

TECH FREEDOM

In the Matter of)	
)	
Use of Spectrum Bands Above 24 GHz for)	GN Docket No. 14-177
Mobile Radio Services)	
)	
Establishing a More Flexible Framework to)	IB Docket No. 15-256
Facilitate Satellite Operations in the 27.5–)	
28.35 GHz and 37.5–40 GHz Bands)	
)	
Petition for Rulemaking of the Fixed Wireless)	RM-11664
Communications Coalition to Create Service)	
Rules for the 42–43.5 GHz Band)	
)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90,)	WT Docket No. 10-112
95, and 101 to Establish Uniform License)	
Renewal, Discontinuance of Operation, and)	
Geographic Partitioning and Spectrum)	
Disaggregation Rules and Policies for Certain)	
Wireless Radio Services)	
)	
Allocation and Designation of Spectrum for)	IB Docket No. 97-95
Fixed-Satellite Services in the 37.5–38.5 GHz,)	
40.5–41.5 GHz and 48.2–50.2 GHz Frequency)	
Bands; Allocation of Spectrum to Upgrade)	
Fixed and Mobile Allocations in the 40.5–42.5)	
GHz Frequency Band; Allocation of Spectrum)	
in the 46.9–47.0 GHz Frequency Band for)	
Wireless Services; and Allocation of Spectrum)	
in the 37.0–38.0 GHz and 40.0–40.5 GHz for)	
Government Operations)	

REPLY COMMENTS OF TECHFREEDOM¹

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Introduction

The future of wireless communications has never looked brighter. According to Cisco, mobile data traffic grew 4,000-fold during the past 10 years, and grew 74 percent — from 2.1 exabytes per month up to 3.7 — during 2015 alone.² Looking forward, these trend lines suggest that global mobile data traffic will increase nearly eight-fold by 2020, with about half of that traffic offloaded onto traditional macro-cellular networks and the other half offloaded onto localized Wi-Fi hotspots and small cells.³ Moreover, both at home and abroad, other wireless services — such as point-to-point microwave and higher-capacity, lower-latency satellites — will be critical in delivering last-mile connectivity and backhaul to remote and unserved areas, as well as boosting capacity in major urban areas.

The common theme underlying all of these next-gen wireless services is the need for more spectrum, particularly at higher frequencies capable of supporting greater throughput. Thus, it is high time the Federal Communications Commission (“FCC” or “Commission”) reconsider its rules for ultra-high-band spectrum — so-called millimeter-wave (“mmWave”) spectrum — and ensure that such spectrum is made available expeditiously for new wireless offerings, both mobile and fixed. To that end, TechFreedom hereby submits these Reply Comments in response to the Notice of Proposed Rulemaking (“NPRM”) issued by the FCC last October.⁴ In these comments, we address both issues raised in the NPRM and comments filed by others in this docket.

Promoting 5G with a Healthy Mix of Old and New

At stake in the Spectrum Frontiers proceeding is the future of 5G service in America. The Commission’s actions (or inaction) here will determine whether the United States is a world leader in 5G — as it was with the previous four generations of mobile wireless technology⁵ — or whether we cede that leadership to innovators in Europe and Asia. Fortunately, having navigated the previous 3G and 4G/LTE upgrade cycles, the Commission is not lost at sea here, as it has a wealth of experience to fall back on in crafting spectrum policy that fosters innovation and entrepreneurship — in some ways, a map for the future.

Of course, while 5G, viewed simply, is merely the next iteration of mobile wireless technology, it would be folly to assume that what worked in the past is the same thing that will work here. Clearly, the demands for 5G will be significantly different than for its predecessor technologies.

² Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015–2020*, at 1 (Feb. 3, 2016), available at <http://goo.gl/IKNNFx>.

³ See *id.* at 3–4.

⁴ Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Notice of Proposed Rulemaking*, GN Docket No. 14-177 (Oct. 23, 2015), available at <https://goo.gl/Kqhf5K>.

⁵ See, e.g., Deloitte, *United States Expands Global Lead in Mobile Broadband: How Policy Actions Could Enhance or Imperil America’s Mobile Broadband Competitiveness* (Sept. 2014), available at <https://goo.gl/VtUvL2>.

Specifically, when it comes to spectrum, 5G will differ from its predecessors in two key respects: (1) it will mix more high-band, millimeter-wave capacity spectrum with lower-band coverage spectrum; and (2) it will mix more licensed spectrum with unlicensed and licensed-lite spectrum.

Thus, in crafting forward-looking policies to support 5G, the FCC should avoid retrofitting legacy policies onto the new wireless environment, but it should also avoid reinventing the wheel. For example, when it comes to spectrum licensing, the FCC's tried-and-true frameworks for licensed and unlicensed spectrum have a proven track record of success — in terms of fostering innovation, promoting timely deployment, and boosting consumer welfare. Following on from the recommendations in the 2012 PCAST Report,⁶ the FCC has experimented with a tiered spectrum-sharing framework, most notably in the television white spaces (“TVWS”) and in the 3.5 GHz band.⁷ These tiered frameworks enable both licensed and unlicensed users to operate in the same bands, and in the same location, by utilizing a spectrum access system (“SAS”) to subdivide the spectrum by time and assign it to users on an opportunistic basis.⁸

While the three-tiered licensed-lite framework, and the similar license assisted access (“LAA”) framework being standardized by 3GPP,⁹ both hold tremendous promise, they are, as of yet, largely unproven policies. Only time will tell whether these more flexible licensing frameworks will yield superior outcomes when compared with the traditional approach of allocating licensed and unlicensed spectrum to different bands. Their added flexibility *may* foster greater investment from network operators and equipment manufacturers, and result in greater utilization of the spectrum by users, thereby promoting the public interest and consumer welfare. However, it may be that the decreased uncertainty from flexible licensing — when compared to the traditional licensing approach — and/or doubt over the efficacy of a SAS actually *reduces* investment and spectrum utilization, thereby harming consumers and the public interest. Or it may be that a flexible licensing framework produces outcomes that are not significantly different than those produced by a traditional licensing framework, and that the benefits from developing and implementing a SAS do not justify the costs.

The prescient PCAST Report contained a lot of good new ideas, and the FCC is right to pursue them in its quest to better serve the communications needs of all Americans. But no technocrat, however wise or well-informed could possibly know how the wireless market will

⁶ Exec. Office of the President: President's Council of Advisors on Sci. & Tech., *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, at 22–27 (July 2012), available at <https://goo.gl/XshAbR>.

⁷ See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550–3650 MHz Band, *Report and Order and Second Further Notice of Proposed Rulemaking*, GN Docket No. 12-354 (Apr. 17, 2015), available at <https://goo.gl/BWHanS>.

⁸ *Id.*

⁹ See, e.g., Ericsson, *LTE License Assisted Access* (Jan. 2015), available at <http://goo.gl/GWsorS>.

evolve, and which regulatory policies will be most suitable to support such evolution going forward. Thus, with this crucial proceeding, the FCC must tread carefully. On the one hand, it must continue experimenting with new policies and frameworks in its effort to support future communications needs, but, on the other, it cannot afford to risk the future of 5G in America on unproven theories.¹⁰

The Commission should therefore heed basic actuarial principles: instead of putting all of its eggs into a single regulatory basket, it should instead distribute risk by utilizing a healthy mix of old and new ideas. That means resisting the calls of some commenters to go all-in on the flexible licensing model, developing SASs to govern access to *all* of the mmWave bands.¹¹ Instead, the Commission should use the flexible three-tiered licensing model for only *some* of the bands, while also setting aside ample allotments for traditional licensed and unlicensed uses, which are regulatory regimes already proven to support innovation and growth.¹² This mix would provide the appropriate balance of old and new policies. It will give industry enough certainty to begin testing and deploying 5G technologies as soon as possible, while also providing long-term flexibility to increasingly transition to more flexible licensing frameworks if they are proven to be a superior alternative to traditional licensing models.

Maximizing Investment and Unleashing Competition

The United States' complete domination in the wireless industry is no accident. The transition from beauty contests to a market-based system for spectrum set in motion unprecedented growth in the wireless sector — with Verizon alone having invested more than \$100 billion in wireless network infrastructure since 2000 under that framework,¹³ licensed spectrum generating \$400 billion in annual economic activity,¹⁴ and unlicensed spectrum generating billions more. Moving forward, the FCC must continue to provide innovators, investors, and operators the certainty they require to maximize the value of this spectrum.

Much of the investment in mmWave spectrum needed to make 5G possible will come from companies that already hold spectrum licenses, and leveraging low-band spectrum (with its

¹⁰ See, e.g., Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of Verizon*, GN Docket No. 14-177, at 4–5 (Jan. 28, 2016), available at <http://goo.gl/XSBAs9>; Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of AT&T*, GN Docket No. 14-177, at 14 (Jan. 28, 2016), available at <http://goo.gl/1493qS>.

¹¹ See, e.g., Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of Open Technology Institute at New America and Public Knowledge*, GN Docket No. 14-177 (Jan. 28, 2016), available at <http://goo.gl/SGCSvu>.

¹² See, e.g., *Verizon Comments* at 13; Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of CTIA*, GN Docket No. 14-177, at 11–19 (Jan. 28, 2016), available at <http://goo.gl/Upwwjc>.

¹³ *Verizon Comments* at 2.

¹⁴ *CTIA Comments* at 12.

superior propagation and penetration) with mmWave spectrum (with its short-range ultra-high capacity) might enable a wireless company to compete head-to-head with wired ISPs in the residential broadband market. Thus, while the FCC should certainly use its authority under Section 309(j)¹⁵ to try to encourage new entrants into mmWave and 5G,¹⁶ it should not hamstring companies that have already risked large investments to acquire licenses and build out wildly successful wireless infrastructure.

The FCC seems to consider going down this path. Following on from its mobile spectrum holdings order in May 2014¹⁷ — adopted during the same open meeting as the Open Internet NPRM,¹⁸ both by a bare majority along party lines — the Commission inquires whether its spectrum screen and case-by-case review process for spectrum transfers on the secondary market should be expanded to cover mmWave spectrum and, if so, how?¹⁹ That the FCC would once again seek to expand its regulatory power over a highly innovative and competitive market — despite being out of its institutional depth — is hardly a surprise. The FCC’s ersatz competition regime bears none of the hallmarks of the FTC and DOJ’s antitrust authority, lacking in economic rigor and using a hopelessly vague and amorphous standard.²⁰

What *is* surprising is that — to its credit — the FCC declares that it is “disinclined to include [mmWave] spectrum bands in the spectrum screen,” due in part to the nascent state of mmWave technology and the corresponding standards.²¹ This is absolutely the right decision, and we strongly encourage the Commission to stick to it. With mmWave spectrum and 5G, there is as of yet no telling what way the technology will develop or how it will be used. It may be that large contiguous blocks of spectrum are needed, or that techniques to utilize small non-contiguous blocks of spectrum spread over a wide range of frequencies are actually preferable. Similarly, to the extent that the FCC’s current mobile spectrum holdings policy simply counts the amount of spectrum a carrier has in a particular market to determine whether such market is competitive, this policy makes even less sense when it comes to mmWave spectrum and 5G. It may well be that, unlike 4G-LTE, 5G splinters into competing standards, like the GSMs and

¹⁵ 47 U.S.C. § 309(j).

¹⁶ For example, commenter Angie Communications USA B.V. reportedly plans to invest approximately \$18.5 billion in the United States by 2021. Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of Angie Communications USA B.V.*, GN Docket No. 14-177 at 1-2 (Jan. 28, 2016), available at <http://goo.gl/m70vXd>.

¹⁷ Policies Regarding Mobile Spectrum Holdings, *Report and Order*, WT Docket No. 12-269 (May 15, 2014), available at <https://goo.gl/PBHf1g>.

¹⁸ Protecting and Promoting the Open Internet, *Notice of Proposed Rulemaking*, GN Docket No. 14-28 (May 15, 2014), available at <https://goo.gl/FlowHO>.

¹⁹ NPRM, ¶¶ 190–92.

²⁰ See, e.g., Randolph J. May, *The Public Interest Standard: Is it too Indeterminate to be Constitutional*, 53 FED. COMM. L. J. 427 (2001), available at <http://goo.gl/vT3MkW>.

²¹ *Id.* ¶ 192.

CDMAs of yore, and that carriers compete mainly by trying to obtain the most spectrally efficient technologies, rather than by trying to simply amass as much spectrum as possible.

The FCC simply cannot know at this point in time precisely how mmWave spectrum holdings will factor into competition in 5G, so, rather than press on to regulate this area and perhaps stifle innovation and investment in the crib, it is best advised to take a wait-and-see approach. Insofar as the FCC, a sector-specific regulator with expertise in communications, should be doing competition policy, it should be acting mainly as fact-finder and expert witness for the FTC and DOJ, who have a more workable standard (“consumer welfare”) and more rigorous economic grounding than the FCC.²²

Harmonizing Fixed Terrestrial and Satellite Wireless Operations

In addition to questions about 5G mobile technology, the NPRM raises important questions with regard to microwave and satellite wireless service. Satellite wireless technology will be crucial in connecting the remaining 4+ billion unconnected people in the world — particularly for those in developing countries without legacy wireline infrastructure, such as India²³ — but it will also provide valuable service to those in more developed countries, including underserved rural areas of the United States.

And although satellite technology cannot currently provide residential broadband access at speeds fast enough to meet the FCC’s 25/3 Mbps benchmark,²⁴ technology upgrades and access to more spectrum may soon change this and enable Americans everywhere to get access to broadband fast enough to meet the FCC’s benchmark.²⁵ (Meanwhile, growing numbers of Americans will use satellite broadband, even if the FCC declares, solemnly, that their service is not fast enough to qualify as “broadband” at all.) Just last week ViaSat and Boeing announced a partnership deal to launch three satellites, each capable of 1 Tbps throughput, to start serving

²² See, e.g., TechFreedom and Int’l Ctr. for L. & Econ., *Letter to Chairmen Fred Upton and Greg Walden, U.S. House of Representatives Energy and Commerce Committee, Communications and Technology Subcommittee, in Response to White Paper #3* (June 16, 2014), available at <https://goo.gl/dhQEWh>.

²³ Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of O3B Limited*, GN Docket No. 14-177, at 15 (Jan. 28, 2016), available at <http://goo.gl/jbykmw>.

²⁴ See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, *2016 Broadband Progress Report*, GN Docket No. 15-191, ¶ 3 (Jan. 28, 2016), available at <http://goo.gl/ec02BX>.

²⁵ See, e.g., Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of ViaSat, Inc.*, GN Docket No. 14-177, at 5 (Jan. 28, 2016), available at <http://goo.gl/M6lkf8>.

broadband to commercial airliners, maritime operations, and other hard-to-reach areas in the coming years.²⁶

The FCC must ensure that its spectrum policies going forward support both new technologies for satellite wireless services and 5G and microwave technologies for terrestrial wireless services. Tackling both terrestrial and future satellite wireless operations in the same proceeding may seem overly ambitious, but in reality it is the only feasible way to go about it, since the two types of wireless services are increasingly going to be interrelated and operating in similar or adjacent spectrum bands. Thus, it is the task of the FCC to ensure that terrestrial wireless operations do not interfere with satellite wireless operations, and to ensure that satellite wireless operations are not disrupted by the atmospheric balloons and drones increasingly used to deliver broadband to those in developing countries.²⁷

Conclusion

In its quest to unleash the next spectrum frontiers, the Commission asks many important questions, and puts forth some promising proposals. But as the FCC embarks on this mission, it would do well to remember and bear in mind the Russian proverb: “Dwell on the past and you’ll lose an eye; forget the past and you’ll lose both eyes.”²⁸ New ideas and methods are worth pursuing, but they must be buttressed by traditional methods as well, which will guarantee investment and value in the near term.

Although it is not within the scope of this proceeding, it also is worth noting the other missing piece from the path to 5G and the spectrum frontiers: infrastructure deployment. A crucial feature of mmWave spectrum is the need for much denser deployments, with smaller transmitters, such as distributed antennae systems and small cells — especially on public rights of way or assets, potentially including street lamps, stop lights, parking meters, and the like.

Coordinating with states and localities on such matters to develop best practices, if not Federal rules or model legislation, would be a far better use of the FCC’s time and resources than, for example, micromanaging the design of increasingly obsolete set-top boxes. It would also be a better way to implement the agency’s mandate to use its authority to promote broadband

²⁶ See, e.g., Sean O’Kane, *New 1-Terabit Internet Satellites Will Deliver High-Speed Internet to Remote Areas*, THE VERGE (Feb. 10, 2016), available at <http://goo.gl/xeY02V>.

²⁷ Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of Google, Inc.*, GN Docket No. 14-177, at 5-6 (Jan. 28, 2016), available at <http://goo.gl/rYLwJ8>; Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, *Comments of Facebook, Inc.*, GN Docket No. 14-177, at 5 (Jan. 28, 2016), available at <http://goo.gl/EJH9wr>.

²⁸ See *History of Painters, Russian Proverbs, Old Sayings and Customary Wisdom*, available at <http://goo.gl/rLuuMJ> (last visited Feb. 26, 2016).

deployment and competition, especially of new services, under Section 706 of the Telecommunications Act of 1996.²⁹

²⁹ *See, e.g.*, Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, *Reply Comments of TechFreedom & ICLE*, GN Docket No. 14-126 (Apr. 6th, 2015), available at <http://goo.gl/3uVhYQ>.