

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

)	
In the Matter of)	
)	Docket No. _____
AT&T Petition for a Rulemaking to)	
Establish a Mid-Band Spectrum Screen)	
)	

**PETITION FOR A RULEMAKING TO ESTABLISH
A MID-BAND SPECTRUM SCREEN**

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PETITION FOR RULEMAKING

Pursuant to 47 C.F.R. § 1.401, AT&T Services, Inc., on behalf of itself and its affiliates (collectively, “AT&T”), respectfully petitions for a rulemaking to fill a critical gap in the Commission’s current spectrum aggregation rules. The Commission has already adopted separate mechanisms to address aggregation of low-band and high-band spectrum, respectively. But it has not yet adopted rules to address undue aggregation of mid-band spectrum, which—as all acknowledge—is a uniquely indispensable asset in any 5G provider’s spectrum portfolio. Such rules are needed to ensure that every provider has a fair and efficient opportunity to acquire the mid-band spectrum it needs to provide consumers with high-quality 5G services, free from anticompetitive foreclosure strategies. Such rules are likewise needed to answer the President’s call for measures “designed to help avoid excessive concentration of spectrum license holdings in the United States, so as to prevent spectrum stockpiling, warehousing of spectrum by licensees, or the creation of barriers to entry.”¹ The Commission should thus ensure continued mobile competition in the 5G era by conducting enhanced review of spectrum acquisitions that would cause a provider to hold more than one-third of unpaired mid-band spectrum.²

INTRODUCTION AND SUMMARY

Like the 3G and 4G/LTE transitions before it, the 5G revolution will exponentially increase the scope and volume of wireless communications in America. Acting Chairwoman

¹ Exec. Order No. 14,036, [Promoting Competition in the American Economy](#), 86 Fed. Reg. 36,987, § 5(I)(ii) (July 14, 2021).

² AT&T does not propose to apply these rules to aggregations that might result from Auction 110. That auction is underway, and the Commission has already adopted an *ex ante* auction-specific cap in lieu of a post-auction spectrum-aggregation analysis. See Second Report and Order, *Facilitating Shared Use in the 3100-3550 MHz Band*, 36 FCC Rcd. 5987, ¶¶ 103-04 (2021) (“3.45 GHz Order”). AT&T does not propose to change that or any other aspect of the Auction by this filing. All discussion of future auctions in this document is intended to exclude Auction 110 unless it is explicitly referenced by name.

Rosenworcel has observed that, “[w]ith speeds as much as 100 times faster than present networks and much lower latency, these networks will kickstart the next big digital transformation.”³ But she added that “to lead in this next generation of connectivity, we need smarter spectrum policy”—and, in particular, a sharper focus on building a strong and competitive “ecosystem in *mid-band airwaves*.”⁴

The Commission has used varying definitions of “mid-band” in the past, depending on the spectrum needs of each successive generation of wireless technologies. In a 5G environment, mid-band spectrum is properly categorized as the expanse from 2.5 GHz to 6 GHz. Unlike legacy mobile spectrum between 600 MHz and 2.5 GHz, mid-band spectrum is unencumbered by licensing policies designed for prior-generation technologies: it is both unpaired and available in the wide contiguous swaths needed for the highest-performance 5G functionality. Its shorter wavelengths also permit greater use of capacity-enhancing “massive MIMO” antenna arrays. And unlike spectrum above 6 GHz (such as millimeter wave), mid-band spectrum has the propagation characteristics needed to support wide-area networks covering urban and suburban neighborhoods. As the Commission has found, this mid-band spectrum is “critical” to any provider’s “5G buildout due to its desirable coverage, capacity, and propagation characteristics.”⁵

The Commission has begun taking much-needed steps to unlock the full potential of mid-band spectrum for commercial 5G uses, including the C-Band (3.7 GHz) auction completed

³ Statement of Jessica Rosenworcel, *Industries of the Future: Hearing Before the S. Comm. on Commerce, Sci., & Transp.*, 116th Cong. at 1 (2020), <https://docs.fcc.gov/public/attachments/DOC-361933A1.pdf>.

⁴ *Id.* at 2 (emphasis added).

⁵ Report and Order and Order of Proposed Modification, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, 35 FCC Rcd. 2343, ¶ 3 (2020) (“*C-Band Order*”).

earlier this year and the upcoming 3.45 GHz auction. But the Commission’s 5G strategy has a blind spot: in addition to its overall spectrum screen, it applies separate granular reviews of spectrum aggregation for low- and high-band spectrum but *not* mid-band.

Specifically, the Commission announced in 2014 that it would apply “enhanced review” to any provider’s aggregation of more than one third of spectrum below 1 GHz.⁶ AT&T opposed that approach because in its view—then and now—available spectrum below 1 GHz is essentially fungible with other legacy mobile spectrum below 2.5 GHz.⁷ But the Commission adopted enhanced review of sub-1 GHz spectrum anyway, erring on the side of more granular review of spectrum assets. In 2016, the Commission similarly determined that *high*-band spectrum in the 28 GHz, 37 GHz, and 39 GHz bands collectively represents a sufficiently unique product market that application of a spectrum screen specific to that spectrum is warranted.⁸

Whatever the merits of these individual screens for low- and high-band spectrum,⁹ it makes no sense to maintain them and *not* apply a similar screen for *mid*-band spectrum. Mid-

⁶ See Report and Order, *Policies Regarding Mobile Spectrum Holdings*, 29 FCC Rcd. 6133, ¶¶ 44-55 (2014) (“*Spectrum Holdings Order*”); Memorandum Opinion and Order, *Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, 34 FCC Rcd. 10578, ¶ 94 (2019) (“*TMO/Sprint Merger Order*”).

⁷ See *Spectrum Holdings Order* ¶ 64 (noting and dismissing AT&T’s position).

⁸ See Report and Order, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, 31 FCC Rcd. 8014, ¶¶ 184, 186-87 (2016) (“*2016 mmWave Order*”). Specifically, in 2016, the Commission adopted an *ex ante* one-third auction screen for millimeter wave spectrum, *see id.*, which it transitioned to an *ex post* case-by-case one-third screen in 2018, *see* Third Report and Order, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, 33 FCC Rcd. 5576, ¶ 34 (2018) (“*2018 mmWave Order*”). In 2017, the Commission adopted a one-third screen for millimeter wave in secondary market transactions. *See also* Second Report and Order, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, 32 FCC Rcd. 10988, ¶¶ 70, 74 (2017).

⁹ The low- and high-band spectrum screens are not identical in function. The former is applied as a supplement or enhancement to the “traditional” spectrum screen and involves a more stringent standard of review. *See Spectrum Holdings Order* ¶ 44. The latter is a separate, stand-alone screen with essentially the same standard of review as the “traditional” screen. *See 2018 mmWave Order* ¶ 34. As explained below, mid-band spectrum is a unique and critical input for the provision of 5G services, and thus a mid-band screen should require the same enhanced standard of review as the low-band screen.

band licenses are the most important input in any wireless provider’s portfolio of 5G spectrum assets—and, not coincidentally, are also the most likely to become the subject of anticompetitive foreclosure strategies. As the Commission has found, a provider with a sizable share of any essential spectrum input may seek to enlarge its holdings of that input “not because it will put the spectrum to its highest use, but because it is motivated to engage in a foreclosure strategy” in which it “keep[s] spectrum out of the hands of potential competitors.”¹⁰ The risk of that anticompetitive outcome is far greater for mid-band spectrum than it was for low- and high-band spectrum holdings when the Commission imposed individualized screens for them.

Yet the current rules do little to prevent that outcome. Instead, they apply only the highly diluted overall spectrum screen to acquisitions of additional mid-band spectrum, inaccurately treating that spectrum as though it were fungible with other spectrum, while applying more granular scrutiny to acquisitions of spectrum below 1 GHz even though that spectrum actually *is* fungible with other bands (*e.g.*, PCS and AWS).

Although all major U.S. wireless providers have the spectrum assets they need to compete in the near term, there is already a substantial imbalance in the mid-band spectrum holdings of leading 5G providers, the result of historical accident and past Commission policies. T-Mobile holds a vast percentage of such spectrum because, over the years, its corporate predecessors Sprint and Clearwire quietly accumulated enormous EBS/BRS assets in the 2.5 GHz band. They did so outside of any auction context and downplayed that band’s utility to keep it out of the spectrum screen.¹¹ The Commission then approved T-Mobile’s acquisition of Sprint without requiring *any* spectrum divestitures. In so doing, the Commission both abandoned

¹⁰ *Spectrum Holdings Order*, ¶¶ 62, 64.

¹¹ See Memorandum Opinion and Order, *Sprint Nextel Corp. & Clearwire Corp.*, 23 FCC Rcd. 17570, ¶¶ 56-59 (2008).

its previous commitment to maintaining four genuine nationwide providers¹² and trivialized its overall spectrum screen, which the combined T-Mobile/Sprint far exceeds in large swaths of the country.¹³ The Commission also designed an upcoming “auction” for the remaining 2.5 GHz assets that, in then-Commissioner Rosenworcel’s words, “structurally advantages a single nationwide carrier”—T-Mobile.¹⁴ As the beneficiary of all this regulatory largesse, T-Mobile openly boasts to Wall Street that it plans to dominate the wireless market by exploiting this “winning hand,” which will confer (in its words) a “lasting advantage” over its rivals and enable it to “grow ... at a pace that can’t be matched.”¹⁵

Nothing stops T-Mobile—or any other provider that gains a substantial percentage of mid-band spectrum—from overpaying for yet more mid-band spectrum as part of the foreclosure strategy the Commission foresaw in 2014. Although the Commission’s traditional spectrum

¹² See Michael J. de la Merced, *Sprint and SoftBank End Their Pursuit of a T-Mobile Merger*, N.Y. Times (Aug. 5, 2014), <https://dealbook.nytimes.com/2014/08/05/sprint-and-softbank-said-to-abandon-bid-for-t-mobile-us/> (“[A] proposed combination of Sprint and T-Mobile, uniting the third- and fourth-biggest carriers in the United States, had been fiercely questioned by officials at both the Federal Communications Commission and the Justice Department. In 2011, AT&T’s attempts to buy T-Mobile for \$39 billion failed after the Obama administration sued to block the deal.”).

¹³ See *TMO/Sprint Merger Order* ¶ 97 & Appx. D.

¹⁴ Report and Order, *Transforming the 2.5 GHz Band*, 34 FCC Rcd. 5446, at Statement of Commissioner Jessica Rosenworcel Approving in Part, Dissenting in Part, at 1 (2019) (“*2.5 GHz Order*”). That auction thus provides no opportunity for competitors to catch up, despite the Bureau’s recent suggestion to the contrary. See Memorandum Opinion and Order, *T-Mobile License LLC Cellco P’ship Applications for 3.7-3.98 GHz Band Licenses*, Auction No. 107, ULS File Nos. 0009446137, 0009446983, ¶¶ 4, 30 (WTB July 23, 2021) (“*Auction 107 Order*”). T-Mobile already controls most 2.5 GHz assets by virtue of its acquisition of Sprint. The residual 2.5 GHz licenses available in Auction 108 are “overlay” licenses for use in the generally non-populous “white space” areas between incumbent license areas, and any operations using those overlay licenses must protect against interference with incumbent operations, including T-Mobile’s. Public Notice, *Comment Sought on Competitive Bidding Procedures for Auction 108*, FCC 21-14, AU Docket No. 20-429, ¶ 2 n.1 (Jan. 13, 2021). No provider other than T-Mobile, therefore, could use these overlay licenses to support nationwide or even large regional deployments. See *2.5 GHz Order* ¶¶ 78-79 (observing that the percentage of population covered by the vacant and available EBS is only slightly over 15%, and that almost all of the incumbent EBS licenses are encumbered by long-term leases, most of which are with Sprint (now T-Mobile)).

¹⁵ Neville Ray, *The Current State of 5G*, T-Mobile Blog (Apr. 19, 2021), <https://www.t-mobile.com/news/network/the-current-state-of-5g>.

screen scrutinizes the percentage of *all* available spectrum any given provider can acquire, that traditional screen treats all spectrum assets as fungible even though they are not: legacy mobile (below 2.5 GHz), mid-band, and high-band spectrum are *each* essential inputs for any provider in a 5G environment. The traditional screen therefore cannot prevent providers with outsized mid-band assets from engaging in a foreclosure strategy designed to keep rivals from obtaining the mid-band assets they need.¹⁶ Just as the Commission has addressed analogous concerns by adopting more granular restrictions on any provider’s accumulation of low- and high-band spectrum, it should now do the same for mid-band spectrum.

The Commission should also enforce any mid-band spectrum screen with flexible but competitively effective divestiture remedies. It should act through provider-specific review of post-auction long-form license applications, not through *ex ante*, provider-agnostic caps on spectrum acquired in any given auction; such caps are simultaneously over- and under-inclusive as mechanisms for preventing undue spectrum aggregation. And the Commission should ensure that any divestitures required as part of its case-by-case review actually promote competition in a 5G environment. That will require divesting providers to sell excess spectrum assets to credible rivals in forms they can use to create wide channels of mid-band spectrum over large geographic regions.

¹⁶ The Bureau relied on this flaw in the rules when rejecting a recent challenge to the long-form applications of T-Mobile and Verizon in Auction 107. The Bureau noted that “enhanced factor” review applies only to “below-1-GHz spectrum,” and it thus analyzed those two providers’ mid-band holdings only under the overall screen, *Auction 107 Order* ¶ 27, whose large denominator grossly understates the competitive significance of those mid-band holdings. The Bureau then allowed T-Mobile and Verizon to exceed the diluted overall screen on the grounds that other providers have significant spectrum holdings today, *id.* ¶ 30, even though most of *those* assets are not, and are not fungible with, mid-band spectrum.

DISCUSSION

I. ANY PROVIDER CAN DELIVER ON THE PROMISE OF 5G PERFORMANCE ONLY IF IT CAN OBTAIN ACCESS TO WIDE AND CONTIGUOUS MID-BAND SPECTRUM CHANNELS.

If equipped with adequate spectrum resources, 5G networks will leapfrog LTE networks in performance, slashing latency and boosting speeds by orders of magnitude.¹⁷ Yet the promise of 5G depends critically on the availability of suitable spectrum assets. Similar transitions in the past—from analog to 2G, from 2G to 3G, and from 3G to LTE—enhanced network performance mainly by implementing more efficient radio standards to squeeze more capacity out of available spectrum. To some extent, the 5G transition will rely on such efficiencies as well: for example, 5G will operate with a lower control-signaling overhead and a somewhat higher bandwidth utilization. But the improvements 5G will achieve in speed and throughput will derive largely from each network’s access to superior spectrum resources—in particular, sub-6 GHz channels that are wide, unpaired, contiguous, and capable of supporting Massive MIMO technologies.

Such channels can be found today only in mid-band spectrum, which, in the Commission’s words, “is essential for 5G buildout due to its desirable coverage, capacity, and propagation characteristics.”¹⁸ To be sure, any successful 5G network will also need access to legacy mobile spectrum below 2.5 GHz for in-building penetration and coverage in rural areas

¹⁷ See, e.g., *5G Technology and Networks (Speed, Use Cases, Rollout)*, Thales Grp., <https://www.thalesgroup.com/en/markets/digital-identity-and-security/mobile/inspired/5G#:~:text=5G%20technology%20offers%20an%20extremely,1%2F1000%20of%20a%20second> (last updated Apr. 5, 2021) (5G offers “10 to 100x speed improvement over 4G and 4.5G networks” and “an extremely low latency rate . . . From 200 milliseconds for 4G, we go down to 1 millisecond (1ms) with 5G”) (emphases omitted); Josh Fruhlinger, *What Is 5G? Fast Wireless Technology for Enterprises and Phones*, NetworkWorld (Apr. 1, 2019), <https://www.networkworld.com/article/3203489/what-is-5g-fast-wireless-technology-for-enterprises-and-phones.html> (“5G wireless is an umbrella term to describe a set of standards and technologies for a radically faster wireless internet that ideally is up to 20 times faster with 120 times less latency than 4G, setting the stage for IoT networking advances and support for new high-bandwidth applications.”).

¹⁸ *C-Band Order* ¶ 3.

and to millimeter-wave spectrum for targeted capacity enhancements in unusually dense environments (*e.g.*, sports stadiums). But neither sub-2.5 GHz nor high-band holdings are a substitute for holdings of what T-Mobile aptly calls “the ‘goldilocks’ of spectrum” in the 5G era—mid-band spectrum between 2.5 GHz and 6 GHz.¹⁹

A. The Limitations of Legacy Mobile Spectrum.

Legacy mobile spectrum between 600 MHz and 2.5 GHz has excellent propagation characteristics, and all three nationwide providers have relied on it as they deploy the first phases of their 5G networks. But this legacy spectrum comes with a major disadvantage: it was allocated over the past four decades in non-contiguous pairs with limited channel sizes. That spectrum-allocation approach was well-tailored to accommodate legacy mobile technologies such as 2G, 3G, and LTE. Those technologies were designed for less demanding bandwidth needs and rely on frequency-division duplexing (“FDD”), which requires separate uplink and downlink bands separated by a duplex gap. But these narrow, paired, non-contiguous bands are not ideal for 5G technologies, which are optimized for time-division duplexing and need wider and contiguous spectrum bands to provide the fastest speeds and greatest capacity.

In particular, a contiguous channel of at least 80-100 megahertz of unpaired spectrum is likely to be table stakes for 5G network operators, given the unprecedented demands 5G will place on network capacity.²⁰ Wide, contiguous, and unpaired spectrum blocks are essential in a

¹⁹ Neville Ray, *The Current State of 5G*, *supra*.

²⁰ See, *e.g.*, GSMA, *3.5 GHz in the 5G Era*, at 2, 6, 8 (Apr. 2021), <https://www.gsma.com/spectrum/wp-content/uploads/2021/04/3.5-GHz-for-5G.pdf> (“For the 3.3-4.2 GHz frequencies, channels of 80-100 MHz are required for each operator to maximise the efficiency and affordability in the first phase of roll out. More capacity will be required as demand increases.”); Comments of Nokia, *Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, at 5 (Oct. 29, 2018) (“Nokia C-Band Comments”) (noting that China and other nations have allotted each provider “between 80 MHz to 130 MHz of [3 GHz] spectrum, providing the abundant bandwidth required for the feature sets, speed and performance to fuel the full potential of 5G. It is through these first-to-market, robust spectrum initiatives that these other countries seek to lead the ‘Race to 5G.’”).

5G environment for two basic reasons. First, they “will allow for gains in statistical multiplexing”: “[a]s the size of a radio channel increases, the available routes for communication traffic to flow increases more than proportionally due to the uneven nature of the traffic load.”²¹ Second, “[w]ider channels lower network density” and require fewer base stations; for example, “[d]ecreasing channel size from 100 MHz to 60 MHz in the 3.5 GHz range will require increasing the number of cell sites by 64%.”²² And those per-cell cost savings will translate into more cost-efficient and expeditious deployments of 5G networks across America.

It will not be feasible within the foreseeable future to refarm legacy mobile spectrum below 2.5 GHz to create the wide, contiguous, unpaired channels needed for optimal 5G performance. First, in most legacy sub-2.5 GHz bands, many different wireless providers hold narrow licenses on a locality-by-locality basis. The Commission has announced no plans to clear legacy mobile spectrum and repack existing licensees into more efficiently configured spectrum blocks—an enormous undertaking that would take many years to complete.

Meanwhile, in the absence of repacking, no individual provider could plausibly acquire all of the third-party licenses needed to create a contiguous 80-100 megahertz contiguous block of sub-2.5 GHz spectrum for its own use. To begin with, the third-party licensees typically need their existing slivers of spectrum to serve their own existing customers. And even if all incumbent licensees in this prospective 80-100 megahertz block were willing to sell, each could charge an inefficiently inflated price for ceding any narrow slice of spectrum that the buyer needs to assemble a wide contiguous block; such transactions would feature the same hold-out

²¹ Public Interest Statement (“TMO-Sprint P.I.S.”), *Applications of T-Mobile US, Inc. and Sprint Corp. for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, Appx. B, ¶ 46 (June 18, 2018) (declaration of T-Mobile Chief Tech. Officer Neville Ray).

²² GSMA, *3.5 GHz in the 5G Era*, *supra*, at 6.

dynamics familiar from the real estate industry. Finally, any 5G provider will need to continue devoting much of its own sub-2.5 GHz spectrum for LTE technologies using traditional paired blocks, in part to supplement its nascent 5G network and in part to support the millions of consumers with non-5G-capable devices.

Even apart from the complications caused by legacy spectrum allocation, simple physics creates another limitation for the use of sub-2.5 GHz spectrum for 5G. The long wavelengths associated with low-band frequencies can make it impractical to use Massive MIMO technologies, a key 5G innovation that uses multiple-antenna arrays to increase speed and capacity. In such arrays, the length of an antenna is directly proportional to the wavelength at issue and thus inversely proportional to the corresponding frequency. Antenna arrays designed for mid-band spectrum are “compact enough to be placed on ubiquitous items like utility poles.”²³ In contrast, Massive MIMO antenna housings for low-band spectrum below 1 GHz are “prohibitively large for deployment on typical supporting structures.”²⁴ As T-Mobile has explained, “smaller wavelengths mean that antennas optimized for that frequency can be smaller—meaning that more antenna elements can be placed in a given area or form factor,” producing “[g]reater efficiency gains.”²⁵

In addition, the unpaired nature of mid-band spectrum optimizes 5G performance because it allows the same frequency to be used for both uplink and downlink transmissions. That feature, known as “reciprocity,” enables network engineers to improve channel estimation and thus enhance signal reception. In contrast, channel estimation for FDD transmissions is generally

²³ Voqal Petition to Deny (“Voqal Pet. to Deny”), *Applications of T-Mobile US, Inc. and Sprint Corp. for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, Ex. A, ¶ 31 (Aug. 27, 2018).

²⁴ *Id.*

²⁵ TMO-Sprint P.I.S., *supra*, at 35.

less accurate and entails significant efficiency losses. Finally, because paired spectrum is non-contiguous, it typically involves the use of spectrum more distant from the center frequency of the antenna than unpaired spectrum does, and it is thus less conducive to Massive MIMO enhancement.²⁶

B. The Limitations of High-Band Spectrum.

In the contexts for which high-band spectrum is most often deployed, it offers enormous advantages. It can be used in wide, contiguous channels to provide breathtaking performance; for example, AT&T's 5G+ service uses mmWave spectrum to deliver download speeds of up to 1 Gbps in high-traffic areas.²⁷ But propagation limitations constrain the use of mmWave technologies to small-cell deployments in concentrated areas with unusually dense demand, such as city blocks, campuses, and stadiums.

Outside of those areas, deploying mmWave spectrum is generally cost-ineffective because of its short-range propagation characteristics. In particular, providers could not possibly deploy everywhere the dense web of countless microcells that would be needed to support ubiquitous coverage using only mmWave spectrum. The costs of such deployment would exceed by orders of magnitude the costs of less dense cellular infrastructure based on spectrum with better propagation attributes, and local zoning approvals for the millions of new microcell sites would take years to obtain in any event. Indeed, the Commission has relied on these “unique technical characteristics” in deciding not to include mmWave holdings in its traditional spectrum screen.²⁸

²⁶ Voqal Pet. to Deny, *supra*, Ex. A, ¶ 31.

²⁷ AT&T, *AT&T Announces Availability of Super-Fast 5G+ Service in Parts of Downtown Chicago* (Dec. 14, 2020), https://about.att.com/story/2020/5g_chicago.html.

²⁸ *2016 mmWave Order* ¶ 180.

C. The Indispensability of Mid-Band Spectrum.

For all of these reasons, the Commission has correctly determined that mid-band spectrum (2.5-6 GHz) is “essential” to a provider’s “5G buildout due to its desirable coverage, capacity, and propagation characteristics.”²⁹ Mid-band is, in the words of T-Mobile CTO Neville Ray, “the ‘goldilocks’ of spectrum.”³⁰ Because foreign policymakers have concluded the same thing, mid-band is also “the global sweet spot for 5G,” around which the worldwide network and device ecosystem is coalescing.³¹

T-Mobile stressed the must-have nature of mid-band spectrum when it persuaded the Commission to approve its acquisition of Sprint. It argued then that “[h]aving a diverse mix of spectrum assets is the foundation for implementing a robust 5G network” and that, without Sprint’s extensive mid-band spectrum assets, “[i]ts ability to roll out a robust 5G network [was] further challenged by its lack of available mid-band spectrum.”³² As T-Mobile contended, the 600 MHz spectrum it had recently deployed “provides superior coverage” but is otherwise inferior to mid-band spectrum because it is “constrained by its relatively low bandwidth and limited ability to efficiently support applications that require high data rates.”³³ Similarly, T-Mobile added, millimeter wave spectrum has inferior propagation characteristics that will confine its deployment to “limited areas,” and such spectrum thus “do[es] not address the need

²⁹ *C-Band Order* ¶ 3.

³⁰ Neville Ray, *The Current State of 5G*, *supra*.

³¹ *Id.*; see also p. 13-14, *infra* (noting East Asian initiatives); Comments of Ericsson, *Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, at 6 (Oct. 29, 2018) (“Ericsson 3.7 GHz Comments”) (describing mid-band as “the sweet spot of spectrum innovation”).

³² TMO/Sprint P.I.S. at 32.

³³ *Id.* at 21.

for mid-band spectrum to support many of the consumer benefits that New T-Mobile would be able to provide.”³⁴

In his supporting declaration, Neville Ray confirmed the same points. He singled out “[m]id-band spectrum” as an essential input because, compared to low-band spectrum, “there is more capacity that can be delivered from a single cell site,” and thus acquisition of Sprint would enable T-Mobile “to deploy a capacity layer of 2.5 GHz spectrum to provide much higher 5G data rates to consumers.”³⁵ Without these extensive mid-band holdings, he explained, T-Mobile would face major competitive limitations: “Our lack of access to significant amounts of available mid-band spectrum that is not encumbered by LTE subscribers ... will significantly limit our ability to provide a nationwide 5G system that can handle the most demanding high capacity 5G applications.”³⁶ He also noted that the value of mid-band spectrum is far more pronounced in 5G networks than LTE networks: “low-band spectrum will achieve a 19 percent improvement in average spectral efficiency (2.1 bps/Hz to 2.5 bps/Hz),” whereas “mid-band spectrum will achieve a 52 percent improvement in average spectral efficiency (2.5 bps/Hz to 3.8 bps/Hz) moving from LTE to 5G.”³⁷

Foreign regulators likewise recognize the indispensable role of mid-band spectrum in the 5G transition, and their policy choices have made mid-band the focus of the emerging global ecosystem for 5G equipment and devices. For example, China and other east Asian countries have assigned each licensee within their jurisdictions “between 80 MHz to 130 MHz of [3 GHz] spectrum, providing the abundant bandwidth required for the feature sets, speed and performance

³⁴ *Id.* at 22.

³⁵ *Id.*, Appx. B, at 18.

³⁶ *Id.*, Appx. B., at 10.

³⁷ *Id.*, Appx. B., at 26.

to fuel the full potential of 5G. It is through these first-to-market, robust spectrum initiatives that these other countries seek to lead the ‘Race to 5G.’”³⁸ And as mid-band spectrum becomes the “global sweet spot” for 5G deployments,³⁹ scale economies will lower the per-unit costs of 5G devices and equipment designed for mid-band operation, and international roaming agreements will likewise focus on reciprocal use of mid-band network assets.

Against this international backdrop, federal policymakers must enable America’s own commercial providers to tap the full potential of mid-band spectrum in the United States. In particular, they must not only free up additional mid-band spectrum for exclusive licenses,⁴⁰ but also ensure that each provider has a fair opportunity to obtain the wide contiguous channels it needs to compete effectively. As discussed below, only T-Mobile—by virtue of inheriting Sprint’s (and previously Clearwire’s) rights to the vast majority of 2.5 GHz spectrum—currently has access to mid-band spectrum suitable for 5G, and those holdings are substantial. No other provider will have access to significant mid-band spectrum until December 2021, when some of the recently auctioned C-Band spectrum becomes available, and even that spectrum will not become fully available until 2023 at the earliest. And the auction-specific cap in the 3.45 GHz auction, while well-intentioned, will prevent any provider from obtaining more than 40 MHz in that auction, far less than the 80-100 megahertz channels needed to achieve the high-end network

³⁸ Nokia C-Band Comments, *supra*, at 5. GSMA has likewise observed that Asian countries “have led the world in assigning 500 [megahertz] or more spectrum to mobile operators in the 3.5 GHz range.” GSMA, *3.5 GHz in the 5G Era*, *supra*, at 2.

³⁹ Neville Ray, *The Current State of 5G*, *supra*.

⁴⁰ Unlicensed spectrum—or practically unlicensed spectrum such as CBRS (3.5 GHz)—is no substitute for exclusive licenses in building out 5G networks, given the low-power and other restrictions necessary to accommodate competing use of the same spectrum by multiple network operators. *See, e.g.*, Ericsson 3.7 GHz Comments, *supra*, at 9 (noting that FCC rules—a “sharing arrangement, lower transmit power, and narrower channelization” “continue to limit the 3.5 GHz band’s utility for macro 5G deployments”).

performance that consumers increasingly enjoy in peer nations abroad and will come to expect in the United States.⁴¹

II. THE COMMISSION SHOULD ADOPT A SPECTRUM SCREEN SPECIFIC TO MID-BAND SPECTRUM.

The Commission should promptly ensure that, as new mid-band spectrum becomes available, rival wireless providers can bid for it on a level playing field, free from anticompetitive foreclosure strategies undertaken by one or two providers with the most such spectrum. To that end, the Commission should adopt a mid-band-specific screen before additional auctions of mid-band spectrum are scheduled to avoid the complex challenges associated with unraveling the spectrum positions of particular providers after the fact. Specifically, the Commission should keep unpaired mid-band spectrum in the overall screen but apply “enhanced review” to any acquisition of unpaired mid-band spectrum that would cause a provider to hold more than one-third of the total amount available.⁴² And the Commission should apply even greater scrutiny to acquisitions of unpaired mid-band spectrum by an entity that already holds more than one-third of unpaired mid-band spectrum in a particular area, as the Commission now does for low-band spectrum.⁴³

The Commission has adopted two types of spectrum screens in response to Congress’s mandate to promote competition “by avoiding excessive concentration of licenses.”⁴⁴ First, the

⁴¹ See Section III, *infra*.

⁴² Such enhanced review historically has involved requiring applicants to complete a General Information Request and provide, among other things, detailed deployment plans for the spectrum to be acquired, shapefiles showing the geographic coverage of all existing spectrum holdings in the market, and a detailed accounting of how existing spectrum holdings are being used. See, e.g., General Information Request Regarding the AT&T/Bluegrass Transaction, Questions for AT&T, *Applications of New Cingular Wireless PCS, LLC, Bluegrass Cellular, Inc., and Bluegrass Wireless LLC for Consent to Assign Licenses*, WT Docket No. 15-225 (Oct. 5, 2015).

⁴³ See *Spectrum Holdings Order* ¶ 287.

⁴⁴ 47 U.S.C. § 309(j)(3)(B).

Commission has long applied a general screen to overall holdings of spectrum deemed “‘suitable’ and ‘available’” for commercial services.⁴⁵ Second, as noted, the Commission has adopted more band-specific mechanisms for scrutinizing accumulations of spectrum that it deems to have unique technical characteristics and/or competitive importance—specifically, sub-1 GHz and mmWave spectrum. Those mechanisms reflect the Commission’s determinations that spectrum assets in each of those two categories are substitutable with other assets in the same category but not with assets in other spectrum bands.⁴⁶

Yet the Commission has adopted no analogous mechanism to scrutinize aggregation of mid-band spectrum, even though, as discussed, *that* spectrum is an essential input in any 5G provider’s spectrum holdings and is not fungible with spectrum below 2.5 GHz or above 6 GHz.⁴⁷ Simply lumping mid-band frequencies into an overall screen that includes non-fungible bands, with no other means of scrutinizing aggregation of mid-band spectrum *specifically*, is no safeguard against anticompetitive foreclosure. The Commission should promptly fill that gap in its rules. Mid-band spectrum is as technologically unique and essential to 5G as the Commission found low-band spectrum to be for 4G. As such, aggregation of mid-band frequencies above one-third of available spectrum should be subject to its own form of “enhanced factor” review. Although each major provider can handle 5G demand with its existing spectrum assets in the near term, the Commission should act to prevent any breakdown in competitive equilibrium, given the importance and relative scarcity of mid-band spectrum.

⁴⁵ *Spectrum Holdings Order* ¶ 71.

⁴⁶ *Id.* ¶ 286; *Spectrum Holdings Order* ¶ 3; *TMO/Sprint Merger Order* ¶ 94; *2018 mmWave Order* ¶ 34; *2016 mmWave Order* ¶ 186.

⁴⁷ *See C-Band Order* ¶ 3 (“Mid-band spectrum is essential for 5G buildout due to its desirable coverage, capacity, and propagation characteristics.”).

A. Spectrum Foreclosure Dynamics.

As a general rule, market forces, expressed through spectrum auctions and secondary market transactions, present the most efficient way to allocate scarce spectrum inputs among downstream wireless providers. The main exception to that rule arises when one or two providers obtain such a large percentage of a necessary spectrum input that they have an incentive to overpay to acquire still more—not because they need it to serve their customers, but because they would benefit from the downstream advantage they accumulate if they keep it out of the hands of their rivals.

The Department of Justice raised this precise concern with the Commission in 2013. It explained:

[D]ue to the scarcity of spectrum, the Department is concerned that carriers may have incentives to acquire spectrum for purposes other than efficiently expanding their own capacity or services. Namely, the more concentrated a wireless market is, the more likely a carrier will find it profitable to acquire spectrum with the aim of raising competitors' costs. This could take the shape, for example, of pursuing spectrum in order to prevent its use by a competitor, independent of how efficiently the carrier uses the spectrum.⁴⁸

Put differently, “the private value for incumbents in a given locale includes not only the revenue from use of the spectrum but also any benefits gained by preventing rivals from improving their services and thereby eroding the incumbents’ existing businesses. The latter might be called ‘foreclosure value’ as distinct from ‘use value.’”⁴⁹ This dynamic, when it occurs, harms not only the foreclosed rivals, but also consumers in general because it reduces competition for high-

⁴⁸ *Ex Parte* Submission of the United States Dep’t of Justice, *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, at 10 (Apr. 11, 2013) (“DOJ Spectrum Aggregation *Ex Parte*”) (footnote omitted).

⁴⁹ *Id.* at 10-11.

performance services and thus increases quality-adjusted prices.⁵⁰ DOJ further noted that the longstanding spectrum screen broadly applicable to a provider’s overall spectrum holdings cannot defeat a foreclosure strategy aimed narrowly at a given category of spectrum bands if each provider needs spectrum in that category to compete effectively.⁵¹

In the *Spectrum Holdings Order*, the Commission “agree[d]” with DoJ that “there is a risk of foreclosure in downstream wireless markets.”⁵² It explained that a provider with the most assets in any essential spectrum category might be the “highest bidder” for any newly available spectrum in that category “not because it will put the spectrum to its highest use, but because it is motivated to engage in a foreclosure strategy.”⁵³ The Commission thus imposed what it called an “enhanced factor” for transactional review that imposes heightened scrutiny on any transaction that would enable a provider to accrue more than one-third of available spectrum below 1 GHz.⁵⁴ The Commission later adopted a separate screen for mmWave spectrum, “limiting an entity’s holding to approximately one-third” of available spectrum across “the 28 GHz, 37 GHz, and 39 GHz bands.”⁵⁵

⁵⁰ *See id.* at 10 (“The result is that spectrum may not be put to its most efficient use, which harms all consumers of wireless services and can have an exclusionary effect on the carrier’s competitors.”).

⁵¹ *See id.* at 13 (“[I]t is important to consider the differing characteristics of spectrum in determining its contribution to a carrier’s competitive position.”).

⁵² *Spectrum Holdings Order* ¶ 62.

⁵³ *Id.*

⁵⁴ *Id.* ¶¶ 283, 286. As noted, AT&T opposed any specific screen for sub-1 GHz spectrum on the ground that such spectrum is largely substitutable with *other legacy mobile spectrum* below 2.5 GHz. That position comports with our position here—that legacy mobile spectrum as a whole is not substitutable with mid-band spectrum because the latter is unencumbered by legacy spectrum-allocation decisions and its shorter wavelengths are necessary for many Massive MIMO arrays.

⁵⁵ *2016 mmWave Order* ¶¶ 186-87; *see also 2018 mmWave Order* ¶ 34; *see generally* notes 8-9, *supra*. This distinct treatment of high-band spectrum is appropriate not only or even primarily because of foreclosure concerns, but because such spectrum is not fungible with legacy or mid-band spectrum and is available in such large quantities that to include it in the *overall* screen would grossly inflate the denominator and deprive that screen of any value in identifying aggregations that require close scrutiny.

A similar approach is needed for mid-band spectrum. Foreclosure strategies are far more likely to succeed today, and are thus far more likely to arise, because of two basic developments: the industry has become “more concentrated”⁵⁶ with the merger of T-Mobile and Sprint, and every provider now needs access to wide but scarce mid-band channels to compete successfully in the 5G era. Ten years ago, providers such as MetroPCS and Leap could provide competitive, high-performing mainstream wireless services with 20 megahertz of paired spectrum in just a few markets. Today, as discussed, providers will need 80-100 megahertz of contiguous mid-band spectrum to provide the full benefits of 5G to their customers. And demand for more such spectrum will only escalate as the new 5G ecosystem generates more bandwidth-intensive applications. In the words of T-Mobile’s Neville Ray, “[e]ach generational transition in wireless technology (*e.g.*, 3G to 4G) has led to a dramatic increase in wireless data consumption,” and “[g]iven the transformational changes that 5G will bring, I anticipate this pattern to continue—and at a greater pace due to an expected tsunami of new data-intensive use cases enabled by 5G. ... All these new 5G applications will dramatically accelerate the increase in capacity demands on the wireless network.”⁵⁷

B. The Foreclosure Threat to Mid-Band Spectrum.

T-Mobile holds an overwhelming portion of the mid-band spectrum needed to handle this coming “tsunami” of demand. It occupies that position not because it outbid others at auction, but because it purchased Sprint, which for years had accumulated massive interests in legacy

⁵⁶ DOJ Spectrum Aggregation *Ex Parte* at 10.

⁵⁷ TMO-Sprint P.I.S., Appx. B, ¶¶ 10-11, 15.

EBS and BRS spectrum in the 2.5 GHz band outside of any auction context and before the Commission recognized the enormous competitive significance of that band.⁵⁸

Having thus acquired the lion's share of mid-band spectrum, T-Mobile now brags to Wall Street that its spectrum portfolio gives it a wide and growing advantage over its rivals. Neville Ray boasts:

[E]veryone in the industry is playing the same game – building out optimal mid-band spectrum to deliver the perfect combo of speeds and coverage. Often called the “goldilocks” of spectrum for this reason, mid-band spectrum is clearly the global sweet spot for 5G. ... *T-Mobile has a winning hand and a lasting advantage.* Verizon and AT&T have very limited mid-band deployments to date while T-Mobile started preparing for the Sprint merger well over two years ago and began work in earnest last year. ... *And we'll only continue to grow from there at a pace that can't be matched.*⁵⁹

Ray not only observes that T-Mobile has *more* mid-band spectrum than its rivals in absolute terms, but also asserts that it has *better* mid-band spectrum, given the physical properties of its 2.5 GHz assets. “[S]pectrum,” he says, “obeys the immutable laws of physics. The higher the frequency, the shorter the distance it can travel and the more easily it is blocked by objects. C-band is 3.7 to 3.98 GHz. T-Mobile’s existing mid-band 5G network uses 2.5 GHz spectrum. Higher banded spectrum cannot travel as far.”⁶⁰ As a result, he claims, “C-band will require 50% more cell sites for meaningful and continuous coverage, and in some areas, for example in-building, the required densification can be 4x higher than 2.5 GHz,” thus imposing major costs on providers that, unlike T-Mobile, must rely on C-Block spectrum for 5G.⁶¹

⁵⁸ See *Spectrum Holdings Order* ¶¶ 107-25 (discussing EBS and BRS assets acquired by Sprint and its corporate predecessor Clearwire and their historical treatment for spectrum aggregation purposes).

⁵⁹ Neville Ray, *The Current State of 5G*, *supra* (emphasis added).

⁶⁰ *Id.*

⁶¹ *Id.*

Despite T-Mobile's disparagement of C-Band airwaves, and despite its already commanding lead in mid-band spectrum, T-Mobile participated in the C-Band auction, bid up prices by placing substantial bids of its own, and ultimately obtained 40 megahertz in many markets. Again, in DOJ's words, "the private value for incumbents in a given locale includes not only the revenue from use of the spectrum but also any benefits gained by preventing rivals from improving their services."⁶² And some portion of the \$9.3 billion that T-Mobile paid for this substantial chunk of C-Band spectrum may well reflect "'foreclosure value' as distinct from 'use value.'"⁶³ Indeed, T-Mobile CEO Mike Sievert suggesting that raising his rivals' costs was a major factor driving T-Mobile's C-Band bidding strategy: "[W]e are incredibly pleased with our clear success in this auction. Our competitors had no choice but to go all in with a break-the-bank attempt to remain relevant in the 5G era."⁶⁴

In short, anticompetitive mid-band spectrum strategies are not only a theoretical possibility; they are likely a present-day reality. And they call out for adoption of a mid-band-specific screen that applies heightened scrutiny to any provider seeking to aggregate more than one-third of available mid-band assets.

T-Mobile currently exceeds that screen by a wide margin. Roughly speaking, there will be 564 megahertz of mid-band spectrum available for commercial uses once C-Band (280 megahertz) and 3.45 GHz (100 megahertz) spectrum is added to the 184 megahertz of currently-attributable 2.5 GHz band spectrum. A one-third screen would thus require close scrutiny of aggregations of more than about 188 megahertz of mid-band spectrum. In many areas, however,

⁶² DOJ Spectrum Aggregation *Ex Parte* at 11.

⁶³ *Id.* at 10-11.

⁶⁴ Christine Torralba, *T-Mobile's C-Band Auction Win Further Solidifies Company as 5G Leader*, TMO News (Mar. 10, 2021), <https://www.tmonews.com/2021/03/t-mobiles-c-band-auction-win-solidifies-company-5g-leader/> (quoting Sievert).

T-Mobile will boast 224 megahertz of attributable mid-band spectrum—nearly 40% of the total available—once its C-Band winnings are added to its 2.5 GHz holdings.⁶⁵

In 2014, the FCC adopted special rules for the 600 MHz auction to “reserve” certain spectrum for T-Mobile and other providers that, at the time, had significantly less low-band spectrum than their competitors.⁶⁶ Indeed, T-Mobile argued that those rules were essential to its future competitiveness.⁶⁷ Large, contiguous channels of mid-band spectrum are far more important to the success of any 5G provider today than was the subset of legacy spectrum subject to the “reserve” rules. Yet although the Commission recognizes the unique properties and critical importance of mid-band spectrum, its current regime imposes an “enhanced factor” analysis for certain aggregations of legacy spectrum while anomalously lumping mid-band spectrum in with legacy spectrum. T-Mobile already has far more mid-band spectrum than any other provider—and could easily accumulate more unless the Commission adopts and enforces reasonable spectrum-aggregation policies.⁶⁸

In short, further acquisitions that bestow an even greater mid-band advantage on T-Mobile—or that carry any other provider beyond one-third of available mid-band spectrum—

⁶⁵ Even this calculation understates T-Mobile’s holdings, as T-Mobile essentially controls (and could use) the entire 2.5 GHz band even though not all of it is included in the spectrum screen.

⁶⁶ *Spectrum Holdings Order* ¶¶ 153-54.

⁶⁷ See, e.g., Letter from Trey Hanbury (T-Mobile) to Marlene H. Dortch (FCC), GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252, Attachment at 5 (July 6, 2015) (an inadequate “spectrum reserve risks seriously endangering the economic viability of smaller MNOs and harming consumers without offering a compensating benefit”).

⁶⁸ As T-Mobile expands its already disproportionately large mid-band holdings, it seeks to subvert the purpose of any spectrum screen by arguing—despite clear Commission rules to the contrary—that Commission review is discretionary when a screen is exceeded and that acquisitions of greenfield spectrum should never count against a screen in the first place. AT&T has asked the Commission to reject those and other implausible arguments on reconsideration of a Bureau order approving T-Mobile’s lease of substantial 600 MHz spectrum from Dish Networks. See AT&T Pet. for Recon., *T-Mobile License LLC and ParkerB.com Wireless L.L.C. De Facto Transfer Lease Arrangements*, ULS File No. 0009217476 (Jan. 29, 2021).

should be carefully reviewed for their competitive implications (with the exception of Auction 110, *see* note 2, *supra*). Otherwise, given the scarcity of spectrum generally and contiguous mid-band spectrum in particular, such mid-band incumbents could essentially pull up the ladder behind them with a few strategic acquisitions designed to prevent rivals from acquiring the spectrum assets they need to compete effectively.

III. A MID-BAND SCREEN SHOULD INCORPORATE PROVIDER-SPECIFIC REVIEW AND COMPETITIVELY EFFECTIVE REMEDIES.

A. The Benefits of Provider-Specific Review.

Generally speaking, the Commission has followed two alternative approaches to implementing spectrum-aggregation limits in the auction context. First, it might apply a “bright-line *ex ante* limit” on the spectrum that any provider can obtain in a given auction.⁶⁹ The Commission has adopted that approach for the upcoming 3.45 GHz auction, imposing on each participant “a limit of 40 megahertz out of the total of 100 megahertz” available.⁷⁰ Under the alternative approach, the Commission imposes no *ex ante* limits on any firm’s acquisition of spectrum in a given auction but instead “perform[s] case-by-case review of the long-form license applications filed as a result of the auction,” accounting for each winning bidder’s preexisting spectrum holdings and potentially leading to spectrum divestitures.⁷¹

This *ex post*, provider-specific approach is far preferable to any “bright-line *ex ante* limit” on spectrum gained at specific auctions. Auction-specific caps can be well-intentioned but often create more competition problems than they are intended to solve because they implicitly assume that all participants enter an auction on a level playing field with respect to their existing

⁶⁹ 3.45 GHz Order ¶ 103.

⁷⁰ *Id.* ¶ 104.

⁷¹ C-Band Order ¶ 83.

spectrum holdings. That assumption, of course, is false. As a result, any auction-specific, provider-agnostic cap is at once over- and under-inclusive as a means of combatting anticompetitive spectrum aggregation.

First, it is *over*-inclusive because it prevents spectrum-poor providers and new entrants from obtaining the spectrum they need to catch up to the most spectrum-rich provider, which in this case obtained a disproportionately large share of spectrum through accidents of history. The Commission’s application of its spectrum screens illustrates this risk. When the Commission permits a provider to exceed a spectrum screen, it typically justifies its decision by highlighting upcoming auctions as a factor mitigating what might otherwise constitute an anticompetitive aggregation of spectrum.⁷² The Commission’s premise is that the potential harm caused when a spectrum-rich provider exceeds the screen is blunted by the opportunity of spectrum-poor providers to make up the difference in those auctions by significantly outbidding the spectrum-rich provider. But auction-specific spectrum caps impair the ability of rival providers to take advantage of that essential opportunity.

Second, any auction-specific, provider-agnostic cap is also *under*-inclusive in that it permits anticompetitive conduct that should be prohibited. In particular, as the Commission has applied it, such a cap forecloses the possibility of post-auction spectrum-aggregation review and

⁷² See, e.g., *Auction 107 Order* ¶ 30 (“We also note that additional spectrum bands will be available for flexible use. For example, the Commission has adopted service rules for 100 megahertz of spectrum in the 3.45-3.55 GHz band, and it has slated it for auction in October 2021. The Commission also has revised the service rules for spectrum in the 2.5 GHz band.”) (footnotes omitted); *TMO/Sprint Merger Order* ¶ 99 (“Moreover, the Commission continues to work to make additional spectrum available for mobile wireless, having for instance recently freed-up additional rural 2.5 GHz spectrum for mobile wireless use in recognition of the importance of mid-band spectrum to 5G innovation. Further, beginning on June 25, 2020, the Commission intends to auction Priority Access Licenses in the 3.5 GHz band.”) (footnotes omitted). As discussed above (at p. 5 & note 14), AT&T strongly disagrees that the upcoming auction for 2.5 GHz spectrum presents a competitive opportunity for any provider except T-Mobile.

thus allows a spectrum-rich provider to engage in anticompetitive foreclosure strategies by overpaying to acquire yet more spectrum so long as it stays within that cap.⁷³

Fortunately, the Commission has suggested that *ex ante*, auction-specific caps may be the exception rather than the rule. As it explained in the *3.45 GHz Order*, “the Commission has come to somewhat different conclusions about the application of pre-auction, in-band spectrum aggregation limits to different bands at different times,” and it chose such limits for the 3.45 GHz auction in large part because of “the importance Congress assigned to rapid deployment of *this particular band* and the timetable set forth in the Beat China to 5G Act.”⁷⁴ AT&T disagrees with the proposition that provider-specific review necessarily or even generally introduces undue delay into the assignment and deployment of spectrum assets. For example, the Commission just issued C-Band licenses to T-Mobile and Verizon after conducting provider-specific review, well in advance of the December 2021 availability date.⁷⁵ But it welcomes this indication that provider-agnostic spectrum caps will not be used in other future auctions.

B. Structuring Divestitures to Ensure Competitive Outcomes.

For secondary market transactions that implicate the mid-band screen, the Commission should obviously apply a provider-specific, case-by-case approach as part of its review of the proposed license transfers. For spectrum auctions (or other sales of newly allocated spectrum), spectrum-aggregation scrutiny would apply after the fact, as the Commission reviews winning bidders’ long-form applications. “[I]n the event that a divestiture is required before issuing any

⁷³ The Commission could mitigate these concerns if, instead of a simple *ex ante* cap, it adopted an approach similar to the one it chose for the 600 MHz auction: a “spectrum reserve . . . to ensure against excessive concentration” of any given spectrum input. *Spectrum Holdings Order* ¶ 143; see *3.45 GHz Order* ¶ 104.

⁷⁴ *3.45 GHz Order* ¶ 103 (emphasis added).

⁷⁵ See *Auction 107 Order*.

new licenses, an applicant would have greater flexibility to choose which spectrum to divest among its existing spectrum holdings already in the screen, in a manner that nevertheless would address competitive concerns.”⁷⁶

Structuring divestitures to “address competitive concerns,” however, presents different issues today than it did ten years ago. Piecemeal divestitures of spectrum were sufficient in a 3G or LTE environment because, as noted, providers could adequately serve their customers’ needs with 10 or 20 megahertz blocks in particular geographic areas. In that context, it was economically efficient to give the divesting party maximal discretion to choose what to divest and to whom.

The Commission may need to play a greater role in structuring efficient spectrum divestitures in a 5G environment, where providers require wide blocks of contiguous spectrum, often across expansive geographic areas. The objective of spectrum-aggregation remedies is not to strip a market leader of assets, but to preserve and enhance competition. That objective requires giving a divesting party’s rivals the spectrum tools they need to compete effectively.

Although most secondary market spectrum transactions should be presumed efficient, that presumption does not hold for a spectrum-rich provider engaged in an anticompetitive foreclosure strategy. Such a provider, if faced with a divestiture obligation, would have every incentive to break its spectrum assets into small pieces incapable of supporting high-quality 5G functionality or to sell its assets to third parties that cannot or will not use them. For example, a speculator with no plans to provide service might well agree to buy narrow slivers of spectrum from a spectrum-rich provider in hopes of a windfall years later, when it can sell the assets at inflated hold-out values to a spectrum-poor provider that needs those slivers to create a wide and

⁷⁶ *C-Band Order* ¶ 89 n.273 (cleaned up).

contiguous spectrum block. That strategy would harm competition not only by imposing inefficiently high costs on the ultimate buyer, but also by making the spectrum unavailable for consumer uses during the multi-year interim.

The Commission should therefore remedy undue aggregations of mid-band spectrum by ensuring that divestitures are sufficient to allow a credible purchaser to compete. The remedy might vary with the circumstances of the parties involved. Suppose that a provider with dominant spectrum holdings acquires a few additional licenses in an auction and, in the process, spoils a rival's chance to assemble a wide contiguous channel across its geographic footprint. Sound competition policy might require the spectrum-rich provider to divest a wide mid-band channel—including spectrum not in the auction, if necessary—to replace the rival's lost opportunity. Of course, depending on the auction results, the winning bidder might alternatively rectify the competitive harm it has caused by selling some of the new licenses it won to a provider that can combine them with its own winnings in that auction to create the wide channel it needs.

Finally, the Commission should consider a “fix it first” approach to mid-band spectrum remedies. Under that approach, the Commission would condition its approval of a new spectrum acquisition by a spectrum-rich provider on its approval of a divestiture transaction that would remedy the competitive risk otherwise posed by that acquisition. That approach would allow the Commission to review the structure of the divestiture and the identity of the purchaser to ensure that the end result is competitively effective and not an anticompetitive measure by the spectrum-rich provider to foreclose spectrum-poor rivals.

CONCLUSION

The Commission should adopt a spectrum screen specific to mid-band spectrum, apply it when reviewing secondary market transactions and long-form applications in auctions or other government sales, and ensure that any required spectrum divestitures are sufficient to protect competition.

Respectfully submitted,

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