BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Joint Application of Sprint Communications Company L.P. (U-5122) and T-Mobile USA, Inc., a Delaware Corporation, for Approval of a Transfer of Control of Sprint Communications Company L.P. Pursuant to California Public Utilities Code Section 854(a).	Application 18-07-011 (Filed July 13, 2018)
And Related Matter.	Application 18-07-012 (Filed July 13, 2018)

ATTACHMENT B: SUPPLEMENTAL
DECLARATION OF MR. CAMERON REED
OF THE PUBLIC ADVOCATES OFFICE

[PUBLIC VERSION]

April 26, 2019

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I. INTRODUCTION

1. The February 26, 2019 Administrative Law Judge's Ruling Denying in Part and Granting in Part the Motion of the Public Advocates Office to Amend and Supplement Testimony and for Additional Hearings; and Revising the Schedule of this Proceeding (ALJ Ruling) directed the Public Advocates Office to respond to new evidence and arguments raised in the Rebuttal Testimony of Sprint Spectrum L.P (Sprint), Virgin Mobile USA, L.P. (Virgin), and T-Mobile USA, Inc., A Delaware Corporation (T-Mobile) (Collectively "Applicants"). This Declaration provides my supplemental response.

2. The Applicants' Rebuttal Testimony contained numerous pieces of new information and new arguments. Based on my review of this new information, I find that several of the Applicants' claims are inaccurate, misleading, and do not hold up to scrutiny. Specifically, the Applicant's new information regarding New T-Mobile's in-home broadband service and the future fifth-generation wireless service (5G) network does not provide specific data or commitments to demonstrate measurable and verifiable merger benefits. As such, the proposed merger is not in the public interest and the Commission should deny the merger.

II. EXECUTIVE SUMMARY

3. The Applicants have attributed several merger benefits to the proposed in-home broadband service. In actuality, the proposed in-home broadband service cannot be construed as a merger benefit and the Commission should disregard Applicants' claims to the contrary. This is because the claimed cost saving benefits of New T-Mobile's in-home broadband service are based on "illustrative" numbers and speculation. Further, the Applicants have not defined projected service areas where they expect to offer the in-home broadband service. Furthermore, the Applicants have inflated the number of homes they would serve with in-home broadband by including homes that do

not exist. Sprint and T-Mobile also plan to offer in-home broadband services and devices independent of the merger. The Applicant's in-home broadband plan is neither specific, measurable, and verifiable nor is it merger specific and therefore it does not constitute a merger benefit.

4. As it relates to 5G deployment, the Applicant's latest 5G data demand projections are inaccurate, considerably higher than other industry sources, and different from data the Applicants previously provided. Additionally, the Applicants' 5G model was prepared for purposes of this litigation and is not used in the ordinary course of T-Mobile's business. As such, the Applicant's projections of average 5G network speed and capacity presented for year 2024 are unreliable and the Commission should give them no weight.

5. Furthermore, the merger would not only result in New T-Mobile decommissioning approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of Sprint's California cell sites, but it will also eliminate Sprint's plans to construct **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new macro cell sites and **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new small cell sites in California. This would result in a net loss of at least **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new California small cell and cell tower sites post-merger. New T-Mobile's elimination of Sprint's current and future cell sites means that the merger will only marginally increase capacity in dense urban areas and significantly reduce cell site infrastructure and redundancy in all of California while offering no concrete benefits to rural areas.

6. Mr. Ray's includes maps in his Rebuttal Testimony which he claims show disparities in the low-band and mid-band 5G coverage for Sprint, T-Mobile, and New T-Mobile by years 2021 and 2024. However, these maps are misleading. I compared these maps to the underlying geographic cell tower data and investment plans of stand-alone Sprint, stand-alone T-Mobile, and New T-

Mobile. The underlying data shows that the cell site locations for stand-alone T-Mobile and New T-Mobile are similar, which means both would have similar 5G coverage if stand-alone T-Mobile invested in deploying 5G radios to rural areas. Since T-Mobile currently does not have a spectrum license limitation on deploying mid-band 5G in rural California counties, stand-alone T-Mobile is simply making the business decision not to deploy mid-band 5G in rural areas. The merger does not change the economic barriers for New T-Mobile to invest in rural areas. This means that the Applicants have given no specific and verifiable evidence that New T-Mobile will have improved rural coverage.

7. New T-Mobile has not demonstrated any plans to invest outside of stand-alone T-Mobile's existing coverage area or in areas where standalone T-Mobile could not also invest today. This indicates that the merger is not necessary or even likely to improve rural coverage.

8. Most of New T-Mobile's "new" sites are in fact a subset of existing Sprint sites that will be retained post-merger. Only **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new California cell sites are a result of new construction, and the Applicants have not demonstrated that the merger is a precondition for that new construction. This signifies that the majority of "new" cell sites in New T-Mobile's network already exist and do not represent increased investment in California.

9. For the reasons outlined in this Declaration, and the reasons outlined in the Public Advocates Office previous Testimony, the Commission should deny the merger.

III. ANALYSIS

10. T-Mobile raises several new arguments and pieces of evidence in its Rebuttal Testimony. This Declaration analyzes those claims in detail along with

information that is publicly available as well as information that the Applicants submitted in Rebuttal Testimony and in response to data requests.

A. New T-Mobile's In-Home Broadband Service Does Not Have a Defined Service Territory, the Customer Cost Savings are Speculative, and It is Not a Merger-Specific Benefit.

11. In his Rebuttal Testimony, Mr. Sievert discussed New T-Mobile's plans for in-home broadband service.[1] Specifically, Mr. Sievert discussed potential customer cost savings as a result of New T-Mobile's in-home broadband,[2] a potential data usage threshold,[3] and the potential number of households covered by the service.[4] As described in further detail below, many of these claims are speculative and underdeveloped. Mr. Sievert's Rebuttal Testimony lacks details on where the in-home broadband service will be available and what price customers will pay for the service. Therefore, the in-home broadband service is not a specific, measurable, and verifiable merger benefit and the Commission should give it no weight in its review.

1. The Applicants' Claimed Customer Cost Savings for In-Home Broadband Service are Based on Speculation.

12. While Mr. Sievert does not cite to it, he appears to rely on Appendix J: Declaration of Dr. Harold Furchtgott-Roth (Furchtgott-Roth Declaration) as a basis for the alleged customer cost savings of New T-Mobile's future in-home broadband service, as the numbers he uses appear to have no other source.[5] As discussed further below, the analysis on potential customer cost savings done in

[1] Rebuttal Testimony of G. Michael Sievert filed January 29, 2019 (Sievert Rebuttal) at pp. 28-34.

[2] Sievert Rebuttal at p. 30.

[3] Sievert Rebuttal at p. 31.

[4] Sievert Rebuttal at p. 31.

[5] Sievert Rebuttal at p. 30:3-19.

Furchtgott-Roth's Declaration is based on speculation and assumptions that do not withstand scrutiny.

13. Furchtgott-Roth's Declaration, which covers the main topics of potential customer savings associated with New T-Mobile's in-home broadband service, states plainly: "[t]he estimates of consumer savings in this paper are ***illustrative*** and only associated with a range of possible price changes. Of course, future prices are ***not knowable today***, but the new T-Mobile clearly plans to offer prices lower than would prevail absent the merger… I have ***not attempted to estimate the increase in quality*** of in-home broadband service, both by New T-Mobile and its competitors, as a result of the merger – and the ***associated improvement in consumer surplus***, but the quality increase and consumer surplus are likely substantial."[6] (emphasis added) Further, he states that, "[m]y analysis focuses on lower prices, not accelerated investment or improved quality of service associated with the proposed merger."[7] Dr. Furchgott-Roth goes on to admit that "the actual price reductions may ultimately be different."[8]

14. Dr. Furchgott-Roth offers "illustrative" customer cost savings that assumes an increase in quality and in consumer surplus would materialize but he offers no analysis to support that assumption. Simply put, the estimated consumer savings are entirely speculative. The Commission should not give weight to the Applicant's "illustrative" customer cost savings as specific, measurable, and verifiable public interest benefits of the merger.

[6] Appendix J to the Sievert Rebuttal, Furchtgott-Roth Declaration at p. 2.

[7] Furchtgott-Roth Declaration at p. 3.

[8] Furchtgott-Roth Declaration at p. 4.

2. The Applicants' Estimate of Households Eligible for In-Home Broadband Service Does Not Account for the Actual Number of Households that Exist Near Cell Towers.

15. To further underscore the speculative nature of the benefits of an in-home broadband service, the Applicants have not provided California specific maps or defined service territories for New T-Mobile's in-home broadband service; the Applicants only provided an estimate of potential eligible households where the service could be offered. However, the Applicants have explained to the Federal Communications Commission (FCC) that the estimate of potential households eligible for in-home broadband service does not account for the number of households that exist near New T-Mobile's cell towers. As discussed further below, this means the number of households that could get New T-Mobile's in-home broadband service would likely be lower than Mr. Sievert estimates.

16. This is a significant problem because the Applicant's estimates of the number of households eligible for New T-Mobile's in-home broadband service are not a measure of "houses passed"[9] but of a theoretical number of households New T-Mobile could serve with its available 5G network capacity. The Applicants claim that they will offer in-home broadband service to **<<Begin Confidential>>** [redacted] **<<End Confidential>>** households in California.[10] However, in conducting this "eligible household" analysis, the Applicants did not account for the number of households (HHs) that actually existed near their cell towers. The Applicants only recently factored in the

[9] Houses passed is a telecommunications industry figure representing the number of customer premises to which an operator has capability to connect in a service area. However, the premises may or may not be connected to the network already. In order to count as a household passed, the customer premise must exist.

[10] Sievert Rebuttal at p. 31:19-20.

number of existing households in a cell tower's service area to produce an estimate of "supported households."

17. T-Mobile's Mr. Mark McDiarmid elaborated on this in his declaration submitted to the FCC: "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."[11] Mr. McDiarmid quantified the effect this new analysis had on New T-Mobile's offering on a national level. By 2024, New T-Mobile estimates its network would have the capacity to serve **<<Begin Confidential>>** [redacted] **<<End Confidential>>** eligible households nationally. However, only **<<Begin Confidential>>** [redacted] **<<End Confidential>>** households exist in the cell tower coverage area where New T-Mobile would have excess capacity to provide in-home broadband service.[12]

18. This means that when accounting for the number of households that exist near New T-Mobile's cell sites, the Applicant's estimates of the number of eligible households vastly overstates how many households would be able to sign up for in-home broadband service. Based on the national estimates in Mr. McDiarmid's declaration, the number of California households able to receive New T-Mobile's in-home broadband service is likely lower than Mr. Sievert estimates in Rebuttal Testimony.[13]

[11] Declaration of Mark McDiarmid at p. 5 which can be found here: https://ecfsapi.fcc.gov/file/10308962711593/(Public)%20In-Home%20Ex%20Parte%20with%20CL%20-%20FINAL%20v2.pdf

[12] Declaration of Mark Mc.Diarmid at p. 7.

[13] Sievert Rebuttal at p. 31.

3. The Applicants Do Not Specify How Their In-Home Broadband Offerings Will be Competitive with Existing Broadband Providers.

19. New T-Mobile has not defined where in-home broadband will be offered in California nor has it specified the price of its potential in-home broadband plans. Defined service territories are needed to determine whether in-home broadband plans will be competitively priced or offer competitive speeds and data caps. The Applicants instead offer the "illustrative" price range of **<<Begin Confidential>>** [redacted] **<<End Confidential>>**[14] existing "traditional in-home broadband providers."[15] This nonspecific pricing does not allow the Commission to determine what pricing customers will receive nor quantify actual customer cost savings. Further, there's no indication of what areas of California would be eligible for this service nor any indication of which incumbent Internet Service Providers (ISPs) New T-Mobile would compete against.

20. New T-Mobile does not specify which ISPs (Telephone companies, cable companies, fixed wireless providers, etc.) are considered "traditional in-home broadband providers." Generally, present-day ISP pricing, speeds, and data caps varies by provider, technology type, and geographic area. To demonstrate the wide variety of traditional offerings, Table 1 below offers a sample of advertised ISP broadband plans for Los Angeles and Fresno counties as of March 2019. A more comprehensive table is included as Attachment 2 to this Declaration.

[14] Sievert Rebuttal at p. 30.

[15] Sievert Rebuttal at p. 30:3-4.

Table 1: Sample of ISP Pricing and Data Plans for Los Angeles and Fresno Counties[16]

ISP	City	County	Download Speeds (Mbps)	Price/ Month	Monthly Data Cap
AT&T Fiber	Altadena	Los Angeles	100	**$50**	1 TB
AT&T Fiber	Altadena	Los Angeles	300	**$70**	1 TB
AT&T Fiber	Altadena	Los Angeles	1,000	**$90**	Unlimited
AT&T DSL	Fresno	Fresno	5	**$40**	1 TB
AT&T DSL	Fresno	Fresno	100	**$50**	1 TB
AT&T DSL	Highway City	Fresno	5	**$40**	1 TB
AT&T DSL	Highway City	Fresno	25	**$50**	1 TB
AT&T DSL	Selma	Fresno	5	**$40**	1 TB
AT&T DSL	Selma	Fresno	10	**$50**	1 TB
Frontier FiOS	North Hills	Los Angeles	50	**$30**	Unlimited
Frontier FiOS	North Hills	Los Angeles	100	**$40**	Unlimited
Frontier FiOS	North Hills	Los Angeles	200	**$40**	Unlimited
Frontier DSL	Fowler	Fresno	6	**$20**	Unlimited
Frontier DSL	Fowler	Fresno	12	**$25**	Unlimited
Frontier DSL	Fowler	Fresno	18	**$30**	Unlimited
GiggleFiber	Arcadia	Los Angeles	150	**$40**	Unlimited
GiggleFiber	Arcadia	Los Angeles	500	**$60**	Unlimited
Xfinity	Fresno	Fresno	60	**$50**	1 TB
Xfinity	Fresno	Fresno	150	**$65**	1 TB
Xfinity	Fresno	Fresno	250	**$80**	1 TB
Xfinity	Fresno	Fresno	400	**$112**	1 TB

21. Table 1 shows that in-home broadband Internet plans vary significantly in price, speeds, and available data caps across California. The Applicants provide no information on which plan they intend to use as a baseline for their proposed

[16] Prices, speeds, and monthly data caps are taken from the advertised Internet-only plans available to customers on the ISP websites. The ISP websites and service offerings in the selected geographic locations were found on the Commission's California Broadband Map here: http://www.broadbandmap.ca.gov/

pricing plans. Table 1 also shows that customers in urban areas typically have access to faster speeds than customers in rural areas for similarly priced plans.

22. For example, an AT&T customer could get 10 Megabits per second (Mbps) service for $50 if they live in Selma, CA and 100 Mbps service for $50 if they live in Altadena, CA. Some ISPs also offer bundled services for Internet, video, and voice services which provide discounts on services within the bundle. New T-Mobile does not provide accurate maps detailing its in-home broadband roll out plan in California. Without such maps it is difficult to determine where New T-Mobile would be able to undercut other ISPs by the "illustrative" amount and to quantify any potential price reduction as customer savings.

4. 5G In-Home Wireless Broadband Service Faces Challenges That Make It an Imperfect Substitute for Wireline Broadband Service.

23. In addition, wireless Internet service, such as what the Applicants propose to offer, has challenges with maintaining line-of-sight, degraded service during inclement weather, and penetrating buildings. These challenges can cause customers to experience slower Internet speeds or even prevent households from getting fixed wireless service at all.[17]

24. Fixed wireless service typically has line-of-sight issues that could prove troublesome for 5G in-home broadband. This is especially applicable with 5G service considering that Millimeter Wave Spectrum (mmWave), a crucial component of 5G's increased speed and capacity, has difficulty penetrating buildings.[18] Rural areas also have potential line-of-sight and coverage problems that could exclude homes from 5G in-home service; especially homes that are distant from cell towers or can have trees blocking line-of-sight. Further, as

[17] The Public Advocates Office has demonstrated such limitations in the past and determined fixed wireless service cannot be a close substitute for fixed wireline service, *see* Decision 16-12-025 at p. 88.

[18] *See* https://arstechnica.com/information-technology/2019/04/millimeter-wave-5g-will-never-scale-beyond-dense-urban-areas-t-mobile-says/ last visited 4/24/19.

discussed in more detail below, New T-Mobile proposed investment plans would construct only a small amount of new cellular infrastructure in rural California. Therefore, the Applicant's proposed fixed wireless service is not a reasonable substitute for wireline service in many circumstances.

25. In Decision (D.) 16-12-025, the Commission concluded that for most consumers, residential wireline broadband and mobile broadband services are not substitutes for each other. The Commission also noted that while its determination could change with 5G wireless service, the Commission would need to examine prices, data caps, indoor access, and backhaul adequacy.[19] The Applicants do not provide specific, measurable, and verifiable plans to address any of the above issues, only assumptions and estimates.[20] The determination of whether 5G is a potential substitute for wireline broadband should come after careful analysis of real 5G performance data and customer choices on service providers, not before.

26. Importantly, New T-Mobile's proposed in-home broadband plan is still in development. The Applicants provided data on New T-Mobile's in-home broadband data usage allowance[21] and potential speed target of 25 Mbps download and 3 Mbps upload[22] but have not provided plans showing the price customers would pay or the speeds customers would ultimately receive. In addition, the Applicants explained New T-Mobile would deprioritize[23] customers that go over the 500 Gigabyte (GB) monthly household usage

[19] D.16-12-025, Finding of Fact 7(g) and 7(h) at p. 186.

[20] The Applicants recently submitted additional documents to the Federal Communications Commission (FCC) regarding potential in-home broadband service plans. The Applicants provided the Public Advocates Office with unredacted copies of these filings on April 5, 2019 which left limited time for review. Still, the new information did not provide the Public Advocates Office information on service plans or California specific service territories.

[21] Sievert Rebuttal at p. 31:7-9.

[22] Sievert Rebuttal at p. 29.

[23] Deprioritizing a user means slowing down their Internet speeds during periods of congestion.

threshold.[24] A 500 GB per month usage allowance is not much data when accounting for current in-home data use with High Definition (HD) video and growth in future data consumption from services such as 4K video streaming.

27. Current broadband data demand trends indicate that more users are relying on in-home broadband for high capacity use, such as to stream HD video.[25],[26] These users have "cut the cord" by dropping cable or phone company video services to save money. HD streaming video can often consume 500 GB of data per month, which means that customers who cannot afford or otherwise do not sign up for HD video services would meet or exceed New T-Mobile's usage cap regularly.[27] Further, average in-home broadband data usage will increase over time. OpenVault, a provider of data consumption and analytical software, discovered that average in-home broadband data use has increased to 269 GB per household at the end of 2018, up from 201 GB per household in 2017.[28] OpenVault also discovered that the amount of households using over 1000 GB of data per month has doubled from 2 percent to 4 percent over 2018.

28. Average in-home data use will continue to increase as more customers switch from cable TV to Internet streaming and as 4K streaming becomes more common, especially by 2024.[29] This means that New T-Mobile's in-home

[24] Attachment 9: T-Mobile Responses to Public Advocates Office Data Requests 10 and 11, Response to Question 10-22.

[25] FCC 2016 Broadband Progress Report at para 2 and para 14. "The Commission relied in particular on the expanding demand for online video services, increasing simultaneous usage of multiple devices in a single household and growing adoption of 25 Mbps/3 Mbps services by consumers in areas where such services were available, among other trends."

[26] Cisco predicts that 79% of all North American Internet traffic will come from video by 2022. https://www.cisco.com/c/en/us/solutions/service-provider/vni-network-traffic-forecast/vni-forecast-info.html Last visited (4/23/19)

[27] Public Advocates Office Testimony on Fifth Generation Wireless Service at p. 19:14-15.

[28] *See,* http://openvault.com/openvault-broad-based-broadband-usage-acceleration-in-2018-1tb-power-users-double-to-4-12-of-all-households/

[29] 4K streaming uses 7 GB of data per hour, meaning 4 hours of 4K streaming a night would consume 840 GB of data, well over New T-Mobile's data allowance.

broadband data allowance would be restrictive to most subscribers that New T-Mobile intends to compete for. Thus, New T-Mobile's in-home broadband service is not competitive with wireline broadband services. The data in Table 1 and Attachment 2 illustrates that many wireline ISPs currently have monthly data caps of 1,000 GB or do not have any data caps at all. The higher data caps offered with wireline broadband service further demonstrates that fixed wireless service is not a reasonable substitute for wireline service.

29. Besides the concerns listed above, T-Mobile and Sprint are also already planning to launch in-home broadband as stand-alone companies.[30] Therefore, the proposed in-home broadband service is not a measurable, verifiable or merger-specific benefit and the Commission should give it no weight.

B. T-Mobile and Sprint will Deploy and Offer 5G Service in California as Stand-Alone Companies.

30. In his Rebuttal Testimony, Mr. Ray discusses customer demand for 5G and T-Mobile's network model which the Applicants used to determine how much network capacity and coverage New T-Mobile will have if the merger is approved.[31] However, Mr. Ray over-estimates 5G customer adoption rates and overstates the limitations of standalone T-Mobile and Sprint. The sections below explore these claims in more detail.

1. T-Mobile and Sprint can Satisfy Demand for 5G Service as Stand-Alone Companies.

31. In his Rebuttal Testimony, Mr. Ray discusses the engineering network model that T-Mobile uses to calculate New T-Mobile's 5G capacity and speeds.[32] In addition, Mr. Ray produced coverage maps that purport to show projected 5G

[30] Sievert Rebuttal at p. 33.

[31] Rebuttal Testimony of Neville R. Ray filed January 29, 2019 (Ray Rebuttal) at pp. 11, 18, and 23-26.

[32] Ray Rebuttal at pp. 26-27:1-7.

coverage for stand-alone T-Mobile, stand-alone Sprint, and New T-Mobile by 2021 and 2024.[33],[34] Mr. Ray's assertions about the network model and the coverage maps are misrepresentative and not grounded in the evidence the Applicants have put forward. This is because T-Mobile has overestimated 5G device adoption, overestimated 5G consumer data use, and underestimated 4G Long Term Evolution (LTE) data use while predicting future demand. The Applicants also underestimated the future performance of stand-alone T-Mobile and stand-alone Sprint, as discussed further below. As such, the Applicant's assertions make their overly aggressive 5G deployment plan seem more necessary than it actually is.

a. The Applicants' Projections Rely on Two Different Data Use Figures, both of which Overinflate Customer Demand.

32. Mr. Ray states that T-Mobile's end-of-year (EOY) 2017 data use per subscriber per month is 10.1 GB, which he uses as a starting point to project future data demand.[35] Mr. Ray does not explain how this figure was derived, but it differs from the estimate that T-Mobile previously provided in its network model.[36]

33. The 10.1 GB figure is larger than the average data consumption information from other industry research sources for both 2017 and 2018. As such, the 10.1 GB figure inflates future customer data demand. The Applicants rely on this inflated demand to suggest that New T-Mobile's aggressive refarming[37]

[33] No underlying data for the maps, or explanation of how the Applicants derived them, was provided, despite requests by the Public Advocates Office.

[34] Ray Rebuttal Testimony pp. 40-41 and Attachment D.

[35] Ray Rebuttal at p. 11. No explanation of how the Applicants derived the 10.1 GB figure was provided despite requests by the Public Advocates Office.

[36] *See* The Exhibits of Public Advocates Office Testimony of Cameron Reed on Service Quality, Exhibit C-34, where T-Mobile provides a data consumption per subscriber per month of **<<Begin Confidential>>** [redacted] **<<End Confidential>>** for 2017 in the 5G model submitted to the FCC.

[37] When I refer to New T-Mobile's refarming plan, I am referring to the plan holistically to include encumbered 4G LTE spectrum (spectrum used to active support cellular subscribers) which will be gradually refarmed to 5G spectrum and unencumbered 4G LTE spectrum (spectrum not currently

strategy and the consolidation of stand-alone Sprint and stand-alone T-Mobile's spectrum and cell towers are necessary, which is not the case. Table 2 below summarizes the average monthly data usage per mobile subscriber in 2017 and 2018 as measured by other industry sources.

Table 2: Average Subscriber Data Consumption per Month (2017 and 2018)

<<Begin Confidential>>

<<End Confidential>>

supporting cellular subscribers) that is already allocated to 5G spectrum. New T-Mobile's 5G plan for both free and used spectrum outpaces demand.

[38] *See* http://research.rewheel.fi/US/ (last visited 3/18/19)

[39] Public Advocates Office Testimony on Fifth Generation Wireless Service at p. 19:9-10.

[40] *See* Attachment 3: Public Advocates Office Data Consumption Calculations

[41] *See* http://www.oecd.org/sti/broadband/1.13-MobileDataUsage-2018-06.xls (last visited 3/18/19)

[42] *See* https://www.ericsson.com/en/mobility-report/reports/november-2018/mobile-data-traffic-growth-outlook (last visited 3/18/19)

[43] *See* https://www.fiercewireless.com/wireless/how-much-data-we-re-using-by-network-operator-and-service-plan last visited 3/18/19

34. Table 2 demonstrates that the figure Mr. Ray provided in his Rebuttal Testimony is not only the highest average data consumption estimate found in publicly available sources, it is also higher than figures T-Mobile had itself previously provided in its network model for the same time period. As further discussed in Attachment 3, the 10.1 GB figure represents a subset of T-Mobile's data users. As such, the 10.1 GB figure does not reflect the data usage habits of all subscribers on T-Mobile's network and is not a good baseline to forecast future demand.

35. Further, research shows that less competitive markets generally trend towards lower data consumption per user on average. This results from the fact that less competitive markets--that is, markets with fewer mobile network operators (MNOs)--typically have higher prices and lower data caps.[44] This leads to lower customer usage on average. Dr. Selwyn's analysis of Organization for Economic Co-operation and Development (OECD) data mirrors the findings of a mobile market research group Rewheel; countries with more MNOs typically have lower prices and higher average data use.[45] As such, the 4 to 3 merger proposed by the Applicants will likely reduce average data consumption over time through increased prices, suggesting the model's projections are inaccurate.[46]

36. As such, the 10.1 GB figure is an overestimate of current demand for mobile data for all of Sprint and T-Mobile's subscribers. T-Mobile's projected demand for 2018 through 2024 is overinflated, because T-Mobile uses an overestimate of current demand in both Mr. Ray's Rebuttal Testimony and their network model. As discussed further below, this means the network model's projections

[44] The Direct Testimony of Lee L. Selwyn on behalf of the Public Advocates Office, at pp. 23-24.

[45] Attachment 4: Rewheel Research: "The State of 4G pricing – 2H2018."

[46] The Direct Testimony of Lee L. Selwyn on behalf of the Public Advocates Office, at p. 142.

are inaccurate which makes New T-Mobile's overly aggressive 5G plan seem reasonable when it is not.

b. The Applicants' Projections Underestimate the Year-over-Year Demand Growth for 4G LTE Service.

37. In addition to using the new 10.1 GB figure as a baseline to project future demand, T-Mobile's forecasting methodology underestimates year-over-year growth in demand for 4G LTE service. As Attachment 3 explains in more detail, T-Mobile's demand model inappropriately assumes that monthly data use per subscriber for LTE service will stagnate at around **<<Begin Confidential>>** [redacted] **<<End Confidential>>** by the end of 2020 and remain relatively constant through 2024.[47]

38. The inaccuracy of New T-Mobile's LTE demand growth forecast is further reinforced considering that 5G network radios will support 4G, 3G, and 2G service.[48] Compatibility between generations of wireless service is a critical element of future wireless use to ensure continued service for customers. The global wireless industry trade body GSM Association (GSMA), of which T-Mobile is a member, expects 5G wireless adoption to reach 49% of total US connection by 2025.[49] GSMA's predictions indicate that 4G demand will remain relevant well into the mid-2020s and demonstrate that the Applicants plans to allocate spectrum resources away from LTE service, which will still support approximately half of the US population by 2025, is overly aggressive.

39. 5G Americas, a trade organization representing telecommunications service providers and manufacturers, mirrors GSMA's prediction. 5G Americas

[47] The Exhibits of Public Advocates Office Testimony of Cameron Reed on Service Quality, Exhibit C-34.

[48] *See* https://www.ericsson.com/en/digital-services/offerings/core-network/5g-core

[49] *See* https://www.gsmaintelligence.com/research/?file=061ad2d2417d6ed1ab002da0dbc9ce22&download at p. 19. Notably, GSMA's estimates place the US ahead of all other regions for 5G adoption.

projects that the total number of LTE connections will not begin to decline until 2020 and will not fall below 400 million until 2023.[50] Both GSMA and 5G Americas predict that 5G adoption will take considerable time and that many customers will rely on LTE service well into the 2020s.

40. Data is data, and customers will not distinguish between LTE and 5G service when accessing the Internet. The network model has placed unreasonable weight on 5G data consumption which makes New T-Mobile's overly aggressive refarming plan seem more necessary than it actually is.[51] On the contrary, if New T-Mobile executes its refarming plan as it has put forward New T-Mobile's LTE customers who cannot afford or otherwise do not adopt 5G devices would experience increased network congestion and reduced service quality compared to the stand-alone companies. This is because New T-Mobile would use less spectrum to support 4G LTE service than the stand-alone companies. Because approximately 50% of US customers will still be using LTE by 2025, the Applicants will either carry out a refarming plan that is detrimental to LTE customers or discard their refarming plans for a more gradual 5G deployment. This either invalidates any benefit the merger would provide to speeding up 5G deployment or means that LTE customers will be harmed by this merger.[52]

[50] *See:* http://www.5gamericas.org/en/resources/statistics/statistics-uscanada/ last visited 4/4/19

[51] Refarming refers to the re-allocation of wireless spectrum used to provide service in one standard so that spectrum can provide service using a different standard. In this case, it refers to re-allocating spectrum used to provide 4G service in order to use that spectrum to provide 5G service.

[52] Attachment 3 to this Declaration presents a more comprehensive analysis of the merger's negative effects on LTE service quality.

c. T-Mobile's 5G Network Model is Not Used in the Ordinary Course of Business, and Its Speed and Capacity Outputs are Based on Inaccurate Network Traffic Projections.

41. In order to derive the claimed speed and capacity benefits of the merger, T-Mobile input its demand projections into a supposed 5G network model.[53] Mr. Ray claims that T-Mobile based the 5G model on an LTE congestion model that T-Mobile uses to direct its network investment decisions. However, the speed and capacity projections that T-Mobile relies on in this proceeding are not from this LTE model – they are from a 5G network model developed in 2018 for purposes of this merger. This 5G network model uses **<<Begin Confidential>>** [redacted] **<<End Confidential>>** modeling.[54] This proxy was used because there is no actual data on 5G traffic loading.

42. T-Mobile created the 5G network model, used to make speed and capacity projections, for purposes of litigation at the FCC. Since its creation, the model has been revised and resubmitted twice to the FCC; first to address a problem where the model didn't account for ordinary-course LTE network improvement projects for the stand-alone networks and then again to accommodate for additional spectrum refarming.[55,56] These errors in the model's construction show that, despite being based on the Applicant's 4G model, the 5G model is

[53] Ray Rebuttal at p. 26.

[54] Attachment 7: Cleary Gottlieb Steen & Hamilton LLP January 4, 2019 Letter to the Department of Justice, Antitrust Division at p. 2.

[55] "Since the filing of the PIS, the engineer model was extended to incorporate the logic from T-Mobile's ordinary-course LTE capacity-planning model…" September 5, 2018 Response to Information Request, filed by T-Mobile at the FCC found here: https://ecfsapi.fcc.gov/file/1090587489537/2018-09-05%20FCC%20Information%20Request%20vFINAL--REDACTED.pdf at p. 30. (last visited 3/19/19)

[56] September 17, 2018 Supplemental Response to Information Request, filed by T-Mobile, *available at* https://ecfsapi.fcc.gov/file/109170006628878/2018-09-17%20Supplement%20to%20Info%20Req.pdf at p. 2. (last visited 3/19/19)

not the ordinary course of business model that T-Mobile has based its investment decisions on. The model was recently constructed in a hasty manner for use in FCC litigation before any actual 5G loading data existed. This resulted in serious flaws in the model's abilities and underscore the fact that the 5G model is a forecasting calculator prepared for the Applicants to advocate for the merger, not an ordinary course of business tool.

43. In conclusion, the above analysis reveals that the 5G network model is not used in T-Mobile's ordinary course of business and was developed for litigation purposes. Further, the data input into the 5G network model predicts demand using a **<<Begin Confidential>>** [redacted] **<<End Confidential>>** based on overestimated 5G device adoption, overestimated 5G consumer data use, and underestimated 4G LTE data use. This means T-Mobile's input inflated 5G traffic loading forecasts into a model created solely for litigation based on a new way of emulating real traffic data—data which does not exist for 5G service. The Commission should give no weight to the network speed and capacity projections derived from the 5G network model.

2. T-Mobile and Sprint have Adequate Spectrum to Deploy 5G service as Stand-Alone Companies.

44. In his Rebuttal Testimony, Mr. Ray discusses the purported limitations of stand-alone T-Mobile and Sprint in deploying 5G without the merger.[57] Mr. Ray's characterization oversimplifies the situation, leading to inaccuracies. T-Mobile currently has significant volumes of high-band spectrum that it can use to increase capacity in urban areas where 5G demand will be highest. Stand-alone T-Mobile also has sufficient low-band and mid-band spectrum and cell sites to provide 5G coverage in sparsely populated rural areas. The average spectrum charts presented by the Applicants have downplayed the volume of

[57] Ray Rebuttal at p. 31:9-23.

mmWave spectrum available to T-Mobile.[58] Figure 1 below recreates this figure with the amount of mmWave spectrum presented proportionally to the depiction of spectrum in other bands.[59]

[58] Ray Rebuttal at p. 23.

[59] The Applicants displayed low-band and mid-band spectrum in 10 MHz blocks and high-band spectrum in 100 MHz blocks. Figure 1 revises the chart to display all spectrum in 10 MHz blocks.

Figure 1: Applicants' Spectrum Portfolios, with Proportional Scaling

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45. Figure 1 demonstrates that T-Mobile's average high-band holdings are significant and are slightly larger than Sprint's average mid-band spectrum inventory. Contrary to the Applicants' claims that T-Mobile must acquire Sprint's mid-band holdings to deploy 5G, T-Mobile's already holds large amounts of unused mmWave spectrum which can provide capacity in densely

populated areas. Sprint will be able to acquire mmWave spectrum to supplement its own deployments in densely populated areas by participating in upcoming FCC auctions.[60] Figure 1 also shows that stand-alone T-Mobile and New T-Mobile will have the **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of average low-band spectrum devoted to 5G by 2024. In addition, stand-alone T-Mobile will have **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of average AWS and PCS spectrum devoted to 5G by 2024. This means stand-alone T-Mobile has sufficient low-band and mid-band spectrum to serve sparsely populated rural areas.

3. T-Mobile and Sprint have Adequate Cell Site Infrastructure to Deploy 5G service as Stand-Alone Companies.

46. In addition to the companies' spectrum inventories, Mr. Ray discusses the amount of cell sites that will be available to New T-Mobile. Mr. Ray created a chart that tabulates unique 5G cell sites for each company.[61] He also discusses the amount of existing Sprint cell sites that New T-Mobile would decommission, totaling approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** California cell sites.[62] However this analysis does not account for Sprint's future investment plans. Therefore, the above number underestimates the total reduction in California cell sites as a result of the merger.

47. Cell sites are critical infrastructure that provide connectivity to mobile users. Additional cell sites mean expanded coverage for cell service and allows for the re-use of spectrum to increase capacity in high demand areas. As such, New T-Mobile's significant reduction in Sprint's existing and future California cell sites will, generally, reduce redundancy in California. The reduction in cell site

[60] Public Advocates Office Testimony of Cameron Reed on 5G Service at p.12:18-22.

[61] Ray Rebuttal at p. 18.

[62] *Id.* at p. 21.

infrastructure would also reduce future mmWave capacity and coverage in urban areas. As discussed further below, this means that the Applicants have overstated the capacity benefits of the Merger and have likely underestimated Sprint's performance in their 2021 and 2024 speed, capacity, and coverage projections.

48. Stand-alone Sprint has significant capital investment planned in California. Sprint plans to deploy thousands of new cell sites which would significantly increase capacity and coverage.[63] According to Sprint's investment plan, Sprint would construct **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new macro cell sites and **<<Begin Confidential>>** [redacted] **<<End Confidential>>** new small cell sites in California. Sprint would be able to further increase its capacity by acquiring mmWave spectrum at the upcoming FCC auctions. In totality, when considering both the cell sites that New T-Mobile will be decommissioning and the planned future stand-alone sprint sites and small cells, the merger could remove approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** cell sites from California, which is a greater number of sites than the **<<Begin Confidential>>** [redacted] **<<End Confidential>>** cell sites New T-Mobile would have if the merger is approved.[64] The data shows that stand-alone Sprint will have significant increases in capacity and coverage absent the merger. Further, the merger would significantly reduce available cellular infrastructure in California, which is not in the public interest.

49. In addition, Sprint and T-Mobile do not operate identical networks in California. Table 3 below summarizes the Geographic Information Systems

[63] Sprint Response to Public Advocates Office Data Request 1-27 and 1-48. This data is tabulated and included in Attachment 5 to this Declaration.

[64] The number of cell sites New T-Mobile is based off T-Mobile's Response to Public Advocates Office Data Request 1, Q 1-48. This is tabulated and included within Attachment 5.

(GIS) analysis performed regarding the collocation of T-Mobile and Sprint's sites:

Table 3: Collocation of Existing Sprint and T-Mobile Cell Sites

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50. As can be seen from Table 3, Sprint and T-Mobile's cell sites are generally not collocated and do have distinct cell site footprints. However, the distance between cell sites in urban areas tends to be small under normal operations due to spectrum re-use, potential line-of-sight issues, and cell site densification. As such, it is difficult to determine whether a cell site is "unnecessary to provide or maintain service"[66] or a site that MNOs would construct to boost capacity in areas with high population density. What is clear is that many of the decommissioned Sprint cell sites are not directly collocated with T-Mobile's existing cell sites. This means the merger would reduce cell site infrastructure and provider redundancy in California.

[65] Collocated Sites are Cell Sites that are on the same pole. I've assumed sites within 3 meters of other sites are collocated to capture potential margins of error in GIS mapping.

[66] Ray Rebuttal at p. 52.

a. Stand-alone T-Mobile and New T-Mobile Would Have Similar Cell Tower Coverage Across California.

51. In addition to his testimony on network capacity, Mr. Ray included county-level maps which purport to show 5G coverage and percent of populations by 2021 and 2024 for stand-alone Sprint, T-Mobile, and the post-merger New T-Mobile.[67] However, the depictions in these maps are simplistic which leads to inaccurate conclusions. Specifically, the maps' portrayal of, T-Mobile, Sprint, and New T-Mobile's 5G coverage and the suggestion that the merger is the only path to ubiquitous 5G coverage are both misleading. The underlying geographic cell tower data shows that New T-Mobile will retain most of Sprint's cell sites to increase network capacity, not increase coverage. As discussed further below, stand-alone T-Mobile would have similar coverage to post-merger New T-Mobile. As such, either company would need significant capital investment to construct more cell towers in order to achieve the 5G coverage depicted in Mr. Ray's maps, which the Applicants have not demonstrated would happen.[68]

52. Due to time constraints, my analysis focuses on select geographic areas in Los Angeles, Fresno, Shasta, and Tehama counties.[69] The analysis below focuses only on Fresno County.

53. Figure 2 below shows a side-by-side comparison of rural areas in western Fresno County that T-Mobile says it will not cover with mid-band 5G absent the merger. This comparison covers four scenarios: current Sprint sites, current T-Mobile sites, post-merger New T-Mobile sites, and planned future investment Sprint sites.

[67] Ray Rebuttal, Attachment D.

[68] Supplemental Declaration of Lee L. Selwyn at pp.43-44.

[69] See Attachments 8 of this Declaration for the maps of all four areas.

Figure 2: Side-by-Side Comparison of Cell Sites in Western Fresno County[70]

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54. Figure 2 shows that the cell site footprint between T-Mobile, Sprint, future Sprint, and post-merger New T-Mobile, and Future Sprint are relatively similar in terms of rural coverage. Table 4 below summarizes the cell sites in western Fresno for each scenario.

[70] All GIS maps the Public Advocates Office generated are included as Attachment 8 to this Declaration.

Table 4: Number of Cell Sites in Western Fresno County by Company[71]

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55. The data in Figure 2 and Table 4 presents several important facts. First, while T-Mobile generally has more towers in western Fresno and a wider coverage footprint, Sprint also has tower coverage in the majority of western Fresno. Sprint's future plans would narrow this gap in coverage through additional cell sites in western Fresno. Specifically, Sprint's plans would mean stand-alone Sprint and stand-alone T-Mobile would have an **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of sites. Further, while New T-Mobile has more towers than either stand-alone company, most of those towers are to increase capacity in densely populated areas. The data shows that the coverage footprint of each network is relatively similar. As such, New T-Mobile would face the same technical and investment issues in deploying mid-band 5G spectrum to cover western Fresno that stand-alone T-Mobile faces currently. The geographic data also shows that in the unlikely scenario New T-Mobile could cover western Fresno with 2.5 GHz spectrum with no newly constructed

[71] The data underlying the map in Figure 2 and the numbers in Table 4 is included as Attachment 8 to this Declaration

cell sites, that stand-alone Sprint should be able to do the same absent the merger.

56. Figure 3 below presents the Post-Merger New T-Mobile cell site information in more detail. The green/blue sliding scale represent population by census block group, with blue being census block groups with the highest population and pale being block groups with the lowest populations. The dots represent New T-Mobile cell sites where pink dots are cell sites previously owned by T-Mobile and yellow dots cell sites previously owned by Sprint.

Figure 3: Post-Merger New T-Mobile Cell Sites in Western Fresno, (by Previous Site Owner and 2018 Census Block Group Population)

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57. Figure 3 clearly illustrates the problems with how the Applicants have portrayed the information in Mr. Ray's maps. New T-Mobile will retain **<<Begin Confidential>>** [redacted] **<<End Confidential>>** Sprint cell sites **<<Begin Confidential>>** [redacted] **<<End Confidential>>** census block groups in western Fresno, **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of which are located near existing T-Mobile cell sites. This means that stand-alone T-Mobile's cell site coverage will be roughly similar to New T-Mobile's cell site coverage in western Fresno.

58. The maps in Mr. Ray's Rebuttal further reinforce this because they portray stand-alone T-Mobile and New T-Mobile as having near identical low-band 5G coverage in western Fresno. Because Mr. Ray's maps portray coverage and do not portray capacity,[72] Figure 3 calls into question why we should believe that New T-Mobile would cover most of western Fresno with mid-band 5G by 2024, but stand-alone T-Mobile would not.[73] Simply put, the mid-band 5G coverage Mr. Ray's maps illustrate for New T-Mobile will not materialize.

b. The Decision to Deploy Mid-Band 5G to Rural Areas is a Business Decision Based on Economic Factors Associated with the Transition from 4G to 5G, Not Available Spectrum.

59. The maps in Attachment D to Mr. Ray's Rebuttal Testimony portray that Sprint would have limited 5G coverage in western Fresno with its 2.5 Gigahertz (GHz) spectrum despite Sprint having a larger existing cell site footprint than what the maps suggest. The maps portray Sprint's 2.5 GHz mid-band spectrum as having a limited coverage range centered only on the developed areas of Fresno county. Yet, the maps also depict New T-Mobile using the existing

[72] Ray Rebuttal, Attachment D at p. 1.

[73] Ray Rebuttal, Attachment D at p. 21.

infrastructure of the two stand-alone companies, along with Sprint's 2.5 GHz mid-band and T-Mobile's mid-band spectrum, to cover most of western Fresno with 5G mid-band.

60. To state the issues plainly: Mr. Ray's coverage maps portray Sprint's 2.5 GHz's coverage area as limited. Further, Figure 1 above shows that stand-alone T-Mobile will deploy **<<Begin T-Mobile Confidential>>** [redacted] **<<End T-Mobile Confidential>>** Megahertz (MHz) of 5G mid-band spectrum by 2021 and **<<Begin T-Mobile Confidential>>** [redacted] **<<End T-Mobile Confidential>>** MHz of 5G mid-band spectrum by 2024. Finally, Figure 3 above clearly demonstrates near identical cell site coverage footprints in western Fresno for stand-alone T-Mobile and New T-Mobile. Despite the combination of the above listed facts, the Applicants continue to present that the difference between companies portrayed in their maps are a result of spectrum inventory or infrastructure issues that only a merged company can remedy.[74] This contention is false and misleading. Stand-alone T-Mobile has the spectrum and the cell sites to provide 5G in western Fresno, and in California in general, absent the merger.

61. The Commission should reject the Applicant's claims that the merger is required or necessary for long term 5G deployment in California. The coverage differences depicted by Mr. Ray's maps are caused by the transition from 4G to 5G, not spectrum or cell site issues that would affect long-term 5G deployment. As Dr. Selwyn has noted, the FCC has rejected such arguments in the past and so should the Commission here.[75]

62. The decision to deploy 5G mid-band spectrum to Fresno, or to any county in California, is a business decision regarding where to deploy new equipment that

[74] Ray Rebuttal at p. 23.

[75] The Direct Testimony of Lee L. Selwyn on behalf of the Public Advocates Office, at pp. 153-154.

AT&T, Verizon, T-Mobile, and Sprint will all need to make. The Applicants have not provided sufficient evidence and justification as to why, in absence of the misleading and false claims about technical cellular infrastructure or spectrum concerns, New T-Mobile would deploy mid-band 5G spectrum throughout Fresno and the majority of California counties where stand-alone T-Mobile would not.

4. The Applicants have Overstated the Potential Capacity Benefit the Merger Would Provide New T-Mobile Over the Stand-Alone Companies.

63. Mr. Ray included an equation in his Rebuttal Testimony which generally calculates the capacity of wireless networks.[76] I used this formula to perform a high-level analysis of select counties and the entire state's potential network capacity for stand-alone Sprint, Future Sprint, stand-alone T-Mobile, and Future T-Mobile. My analysis suggests that New T-Mobile will not have as much increased potential network capacity when compared to the combined stand-alone companies in CA as the Applicants initially claim.[77] Attachment 6 to this declaration includes a maximum potential capacity analysis for Los Angeles, Tehama, Fresno, and Shasta counties.

64. When comparing total LTE and 5G capacity at the merger's closing, New T-Mobile would have **<<Begin Confidential>>** [redacted] **<<End Confidential>>** the maximum potential capacity in California when compared to the combined maximum potential capacity of stand-alone Sprint and T-Mobile. This difference in capacity between New T-Mobile and the combined stand-alone companies shrinks further to about only a **<<Begin Confidential>>** [redacted] **<<End Confidential>>** for New T-Mobile when considering Sprint's future planned network investments in California. The above figures

[76] Ray Rebuttal at p. 8.

[77] These Calculations are presented in Attachment 6: Capacity Potential Analysis for California

represent maximum possible capacity and are a significant simplification of the capital costs that a real-world deployment would entail. This analysis of maximum potential capacity is merely to demonstrate that on paper the Applicants have overstated the increases in capacity that is a direct result of combining Sprint and T-Mobile's assets as a result of the merger.

65. More to the point, the Applicants have not demonstrated that any merger-driven gain in maximum potential capacity would bring any benefit whatsoever to rural and low-population areas. The Applicants have also not demonstrated that the additional mid-band 5G coverage that is portrayed on Mr. Ray's 2021 and 2024 New T-Mobile maps provide any benefit over the low-band (600 MHz) spectrum that standalone T-Mobile is already able to deploy in all but the most densely populated counties. Further, in those densely populated areas – Los Angeles County in particular -- T-Mobile's existing inventory of high-band spectrum, together with its low-band and mid-band spectrum, is more than sufficient to achieve whatever additional 5G capacity may actually be required.

5. Expanding Coverage to Rural Areas Depends on Capital Investment and is Not a Spectrum Issue.

66. Mr. Ray included maps in his Rebuttal Testimony that purported to show an increase in coverage as a result of the merger.[78] As discussed above, the maps in Attachment D of Mr. Ray's Rebuttal Testimony are misleading for a number of reasons, but the maps also overlook an important fact about New T-Mobile's additional cell sites and coverage. Mr. Ray states that "New T-Mobile will have 800 more cell sites with 600 MHz and 3,700 more cell sites with 2.5 GHz in California by 2024."[79] The Commission should understand that many of the cell

[78] Ray Rebuttal, Attachment D.

[79] Ray Rebuttal at p. 17.

sites to which Mr. Ray is referring are not new cell sites, but new radios deployed on existing cell sites.

67. Further, the Applicants have not thoroughly articulated New T-Mobile's specific plans to deploy infrastructure in rural areas in order to create the coverage depicted in Mr. Ray's maps. Expanding 5G coverage to rural California will likely require extensive capital investment. The Applicants have not unequivocally proved that New T-Mobile will commit to this investment.[80] Further, the Applicants have not proved, as evidenced by the above analysis done in western Fresno County, that stand-alone T-Mobile is incapable of making such investment.[81]

68. For example, only **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of the additional California cell sites New T-Mobile will gain from this merger are from new construction. On the contrary, **<<Begin Confidential>>** [redacted] **<<End Confidential>>** are retained cell sites from Sprint. As far as rural infrastructure, approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** out of the newly constructed cell sites and **<<Begin Confidential>>** [redacted] **<<End Confidential>>** out of the retained Sprint cell sites will be in rural areas.

69. The data the Applicants provided is unclear on whether the **<<Begin Confidential>>** [redacted] **<<End Confidential>>** were

[80] Attachment 9: T-Mobile Responses to Public Advocates Office Data Requests 10 and 11, Response to 11-7 "T-Mobile responds that it does not have capital budgeting "business case" type analyses or studies that have been undertaken in connection with the 5G coverage projections presented in Attachment D…"

[81] Supplemental Declaration of Dr. Lee L. Selwyn at p. 45. His Figure 9 shows that New T-Mobile would invest **<<Begin Confidential>>** [redacted] **<<End Confidential>>** in Fresno County by 2024 and Stand-Alone T-Mobile would invest **<<Begin Confidential>>** [redacted] **<<End Confidential>>**. The Applicants have not explained how New T-Mobile's investment would result in the coverage depicted in Attachment D, nor have they explained why stand-alone T-Mobile is incapable of investing **<<Begin Confidential>>** [redacted] **<<End Confidential>>** in Fresno to improve coverage.

planned prior to the merger or if the new construction would be completed by stand-alone T-Mobile regardless of the merger's approval. In addition, as discussed above, New T-Mobile is generally retaining Sprint's cell sites in order to increase capacity in more densely populated areas, not to increase coverage to rural areas.

70. This distinction between new construction and retained cell sites is important. The Applicants did not analyze whether there is available space on existing cell sites for the installation of new radios and antennas. Some cell sites may not have available space for additional radios. Acquiring Sprint's spectrum will not add all of that spectrum to T-Mobile's anchor towers for free. New T-Mobile will require work crews and time to install new radios to thousands of cell towers. Some existing cell sites may be on third-party towers that do not have adequate space or capacity and would unable to support additional equipment; this would delay New T-Mobile's upgrades or prevent the upgrade entirely.

71. The Applicant's plan to decommission thousands of Sprint's towers and upgrade thousands of T-Mobile's existing towers will be a considerable undertaking that lacks specific, measurable, and verifiable commitments to complete these projects. The Applicants have incorrectly assumed that the synergies of decommissioning Sprint's network will manifest expeditiously. On the contrary, California needs more infrastructure, not less. Accordingly, the Commission cannot assume that New T-Mobile's coverage maps will materialize and should give the maps no weight.

72. Rural areas will get 5G service independently of the merger. T-Mobile and Sprint have the available spectrum to serve rural areas as stand-alone companies. The Applicants admitted this in their maps in Attachment D, as stand-alone T-Mobile will deploy low-band 5G spectrum in most California counties by 2024. The decision on whether or not to deploy mid-band 5G in rural areas is a business decision that every MNO will have to make during the

transition from 4G to 5G. Demand in rural areas will be lower than demand in urban areas because handset adoption will be slower and population density is lower in rural areas. These economic barriers to investment do not change with the merger. New T-Mobile will have to make the same justifications as stand-alone Sprint and stand-alone T-Mobile, which the Applicants have not demonstrated here.

IV. Conclusion: Californians Will Benefit From 5G Independent of the Merger. The Merger is Not Necessary to Deploy 5G and Not in the Public Interest.

73. Ultimately, Californians will get 5G service regardless of the merger. AT&T, Verizon, Sprint, and T-Mobile are all currently deploying 5G infrastructure in major cities in California and across the United States. The Applicants' maps, models, and projections misrepresent the realities of the cellular infrastructure stand-alone Sprint and stand-alone T-Mobile currently have and will have in the future. Further, the data underlying the maps does not thoroughly prove that the coverage and capacity increases purported to be merger benefits are unattainable by the stand-alone companies through additional capital investment.

74. Generally, markets with less competition have higher prices per GB of data than markets with more MNOs in competition. This means the merger may inhibit, rather than enhance, 5G service in California especially in highly populated urban areas where the potential capacity gains from the merger are minimal. Due to overinflated projections, the merger would also lead to aggressive refarming which may degrade service quality for 4G LTE customers and create a divide in service quality between customers who can afford 5G phones and those who cannot.

75. Despite the claims in Applicants' voluminous Rebuttal Testimony, this merger is not in the public interest. The Commission should deny the proposed merger.

Attachment 1: Statement of Qualifications

Statement of Qualifications of Cameron Reed

76. My name is Cameron Reed. I am currently employed by the California Public Utilities Commission (Commission) as a Utilities Engineer assigned to the Public Advocates Office Communications and Water Policy Branch.

77. I have a Bachelor of Science in Mechanical Engineering from the University of California-Davis. My studies included courses in engineering control systems, electrical circuits, experimental methodology, and mechanical systems design. I am a member of the Phi Theta Kappa honor society.

78. I began work with the Commission on July 5, 2016. I have previously submitted testimony concerning Telecommunications Public Safety in the general rate case (GRC) of Sierra Telephone Company (Application 16-10-003), Service Quality and Public Safety in the GRC of Ducor Telephone Company, (Application 17-10-003), Service Quality in the GRC of Foresthill Telephone Company (Application 17-10-004), and Public Safety and Cybersecurity in the Application of Pacific Gas and Electric for a Certificate of Public Convenience and Necessity to become a Competitive Local Exchange Carrier (Application 17-04-010).

79. I reviewed the merger between CenturyLink and Level 3 Communications (Application 17-03-016). I have reviewed thousands of the Federal Communications Commission's Network Outage Reporting System outage reports.

80. I have previously submitted testimony in this proceeding.

Attachment 2: California In-Home Broadband Plans

Provider	City	County	Download Speeds (Mbps)	Price/ Month	Monthly Data Cap
AT&T Fiber	Altadena	Los Angeles	100	$50	1 TB
AT&T Fiber	Altadena	Los Angeles	300	$70	1 TB
AT&T Fiber	Altadena	Los Angeles	1,000	$90	Unlimited
AT&T DSL	Fresno	Fresno	5	$40	1 TB
AT&T DSL	Fresno	Fresno	100	$50	1 TB
AT&T DSL	Highway City	Fresno	5	$40	1 TB
AT&T DSL	Highway City	Fresno	25	$50	1 TB
AT&T DSL	Selma	Fresno	5	$40	1 TB
AT&T DSL	Selma	Fresno	10	$50	1 TB
Frontier FiOS	North Hills	Los Angeles	50	$30	Unlimited
Frontier FiOS	North Hills	Los Angeles	100	$40	Unlimited
Frontier FiOS	North Hills	Los Angeles	200	$40	Unlimited
Frontier DSL	Fowler	Fresno	6	$20	Unlimited
Frontier DSL	Fowler	Fresno	12	$25	Unlimited
Frontier DSL	Fowler	Fresno	18	$30	Unlimited
GiggleFiber	Arcadia	Los Angeles	150	$40	Unlimited
GiggleFiber	Arcadia	Los Angeles	500	$60	Unlimited
Race Internet	Cummings Valley	Kern	25	$25	Unlimited
Race Internet	Cummings Valley	Kern	1,000	$60	Unlimited
Sonic	San Francisco	San Francisco	1,000	$40	Unlimited
Spectrum	Arcadia	Los Angeles	100	$45	Unlimited
Spectrum	Arcadia	Los Angeles	400	$70	Unlimited
Spectrum	Arcadia	Los Angeles	940	$105	Unlimited
SuddenLink	Auburn	Auburn	50	$35	250 GB
SuddenLink	Auburn	Auburn	100	$55	Unlimited
SuddenLink	Auburn	Auburn	150	$75	Unlimited
Xfinity	Fresno	Fresno	60	$50	1 TB
Xfinity	Fresno	Fresno	150	$65	1 TB
Xfinity	Fresno	Fresno	250	$80	1 TB
Xfinity	Fresno	Fresno	400	$112	1 TB

1

Attachment 3: Public Advocates Office Calculation of Monthly Data Use per Subscriber using T-Mobile's Traffic Data [Contains Confidential Information]

I. T-Mobile's Network Data Use per Subscriber Figures do not Represent All of T-Mobile's Subscribers.

1. The Applicants have put forward the 10.1 GB of data used per subscriber per month (GB/sub/month) as its end of year (EOY) 2017 network usage per subscriber figure. This figure implies that across all of T-Mobile's network users, the average subscriber uses 10.1 GB per month. This is not the case. The Applicant's use of 10.1 GB here is misleading, because it is not the monthly network usage of all of T-Mobile's network users, but the average network use of a subset T-Mobile's network users. Specifically, the 10.1 GB figure is the data use of subscribers to only T-Mobile branded services not including Metro users or MVNO users. As such, it is not an accurate picture of every network user on T-Mobile's network.

2. The Applicant's misleading statement is an issue because it attributes to all of T-Mobile's network users the behaviors of smaller subset of users. Branded T-Mobile had approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** devices, compared to **<<Begin Confidential>>** [redacted] **<<End Confidential>>** for branded MetroPCS and **<<Begin Confidential>>** [redacted] **<<End Confidential>>** devices for the Mobile Virtual Network Operations (MVNOs) which also put traffic on T-Mobile's network. Assigning the behavior of **<<Begin Confidential>>** [redacted] **<<End Confidential>>** of T-Mobile's devices to all of the devices on T-Mobile's network inflates the amount of data an average subscriber on T-Mobile's network would use.

3. I used the Applicant's source data to calculate an accurate GB/sub/month figure., T-Mobile's average data use per subscriber should be split across all subscribers as either a flat average or a weighted average. The below analysis performs these calculations for a flat average of all of T-Mobile's EOY 2017

subscribers,[82] as well as for devices and a weighted average of T-Mobile, MetroPCS, and MVNO subscribers by plan. T-Mobile provided this information in a report, of which a snapshot is included in Figure 3-1 below:

Figure 3-1: Snapshot of T-Mobile Network Dashboard for EOY 2017[83]

<<Begin Confidential>>

<<End Confidential>>

4. First, I calculated a flat average of T-Mobile's network use per subscriber. T-Mobile provided information on its daily network payload by week for December, which I averaged across the entire month to **<<Begin**

[82] These numbers can be found here: https://investor.t-mobile.com/news-and-events/t-mobile-us-press-releases/press-release-details/2019/T-Mobile-Posts-Its-Best-Customer-Results-Yet-Reports-Lowest-Ever-Q4-Postpaid-Phone-Churn-Beats-Customer-Guidance-for-FY-2018/

[83] Attachment 9 contains the full network dashboard report.

Confidential>> [redacted] **<<End Confidential>>** per day. Months are uneven in terms of how many days make up a month, but on average there are 30.4 days in a month. T-Mobile had a total of 72,585,000 subscribers nationwide at the end of 2017 according to investor reports.[84] By putting these numbers together as follows, I determined the flat average of T-Mobile's network use per subscriber per month:

Network Usage Per subscriber = **<<Begin Confidential>>** [redacted] **<<End Confidential>>** (GB/day) * (365/12) days / 72,585,000 Subscribers

5. This equation produces a flat average of **<<Begin Confidential>>** [redacted] **<<End Confidential>>** for an average subscriber on T-Mobile's network. This number includes all subscribers who use T-Mobile's network and is approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** percent lower than the 10.1 GB/sub/month figure advanced by the Applicants in Rebuttal Testimony.

6. I also performed weighted averages of various other measures of monthly data consumption, including a weighted average of subscriber use by company, device data use by company, and data user by plan. The tables 3-1 through 3-3 below detail this analysis.

[84] EOY Subscribers taken from: https://investor.t-mobile.com/news-and-events/t-mobile-us-press-releases/press-release-details/2019/T-Mobile-Posts-Its-Best-Customer-Results-Yet-Reports-Lowest-Ever-Q4-Postpaid-Phone-Churn-Beats-Customer-Guidance-for-FY-2018/

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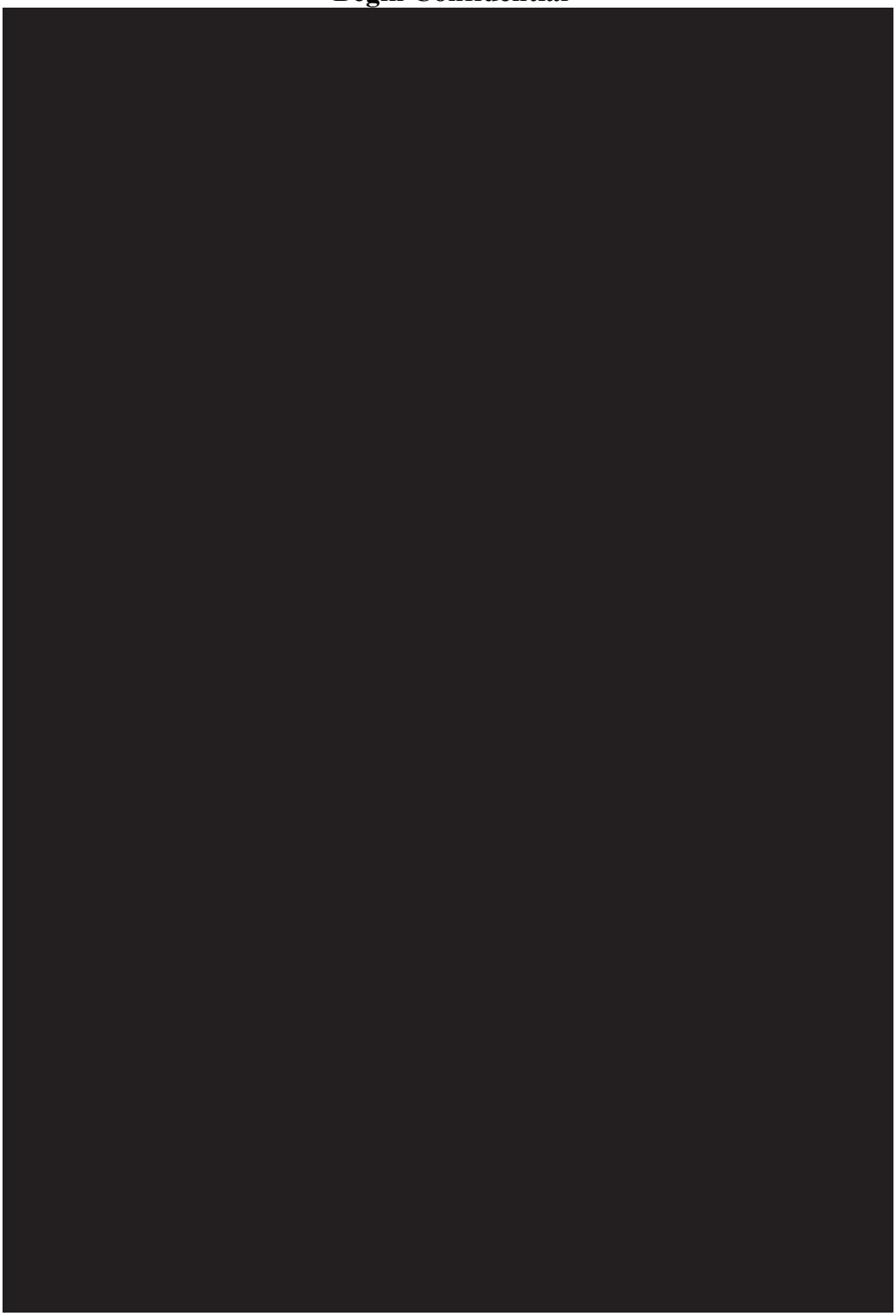


<<End Confidential>>

7. The network dashboard presented in Figure 3-1 reveals how T-Mobile's 10.1 GB figure is incorrect. For example, the network report attributes approximately **<<Begin Confidential>>** [redacted] **<<End Confidential>>** fewer devices to MVNO companies than there are MVNO subscribers active on T-Mobile's network.

8. As the above analysis demonstrates, the GB per month figure can differ depending on the framing of the analysis. A flat average of all users of T-Mobile's network and the average monthly traffic load on the network is the simplest of the above approaches and produced the highest average GB/sub/month figure. As such, **<<Begin Confidential>>** [redacted] **<<End Confidential>>** GB/sub/month is more representative of the average T-Mobile network user than 10.1 GB/sub/month. The Public Advocates Office's figure is also closer to industry predictions and measurements. This indicates the Applicants have overinflated their baseline demand numbers. T-Mobile's network use per sub, based on its reported data, appears to be slightly higher than the North American average reported by Ericsson. In fact, it is **<<Begin Confidential>>** [redacted] **<<End Confidential>>** to Ericsson's 2018 prediction, which implies that T-Mobile's average network use per subscriber would reach between **<<Begin Confidential>>** [redacted] **<<End Confidential>>** Even factoring in T-Mobile's data, network use per subscriber in 2024 would still lower than the Applicants have projected.

II. The Applicants Inflated Projections Attempt to Justify an Aggressive Refarming Plan That Will Harm 4G LTE Subscribers, Which Will Still be 50% of Mobile Phone Users by 2025.

9. The Applicant's inflated data demand and 5G adoption are important because the Applicants are relying on them to justify a spectrum refarming plan which will degrade service quality for LTE customers. Attachment 6 demonstrates

New T-Mobile would have significantly less LTE capacity in California than compared to the combined stand-alone companies. Further, the Applicant's own network model, which is typically used for LTE congestion, shows that LTE network speeds and capacity would **<<Begin Confidential>>** [redacted] **<<End Confidential>>** for Sprint's customers as a direct result of the merger. This means the merger would reduce service quality for Sprint's LTE customers. The Table 3-4 below compare the model's predictions of the LTE capacity of Sprint, T-Mobile, and New T-Mobile's networks:

Table 3-4: Applicant's Model Outputs for LTE Services 2021-2024[85]

<<Begin Confidential>>

[redacted]

<<End Confidential>>

10. The Applicants aggressive 5G plans and overestimation of 5G demand and adoption has left LTE behind. This is evident in how the Applicants have assumed LTE data growth will **<<Begin Confidential>>** [redacted] **<<End**

[85] Numbers taken from the Applicant's 5G network model.

Confidential>> by 2021.[86] This is not going to be the case, 5G adoption will take time. Industry groups such as 5G Americas have predicted that North American LTE connections will continue to grow until 2020 and won't fall below 400 million until 2023.[87] The numbers in Table 3-4 are very likely incorrect predictions of the company's 4G LTE performance, because the Applicants have underestimated 4G demand. This means the negative effects on LTE customers are likely to be worse than the model predicts because LTE customers will be forced to share less spectrum than they otherwise would when compared to the combined stand-alone companies.

11. By aggressively refarming spectrum from 4G to 5G, the merger would create a digital divide between customers who could afford 5G service and those who could not. Sprint's LTE customers would get the worst of both worlds, likely experiencing price increases as predicted by Dr. Selwyn[88] and reduced service quality as discussed above.

[86] Exhibit C-34 to the Testimony of Cameron Reed on Service Quality and Public Safety for the Proposed Transfer of Control of Sprint to T-Mobile.

[87] *See* http://www.5gamericas.org/en/resources/statistics/statistics-uscanada/ last visited 4/16/19.

[88] Testimony of Dr. Lee Selwyn at p. 65.

Attachment 4: Excerpts from Rewheel Research the state of 4G pricing – 2H2018[89]

[89] The Full Public Report is Available Here: http://research.rewheel.fi/downloads/The_state_of_4G_pricing_DFMonitor_10th_release_2H2018_PUBLIC.pdf

Rewheel/research

DIGITAL FUEL MONITOR
MONITORING MOBILE CONNECTIVITY COMPETITIVENESS

The state of 4G pricing – 2H2018

Digital Fuel Monitor 10th release, October 2018

With a special focus on US prices ahead of the planned 4 to 3 consolidation

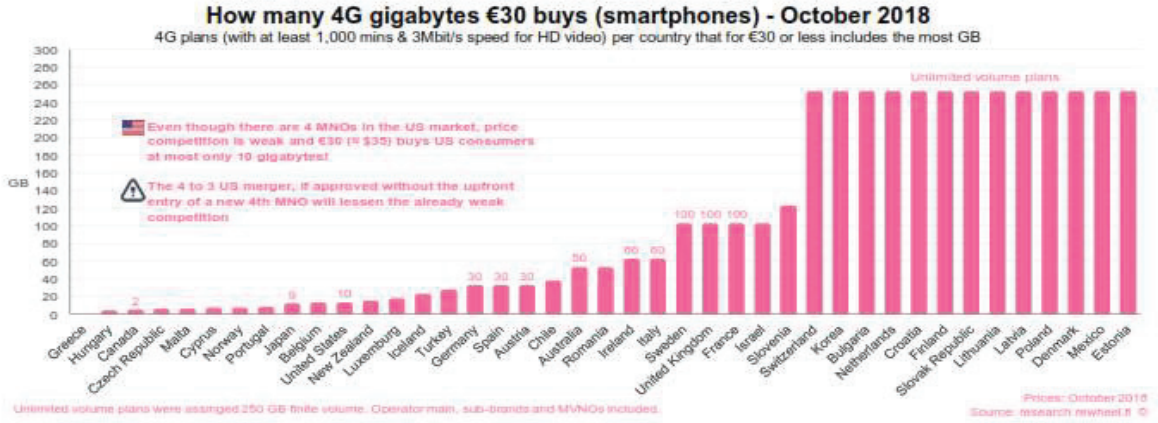
Rewheel research PRO study, 26th October 2018

Unlimited mobile data and fixed-to-mobile broadband substitution

- It is all about unlimited mobile internet: in smartphones, portable MiFi's or 4G wireless home broadband.

How many gigabytes €30 (≈ $35) buys in 4G smartphone plans?

- In October 2018 €30 bought a 4G smartphone plan with truly[1] unlimited volume in 13 countries (up from 10 in April 2018) while €20 bought a 4G smartphone plan with truly unlimited volume in 8 countries (up from 4 in April 2018).



Median gigabyte prices in 4 versus 3-MNO markets

- Gigabyte prices in 3-MNO European markets are 2x higher than in 4-MNO markets.
- Gigabyte prices in 3-MNO EU28 & OECD markets are 81% higher than in 4-MNO markets.

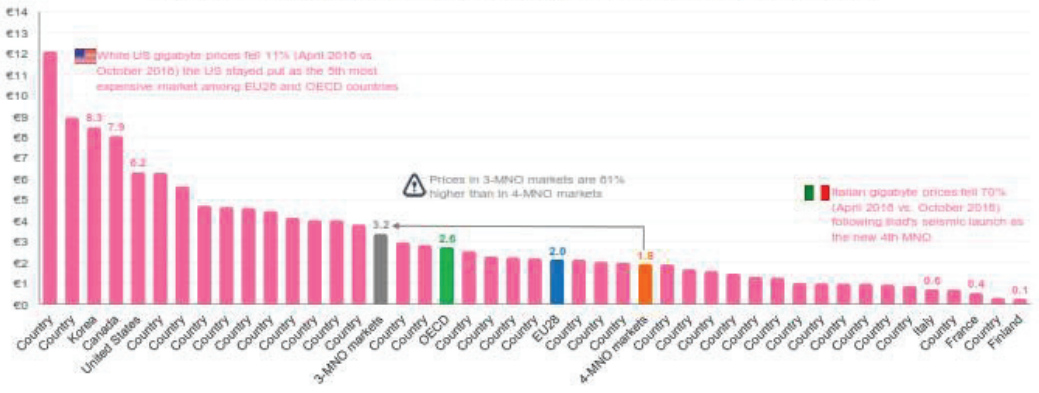
[1]According to the DFMonitor methodology truly unlimited mobile data volume plans are plans without a named finite volume after which the speed is throttle below 3 Mbps or where the traffic is de-prioritized e.g. US unlimited volume plans

Are gigabyte prices in the 4-MNO US market competitive?

- Even though there are 4 MNOs present in the market US gigabyte prices are not competitive.
- The US has the 5th highest gigabyte prices in smartphone plans and is the most expensive market in mobile broadband among the 41 EU28 & OECD countries.

Median gigabyte price (smartphones) - October 2018

Fully allocated median gigabyte price of 4G smartphone plans (with at least 1,000 minutes and 3Mbit/s for HD video)



Fully allocated GB price: tariff retail monthly price (incl. VAT) divided by included gigabyte allowance. 3-MNO markets (27 countries); 4-MNO markets (14)
Median price of all eligible plans logged in the database for country or group of countries. Unlimited plans were assigned 250 GB finite volume.

Prices: October 2018
Source: research.rewheel.fi ©

Median gigabyte price (mobile broadband) - October 2018

Fully allocated median gigabyte price of 4G mobile & wireless home broadband plans (with at least 3Mbit/s for HD video)

Fully allocated GB price: tariff retail monthly price (incl. VAT) divided by included gigabyte allowance.
Median price of all eligible plans logged in the database for country or group of countries. Unlimited plans were assigned 1000 GB finite volume.

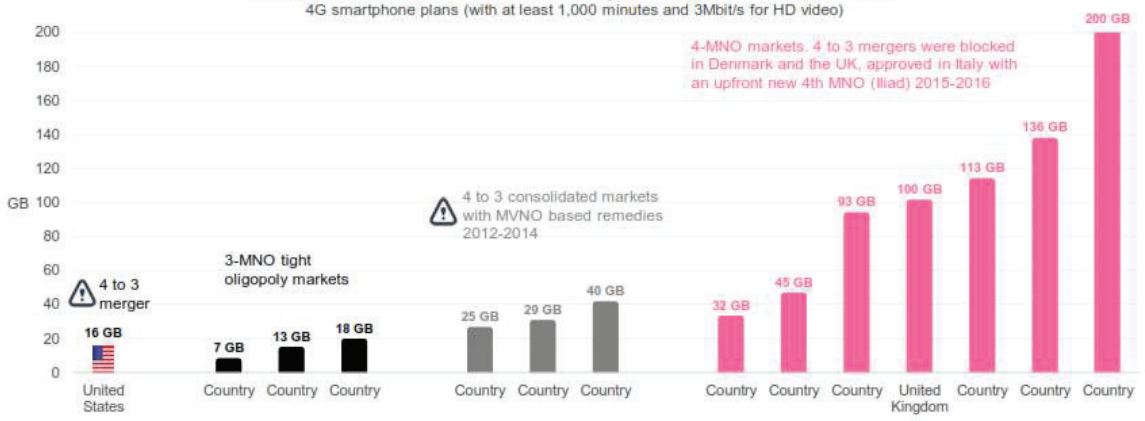
Prices: October 2018
Source: research.rewheel.fi ©

Key development in other markets

- Italian gigabyte prices fell 70% (October vs. April 2018) following Iliad's seismic launch as the new 4th MNO.
- Dutch prices were flattish. After the announcement of the 4 to 3 mobile merger between T-Mobile and Tele2, Dutch gigabyte prices started falling much slower.
- The 4 to 3 consolidated Austrian market fell further behind during the 2H2018. In December 2012, just before the 4 to 3, Austria was the 3rd most competitive market among EU countries. In October 2018 it has fallen in the 18th place.
- In Korea, sub-brands of KT Telecom and LG Uplus have started selling smartphone plans for less than €30 with unlimited volume.
- KT Mobile and Uplussave have been discounting in promotional offers the price of their high-end smartphone plans from ≈49 300 WON (≈€37) to 33 880 WON (≈€26).
- Despite these new promotional offers, the overall gigabyte price level in Korea remained high (e.g. €20 buys only 3 GB) and hence in the median gigabyte price comparison Korea still ranks as the 3rd most expensive country.

Gigabytes that 50 EUR (60 USD for US) buys in the 4-MNO US market versus 3-MNO, 4 to 3 consolidated and 4-MNO European markets – October 2018

4G smartphone plans (with at least 1,000 minutes and 3Mbit/s for HD video)



Average among the maximum GB sold by MNOs and merger mandated MVNOs in Germany, Ireland, Austria.
Four values were averaged in 4-MNO and 4 to 3 consolidated markets while 3 values in 3-MNO markets. Unlimited plans were assinged 250 GB finite volume

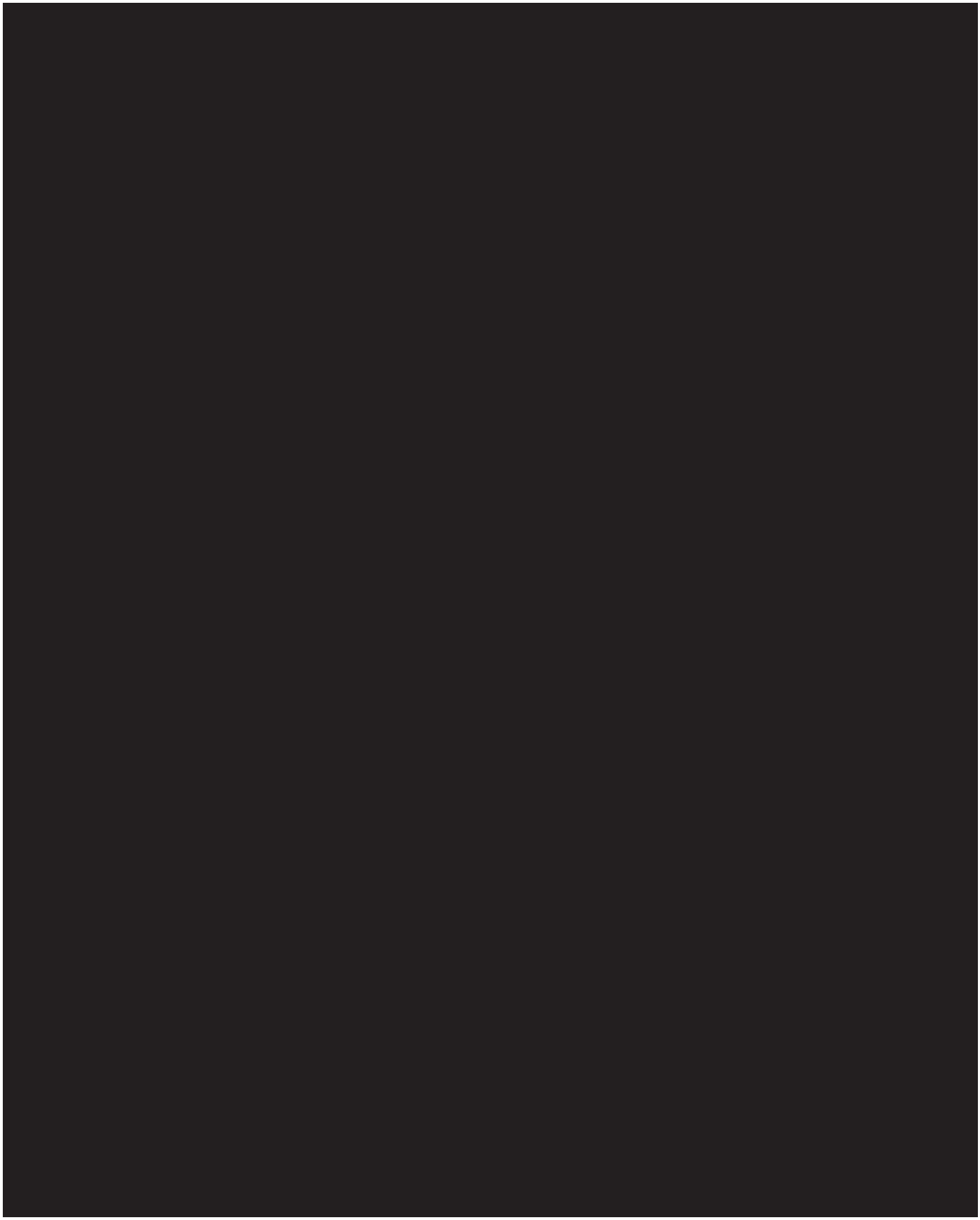
Prices: October 2018
Source: research.rewheel.fi ©

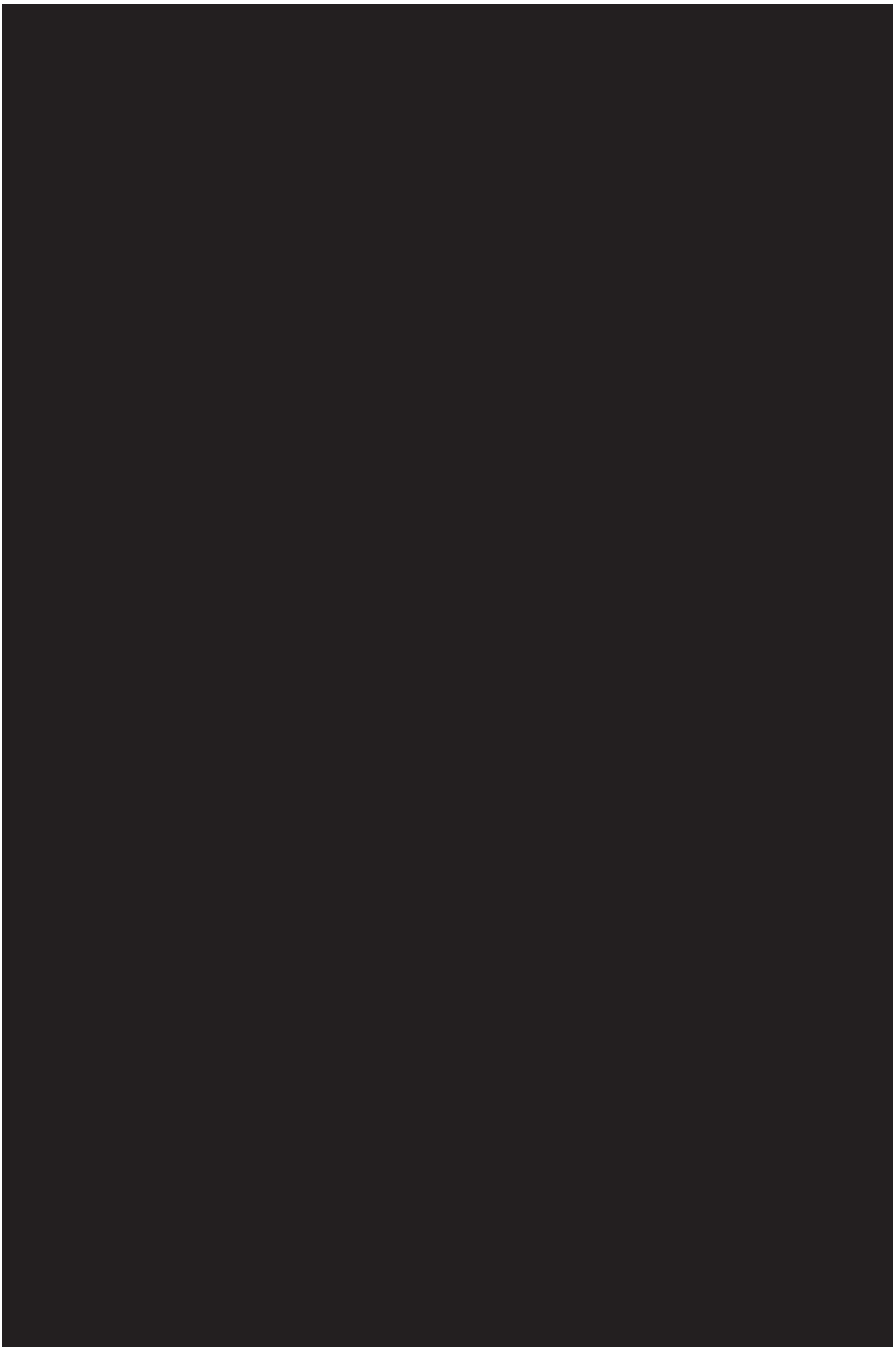
How many gigabytes €30 buys in 4G mobile and wireless home broadband plans?

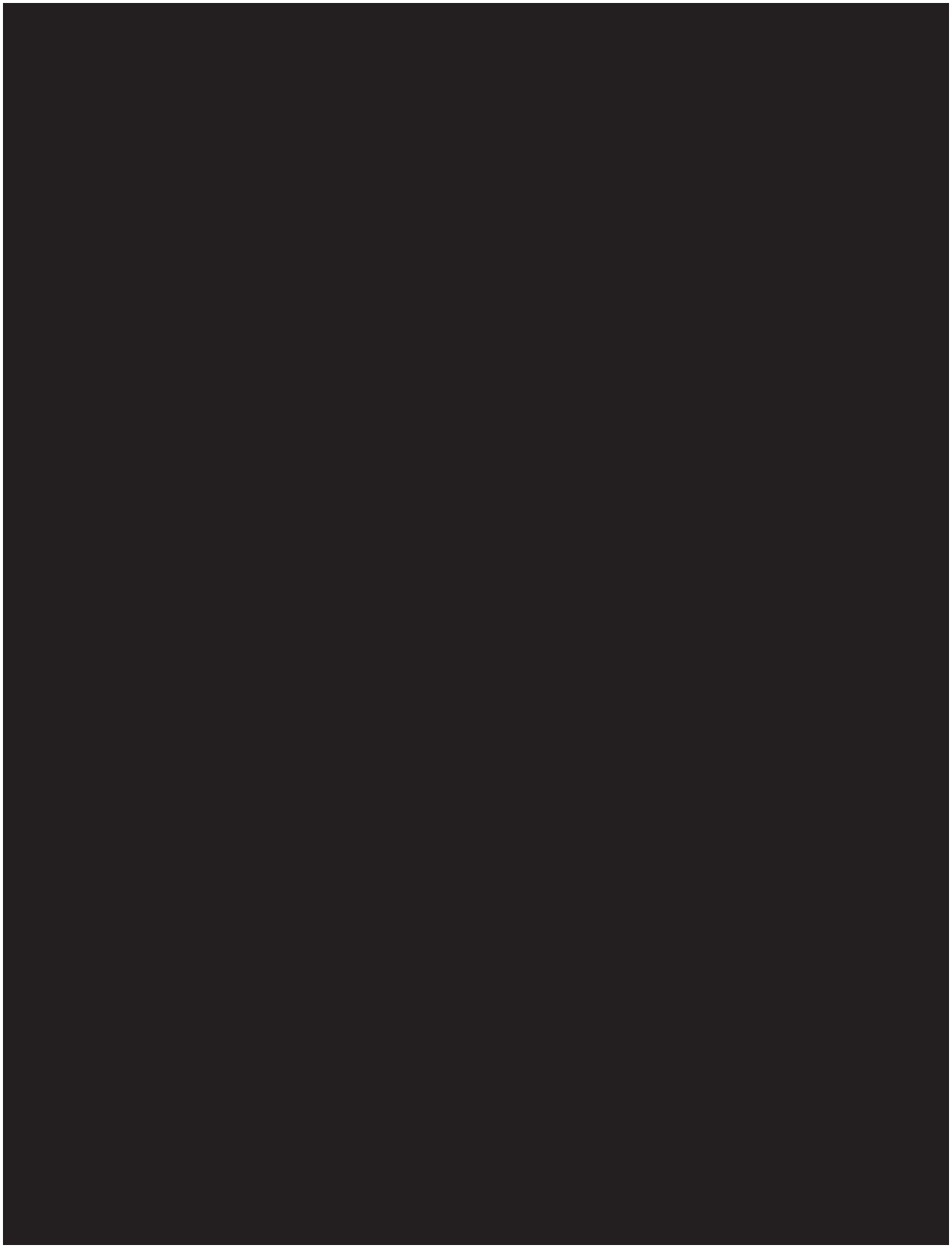
- Unlimited mobile broadband plans for fixed-to-mobile home broadband substitution (FMS) are now available for less than €30 in 11 countries (up from 9 countries in April 2018) and for less than €20 in 9 countries including Switzerland, Austria and Finland (up from 8 countries in April 2018).
- Judging from the excessive gigabyte prices, US operators are charging today for 4G mobile broadband (see Verizon's striking $710 100 gigabyte hotspot plan[2], in Europe 100 gigabyte mobile broadband typically costs between €10 and €20) merger promises concerning affordable 5G home broadband should be critically reviewed and if verified must be made binding.

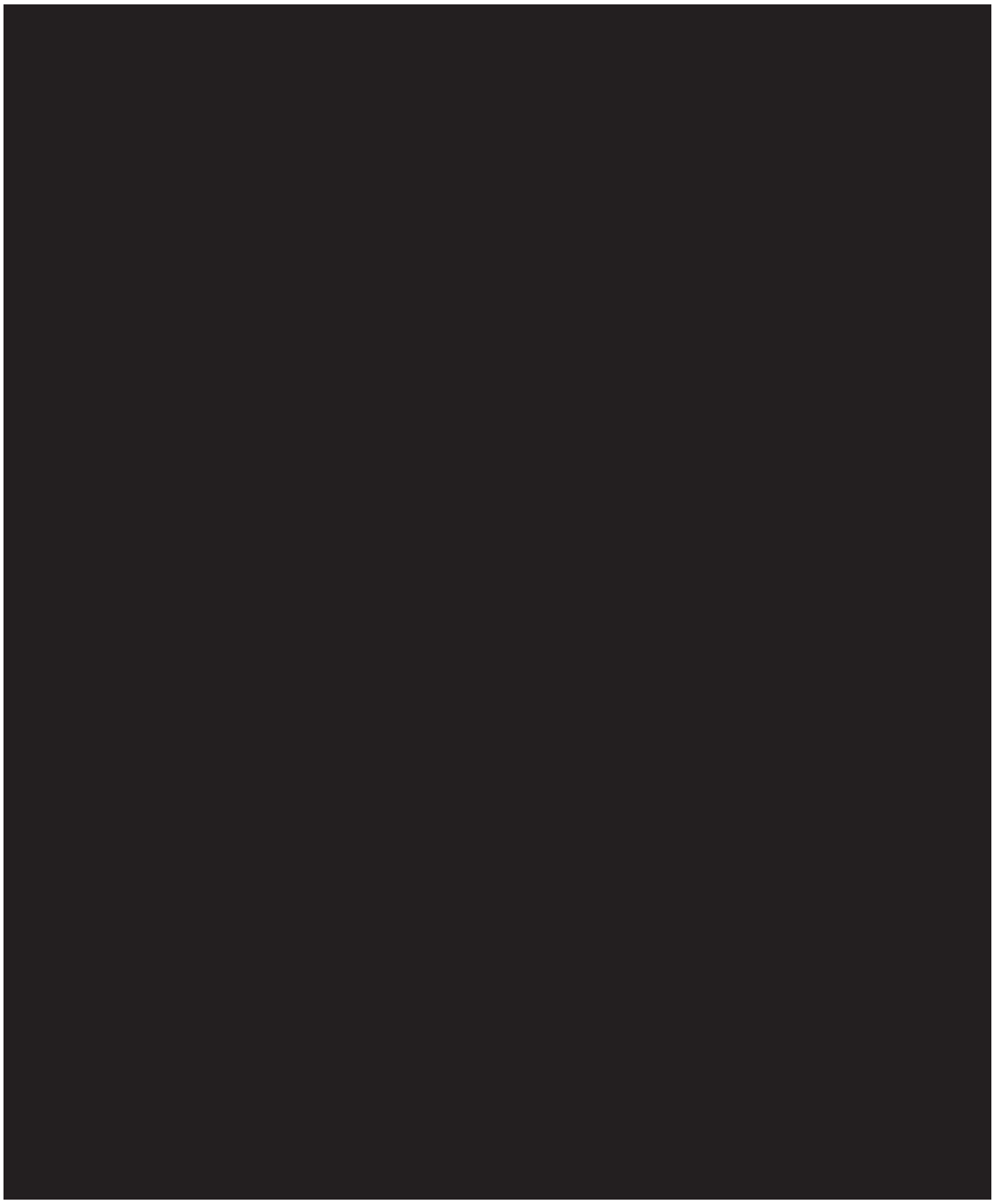
1

Attachment 5: Tabulated Cell Sites for Stand-Alone Sprint, Stand-Alone T-Mobile, New T-Mobile, and Planned Future Sprint Sites [Confidential]









Attachment 6: Capacity Analysis for Select California Counties [Confidential]

Introduction

The analysis in this attachment is of maximum potential instantaneous capacity (in Megabits per second (Mbps)) and thus assumes deployment of the entire average spectrum inventory across all cell sites by each company, except mmWave which is assumed to be deployed only to cell sites in urban areas. Our analysis also does not distinguish between downlink and uplink capacity. The capacity multiplier figure in each table in the attachment shows that the majority of New T-Mobile's capacity increases come from rural areas, where demand for 5G service will be the lowest. The Commission should recognize that the differences between the combined stand-alone Sprint and T-Mobile networks and New T-Mobile's network are slimmer than the Applicants claim and that many of the differences are a result of the different capital investment priorities in the respective cell networks between stand-alone Sprint, stand-alone T-Mobile, and New T-Mobile.

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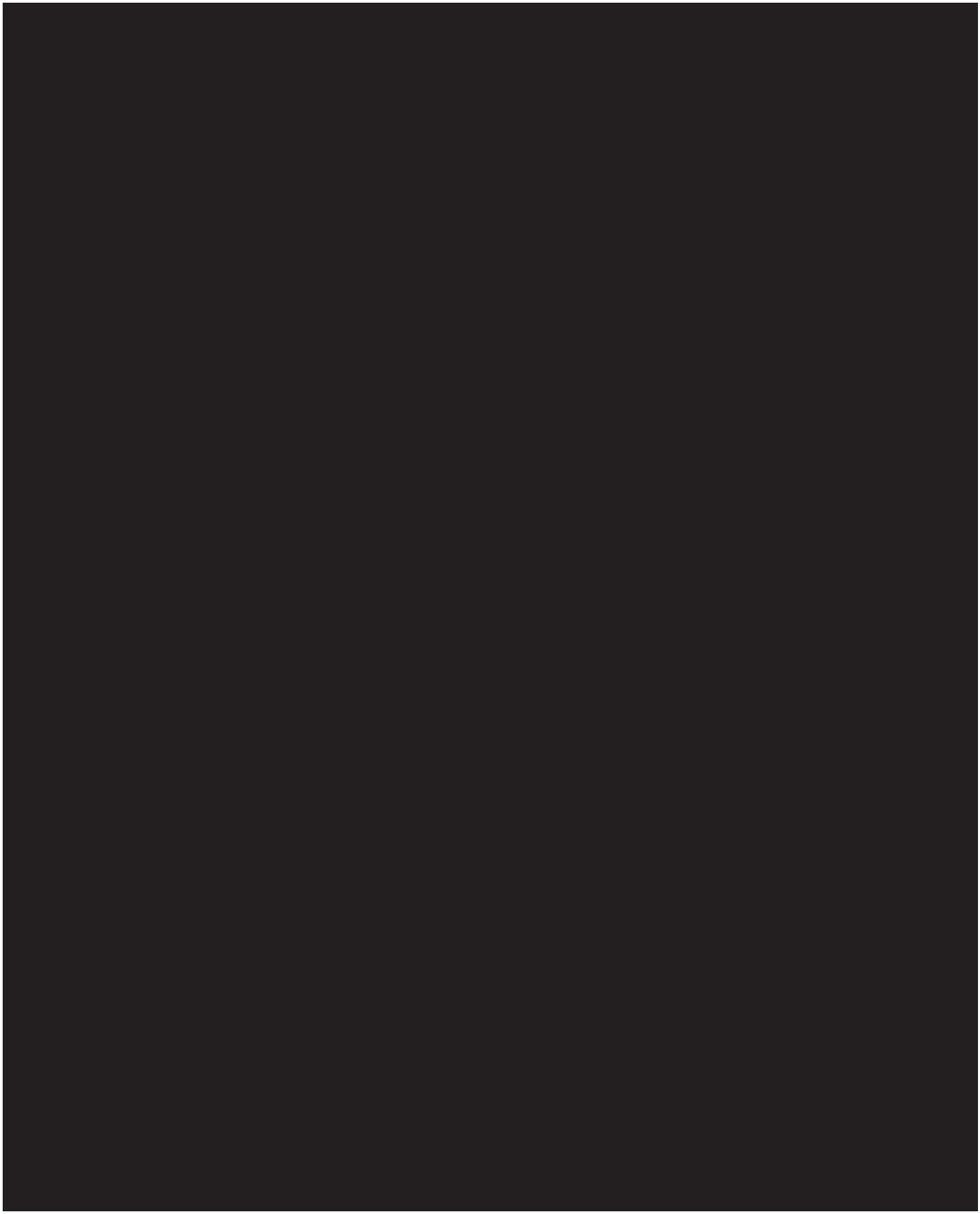

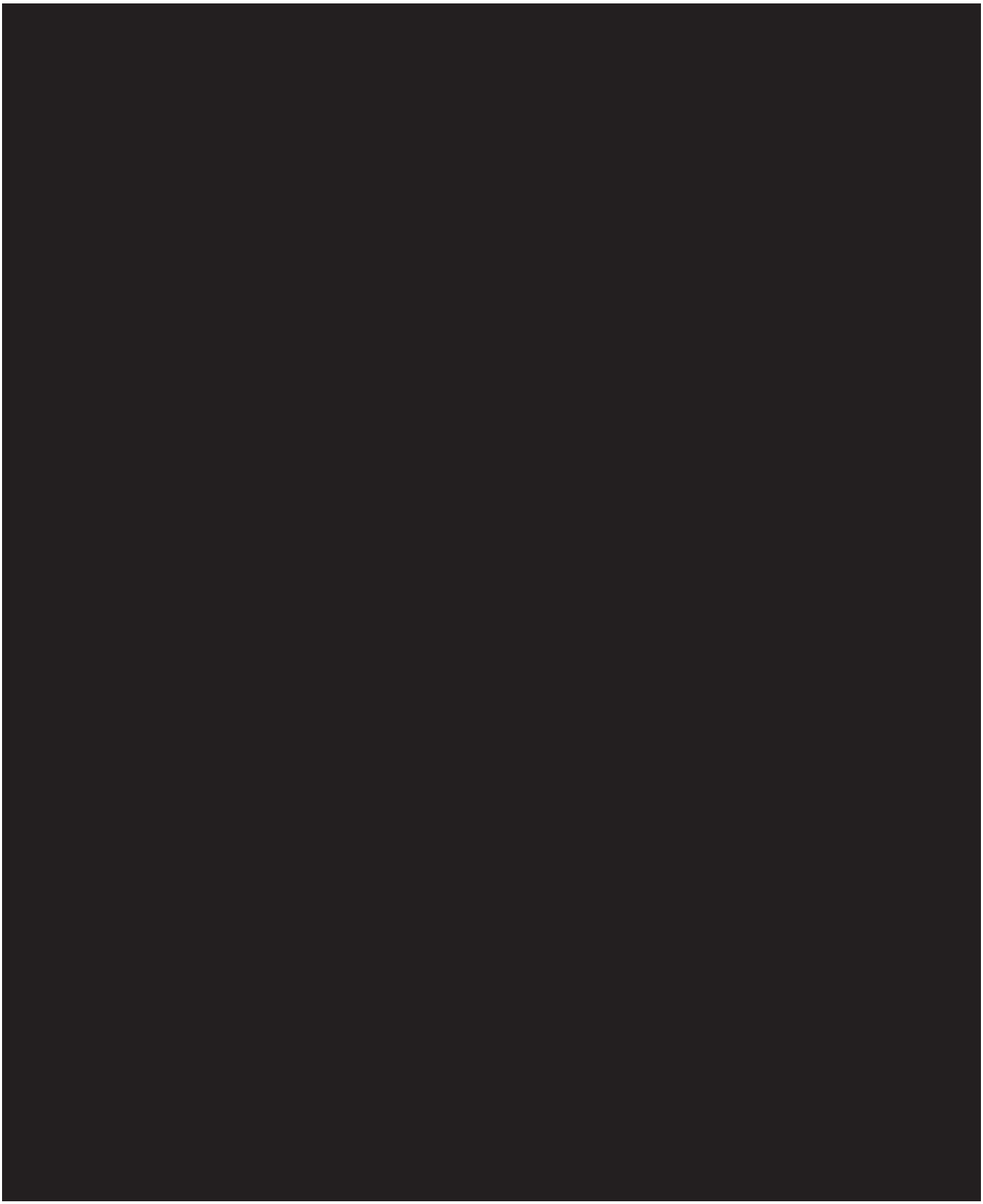

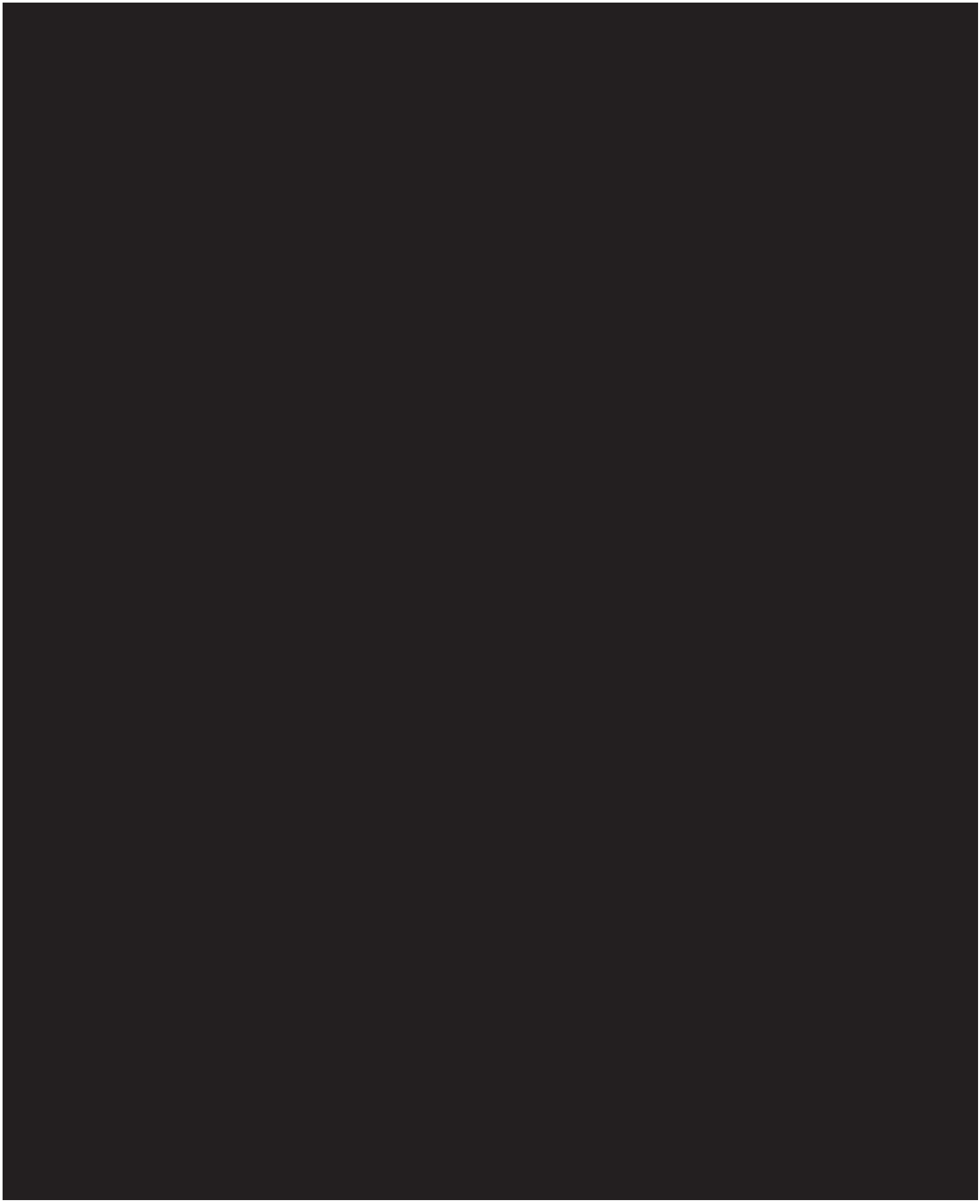

<<End Confidential>>

Attachment 7: Cleary Gottlieb Steen & Hamilton LLP January 4, 2019 Letter to the Department of Justice, Antitrust Division [Confidential]

Attachment 8: Public Advocates Office GIS maps for Shasta, Tehama, and Fresno Counties and Downtown Los Angeles [Confidential]

Attachment 9: T-Mobile Supplemental Responses to Public Advocates Office Data Request No. 10 Questions 10-19 through 10-31 and Data Request 11

[Confidential]