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November 2, 2018

VIA ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

REDACTED – FOR PUBLIC INSPECTION

Re: Notification of Oral *Ex Parte* Presentation
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:

Pursuant to Section 1.1206(b) of the Commission's Rules, 47 C.F.R. § 1.1206(b), notice is hereby provided of an oral *ex parte* presentation in the above-referenced docket. On October 31, 2018, representatives of T-Mobile US, Inc. ("T-Mobile") and Sprint Corporation ("Sprint" and, collectively, "Applicants")[1] met with members of the FCC Transaction Team (a list of FCC participants is provided in Attachment A) to discuss the Declaration of Mark Israel, Michael Katz and Bryan Keating submitted with the Applicants' Joint Opposition.[2] During the meeting, Michael Katz, emeritus professor at the University of California, Berkeley, and Bryan Keating of Compass Lexecon presented the document submitted herewith as Attachment B.

[1] Those representatives included David Miller and Kathleen Ham of T-Mobile; Vonya McCann of Sprint; Reinhard Wieck of Deutsche Telekom AG; Michael Senkowski and Nancy Victory of DLA Piper LLP; Daniel Culley of Cleary Gottlieb Steen & Hamilton LLP; Richard Metzger and Regina Keeney of Lawler, Metzger, Keeney & Logan LLC; Bradley Lui of Morrison & Foerster LLP; John Flynn of Jenner & Block LLP; Joseph Rancour and Julia York of Skadden, Arps, Slate, Meagher & Flom LLP; Michael Katz of the Univ. of Calif. at Berkeley; Bryan Keating, Mark Israel (by phone) and Ka Hei Tse of Compass Lexecon.

[2] Declaration of Mark Israel, Michael Katz and Bryan Keating, App. F to Joint Opposition of T-Mobile and Sprint, WT Docket No. 18-197 (Sept. 17, 2018).

Drs. Katz and Keating explained that their model determines the critical level of cost-reducing and quality-enhancing efficiencies required for the merger to be procompetitive under a set of conservative assumptions and methodologies, accounting for the change in the company's incentives from the merger as well as the potential reactions of competitors. They then explained that the cost reductions that the network engineering model demonstrates clear this threshold in nearly all cases, including under even more conservative sensitivities. Finally, they discussed methods of partially valuing the quality enhancements the merger will create and that these quality enhancements surpass the critical thresholds in all cases. Thus, their model demonstrates that the merger is pro-competitive even under the conservative approach they have taken.

Drs. Katz and Keating described the model's structure and the construction of and assumptions underlying each of the model's key modules. The discussion of the Market Equilibrium Module reviewed the nesting structure and model calibration (shares, margins and diversion ratios). Drs. Katz and Keating explained the sources of data that could be used for diversion ratios and the pros and cons of those various sources of data.

Drs. Katz and Keating next reviewed how, provided with traffic and network inputs, the Network Build Model generates projections of network investment and performance that the Economic Performance Module uses to quantify the network marginal cost savings and quality improvements that will result from the merger. They described how they considered two scenarios for New T-Mobile – one in which New T-Mobile maintains the same usage levels and LTE/5G migration paths as would the standalone companies and another in which New T-Mobile relaxes restrictions on usage so that average subscriber usage is equal to unconstrained demand and the migration to 5G handsets is accelerated. The model shows that, in both scenarios, the merger will substantially lower network marginal costs per subscriber. In other words, even without taking the service quality improvements into account, the model shows that the merger would be beneficial to consumers under either demand scenario.

Drs. Katz and Keating then described that the merger is likely to improve various dimensions of the quality of the 5G service that New T-Mobile will deliver to customers. They reviewed how they: 1) computed the traffic-weighted average user throughput for each sector (averaging LTE and 5G network performance) for each of the standalone networks and New T-Mobile; 2) then used estimates based on the peer-reviewed economic literature (*Nevo et al.*[3]) to calibrate a conservative estimate of the value to consumers of this weighted average throughput at each

[3] Aviv Nevo, John L. Turner, and Jonathan W. Williams, "Usage-Based Pricing and Demand for Residential Broadband," *Econometrica*, 84(2): 411-443 (2016).

sector; and 3) finally weighted the resulting sector-level valuations up to the network level by using the sector traffic levels as weights. Two approaches were used to derive quality valuations: applying the parameters from *Nevo et al.* with no adjustments and adjusting and rescaling the parameters to better take into account the throughput and usage levels observed in the Applicants' data. In both the maintain and relax cases, the merger's critical efficiencies will be greater than the critical thresholds, demonstrating that the merger will not result in competitive harms.

This filing contains information that is "Highly Confidential" pursuant to the Protective Order filed in WT Docket No. 18-197.[4] Accordingly, pursuant to the procedures set forth in the Protective Order, a copy of the filing is being provided to the Secretary's Office. In addition, two copies of the Highly Confidential Filing are being delivered to Kathy Harris, Wireless Telecommunications Bureau. A copy of the Redacted Highly Confidential Filing is being filed electronically through the Commission's Electronic Comment Filing System.

Please direct any questions regarding the foregoing to the undersigned.

Respectfully submitted,

DLA Piper LLP (US)

/s/ Nancy Victory

Nancy Victory
Partner

cc: David Lawrence
Kathy Harris
Linda Ray
Kate Matraves
Jim Bird
David Krech
FCC participants listed in Attachment A

[4] Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Assign Licenses, Protective Order, WT Docket No. 18-197 (June 15, 2018).

ATTACHMENT A

David Lawrence
Charles Mathias
Donald Stockdale
Morasha Younger
David Sibley (via phone)
Catherine Matraves (via phone)
Dana Shaffer
Joel Rabinovitz
Thuy Tran (via phone)
Eugene Kiselev
Sean Sullivan
Nicholas Copeland
Joseph Wyer
Murtaza Nasafi
Weiren Wnag
Aleks Yankelevich
Patrick Sun
Matthew Collins
Katherine LoPiccalo
Paul LaFontaine
Pramesh Jobanputra
Monica Delong
John Henly

ATTACHMENT B

An Economic Analysis of the T-Mobile/Sprint Merger

Mark Israel, Michael Katz, and Bryan Keating

October 31, 2018

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Table of Contents

Overview

Our analysis focuses on 5G

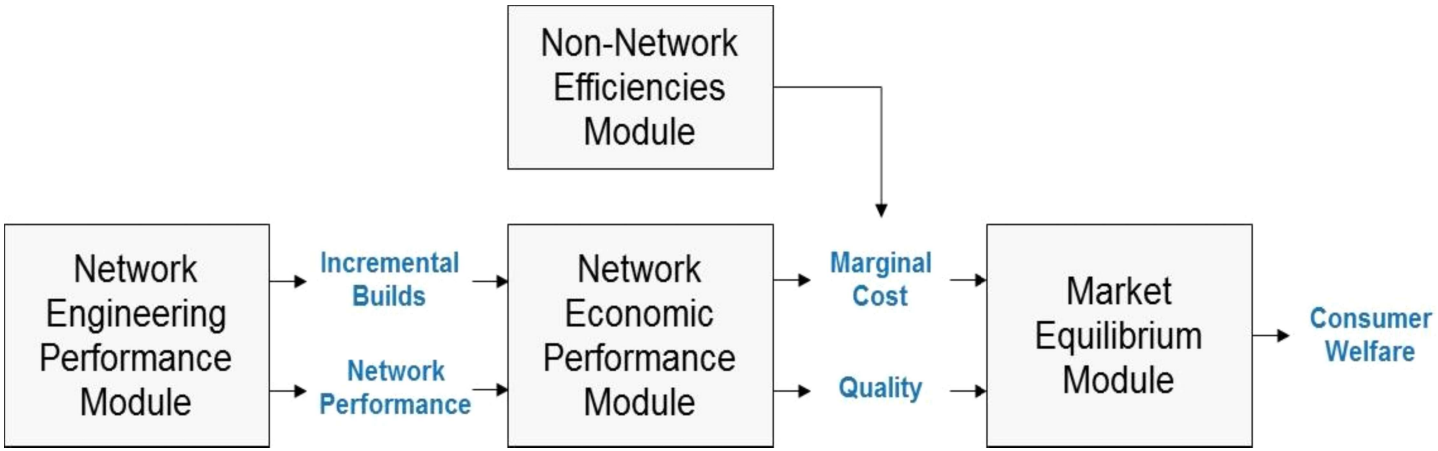
- Because it relies on the network engineering model that determines capacity builds, our analysis begins once the integration of the two networks is complete in 2021.
- The overwhelming majority of new customers in 2021 and beyond are likely to be customers with 5G-capable devices.
- Therefore, 5G services will be the focus of pricing decisions by 2021 (Draper Reply, ¶ 12; Ewens Reply, ¶ 37).
  - We model marginal costs associated with incremental traffic generated by customers with 5G-capable devices as the relevant costs for the Parties' pricing decisions.
- We account for leakage from 5G-capable devices to the LTE networks, and we account for both 5G and LTE throughput when quantifying consumer valuation of improved network quality.

The merger will strengthen mobile broadband competition

- The companies' plans and network engineering model show that New T-Mobile will build a network that will achieve lower marginal costs of providing services and offer higher quality services than would those of either merging party operating on its own.
- Our simulation analysis, as well as one submitted by Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas ("HBVZ"), both indicate that the merger increases consumer welfare among mobile broadband customers.
  - The merger will create downward pressure on New T-Mobile's quality-adjusted prices, thus benefiting consumers.
  - New T-Mobile's lower quality-adjusted prices will also create competitive pressures on rival service providers to respond by reducing their prices and improving their services, further benefiting consumers.

Modeling Structure

Model Schematic



Market Equilibrium Module

Market Equilibrium Model

- Standard antitrust model designed to assess the net effects of loss of competitor, merger efficiencies, and rivals' responses:
  - allows for change in the ownership structure such that T-Mobile will jointly own both Sprint and T-Mobile;
  - allows for changes in the marginal costs of serving additional customers facing the combined firm relative to those facing the standalone firms; and
  - allows for changes in the quality of service that the combined firm will offer relative to what the standalone firms would offer.
- "Static" Bertrand (price) competition with a nested logit demand system.
- Integrates vGUPPI into the simulation.
- Calibrated to fit observed industry outcome (e.g., prices, shares, margins, substitution patterns, and industry elasticity).

Nesting Structure

Nest	Rationale
Postpaid brands controlled by T-Mobile and Sprint	Group Sprint and T-Mobile postpaid brands into their own nest to allow for the possibility that these brands are closer substitutes for one another than for other brands.
Postpaid brands controlled by all other operators	Group other postpaid brands into their own nest to allow for the possibility that these brands are closer substitutes for one another than for other brands
Prepaid brands controlled by mobile network operators (MNOs, including AT&T, Verizon, Sprint, and T-Mobile)	Group branded prepaid brands in their own nest to allow for the possibility that prepaid brands are closer substitutes for one another than for postpaid brands.
Prepaid brands controlled by MVNOs	Group MVNO brands in their own nest to allow for the possibility that they constitute a strategic group of low-end brands.
An outside good	Outside good has its own nest to reflect potential differences from mobile broadband options.

Model Calibration

Parameter	Description	Calibration
Product-specific quality parameters	Capture non-price attributes of each product, such as network quality (i.e., how attractive each product is to each customer, holding price fixed).	Product-specific quality parameters chosen so that predicted shares match **observed shares** (given values for the other parameters).
Price-sensitivity parameter	Specifies how strongly consumers react to price changes and helps to determine firms' equilibrium profit margins.	Price-sensitivity parameter chosen so that predicted average profit-maximizing Sprint and T-Mobile margins matches the **observed average margins**.
Nesting parameters	Measure the degree of substitutability between products within the same nest and helps determine diversion ratios between carriers.	Model chooses a nesting parameter common to the two postpaid nests, and a separate nesting parameter common to the two prepaid nests, such that the predicted average diversion ratio between Sprint postpaid and T-Mobile postpaid products and the predicted average diversion ratio between Sprint prepaid and T-Mobile prepaid products match the corresponding **average observed switching rates**.

Model Calibration: Shares

IKK Table 25

Model Calibration: Margins

We derive revenue and non-network costs from the Parties' ordinary course customer lifetime value (CLV) models, supplemented by projections from Build 8.0/9.0. We derive network costs from the network engineering model.

IKK Table 26

Model Calibration: Diversion Ratios

IKK Table 28

LNP porting data do not provide a good measure of diversion between Sprint and T-Mobile

- A substantial majority of total gross adds and deactivations are not accounted for in the porting data.
- LNP data overstate Sprint and T-Mobile switches relative to total gross adds and deactivations.
- LNP data likely understates MVNO switching because MVNOs typically do not offer incentives to port numbers when switching.
- LNP do not separately report several prepaid brands (e.g., Boost, Virgin, Cricket).

Critical Efficiency Thresholds

Critical Efficiencies in $/Sub/Month for 2021-2024

Critical efficiencies represent the combination of marginal cost savings and monetary value of quality improvements ($/sub/month) sufficient to make the merger welfare-enhancing.

IKK Table 2

Trade-Off between Sprint and T-Mobile Efficiencies (2021)

Based on a merger simulation model assuming diversion ratios based on the Harris Mobile Insight Survey, industry elasticity of -0.3, 75% wholesale passthrough rate, and vGUPPI calculated without allowing for input substitution.

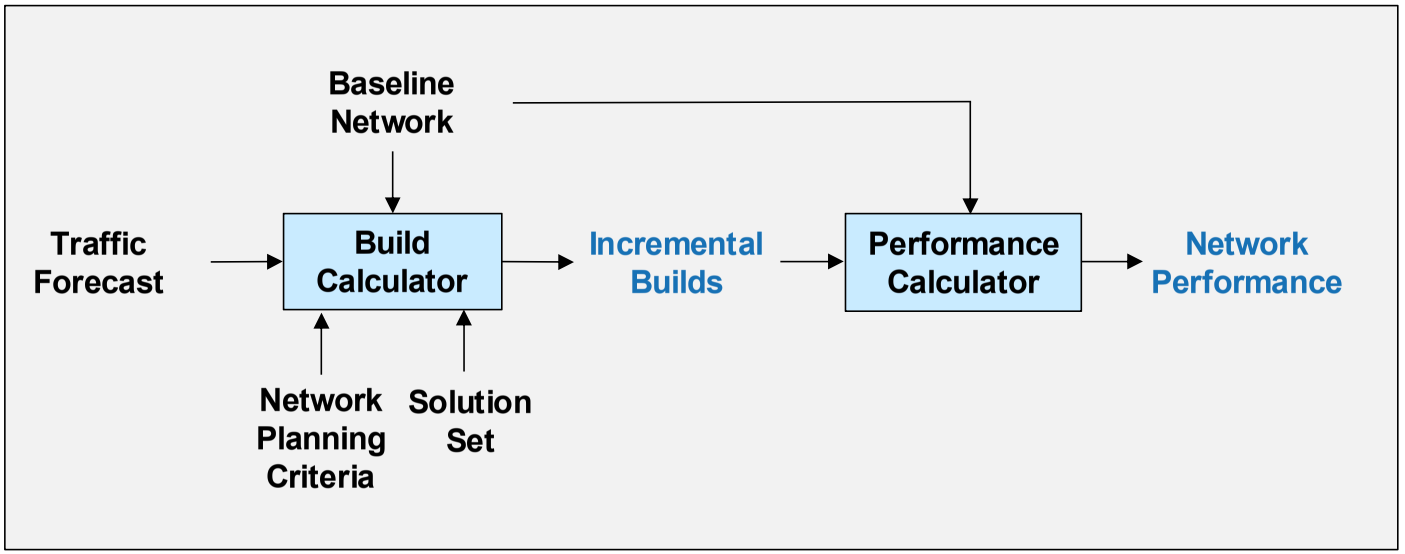
Source: See Appendix I for the description of data sources.

IKK Figure 2

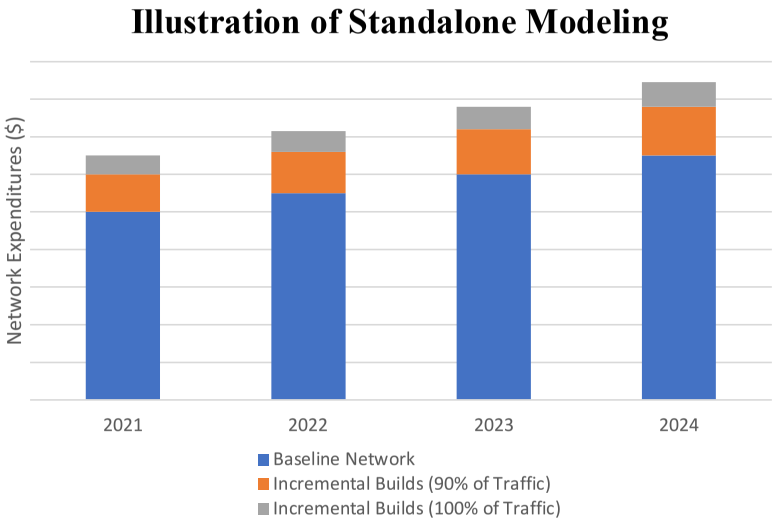
HBVZ Critical Efficiencies ($/Sub/Month)

Marginal Cost Efficiencies

Schematic of Network Build Model

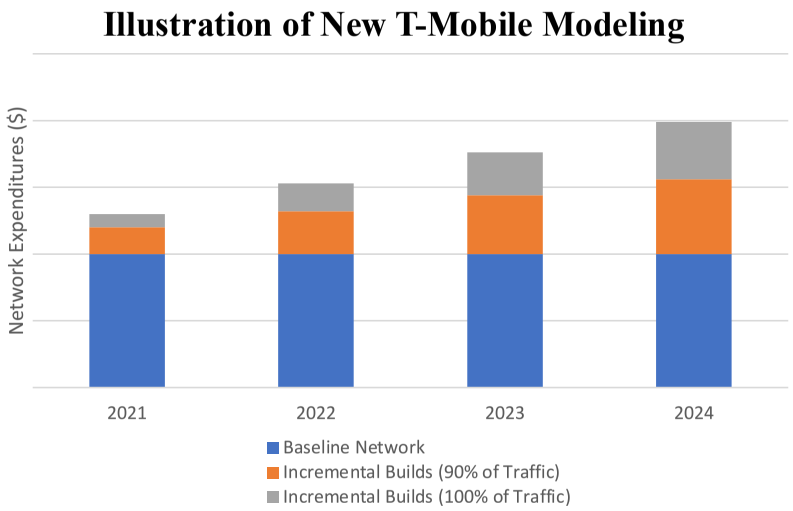


Baseline Networks: Use Plans of Record for Standalone Networks



- Use each standalone company's plan of record for any given year.
- Do *not* attribute any costs associated with builds in the plan to marginal costs.
- Approach underestimates standalone marginal costs to the extent baseline plans include capacity builds.

Baseline Networks: Use only 2021 Baseline for New T-Mobile



- Take 2021 network as given (Ray Reply Declaration, ¶ 15) and use as the baseline for all years.
- Use the network model to calculate all builds beyond the 2021 baseline endogenously.
- Attribute *all* costs associated with incremental builds to marginal costs.
- Approach overestimates New T-Mobile marginal costs to extent some incremental sites would be built anyway for reasons other than capacity/congestion.

Baseline Networks: Our Approach is Conservative

- Approach underestimates standalone companies' marginal costs to the extent baseline plans includes capacity builds.
- Approach overestimates New T-Mobile's marginal costs to extent some incremental sites would be built anyway to enhance coverage.
- In each case, the direction of potential error underestimates the extent of marginal cost savings due to the merger.

Usage/sub: Sprint and T-Mobile Data Usage Forecasts

- Usage/sub is an input for the model, not an output.
- We used Sprint projections as inputs to model of standalone Sprint.
- For standalone T-Mobile and New T-Mobile, we used usage levels at which each company projects it will operate.

IKK Figure 9

Usage/sub: We evaluate standalone T-Mobile's network at usage levels reflecting financial constraints and business strategy

- The standalone network would be unable to meet unconstrained demand at any reasonable cost.

- Standalone T-Mobile would implement various plan features to limit usage.

(Ewens Reply Declaration, § II.H.)

Usage/sub: We consider two scenarios for New T-Mobile

- **Maintain:** New T-Mobile maintains the same usage levels and LTE/5G migration paths as would the standalone companies.
- **Relax:** New T-Mobile:
  - relaxes restrictions on usage so that average usage per subscriber is equal to "unconstrained" demand, and
  - accelerates handset migration to 5G.

Network Planning Criteria

- **LTE:** Seeks to maintain an average sector-level busy hour user throughput greater than [redacted]Mbps, with key geographies in all markets dimensioned at [redacted] Mbps. (Ray Reply, ¶ 10.)
- **5G:** Seeks to maintain an average sector-level busy hour user throughput greater than [redacted]Mbps. (Ray Reply, ¶ 27.)

Congestion criteria is benchmarked to video experience on mobile broadband (720p/1080p for LTE and 4K for 5G). (Ray Reply, ¶¶ 10, 25.)

Build Calculator Inputs

Component	Standalone Networks	New T-Mobile Network
Baseline networks	Use plans of record in all years.	Use 2021 plan of record network.
Subscribers	Use projected subscriber counts based on Build 8.0/9.0.	Use sum of stand-alone subscribers.
Usage per Subscriber	Sprint: Based on ordinary course forecasts.	"Maintain": Assumes Sprint and T-Mobile subs use same amount of data as in stand-alone network and that the LTE/5G mix is the same. "Relax": Assumes subscribers consume amount predicted by T-Mobile Traffic Forecast Model and 5G migration is accelerated.
	T-Mobile: Based on Traffic Forecast Model subject to financial constraints.	
Network Planning Criteria	Use input from Sprint and T-Mobile engineering teams based on how each operates its network.	Use input from the T-Mobile engineering team.
Solution Sets	Use input from Sprint and T-Mobile engineering teams based on how each operates its network.	Use input from the T-Mobile engineering team.

Performance Calculator

- For each solution type, multiplies the incremental number of solutions times the unit cost per solution to obtain incremental expenditures on that solution type.
- Then sums over all solution types to determine incremental costs.
- Calculates sector-level throughput.

Total Incremental Costs

IKK Figures 11 & 12

Network Marginal Costs ($/GB)

IKK Figures 22 & 23

The Merger will Substantially Lower Network Marginal Costs per Subscriber: Maintain Case

IKK Figures 13 & 14

The Merger will Substantially Lower Network Marginal Costs per Subscriber: Relax Case

IKK Figures 15 & 16

Non-Network Marginal Costs Savings ($/subscriber/month)

IKK Table 9

Summary of Overall Marginal Cost Efficiencies: Maintain Case

IKK Table 12

Summary of Overall Marginal Cost Efficiencies: Relax Case

- Relaxing usage constraints lowers marginal cost savings but consumers benefit from the increased usage.
- New T-Mobile will have economic incentives to implement the relaxed case if and only if the increase in consumer value outweighs the change in marginal costs.
- If the proposed merger is procompetitive under the Maintain scenario—as we show that it is—then it must also be procompetitive under the Relax scenario if that is the one chosen by New T-Mobile

IKK Table 14

For almost all cases, marginal cost savings alone are enough.

IKK Tables 16 & 17

Critical Quality Efficiencies Based on HBVZ's Models

HBVZ's simulation model indicates that the merger's projected marginal cost efficiencies are sufficient to increase consumer welfare even if (counterfactually) there were no quality improvements.

IKK Tables 13 & 15

Quality Efficiencies

The merger is likely to improve various dimensions of network quality.

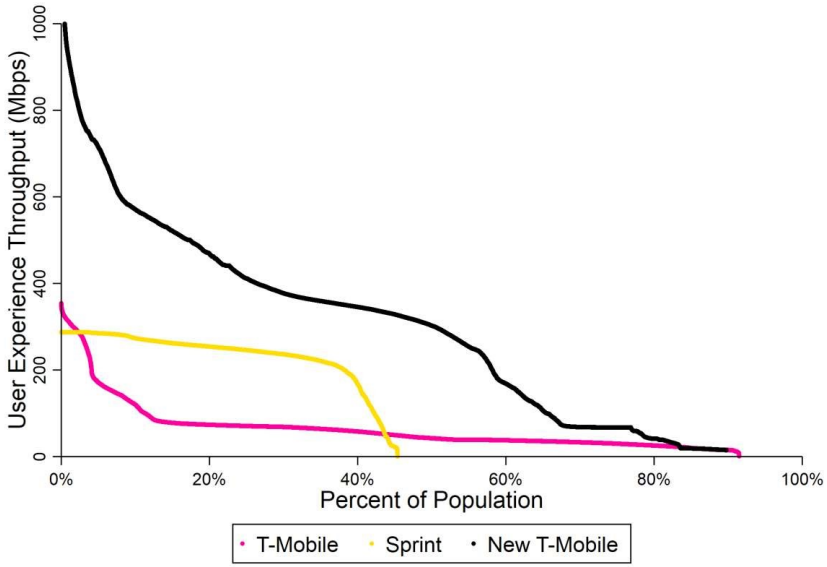
- Speed/Throughput
- Coverage/Consistency
- Latency
- Device power performance
- Reliability
- Security

The Merger will Substantially Increase 5G Users' Average Speeds (Relax Case)

IKK Figures 5 & 6

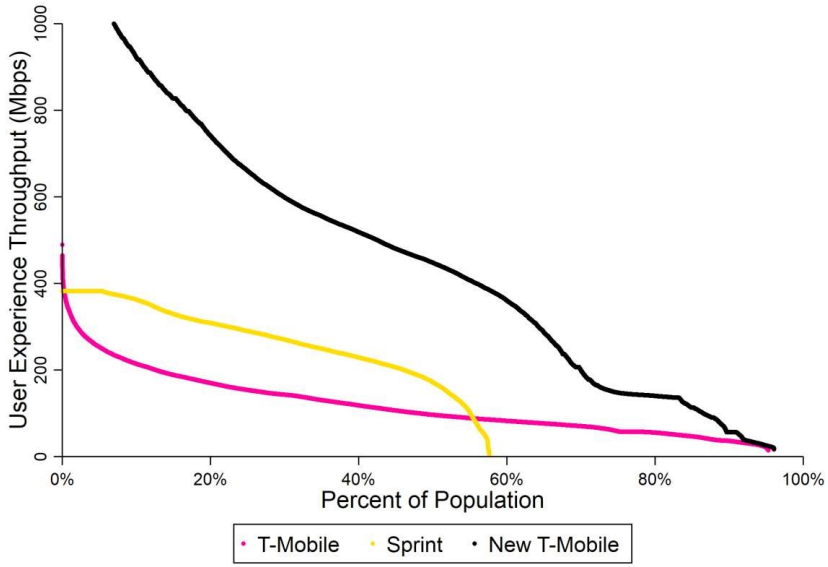
The Merger will Substantially Improve the Distribution of 5G Users' Speeds (Relax Case)

5G User Experience Throughput by Covered POPs (2021)



Source: Calculations based on Network Build Model results.

5G User Experience Throughput by Covered POPs (2024)



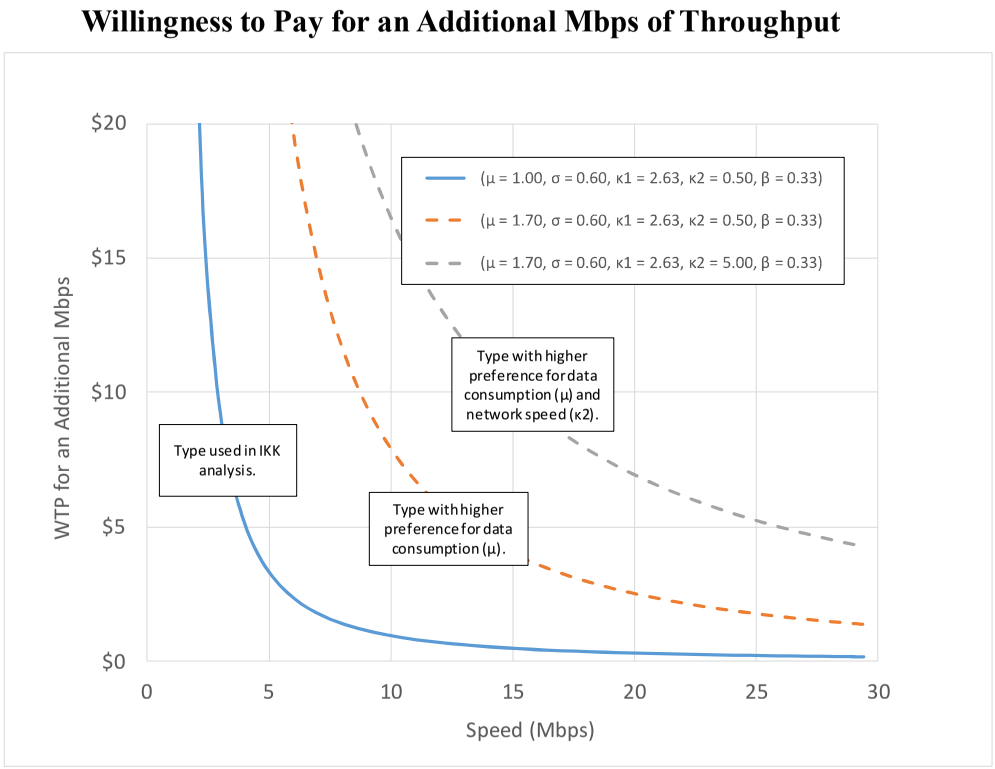
Source: Calculations based on Network Build Model results.

IKK Figures 7 & 8

Method for Computing Consumer Valuation of Increased Throughput

1. Compute the weighted average user throughput for each sector—weighting the 5G and LTE throughputs by the traffic on each sector—for each of the standalone networks and new T-Mobile.
2. Use the *Nevo, et al.* (2016) results to determine the consumer valuation of this weighted average throughput at each sector.
3. Weight the resulting sector-level valuations up to the network level by using the sector traffic levels as weights.

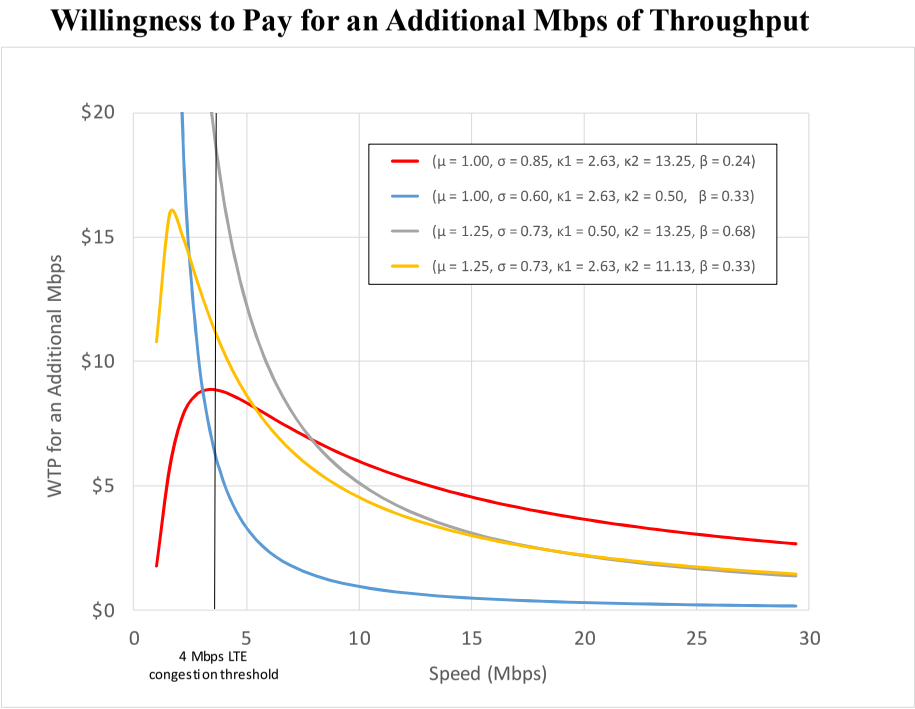
Valuation Changes with Quality Level and Over Time



Estimates derived from the Nevo *et al.* model.

- For given demand for quality, marginal valuation on throughput declines as throughput increases.
- As ecosystem evolves, demand for throughput shifts outward.

We use a conservative estimate of the consumer valuation for quality



- We used the most common customer type (blue line) to estimate valuation on quality.
- Other types reported in *Nevo, et al.* place greater value on speed at relevant levels of throughput.

Two Approaches to Using *Nevo, et al.* to Derive Quality Valuations

Unadjusted

- Apply the quality-valuation parameters from *Nevo, et al.* with no adjustments for likely differences between mobile broadband consumers in 2021-2024 and the consumers in *Nevo, et al.*'s sample

Adjusted

- Adjust for the fact that the throughput and usage levels in our data are different from those in *Nevo, et al.*
- Rescale the throughputs observed in our data so that the weighted average throughput experienced by standalone T-Mobile and Sprint customers in our data match the mean throughput in *Nevo, et al.*
- Change the parameter that determines data usage per subscriber per month so that the data usage implied by the model matches the usage in our simulation analysis (the constrained usage for both the standalone firms and New T-Mobile in this scenario).

Consumer Valuation of Merger's Throughput Improvements: Maintain Case, *Nevo, et al.* Estimates

IKK Tables 20 & 21

The Merger's Quality Efficiencies will be Greater than the Critical Thresholds: Maintain Case (2021)

Based on most conservative case.

IKK Figures 18 and 19

Consumer Valuation of Merger's Throughput Improvements: Relax Case, *Nevo et al.* Estimates

IKK Figures 22 and 23

The Merger's Quality Efficiencies will be Greater than the Critical Thresholds: Relax Case (2021)

Based on most conservative case.

Conclusion

Conclusion

A conservative approach demonstrates that the merger of Sprint and T-Mobile will strengthen competition and benefit consumers once the integration period is complete.