July 31, 2017

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street S.W.
Washington, D.C. 20554

Re: Written Ex Parte, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, et al.*, GN Docket No. 14-177, IB Docket No. 15-256, RM-11664, WT Docket No. 10-112, IB Docket No. 97-95

Dear Ms. Dortch:

Mobile Future submits this letter in the above-referenced dockets to urge the Commission to move as quickly as possible in the "*Spectrum Frontiers*" proceeding[1] to 1) auction the high-band spectrum identified in the *Spectrum Frontiers Order*, 2) adopt rules for the additional spectrum bands identified in the Further Notice of Proposed Rulemaking, and 3) approve pending secondary market transactions as quickly as possible. The Commission must also leave intact the elegant and practical compromise framework adopted in the *Spectrum Frontiers Order* that balances terrestrial and satellite user interests to facilitate 5G services while providing flexibility for satellite users to operate in the band. As the Commission moves forward with efforts to free up additional millimeter wave spectrum, it should not simultaneously take a step backward by altering the careful compromise adopted in the *Spectrum Frontiers Order*. Taking these actions will ensure that consumers and businesses will more quickly be able to take advantage of the substantial benefits of 5G.

Promptly Making Available High-Band Spectrum Will Speed 5G Deployment.

The high-band spectrum identified in the Spectrum Frontiers proceeding will form an important component of providers' portfolio of spectrum for 5G services in the United States. As the Commission recognized in the *Spectrum Frontiers Order*, "[m]oving quickly to make

[1] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8031-38, 8048-52 ¶¶43-60, 88-93 (2016) ("*Spectrum Frontiers Order*" or "*Spectrum Frontiers FNPRM*").

[millimeter wave spectrum] available in the near term will best enable potential users, technology developers, and innovators to have relative certainty about the spectrum structure in the mmW bands for these new uses."[2] The Commission can achieve this objective by moving quickly to auction the spectrum in the 28, 37 and 39 GHz bands already identified in the *Spectrum Frontiers Order* and accelerating its push to find even more millimeter wave spectrum suitable for flexible licensed use, including spectrum in the 24 GHz, 32 GHz, 42 GHz, 47 GHz, 50 GHz, 71-76 GHz, and 81-86 GHz bands, and potentially above 95 GHz as explored in the FNPRM.[3] The Commission noted in the *Spectrum Frontiers FNPRM* that it is exploring additional bands "to ensure that mmW band spectrum is utilized as fully and efficiently as possible."[4] Consistent with that objective, earlier this year Chairman Pai stated that his goal is "to open up even more spectrum in the millimeter wave bands for 5G and other uses," and that he intends "to move forward quickly to do just that."[5] Commissioners Michael O'Rielly and Mignon Clyburn have also highlighted the need for swift action; when the Commission adopted the *Spectrum Frontiers Order*, Commissioner Clyburn highlighted that "America is leading the way,"[6] and just this week Commissioner O'Rielly called for the Commission to license the auctioned bands "as soon as possible"[7] The Commission can also achieve its objective to make mmW band spectrum available in the near term for potential users, technology developers and innovators by accelerating the review process and approving secondary market transactions that promise to put spectrum in the 28 and 39 GHz bands to work quickly. Taking these actions will ensure continued U.S. leadership in the wireless sector as the world moves towards 5G.

Network operators in the United States have made great advancements in developing 5G services. In May, Verizon demonstrated a pre-commercial 5G test network providing a consistent 1.6 Gbps connection to power a whole home in Speedway, Indiana, including multiple 4K screens streaming video, a live 4K VR stream from the Indy 500 track, and smart devices like Google Home, Ring Doorbell, and Phillips Hue Lighting.[8] At the Indianapolis Motor Speedway, Verizon completed a test showing consistent 5+ Gbps mobile speeds with a vehicle driving 60

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[2] *Id.* at 8020 ¶ 7.

[3] *Id.* at 8023-8101, 8144-8170 ¶¶ 17-254, 369-445.

[4] *Id.* at 8144, ¶ 369.

[5] Ajit Pai, Chairman, FCC, Remarks at Carnegie Mellon University's Software Engineering Institute, "Bringing the Benefits of the Digital Age to All Americans" at 8 (Mar. 15, 2017), https://apps.fcc.gov/edocs_public/attachmatch/DOC-343903A1.pdf.

[6] *Spectrum Frontiers Order*, Statement of Commissioner Mignon L. Clyburn, 31 FCC Rcd at 8273.

[7] Remarks of FCC Commissioner Michael O'Rielly before the Free State Foundation, Washington, DC, "Next Generation 5G Wireless Networks: Seizing the Opportunities and Overcoming the Obstacles" (Jul. 25, 2017), http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0725/DOC-345941A1.pdf.

[8] Steven Van Dinter and Jason Moriber, *Verizon 5G Fuels Imaginations of Indy 500 Fans*, Verizon (May 26, 2017), http://www.verizon.com/about/news/verizon-5g-fuels-imaginations-indy-500-fans.

mph around the track.[9] These recent developments build on the company's February announcement that it would deliver 5G pre-commercial services to customers in 11 markets across the country on its newly built 5G network.[10] AT&T has announced plans to launch standards-based mobile 5G as soon as late 2018.[11] Earlier this year, the company moved into new rounds of 5G testing in Austin, Texas and Indianapolis, Indiana, and announced that it expects to achieve data rates of 1 Gbps by the end of 2017.[12] T-Mobile recently announced plans to launch a national 5G network by 2020, with rollout beginning in 2019.[13] Equipment manufacturers Ericsson and Nokia have been involved in multiple 5G trials with a variety of partners.[14] And Samsung recently unveiled its end-to-end portfolio of 5G mobile network products and solutions, with pre-commercial versions of the equipment already under deployment in trial networks.[15] By 2022, technologists predict that 25 percent of North American mobile subscriptions will be 5G connections.[16]

The global race to deploy 5G is heating up, however, and countries across the world are sprinting ahead. China recently finished planning its 30-site 5G test field in Beijing, which will include a wide range of vendors including Huawei, ZTE, Ericsson, Nokia, Datang, and Samsung.[17] In addition, China Mobile and Huawei demonstrated augmented and virtual reality applications using mmW and sub-6 GHz spectrum simultaneously to deliver 22 Gbps throughput

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[9] *Id.*

[10] Press Release, *Verizon to Deliver 5G Service to Pilot Customers in 11 Markets across U.S. by Mid 2017* (Feb. 22, 2017), http://www.verizon.com/about/news/verizon-deliver-5g-service-pilot-customers-11-markets-across-us-mid-2017.

[11] Andre Fuetsch, *Accelerating 5G: Faster Timeline Means First Standardized Mobile 5G Services Coming as Soon as Late 2018*, AT&T Innovation Blog (Mar. 14, 2017), http://about.att.com/innovationblog/standardized_5g.

[12] *AT&T Network 3.0 Indigo Redefining Connectivity through Software Control, Big Data, and Blazing Speed*, AT&T Newsroom (Feb. 1, 2017), http://about.att.com/story/indigo_redefining_connectivity.html.

[13] Jon Fingas, *T-Mobile Plans to Launch a National 5G Network by 2020*, Engadget (May 2, 2017), https://www.engadget.com/2017/05/02/t-mobile-plans-national-5g-network-by-2020/.

[14] Jon Gold, *2016 – The Year 5G Wireless Testing Took Off* (Nov. 21, 2016), http://www.networkworld.com/article/3143106/mobile-wireless/2016-the-year-5g-wireless-testing-really-took-off.html.

[15] *Samsung Announces Complete Portfolio of Commercial 5G Products and Solutions* (Feb. 26, 2017), http://www.samsung.com/global/business/networks/insights/news/samsung-announces-complete-portfolio-of-commercial-5g-products-and-solutions.

[16] Ericsson, *Ericsson Mobility Report*, at 9 (June 2017), https://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-june-2017.pdf.

[17] Juan Pedro Tomas, *China Completes Plan for 5G Test Field in Beijing* (May 31, 2017), http://www.rcrwireless.com/20170531/5g/china-test-planning-5g-tag23.

and latency under 0.5 milliseconds.[18] ZTE announced the successful completion of seven major tests and cell throughput exceeding 19 Gbps in sub-6 GHz spectrum.[19] Japan's Ministry of Internal Affairs and Communications recently launched a 5G system trial in Tokyo as well as in rural areas, which is expected to continue in the run up to commercial launches in 2020.[20] SoftBank and Ericsson announced plans to conduct a 5G test in the 28 GHz band,[21] and NTT Docomo recently completed a 5G trial in the 39 GHz band with 1.3 Gbps peak throughput for a single user at a distance of 1.5 kilometers.[22] South Korea plans to complete deployment of a commercial 5G mobile network in the second half of 2019, while KT is planning to run 5G trials in PyeongChang before and during the 2018 Winter Olympics.[23] Finland's Ficora has granted thirteen radio licenses to different organizations for 5G testing in Finland.[24]

Ultimately, the race to 5G will be won by those who can raise the necessary capital and deploy 5G networks the fastest. "Light touch" policies and positive and constructive regulatory certainty create the best atmosphere to achieve these goals. It is therefore imperative that the Commission act as quickly as possible to auction the high-band spectrum identified in the *Spectrum Frontiers Order*, adopt rules for the additional spectrum bands identified in the *FNPRM*, and speed approval of pending secondary market transactions.

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[18] Sean Kinney, *5 Huawei 5G trials: Focus on MIMO, mm wave and network slicing*, RCR Wireless News (Apr. 21, 2017), http://www.rcrwireless.com/20170421/fundamentals/huawei-5g-trials-tag17-tag99.

[19] News Release, *ZTE Sets Multiple Industry Records in Phase 2 of China's National 5G Tests* (July 3, 2017), http://www.zte.com.cn/global/about/press-center/news/201707ma/0705ma2.

[20] Juan Pedro Tomas, *Japan Launches 5G Trial System in Tokyo and Rural Areas*, RCR Wireless News (May 30, 2017), http://www.rcrwireless.com/20170530/carriers/japan-5g-trial-system-tokyo-tag23?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+rcrwireless%2FsLmV+%28RCR+Wireless+News%29.

[21] Sean Kinney, *5 Ericsson 5G partnerships: SoftBank, Vodafone, Telstra, Chungwa, NTT DoCoMo* (Apr. 17, 2017), http://www.rcrwireless.com/20170417/fundamentals/20170417fundamentalsericsson-5g-softbank-vodafone-telstra-tag17-tag99.

[22] *DOCOMO, Huawei Showcase 5G NR in 39-GHz*, The Fast Mode (Jul. 5, 2017), https://www.thefastmode.com/technology-solutions/10873-docomo-huawei-showcase-5g-nr-in-39-ghz.

[23] Juan Pedro Tomas, *South Korea to Launch First Commercial 5G Network in 2019*, RCR Wireless News (May 25, 2017), http://www.rcrwireless.com/20170525/5g/south-korea-launch-first-commercial-5g-network-2019.

[24] Telecompaper, *Finland's Ficora Grants 13 Licenses for 5G Tests* (May 24, 2017), https://www.telecompaper.com/news/finlands-ficora-grants-13-licences-for-5g-tests--1197316.

The Spectrum Frontiers Order Reflects a Compromise between Satellite and Terrestrial User Interests That Should Not Be Disturbed.

At the same time, the Commission should not take any actions that will upset the balanced framework adopted in the *Spectrum Frontiers Order*. The final compromise unanimously agreed to by all of the Commissioners was carefully crafted to facilitate 5G terrestrial operations in the mmW bands while providing flexibility for satellite users of the spectrum. As Commissioner Clyburn stated, "Each of us has worked diligently to craft a regulatory regime that carefully balances the needs of all stakeholders invested in the future of the 28 GHz, 37 GHz and 39 GHz bands."[25] The Commission should reject requests from satellite parties to upset that balance.

Before the Commission adopted the rules in the *Spectrum Frontiers Order*, satellite operations were permitted only on a secondary basis in the 27.5-28.35 GHz ("28 GHz") band.[26] Prior to last year's Order, satellite operations in the 37.5-40 GHz band were co-primary, but could only deploy gateway earth station operations if they held a 39 GHz terrestrial license or had an agreement with the terrestrial license holder.[27] In the *Spectrum Frontiers NPRM*, the Commission proposed changes to the satellite licensing framework to allow additional satellite use of the spectrum while ensuring that new terrestrial mobile operations were enabled. As the rulemaking progressed, the Commission made several additional changes to the proposed framework at the request of satellite operators. For example, the proposal in the NPRM limited FSS earth stations to one location in each market, but the Commission ultimately allowed three locations per market following specific satellite operator requests in the docket.[28]

Further, the Commission made clear in the *Spectrum Frontiers Order* that if a satellite operator seeks additional access to mmW spectrum, it is free to participate in the auction for spectrum or to obtain spectrum licenses on the secondary market.[29] The Commission need not upset the balanced compromise framework adopted in the *Order* for satellite operators to expand their operations, and should instead allow all participants to compete on the open market for access to additional spectrum rights.

Pursuant to Section 1.1206 of the Commission's rules, a copy of this letter is being filed via ECFS. Please do not hesitate to contact the undersigned with any questions.

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[25] *Spectrum Frontiers Order*, Statement of Commissioner Mignon Clyburn, 31 FCC Rcd at 8273.

[26] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878, 11917 ¶ 127.

[27] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878, 11926 ¶ 161.

[28] *Spectrum Frontiers Order*, 31 FCC Rcd at 8036 ¶ 54.

[29] *Id*.

Sincerely,

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