32.

**Table 4: Merger Price Effects in the 5G/LTE Transition Years
mmWave Adjusted Cost Savings, by Diversion Ratio Source, and Nevo Adjusted WTP
(Maintain Usage Scenario)**
{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Revised Model; Brattle Calculations.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions. Quality improvements under adjusted Nevo assumptions.

We find that under the millimeter wave acquisition adjustment and calibrating to the Cornerstone diversion³⁴ information, prices increase across brands by {{BEGIN HCI
END HCI}} for the Applicants' postpaid brands, and {{BEGIN HCI
END HCI}} for their prepaid brands. Price increases are even greater under the Harris diversion information, with price increase across brands of {{BEGIN HCI
END HCI}} for the Applicants' postpaid brands and {{BEGIN HCI
END HCI}} for their prepaid brands. Finally, we predict price increases under porting diversion of {{BEGIN HCI

³⁴ As discussed in our previous filings, we believe that the Cornerstone diversions are unfit to be used in the merger simulation. *See* Reply to Cornerstone "Response to Dish and CWA Comments" of Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *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, February 18, 2019, (henceforth "Brattle February 18 Declaration"). *See also* Response to Applicants' February 7 Filings on Diversion Ratios of Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *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, March 25, 2019, (henceforth "Brattle March 21 Declaration").

END HCI}} for the Applicants' postpaid brands and {{BEGIN HCI
HCI}} for their prepaid brands. Ultimately, Compass Lexecon's revisions to its model fail to take into account crucial corrections that we have repeatedly emphasized, and its model continues to show that the merger will induce large price increases.

However, even after failing to address our concern related to Sprint and T-Mobile's standalone millimeter wave holdings, failing to respond to our criticisms of the Nevo quality adjustment, assuming no coordinated pricing effects, and allowing for all of Compass Lexecon's updated claimed marginal cost efficiencies and updated claimed quality improvements, Compass Lexecon's updated merger simulation model still shows that Sprint customers will be harmed by the merger. Table 5, below, presents the price effects that result from Compass Lexecon's model when all its assumptions for the 5G/LTE transition years are adopted.

**Table 5: Merger Price Effects in the 5G/LTE Transition Years
Accepting All Compass Lexecon Assumptions - Compass Lexecon's Claimed Efficiencies,
ABH Diversions, and Adjusted Nevo WTP
(Maintain Usage Scenario)
{{BEGIN HCI**

END HCI}}

Sources: Compass Lexecon Revised Network Model; Brattle Calculations.

As shown in the table, even under Compass Lexecon's preferred assumptions, Sprint customers would experience price increases in the range of {{BEGIN HCI
postpaid service and increases in the range of {{BEGIN HCI
prepaid service. END HCI}} for
END HCI}} for

IV. The Revised Network Build Models

In its February 20, 2019 Extension Analysis, Compass Lexecon provided network analysis for the merger integration years (2019 and 2020), and also modified the Network Build Model for 2021-2024, the period covered in prior reports and the period in which Compass Lexecon previously estimated marginal cost savings associated with serving 5G demand.

As we discuss below, Compass Lexecon conducted a largely hypothetical study of marginal cost savings for 2019 and 2020 because their analysis was based on differences in the costs of incremental solutions that the Applicants assert they have no intention of implementing.³⁵ Specifically, Compass Lexecon estimated marginal cost savings in its model based on an assumption that the Applicants would make investments needed to relieve congestion in 2019 and 2020, despite the Applicants' assertions that their networks, as they currently exist, are sufficient to meet projected demand.³⁶ Thus, calculation of marginal costs and marginal cost savings in the integration period is merely a hypothetical exercise.

With respect to revisions to the 2021-2024 period, the primary model update concerns an increase in Compass Lexecon's demand forecast. This change is consequential because it, as the Applicants claim, requires the deployment of additional incremental solutions. When combined with Compass Lexecon's modifications to the costs of incremental solutions, Compass Lexecon claims that the revised marginal cost savings have increased since its last model runs. However, removing the effect of this increased demand actually reverses the revised model's increases in marginal cost savings. More importantly, the Applicants left out a key element of any significant update to the Network Build Model: the addition of millimeter wave spectrum. This simple addition would cause any claimed marginal cost savings to mostly disappear. For example, Compass Lexecon's claimed marginal cost savings for existing T-Mobile subscribers would decrease by over {{BEGIN HCI END HCI}} in 2021.³⁷

³⁵ Compass Lexecon February 20 Declaration at p. 17.

³⁶ *Ibid.*

³⁷ See Table 13.

A. Integration Period: 2019-2020 (LTE) Model

The Applicants' network model for the 2019-2020 period is largely similar to the model for the 2021-2024 period in that the differences in incremental solutions are used to calculate marginal cost in both the integration period (2019-2020) and the 5G/LTE transition period (2021-2024).³⁸ For the transition period, Compass Lexecon assumes that marginal costs are those related to 5G traffic,³⁹ while Compass Lexecon adjusts this assumption to reflect the predominance of LTE traffic for the integration period. Marginal costs for 2019 are therefore based on LTE traffic, while marginal costs for 2020 are based on the weighted average of LTE and 5G traffic.⁴⁰

Our review indicates that Compass Lexecon's modeling does not reflect the reality of how the networks will address congestion in 2019-2020. Both the Applicants and Compass Lexecon acknowledge that their network engineering models predict the need for incremental solutions at the baseline level of demand in the integration years. But, they also assert that the networks as they currently exist will be able to meet demand until 2020 without any additional investment.⁴¹ Thus, there is a significant disconnect between predicted network investments under the model and expected network investments presented by management. This calls into question the calculation of marginal cost, and the claimed marginal cost savings from the merger in 2019 and 2020—because they are calculated from a base of investments that the Applicants assert they will never make. In other words, the Applicants effectively admit that these marginal cost savings will never be realized.

Notwithstanding this fictionalized account of savings, the Applicants nonetheless apply incremental solutions within the network model for the years 2019 and 2020 to calculate marginal costs, and marginal costs savings, for those years. The incremental solutions applied in this model are significant. Table 6 shows the monthly levelized costs for the incremental solutions not deployed during the integration period to meet expected traffic. The average integration period solutions' costs range from {{BEGIN HCI}} of the average solutions costs after the integration years. These numbers are far from negligible. Consequently, the network models with these incremental solutions included are *not* similar to

³⁸ Compass Lexecon February 20 Declaration at Appendix II.A.

³⁹ Compass Lexecon February 20 Declaration at Appendix I.A.

⁴⁰ *Ibid.*

⁴¹ Compass Lexecon February 20 Declaration at p. 17.

the network models the Applicants claim they will actually use, and any hypothetical marginal costs or marginal costs savings are irrelevant.

**Table 6: Monthly Levelized Costs to Accommodate Expected Traffic
(\$M/Month)
{{BEGIN HCI**

END HCI}}

Source: Compass Lexecon Revised Model Backup Materials.

Notes: Sprint 41212 and Sprint 4512 are under different congestion threshold assumptions for 2021-2024. 41212 assumes a 12 Mbps threshold, while 4512 assumes a 5Mbps threshold. See Compass Lexecon February 20 Declaration, Appendix II. A.

B. Transition Period: 2021-2024 (5G) Model

While Compass Lexecon stated that they have “implemented a few refinements to the Network Build Model,”⁴² their changes are substantial. Some of these changes concern expansions of available incremental solutions, changes in assumptions, and changes in 5G standards (as used in the model).

1. Incremental Solutions

The Applicants add to the set of incremental solutions in the revised network models that are intended to be applied to address congestion at the sector level. Table 7 indicates that these additional incremental solutions vary by network. Under the revised model, more additional solutions have been added to New T-Mobile than for either standalone T-Mobile or Sprint. These new solutions include cell splits, overlays, add-ons without “clubbing,” and add-ons with “clubbing.”⁴³

⁴² Compass Lexecon February 20 Declaration at p. 27.

⁴³ “Clubbing” refers to the bundling of solutions, which lowers the cost of implementing the solutions.

Table 7: Incremental Solutions Added in Compass Lexecon Revised Model
{{BEGIN HCI

END HCI}}

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

2. Revised Inputs and Assumptions

The Applicants have also changed key inputs and assumptions in their revised network model, notably in the amount of demand and the costs of incremental solutions. Demand has a sizable effect on marginal cost savings because, in large part, it determines when incremental solutions are triggered. Thus, increasing demand, as the Applicants have done in their revised model, will result in higher deployment of incremental solutions.

Forecasted Demand As can be seen in Table 8, Compass Lexecon updated the demand forecast included in their models.⁴⁴ On balance, these changes increase the payload applied to the network models, mainly through revisions to the 5G penetration rates for Sprint and the 5G usage for T-Mobile.⁴⁵ For Sprint, 5G penetration increased by {{BEGIN HCI
END HCI}}. For T-Mobile, 5G usage increased by {{BEGIN HCI

⁴⁴ Compass Lexecon does not discuss adjustments made to standalone T-Mobile's projected demand.

⁴⁵ Note that the demand applied to New T-Mobile is still calculated as the sum of the demand applied to the standalones. This is consistent with the Compass Lexecon September 17 Declaration.

END HCI}} or 27% higher usage per user in 2021 and 9% higher usage per user in 2022 (see Table 8).

Table 8: Demand Levels in Compass Lexecon Original and Revised Models
{{BEGIN HCI

END HCI}}

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

Note: Revised Model is under Sprint 41212 congestion threshold assumptions.

The original Compass Lexecon demand assumptions for the “maintain restrictions” scenario were described by T-Mobile executive vice president Peter Ewens as the level of per-user 5G traffic forecast (GB per subscriber per month) that T-Mobile could support through certain incremental operative expenditures, subject to certain “financial constraints” faced by standalone T-Mobile.⁴⁶ We have not seen supporting evidence for Mr. Ewens’ original 5G traffic forecasts. More

⁴⁶ Reply Declaration of Peter Ewens, Executive Vice President, Corporate Strategy, T-Mobile US, Inc. *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, at p. 16, Table B.

importantly, we have also not uncovered any documentation for the recent update in the 5G traffic forecasts that Compass Lexecon uses in its revised model.

As discussed below in Section IV.C and reported in Table 13, these changes in 5G usage have significant impacts on Compass Lexecon’s estimated marginal costs savings. Given the sensitivity of their conclusions about the purported benefits of the merger to marginal cost savings and, in turn, the sensitivity of the marginal cost savings to the demand assumptions, the level of projected 5G usage should not be revised in such a casual manner; updates to these demand assumptions are only justified by new and well-documented developments.

Incremental Solution Costs. In addition to revising the demand forecasts in the network engineering models, Compass Lexecon also makes adjustments to the cost assumptions associated with many of the incremental solutions applied to address congestion at Level 3. As is evident in Table 9, the cost of low band overlays for the combined company is notably, and unaccountably, lower in the revised model than it was in the original engineering model, declining by over {{BEGIN HCI END HCI}} in CapEx, from roughly {{BEGIN HCI END HCI}} per overlay to less than {{BEGIN HCI END HCI}} per overlay.

Table 9: Incremental Solutions Cost Changes in Compass Lexecon Revised Model
{{BEGIN HCI

END HCI}}

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

Note: Revised Model is under Sprint 41212 congestion threshold assumptions.

3. 5G Standards

Compass Lexecon also increased the average throughput per user in its revised model. Table 10 shows that under both Compass Lexecon’s original and revised models, stand-alone Sprint and T-Mobile will be able to provide user throughput at 5G levels (i.e., average of at least 100 Mbps) at Level 3 (i.e. after incremental solutions) in most years. Thus, Compass Lexecon’s revisions do not change the finding that a merger is not needed to reach 5G throughput.

Table 10: 5G Average User Throughput (Mbps) in Network Models, 2021 – 2024

{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Network Models; 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.

Note: Average user throughputs reflect Level 3 levels (i.e. post incremental solutions).

C. Effects on Marginal Cost Savings

The Applicants’ revisions to the Network Build Model materially altered their estimates of merger-related marginal cost savings. As shown in Table 11, the Applicants’ revised marginal cost savings are higher than those derived from the previously supplied Network Build Model, with the exception of T-Mobile in 2023. However, the additional marginal cost savings are driven more by changes in demand assumptions than they are to enhancements in network efficiencies.

The increased demand included in the Applicants' revised model (as shown in Table 8) is the primary reason behind the claimed increases in marginal cost savings. The effect of higher levels of demand upon marginal cost savings is pronounced because the Applicants' network models are capacity constrained, artificially so, as future spectrum acquisitions would ease the constraint. Increasing demand serves to further strain the Applicants' networks, and exaggerates the benefits of refarming spectrum that can be accomplished by New T-Mobile. Overall, this results in a gross exaggeration of benefits from combining the standalone networks into New T-Mobile.⁴⁷

We separate the effect on marginal cost savings of Compass Lexecon's revised demand revisions from all other network model revisions in Table 11. The table shows the change in total network marginal cost savings resulting from: 1) all of Compass Lexecon's revision to the network model; 2) only Compass Lexecon's changes to demand levels; and 3) Compass Lexecon's non-demand related revisions to the network model alone. The difference between total effects and the sum of demand and non-demand related revisions is explained by the interaction of the demand and modeling effects.

⁴⁷ Brattle October 31 Declaration, Section III.C.

**Table 11: Components of Compass Lexecon Revised Model
Change in Network Marginal Cost Savings
{{BEGIN HCI**

END HCI}}

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

Note: Revised Model under Sprint 41212 congestion threshold assumptions.

Table 11 indicates that the increases in marginal cost savings coming out of the revised network model are due largely to changes in demand assumptions, particularly for standalone T-Mobile. For example, in 2021, the effect on marginal cost savings from the increases in New T-Mobile's demand relative to standalone T-Mobile was an increase of {{BEGIN HCI END HCI}} (which was {{BEGIN HCI END HCI}} of the equivalent marginal cost savings from the original Compass Lexecon model). This was offset slightly by changes in other model inputs and assumptions that resulted in a decrease in marginal cost savings of {{BEGIN HCI END HCI}}. These two effects, plus the interaction of demand and modeling effects, produced an

overall increase in marginal cost savings for T-Mobile of {{BEGIN HCI END HCI}} in 2021.⁴⁸

Thus, Compass Lexecon’s “few refinements to the Network Build Model” were actually quite consequential, especially its revision to the model’s demand forecast. Furthermore, this revision is not the first. In the Public Interest Statement, an extensive analysis by David Evans purported to show enormous merger benefits.⁴⁹ The Applicants also put in the record a network model by Neville Ray, showing significantly less benefit from the merger than the Evans analysis. In its prior submission, Compass Lexecon used its own version of the Ray model, which significantly reduced the demand assumptions and showed increased marginal cost savings. Compass Lexecon’s revised model raise demand from that level, but in a way that also increases marginal cost savings. Our criticisms of the ever-changing modeling of merger benefits has remained consistent – the models are artificially spectrum constrained and, therefore, show inflated benefits from the merger.

D. Millimeter Wave Spectrum

The most notable aspect of Compass Lexecon’s revised network model is the conspicuous absence of additional millimeter wave spectrum. We have pointed out the absence of reasonable amounts of millimeter wave frequencies from the Applicants’ network engineering models in our prior filings,⁵⁰ however, despite the many updates to the network engineering models made by the Applicants, they continue to ignore our core criticism. The revised network engineering models still do not account for millimeter wave spectrum, even as it is currently being auctioned by the FCC with both Sprint and T-Mobile qualified as bidders.

⁴⁸ The net effect of the change in demand and in the network model is less than the sum of the two standalone effects because of the interaction of changed network model on the changed demand.

⁴⁹ See 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 at Appendix G: Declaration of David Evans, (“Evans Declaration”).

⁵⁰ Brattle October 31 Declaration, Section III.C; Network Engineering Model’s Sensitivity to Millimeter Wave Adjustments by Coleman Bazelon, Jeremy Verlinda, William Zarakas, Attachment A to Letter by 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, February 4, 2019 (henceforth “Brattle Millimeter Wave White Paper”).

Table 12 below, demonstrates that an even larger amount of Compass Lexecon’s claimed marginal cost savings are generally eliminated when millimeter wave spectrum is included in the new network model compared to the original network model.

Table 12: Effects of Millimeter Wave Correction on Network Marginal Cost Savings
{{BEGIN HCI

END HCI}}

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

Note: Revised Model under Sprint 41212 congestion threshold assumptions.

The table indicates that Compass Lexecon’s claimed marginal cost savings for Sprint in 2021 ({{BEGIN HCI END HCI}} per subscriber month) are reduced by {{BEGIN HCI END HCI}} after millimeter wave spectrum is incorporated into the model, leaving only {{BEGIN HCI END HCI}} in marginal cost savings. The percent reductions in marginal cost savings (under Compass Lexecon’s revised model) for 2021-2024 due to the addition of millimeter wave spectrum is shown in Table 13.

Table 13: Percent Change of Network Marginal Costs from the Millimeter Wave Correction by Model

	Sprint				T-Mobile			
	2021	2022	2023	2024	2021	2022	2023	2024
<i>Percent Change from mmWave Adjustments</i>								
Original Model	-69.1%	-67.2%	-57.9%	-54.1%	-87.5%	-84.4%	-82.2%	-68.0%
Revised Model	-68.0%	-65.3%	-55.2%	-56.8%	-99.2%	-91.0%	-83.6%	-69.3%

Sources: Brattle Calculations; Compass Lexecon Backup Materials.

Note: Revised Model under Sprint 41212 congestion threshold assumptions.

V. Fixed Broadband

The Applicants claim that they will offer a fixed broadband service to homes (or in-home broadband) by using excess capacity on their mobile 5G network. Specifically, the Applicants claim that they can connect customers to the underutilized sectors of their 5G network by way of a special home broadband receiver placed in a window, for a nominal one-time investment of **{{BEGIN HCI** **END HCI}}**.⁵¹

The Applicants also claim that their fixed broadband network will reach a large number of consumers. According to Mark McDiarmid (Senior Vice President of Radio Network Engineering and Development, T-Mobile) New T-Mobile's fixed broadband network will have a sufficiently strong signal to potentially reach {{BEGIN HCI}} U.S. households.⁵² However, Mr. McDiarmid estimated that a lesser number of households, {{BEGIN HCI}} {{END HCI}}, meet the first cut of potential customers, as these are the number of households that potentially could be served fixed broadband service at 25 Mbps downstream and 3 Mbps upstream (25/3) levels with the excess capacity in the network.⁵³

This number is further reduced to only {{BEGIN HCI}} “Eligible Households” that could actually be served in 2024 after the excess capacity of the network nodes and the houses covered by each node were appropriately factored in.⁵⁴ Further still, the Applicants estimate that they will be able to sign up a subset of this number, about {{BEGIN HCI}} or about 9.5 million households by 2024.⁵⁵

The Applicants also claim that their fixed broadband service will be able to reach about {{BEGIN HCI END HCI}} rural households and {{BEGIN HCI END HCI}} households that have no or one existing broadband service provider. Mr. McDiarmid estimated

⁵¹ Applicants' March 6 Filing at p. 15, footnote 54.

⁵² Applicants’ March 6 Filing, Appendix B, “Declaration of Mark McDiarmid, Senior Vice President of Radio Network Engineering and Development, T-Mobile US, Inc,” at p. 2, (henceforth “Applicants’ March 6 Filing, Appendix B”).

⁵³ Applicants' March 6 Filing, Appendix B at p. 4.

⁵⁴ Applicants' March 6 Filing, Appendix B at p. 7.

⁵⁵ Applicants' March 6 Filing at p. 2.

that about {{BEGIN HCI END HCI}} of these rural households could potentially be served.

We show below that the Applicants' claims are overstated and, to the extent that they can be reached, they can be accomplished without the proposed merger.

A. Merger Specificity

The Applicants claim that the fixed broadband service would not happen without the merger of Sprint and T-Mobile. This is not true. Sprint and T-Mobile as standalone carriers can do this with the millimeter wave spectrum that they have indicated they will acquire on their own. Millimeter wave spectrum is able to deliver fixed broadband service, as indicated by the Applicants own plans and the intentions of other fixed wireless broadband providers.⁵⁶ Thus, whether or not standalone Sprint and T-Mobile might be able to provide fixed broadband services over their own mid-band spectrum, they certainly would be able to over millimeter wave spectrum.

The following table describes the ubiquity of likely millimeter wave deployment among sites that provide fixed broadband service. In our previous analysis we identified nodes where the standalone networks would likely deploy millimeter wave spectrum.⁵⁷ We compared these likely to deploy nodes to the nodes where the Applicants identify likely home broadband customers. A remarkable {{BEGIN HCI END HCI}} of the households that New T-Mobile claims it will provide home broadband to are also in nodes where standalone Sprint and T-Mobile will most likely have deployed millimeter wave spectrum (see Table 14). Consequently, many of the households that the Applicants claim will benefit from their in-home broadband offering would most likely be served by standalone Sprint and T-Mobile, without a merger of the two.

⁵⁶ Mike Dano, "Sprint: Millimeter wave spectrum is 'important part of our strategy going forward'," FierceWireless, May 3, 2018, accessed September 30, 2018, <https://www.fiercewireless.com/5g/sprint-millimeter-wave-spectrum-important-part-our-strategy-going-forward>; Jack Browne, "What Role Will Millimeter Waves Play in 5G Wireless Systems?," Microwaves&RF, April 10, 2018, accessed October 1, 2018, <https://www.mwrf.com/systems/what-role-will-millimeter-waves-play-5g-wireless-systems>; John O'Malley, "What is millimeter wave technology?," Verizon Wireless, June 21, 2018, accessed October 1, 2018, <https://www.verizon.com/about/our-company/5g/what-millimeter-wave-technology>.

⁵⁷ Brattle October 31 Declaration, Appendix A.I.B.

Table 14: Share of Fixed Broadband Eligible Households Covered by Nodes with Likely Millimeter Wave Deployment
{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Fixed Broadband Network Model; Brattle Calculations; “35. Site and sector coordinates.xlsx”.

The Applicants claim that together they can offer their in-home broadband offering on their existing spectrum without the need for millimeter wave frequencies.⁵⁸ This is incorrect. Even if New T-Mobile only offers the in-home broadband service on its 600 MHz and 2.5 GHz frequencies, claims of spare capacity on any given node are often facilitated by the availability of millimeter wave deployments.

Figure 1, reproduced from our initial filing in this proceeding, shows the locations where stand-alone T-Mobile currently has millimeter wave spectrum.⁵⁹ Figure 2, reproduced from the Applicants’ March 6 filing, shows the locations where the Applicants claim they will be able to offer fixed broadband service.

⁵⁸ Applicants’ March 6 Filing at p. 16.

⁵⁹ 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 Initial Declaration”).

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Figure 1: T-Mobile's MmWave Holdings, 28 GHz and 39 GHz

{{BEGIN HCI

END HCI}}

Source: HBVZ Initial Declaration, Figure 3.

Figure 2: New T-Mobile 2024 Fixed Broadband Supported HHs

{{BEGIN HCI

END HCI}}

Source: Reproduced Figure 4 from Applicants' March 6 Filing, Appendix B, p. 7.

A simple visual comparison of these figures makes clear that the areas where the Applicants have the most excess capacity to offer fixed broadband are also the areas where they currently already have millimeter wave frequencies. Thus, the excess capacity on the Applicants’ networks is correlated with the presence of millimeter wave spectrum. Sites where the Applicants intend to deploy millimeter wave spectrum that T-Mobile already has in place will allow for providing home broadband for more households on average than sites without millimeter wave. Table 15 shows the relative difference in broadband coverage for households served by T-Mobile’s existing millimeter wave spectrum versus non-millimeter wave spectrum.

**Table 15: Relative Average Broadband Coverage for
Nodes with Millimeter Wave Spectrum**
{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Fixed Broadband Network Model; Brattle Calculations.

As shown in the table, even before any additional millimeter wave spectrum is acquired, the Applicants’ existing millimeter wave sites provide coverage to {{BEGIN HCI END HCI}} more households in 2021 and {{BEGIN HCI END HCI}} more households in 2024, than sites that do not deploy millimeter wave spectrum. That is, although in-home broadband service may not be provided over millimeter wave frequencies, the sites that have excess capacity available to provide home broadband services have more capacity and serve more potential households when those sites also deploy millimeter wave spectrum. Thus, the Applicants proposed home broadband offering *is* dependent on millimeter wave spectrum.

Both Sprint and T-Mobile can acquire this spectrum just as easily as standalone carriers. For Sprint, the majority licensee of 2.5 GHz spectrum and the only licensee of these frequencies among the Applicants, a modest deployment of millimeter wave spectrum deployments could enable the carrier to provide fixed broadband to its current subscribers at a level equal to or exceeding that claimed by the Applicants for the combined network. Similarly, a standalone T-Mobile with a modest increase in millimeter wave spectrum would likely have excess capacity on its other mid-band frequencies it could use to provide a fixed broadband service.

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A significant amount of the fixed broadband coverage claimed by the Applicants is also accomplished with T-Mobile's 600 MHz spectrum. Figure 3 shows the fixed broadband coverage for the Applicants that will be available over New T-Mobile's network. The lighter pink areas are enabled by 600 MHz spectrum alone. This is significant because deploying 600 MHz for 5G services is not a merger specific benefit. T-Mobile already owns these frequencies. Most of the 600 MHz-only home broadband areas would be reachable on the stand alone T-Mobile network.⁶⁰ Thus, standalone T-Mobile would have the same quantity of 600 MHz spectrum as New T-Mobile, but many fewer mobile subscribers. This indicates that standalone T-Mobile would likely have even more capacity available to serve fixed broadband customers than would New T-Mobile.

Figure 3: New T-Mobile 2024 Network Coverage Using 5G In-Home Broadband Link Budget
{{BEGIN HCI}}

END HCI}}

Source: Reproduced Figure 2 from Applicants' March 6 Filing, Appendix B.

⁶⁰ See Brattle October 31 Declaration, Section III.D. In our October 31, 2018 filing we noted that less than 1% of added nodes in the New T-Mobile network were more than 20 km from existing nodes in the standalone T-Mobile network. 600 MHz spectrum, even in the home broadband deployments, will travel significantly further than this distance.

B. Rural Service

The Applicants make much of their plans to offer fixed broadband to customers in rural areas, many of which have no or limited broadband options. Specifically, they claim that they could serve up to {{BEGIN HCI}} rural “supported” households, {{BEGIN HCI}} of which currently have access to one or zero broadband providers. However, this is only a small portion of the rural market. As reported in Table 16, the Applicants estimate that there are {{BEGIN HCI}} rural households, making New T-Mobile’s targeted rural market equal to about only {{BEGIN HCI}} of total rural households. The Applicants claim that, in the best case, they will be able to sign up {{BEGIN HCI}} of the national households they could potentially serve by 2024. If this national proportion carried over to rural areas, it indicates that they would only serve about {{BEGIN HCI}} of the {{BEGIN HCI}} rural households, or {{BEGIN HCI}} of the rural market.

Table 16: Household Coverage in Rural Regions, Millions of Households
{{BEGIN HCI}}

END HCI}}

Source: Compass Lexecon Fixed Broadband Network Model; McDiarmid Additional Declaration, Figure 5.

Notes: Take-up Rate is calculated as the ratio of the subscribers New T-Mobile plans to serve to the subscribers New T-Mobile expects to be available, or: {{BEGIN HCI}} END HCI}}.

VI. Appendix

A. Additional 2019-2020 simulation results

**Table 17: Post-Merger Price Changes in the Integration Period with
No Efficiencies, Wholesale Price Restrictions, by Diversion Ratio Source***

{{BEGIN HCI

END HCI}}

Sources: Compass Lexecon Revised Network Model and Brattle Calculations.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions.

“Combined” values in porting diversion approximation scenario calculated using pre-merger shares to weight each respective brand for both pre- and post-merger price effects.

* Porting diversion scenario uses Jaffe and Weyl (2013) approximation of price effect. See footnote 22 for details.

B. Tables of Competitive effects for 2021-2024

Table 18: Price Effects for the 5G/LTE Transition Period with
mmWave Adjustments by Diversion Source,* Nevo Adjusted WTP, Maintain Usage
{{BEGIN HCI

END HCI}}

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Sources: Compass Lexecon Revised Network Model and Brattle Calculations.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions. Quality improvements under adjusted Nevo assumptions.

* For the combined price change calculations using approximated porting diversion, we use pre-merger shares to weight each respective brand. This is because our methodology does not generate post-merger market shares.

**Table 19 Price Effects for the 5G/LTE Transition Period with
No Efficiencies by Diversion Source,* Maintain Usage
{{BEGIN HCI**

END HCI}}

Sources: Compass Lexecon Revised Network Model and Brattle Calculations.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions. Quality improvements under adjusted Nevo assumptions.

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* For the combined price change calculations using approximated porting diversion, we use pre-merger shares to weight each respective brand. This is because our methodology does not generate post-merger market shares.

C. Lost Profits From 2019-2020 Price Commitments

Table 20: New T-Mobile Total Annual Profit Loss From Price Commitment with Compass Lexecon Efficiencies, Adjusted Nevo, (\$Mil), Maintain Usage [Site Specific]

{{BEGIN HCI

END HCI}}

Source: Compass Lexecon Backup Materials and Brattle Calculations.

D. Millimeter Wave Correction Marginal Costs, Relax Usage Restrictions

Table 21: Marginal Cost Savings, Compass Lexecon Revised Model with mmWave Adjustment (\$/Subscriber/Month), Relax Usage Restrictions
{{BEGIN HCI

END HCI}}

Source: Brattle Calculations based on Compass Lexecon February 20 Declaration at Table 13, p. 34, Compass Lexecon Revised Financial Backend Model and Compass Lexecon Revised Network Build Model.

Notes: Revised Model under Sprint 41212 congestion threshold assumptions. Compass Lexecon includes roaming efficiencies along with other marginal network cost efficiencies. Network models have been updated to include **{{BEGIN HCI**
END HCI}}.

E. Distribution of NMP Income

The following figure updates Figure 2 in our March 18 filing.⁶¹

Figure 3: Distribution of Estimated NMP Incomes, by Brand Type
{{BEGIN HCI

END HCI}}

Source: Brattle Calculations, NMP Survey Data, and Cornerstone Backup Materials.

⁶¹ See Reply to Cornerstone “Reply to Cornerstone’s ‘Response to Dish’s February 19 and 25 Submissions’ by Coleman Bazelon, Jeremy Verlinda, and William Zarakas, *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, March 18, 2019.

Attachment B

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.

Assignment and Summary

3. We have been asked by DISH Network Corporation (“DISH”) to review certain claims made by Sprint and T-Mobile (together, the “Applicants”) regarding the speed with which the Applicants can integrate two vastly different networks, and the supporting information provided by the Applicants about New T-Mobile’s proposed in-home broadband service.

4. The Applicants suggest they will integrate the Sprint and T-Mobile networks quickly and simply. But they fail to account for the practical limitations and shortcomings that mobile network deployment teams regularly encounter. The Applicants assert that it is simple

and without cost to align cell site schedules to achieve cost savings or “clubbing benefits.” In reality, the availability of equipment, labor, zoning/construction/compliance permitting, and other factors rarely align. And, attempting to force the alignment of these items could result in additional cost due to waiting by idled crews and ticking payment clocks. In fact, deployment teams only work on what is possible during any given week. The Applicants also fail to account for problems related to adding equipment and spectrum to increasingly crowded towers such as space availability and intermodulation interference. The Compass Lexecon Declaration also makes hypothetical assumptions about cell splits in a combined network versus two standalone networks, leading to speculative cost-saving calculations.

5. There are many other respects in which the Applicants understate the costs of New T-Mobile and/or overstate those of standalone Sprint. We discussed these matters in detail in our original declaration, filed with DISH’s reply in this proceeding. The Applicants have failed to respond to these criticisms.

6. In addition, the proposed in-home broadband service is not a merger-specific benefit, as millimeter wave frequencies are suitable for that service. Furthermore, the Applicants’ plan to use their existing frequencies for such a service is unproven and speculative. Among other things, the Applicants will face challenges due to a combination of factors – challenges that they do not adequately explain how they will overcome. The Applicants also greatly exaggerate the benefits that would flow from their proposed service.

New T-Mobile’s Integration Costs and Difficulties Are Understated

7. The Applicants propose to quickly integrate their two networks and provide additional capacity on the New T-Mobile sites during 2019-2021. However, they fail to discuss the limitations and shortcomings of these methods. The Applicants state that “New T-Mobile

will move 5+5 MHz of Sprint PCS spectrum to the New T-Mobile sites to support the incremental migrating customers. About {{BEGIN HCI END HCI}} of the anchor T-Mobile sites that require capacity to be augmented due to increased traffic can add this spectrum with a simple configuration change and without the need for a radio upgrade.”¹

8. To add Sprint’s PCS spectrum block to the T-Mobile radios, however, they must both be within the instantaneous bandwidth of the cell site receiving the spectrum (within a certain number of MHz of the existing spectrum). Further complicating this spectrum move is that Sprint’s PCS spectrum may be licensed in one geographic area, but the New T-Mobile site may be in a different geographic area, preventing the spectrum move. This means that the exact source and target site must be considered with the exact PCS channel to determine the feasibility of moving it. As a result, the criteria for moving Sprint’s PCS spectrum to New T-Mobile sites are much more complex and problematic than the Applicants state.

9. The Applicants describe cost savings that will supposedly be achieved through “clubbing” benefits where two upgrades are performed at the same time, rather than on two separate occasions.² They describe these schedule alignments as a simple matter, stating that “T-Mobile will align these upgrades with the 2.5 GHz additions to achieve cost efficiencies from doing both at once (‘clubbing benefits’)” and that “New T-Mobile will add 2.5 GHz radios to T-Mobile sites ... [w]here these sites overlap with T-Mobile’s 600 MHz spectrum additions, T-

¹ Declaration of Mark McDiarmid ¶¶ 8b, 9b, 11b (Feb. 21, 2019) (“Feb. 21 McDiarmid Declaration”) (Attachment A to Letter from Nancy Victory, Counsel for T-Mobile, to Marlene Dortch, FCC, WT Docket No. 18-197 (Feb. 21, 2019) (“T-Mobile Feb. 21 Letter”)). *See also* Mark Israel, Michael Katz, & Bryan Keating, *Extension of the Israel, Katz, and Keating Analysis to 2019-2020*, Section 3.A.2 (Feb. 20, 2019) (“IKK Declaration”) (Attachment B to T-Mobile Feb. 21 Letter).

² Feb. 21 McDiarmid Declaration ¶¶ 8c, 8d, 9c, 9d, 11c, 11d.

Mobile will make both improvements at the same time where these upgrade activities align from a timing perspective.”³

10. However, this oversimplification ignores the on-the-ground realities of a network upgrade program. Some of the proposed upgrades to the T-Mobile sites include the addition of 600 MHz, 2.5 GHz radios, and AWS/PCS radio upgrades. There are many disparate factors limiting the ability to align the timing and feasibility of upgrades that the Applicants propose.⁴ This limits the ability to make additional capacity available as proposed and reduces the clubbing benefits. There are too many variables and constraints to reliably predict or control the time alignment of multiple upgrades on a given cell site.

11. For example, the various equipment manufacturers ship their products from different locations throughout the world and on different shipping schedules, especially during peak industry buildout years. On a weekly basis, the deployment and implementation vendors adjust their construction, installation, and commissioning plans based on what is feasible for that week. This problem is further constrained by the fact that operators schedule upgrades and go live in geographic clusters of cell sites—and different cluster upgrades are contracted to different vendors. If New T-Mobile were to simply wait until all components of a multi-upgrade site were in place, it would incur costs related to storage, idled crews, and payment clocks ticking on undeployed gear.

12. Given the operational realities, we believe that, on a given cell site, the cost of performing one complex multi-component upgrade could be higher than the simpler case of performing two single-component upgrades. While there may be cost savings in the

³ See Feb. 21 McDiarmid Declaration ¶¶ 8c, 9, 11c.

⁴ See Feb. 21 McDiarmid Declaration ¶¶ 8c, 8d, 9c, 9d, 11c, 11d.

mobilization fees and in the preconstruction phase (pre-building permit), such as scoping the bill of materials, dealing with real estate, zoning, compliance, and drawings, the costs could rise in the construction phase.

13. The cost increases on these more complex upgrade sites come from logistical issues. Construction management costs could also rise because more management time and site visits are required for the more complex tasks to maintain quality levels and schedule. Finally, the time for the installation, commissioning, and PIM testing teams rises relative to simpler installations. After the installation and commissioning is complete, professional services firms use (and charge for) top-skilled “tiger teams” to fix lingering problems—usually appearing on the more complex installation and upgrades. These issues, among others, do not appear to be taken into account by the Applicants.

14. The Compass Lexecon Declaration attempts to illustrate how a combined network uses existing network assets and spectrum more efficiently. This is an oversimplification. The Declaration describes how different networks and cell sites are congested at different times.⁵ The Compass Lexecon Declaration asserts that combining the networks is the way to make the spectrum utilization efficient. T-Mobile’s Senior Vice President of Research and Development, Mr. Mark McDiarmid also claims that “[a]s separate networks, T-Mobile cannot ‘borrow’ capacity from Sprint’s spectrum (nor Sprint from T-Mobile’s).”⁶

15. There are several problems with this argument. First, there is in fact a way for networks to “borrow” capacity from each other. It is the very same technique that the Applicants propose to use shortly after the close of the merger—multi-operator core network (“MOCN”).

⁵ IKK Declaration, Section 3.A.1.

⁶ Feb. 21 McDiarmid Declaration ¶ 14c

MOCN allows subscribers to move back and forth between networks based on congestion thresholds, as well as those related to coverage and signal quality. In fact, this can be done without the merger as MOCN was initially designed to allow different operators to share each other's networks. Second, the implication that "adding spectrum" to a cell site "essentially creat[es] additional capacity for free"⁷ ignores the on-the-ground realities of network deployment. Towers are owned by third parties and can lack physical space required to add new antennas and radios. Adding equipment to those crowded towers to support the spectrum increasingly requires structural upgrades and can be blocked by zoning and leasing considerations, or at least increased costs and delays. The Applicants fail to adequately account for this.

16. The Compass Lexecon Declaration goes on to incorrectly identify cost savings related to adding cell sites when needed for capacity relief, known as "cell splitting." It states that "deploying combined spectrum on cell sites increases the incremental capacity generated by each cell split going forward" and that "... absent the merger, the standalone firms would need two separate cell splits to deploy what the merged firm will be able to do as one."⁸ It proceeds to give an example of how, in isolation, upgrading a pair of standalone sites is more expensive than upgrading a single site. However, this example relies upon the incorrect assumption that traffic demand causing a cell split in the combined network would also exist in both the Sprint and T-Mobile standalone networks. The Compass Lexecon Declaration even describes a scenario that contradicts the cost savings conclusion that there are "congested T-Mobile sites in areas where

⁷ IKK Declaration, Section 3.A.1.

⁸ IKK Declaration, Section 3.A.2.

Sprint has excess capacity.”⁹ Because the underlying assumption is invalid, the cost savings calculation is invalid.

17. There are also increasingly difficult practical limitations associated with adding more spectrum and infrastructure to T-Mobile’s existing cell sites. These include:

- Physical space may not be available to perform the spectrum addition. Sufficient space on the towers for upgrades and additional infrastructure is highly variable, as is the cost. The Applicants’ towers are generally owned by third party companies leased using a master lease agreement and a ground lease with the landowner. This means that acquiring the required space may not be available or cost effective.
- Adding spectrum to a tower often can result in additional costs, delays, or cancellations of projects. Based on our experience in the field, for towers with available space, changes to the equipment will often require new zoning permits, new building permits, analysis and remediation to comply with environmental/historical preservation/safety rules, and structural upgrades, all of which have independent timescales.

18. Costly, complex, and time-consuming activities are portrayed as “synergies” or described as simply an item on a checklist.¹⁰ The McDiarmid Declaration refers to a “large amount of decommissioning synergies.”¹¹ This statement is in contrast to the reality of a decommissioning effort. This effort will require a large amount of labor and cost, which the Applicants do not appear to adequately account for.

19. Separately, the Applicants make a seemingly innocuous statement about upgrades to Sprint sites retained after the merger. They state that they will “align RAN vendors.”¹² In industry parlance, this is known as “rip and replace.” Contrary to the Applicants understatement,

⁹ IKK Declaration, Section 3.A.1.

¹⁰ Feb. 21 McDiarmid Declaration ¶ 11e.

¹¹ Feb. 21 McDiarmid Declaration ¶ 5.

¹² Feb. 21 McDiarmid Declaration ¶ 11e.

this involves costly and time-consuming efforts to climb towers, removing radios, antennas, and other equipment, not to mention the long vendor selection and negotiation process.

20. In summary, the integration difficulties inherent in the combination of two complex networks will likely be vastly more troublesome than those encountered by T-Mobile when integrating MetroPCS.¹³ It will not be a seamless process and few, if any, of the merger's purported benefits will accrue in the first two years of the integration.

New T-Mobile's In-Home Broadband Deployment Will Be Very Limited

21. T-Mobile states that “the Home Internet Service will be offered to {{BEGIN HCI
END HCI}} “eligible households,” including {{BEGIN HCI
END HCI}} rural eligible households.¹⁴ T-Mobile claims that “eligible households, in traditional fixed wireline parlance, are the equivalent of ‘homes passed.’”¹⁵ But they are not, because T-Mobile appears to define “eligible households” as the number of households that T-Mobile has the capability to serve, whether they exist or not. The key to understanding this is provided in the Declaration of Mr. McDiarmid, who explains that eligible households refer to “how many HHs [New T-Mobile's] capacity could support.”¹⁶ Mr. McDiarmid then explains how the “eligible households” are narrowed down into the “supported households”:

Having determined that there is in-home broadband coverage and capacity available in a particular area, we then determine the number of in-home Broadband Supported Households. In a simplistic way, this can be thought of as determining, for each specific In-Home Broadband Eligible Area, whether the limiting factor is the number of HHs in

¹³ Reply of DISH Network, WT Docket No. 18-197, at 102-03 (Oct. 31, 2018).

¹⁴ Letter from Nancy Victory, Counsel for T-Mobile, to Marlene Dortch, FCC, WT Docket No. 18-197, at 3 (March 6, 2019) (“T-Mobile March 6 Letter”).

¹⁵ *Id.* at 11.

¹⁶ Declaration of Mark McDiarmid ¶ 4 (Appendix B to T-Mobile March 6 Letter) (“March 6 McDiarmid Declaration”).

the area or the in-home broadband network capacity available in the area. By example, if there is capacity to support ten HHS in a specific local geography, but there are only four HHS in that local geography, the in-home Broadband Supported HHs for that area would be only four. Similarly, if there is capacity to support ten HHs in a specific local geography with one hundred HHs, the In-Home Supported HHs for that area would only be ten.¹⁷

22. But this means that the “eligible households” number includes households that literally do not exist in what Mr. McDiarmid refers to as “the local geography.” The Applicants thus incorrectly describe eligible households as “equivalent” to homes passed. Homes passed means the number of *existing* homes a system has the technical ability to serve promptly using its current facilities if a potential customer orders service.¹⁸

23. The true equivalent of homes passed in this context is what the Applicants refer to as “supported” households. There are {{BEGIN HCI END HCI}} supported households nationwide, and only {{BEGIN HCI END HCI}} in rural areas. This means that the new service would only pass a mere {{BEGIN HCI END HCI}} of the nation’s rural households.¹⁹ Thus, T-Mobile’s claim that the in-home broadband service will cover “90 percent of the country by 2024” is a significant overstatement—{{BEGIN HCI END HCI}} households is not 90% of the country.

24. We analyzed the market share figures provided by the Applicants and found that the penetration rates in their submission to be exaggerated and speculative. They state that they will have {{BEGIN HCI END HCI}} in-home broadband subscribers by 2024.²⁰

¹⁷ *Id.* ¶ 5.

¹⁸ *See, e.g.*, Petition for Reconsideration of Barden Cablevision of Certification of Detroit Cable Communications Commission to Regulate Basic Cable Rates, *Memorandum Opinion and Order*, 9 FCC Rcd. 4805, 4806 n.17 (1994).

¹⁹ T-Mobile March 6 Letter at 13.

²⁰ T-Mobile March 6 Letter at 14, Figure 6.

They do not provide a sufficient evidentiary basis to reach this conclusion. Moreover, this is an adoption rate of {{BEGIN HCI END HCI}} of the supported households. By comparison, Comcast has a penetration rate of about 44% of homes passed.²¹ WOW! (Wide Open West), a cable over builder, achieved a penetration rate of 23% of homes passed in 2017.²²

Millimeter Wave Spectrum Is Suitable Spectrum for In-Home Broadband

25. The millimeter wave bands offer massive license blocks of spectrum (and therefore capacity and speed for customers). T-Mobile is currently using over {{BEGIN HCI END HCI}}²³ In addition, both standalone companies could acquire this spectrum at auction or through secondary markets. If these vast quantities of spectrum were dedicated to in-home broadband, both companies, standing alone, could deploy a network with sufficient capacity to support a fixed broadband service. The Applicant's in-home broadband plan is thus not a merger-specific benefit.

²¹ This rate is approximate, as we have calculated it based on Comcast's residential home broadband subscribers as the numerator, and the number of homes and businesses passed by Comcast cable systems as the denominator. See Comcast 10-K at 2-3 (Feb. 1, 2019), <https://www.cmcsa.com/static-files/54b28afa-2286-46bc-bca0-e35c9a4be739>. Comcast also reports "market penetration" of 47%, and Verizon reports "market penetration" of 40%. See Transcript, Comcast Corp. at Deutsche Bank Media and Telecom Conference, Fair Disclosure Wire (Mar. 12, 2019) ("If you look at our own [broadband] penetration around approximately 47%...."). See also Transcript, Verizon Communications Inc. at Morgan Stanley Technology, Media, and Telecom Conference 2018, Fair Disclosure Wire (Feb. 27, 2018) ("We're above 40% penetration on broadband where we have Fios deployed.").

²² *Wide Open West, Inc.*, Credit Suisse Equity Research, at 17 (June 19, 2017), <https://plus.credit-suisse.com/rpc4/ravDocView?docid=XDHx2AL-YxKG>.

²³ Feb. 21 McDiarmid Declaration ¶¶ 8-11.

Self-Installation of Indoor Wireless CPE for In-Home Broadband Lacks Certainty

26. The Applicants plan to use indoor customer premises equipment (“CPE”) without a supplemental outdoor antenna. The Applicants plan assumes successful self-installation of the indoor wireless routers. But this self-installation, combined with the lack of experience in assisting consumers with installation as well as the lack of a field staff to trouble-shoot, may be risky and comes with no articulated plans to address customer support issues. As the Applicants know well, Sprint’s affiliate Clearwire attempted to provision in-home wireless broadband service, which included self-installation and an indoor wireless CPE, and the service did not succeed. The Applicants do not address the lessons from that experience which would include the challenges with relying solely on indoor CPE using self-installation, and how their new plan is technically and operationally different.

27. On a related subject, the Applicants have dealt with building penetration loss by simply assuming it away. The Applicants expressly admit that their link budget does not allow for signal attenuation to penetrate buildings. Mr. McDiarmid explains that the analysis “does not factor in-building penetration losses,” because T-Mobile has “assume[d] that CPE will be placed in areas maximizing signal-strength, e.g. near windows.”²⁴ The signal attenuation that goes hand-in-hand with indoor reception is hardly an insuperable obstacle in either mid-band or higher frequencies. But it should be budgeted for, as it affects the number of households that can receive reliable service.

²⁴ March 6 McDiarmid Declaration ¶ 3.

* * * *

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 March 28, 2019

A handwritten signature in black ink, appearing to read 'Peter', written over a horizontal line.

Peter Tenerelli

A handwritten signature in black ink, appearing to read 'Vijay Venkateswaran', written over a horizontal line.

Vijay Venkateswaran