



Center for Technology, Innovation and Competition



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## **TESTIMONY OF CHRISTOPHER S. YOO**

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**Hearing on “The State of Competition in the Wireless Market: Examining the Impact of the  
Proposed Merger of T-Mobile and Sprint on Consumers, Workers, and the Internet”**

**Before the Subcommittee on Antitrust, Commercial, and Administrative Law,  
Committee on the Judiciary,  
United States House of Representatives**

**March 12, 2019**

Mr. Chairman and Members of the Subcommittee, I am grateful for the opportunity to testify here today. At the Subcommittee’s request, my remarks will focus on the proposed merger’s likely impact on rural consumers. The key issue will be the impact that spectrum holdings have on the growing demand for mobile broadband and the deployment of 5G.

### **The Basic Principles of Low-, Mid-, and High-Band Spectrum**

A key input to meeting the growing demand for wireless broadband services is spectrum. Spectrum can be divided into three basic types—low-, mid-, and high-band—each of which operates in different frequency bands and serves a different role.

Low-band spectrum is typically defined as those bands falling below 1 GHz. Low-band signals propagate very strongly, typically reaching a distance of 18 miles. In addition, low-band spectrum is less prone to environmental interference and is more able to penetrate buildings than other types of spectrum and does not require direct line of sight. Because of these attractive

characteristics, the original cellular telephone service was deployed in low-band spectrum. Low-band spectrum does have some drawbacks: it does require larger antennas and provides less bandwidth than other types of spectrum. Its strong propagation characteristics make it less useful for adding capacity on a localized basis.

Mid-band spectrum consists of bands ranging from 1 GHz to 6 GHz. Base stations operating in the mid-band typically cover a radius of four miles. Mid-band spectrum typically requires line-of-sight transmission, but can penetrate buildings. It does support more bandwidth than low-band spectrum and can utilize smaller antennas.

High-band spectrum is generally regarded as including frequencies higher than 20 GHz that had long been regarded as unusable, but are not being unlocked by improvements in technology. The range of high-band spectrum is quite limited, typically propagating roughly half a mile. In addition, high-band spectrum both requires direct line of sight and does not penetrate buildings well. It does provide the highest bandwidth and permits the use of the smallest antennas.

The engineering community has long recognized that the deployment of 5G will depend on a mix of both low-band macrocells and mid- and high-band microcells.<sup>1</sup> This is particularly important in rural areas. The fourteen-mile service range and good propagation characteristics of low-band spectrum makes it ideal for supporting basic coverage for rural areas.

The problem is that because low-band spectrum covers such large areas and accordingly a relatively large number of users, the bandwidth that it can provide can quickly become exhausted. Although these shortages can be addressed by adding more low-band spectrum, the

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<sup>1</sup> See, e.g., Jeffrey G. Andrews et al., *What Will 5G Be?*, 32 IEEE J. ON SELECTED AREAS IN COMM. 1065, 1066-68 (2014).

fact that the additional bandwidth would be needed by only in population clusters within rural areas, much of that additional low-band spectrum would be wasted.

The generally accepted technical solution is to meet the growing demand for bandwidth by adding smaller cells that rely on mid-band spectrum. The four-mile service range of mid-band spectrum allows it to be targeted efficiently at those areas that need the additional bandwidth the most. Not only does the addition of these microcells expand the bandwidth available in population clusters; diverting the demand generated by those clusters to microcells frees up macrocell capacity for the most remote customers for whom macrocell service is the only viable option.

### **Implications for the Proposed Merger**

The foregoing underscores the reality that successful deployment of 5G depends on having a mix of low-band and higher-band spectrum. This fact underscores two realities.

The first is that Sprint lacks the low-band spectrum to be able to provide 5G in rural areas as a standalone company. As the FCC's most recent *Wireless Competition Report* demonstrated, Sprint holds no spectrum in the traditional cellular blocks (850 MHz), the spectrum auctioned following the digital television transition (700 MHz), or the spectrum distributed in the recent incentive auction (600 MHz). Its only low-band spectrum is a small sliver of Specialized Mobile Radio (SMR) spectrum that is three to four times smaller than the low-band holdings of the other national wireless providers.<sup>2</sup>

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<sup>2</sup> Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, Twentieth Report, 32 FCC Rcd. 8968, 8996-97 (2017) [hereinafter 2017 Wireless Competition Report].

Sprint's lack of low-band spectrum has manifested itself in the mounting indicators of its weak operational performance. Information provided to regulators as part of the merger have revealed that Sprint's reliance on mid-band spectrum has given it a much smaller LTE coverage area than the other national wireless providers.<sup>3</sup> In addition, measures of bandwidth performance surveyed by the FCC reveal that Sprint's LTE networks consistently deliver significantly lower bandwidth than do other national wireless providers.<sup>4</sup> Although Sprint's financial condition is no longer in free fall, its current spectrum holdings make it unlikely to be able to address these shortcomings should it remain as a standalone company. The lack of low-band spectrum leaves Sprint particularly poorly positioned to serve rural consumers. The low population density of rural areas makes it unlikely that the limited geographic range of mid-band service will reach enough customers in order to be financially viable.

The second is that the company resulting from the proposed T-Mobile/Sprint merger is planning a very different strategy from that being pursued by the other national providers. The company resulting from the proposed merger plans to use the low-band 600 MHz spectrum that T-Mobile obtained in the recent incentive auction to provide the macrocell foundation for its service. Because this spectrum is not currently in use for mobile wireless services, the company will be able to deploy 5G technologies in its macrocells as well as its microcells without any concerns about cannibalizing its existing businesses. More rapid deployment of 5G in low-band spectrum can only benefit rural consumers. The addition of Sprint's underutilized mid-band

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<sup>3</sup> Ex Parte Notice on Behalf of Sprint, Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, att. C, slide 4 (Sept. 25, 2018) (WT Docket No. 18-197), <https://ecfsapi.fcc.gov/file/10926182275583/Sprint%20Ex%20Parte%20-%20Doc%20Prod.%20-%2009.26.2018%20FINAL%20-%20REDACTED.pdf>; Chaim Gartenberg, *Sprint points out its LTE network is, in fact, trash*, THE VERGE (Sept. 28, 2018, 1:11 pm EDT), <https://www.theverge.com/2018/9/28/17914230/sprint-lte-network-coverage-bad-tmobile-merger>.

<sup>4</sup> 2017 Wireless Competition Report, *supra* note 2, at 9035-37.

spectrum would allow the merged company to deploy microcells without having to wait for additional high-band allocations. The other national wireless providers can follow the same strategy, but having largely sat out the incentive auction, they would have to repurpose low-band spectrum currently devoted to LTE to provide the base-level macrocell coverage. Their public announcements indicate that they are focusing on future releases of high-band spectrum for microcells, which remain uncertain, instead of relying on mid-band spectrum to support their microcells.

### **Closing Thoughts**

Sprint's limited low-band spectrum holdings leave it poorly positioned to provide rural service as a standalone company in a 5G world. In addition, the fact that the company resulting from the proposed merger appears poised to follow a business model that is quite different from the one embraced by the other national wireless providers raises strong potential benefits for consumers generally and rural consumers in particular. That is why a bipartisan group of thirteen House members have signed a letter supporting the transaction.<sup>5</sup>

The Subcommittee should also bear in mind that the nature of competition in the telecommunications industry has changed. Instead of simply engaging in price competition on facilities that already exist, the modern industry now competes by focusing on investments in newer, higher quality facilities. This replaces the thin price competition based on the resale of existing facilities that proved so unsuccessful under the Telecommunications Act of 1996 with one that benefits consumers by incentivizing investments in improved capacity and services.

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<sup>5</sup> Letter from 13 Members of the House of Representatives to Ajit Pai, Chairman, Fed. Commc'ns Comm'n, and Makan Delrahim, Assistant Attorney General, Antitrust Division, U.S. Dept. of Justice (Jan. 25, 2019), <https://assets.documentcloud.org/documents/5699740/Sprobile.pdf>.

Lastly, policymakers should always remember that market developments that improve efficiency, quality, or innovation create benefits for consumers while leaving direct competitors worse off. That is why antitrust law has long viewed competitor complaints with a skeptical eye and emphasized that importance of focusing on mergers' impact on consumers, not competitors. This makes the presence of respected advocates for rural consumers supporting the merger, including Betsy Huber of the National Grange (with whom I have the privilege of serving on the FCC's Broadband Deployment Advisory Committee)<sup>6</sup> as well as the Attorneys General for New Mexico and Utah<sup>7</sup> particularly meaningful.

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<sup>6</sup> Letter from Betsy E. Huber, President, National Grange, to Marlene Dortch, Secretary, Federal Communications Commission, WT Dkt. No. 18-197 (Sept. 12, 2018), <https://ecfsapi.fcc.gov/file/109130913822630/T-Mobile-Sprint-Grange%20Letter%20to%20FCC-Final%209-12-18.pdf>.

<sup>7</sup> Letter from Hector Balderas, New Mexico Attorney General, and Sean Reyes, Utah Attorney General, to Marlene Dortch, Secretary, Federal Communications Commission, WT Dkt. No. 18-197 (Aug. 24, 2018), <https://ecfsapi.fcc.gov/file/1082488029914/2018-08-24%20Joint%20AG%20Ltr%20FCC.pdf>.