

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

Competitive Bidding Procedures for)	
)	
)	AU Docket No. 18-85
Auction 101 (28 GHz) and)	
Auction 102 (24 GHz))	
)	

COMMENTS OF T-MOBILE USA, INC.

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I. INTRODUCTION.

T-Mobile supports the timely auction of millimeter wave spectrum and welcomes the Commission’s request for comment on procedures for Auctions 101 and 102 that will best promote 5G investment and innovation in the United States.¹ Making more flexible-use spectrum licenses available for competitive bidding offers an important opportunity to help wireless operators satisfy the continued explosion in demand for mobile data. Many of the procedures for the auctions promise to allow for a fair, timely, and efficient resolution of mutual exclusivity among would-be licensees. But a handful of proposed procedures—including the proposed serial nature of these two auctions and excessively high bidding price levels—threaten to frustrate efficient resource allocation, depress auction revenues for the U.S. Treasury, prevent timely investments in millimeter wave spectrum, and violate the law.

The *Public Notice* contemplates scheduling Auctions 101 and 102 in an overlapping or back-to-back manner that could impair commercial wireless market activity during the course of

¹ *Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services; Comment Sought on Competitive Bidding Procedures for Auctions 101 (28 GHz) and 102 (24 GHz)*, Public Notice, AU Docket No. 18-85 (rel. Apr. 17, 2018) (“*Public Notice*”).

the prolonged quiet period.² As the Commission recognizes, if “the short-form window for Auction 102 occurs before the close of Auction 101, entities wishing to participate in either auction will be applicants during overlapping periods of time” and the prohibited communications period would extend continuously until the down payment deadline of Auction 102.³ T-Mobile has repeatedly urged the Commission to auction all millimeter wave spectrum at once.⁴ But if the Commission intends to hold the 28 GHz and 24 GHz auctions separately as envisioned in the *Public Notice*, it should provide sufficient time between the two quiet periods to allow carriers to assess the results of the first auction and prepare for the second. Creating two discrete quiet periods instead of one extended period would fulfill the Commission’s statutory obligation to schedule the auctions in a manner that affords interested parties the opportunity to develop business plans, assess market conditions, and evaluate the availability of equipment for the relevant services.⁵

In addition, revising certain procedures and adjusting the upfront payment and reserve price levels would stimulate bidder participation and guard against the risk of auction failure. The Commission’s plan to conduct piecemeal bidding of the millimeter wave spectrum bands, for example, would frustrate rational spectrum planning by limiting participants’ ability to

² *Public Notice* ¶¶ 14-15.

³ *Id.* ¶ 22.

⁴ *See, e.g.*, Letter from Steve B. Sharkey, Vice President, Government Affairs Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-258 *et al.*, at 3-4 (Apr. 23, 2018); Letter from Steve B. Sharkey, Vice President, Government Affairs Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, AU Docket No. 18-85 *et al.*, at 2-5 (Apr. 3, 2018).

⁵ *See* 47 U.S.C. § 309(j)(3)(E)(ii) (requiring that the Commission seek to “ensure that, in the scheduling of any competitive bidding under this subsection, an adequate period is allowed ... after issuance of bidding rules, to ensure that interested parties have a sufficient time to develop business plans, assess market conditions, and evaluate the availability of equipment for the relevant services.”).

choose among spectrum bands that are complements or substitutes for one another. Other than the 28 GHz band, most of which Verizon has already acquired through secondary market transactions, the Commission has four major millimeter wave spectrum bands in inventory: 24.25-24.45 GHz and 24.75-25.25 GHz (“24 GHz”); 37.6-38.6 GHz (“37 GHz”); 38.6-40 GHz (“39 GHz”); and 47.2-48.2 GHz (“47 GHz”). While no two spectrum allocations are identical, the 24 GHz, 37 GHz, and 47 GHz bands are largely greenfield, significant opportunities exist in the 39 GHz band, and—for now at least—licensees can use these bands nearly interchangeably to deliver wireless broadband services across the United States. Further, because the 24 GHz and 47 GHz bands fall behind the 39 GHz and 37 GHz bands in terms of technology development, auctioning these bands prior to the 37 GHz and 39 GHz bands is not the fastest road to 5G deployment and may risk creating delays as resources must be shifted from the more advanced 39 GHz band. Auctioning the 37 GHz, 39 GHz, and 47 GHz bands together with the 24 GHz band in Auction 102 would reduce bidders’ exposure risk, promote interoperable equipment development across the millimeter wave bands, and accelerate the deployment of 5G technologies in the United States.

Similarly, reducing the upfront payment and reserve price levels would reduce barriers to entry and allow greater latitude to identify fair market value for mobile broadband spectrum at frequencies that the Commission has never before offered for competitive bidding. The proposed upfront payment and reserve price levels of \$0.001 per MHz-pop and \$0.002 per MHz-pop, respectively,⁶ are excessive given the absence of a reliable track record regarding the fair market value of millimeter wave spectrum. Setting upfront payment and reserve price values at these levels could also dampen interest in rural geographic license areas because the differential

⁶ *Public Notice* ¶¶ 50, 63, 93, 104.

or “spread” in pricing between rural and urban areas is likely to be much greater in the millimeter wave band auctions than in lower-frequency band auctions. Reducing the upfront payment and reserve price levels would expand auction participation, encourage spectrum acquisition in rural areas, and allow for price discovery during the auctions.

By implementing modest changes to the schedule and design of Auctions 101 and 102, the Commission can help expedite 5G deployment, increase auction revenues to the U.S. treasury, accelerate equipment development and interoperability, and ensure that consumers enjoy the benefits of robust competition among large and small providers.

II. ALLOWING SUFFICIENT TIME BETWEEN AUCTIONS 101 AND 102 IS NECESSARY TO COMPLY WITH THE LAW, MAXIMIZE AUCTION PARTICIPATION, AND PROMOTE THE BROAD AVAILABILITY OF MILLIMETER WAVE SPECTRUM.

The *Public Notice* proposes to leave little, if any, separation between Auctions 101 and 102. Back-to-back or overlapping quiet periods would fail to give applicants enough time to plan for Auction 102, as required by law and business realities. Section 309(j)(3) of the Communications Act requires that the Commission seek to “ensure that, in the scheduling of any competitive bidding under this subsection, an adequate period is allowed ... after issuance of bidding rules, to ensure that interested parties have a sufficient time to develop business plans, assess market conditions, and evaluate the availability of equipment for the relevant services.”⁷ That statutory mandate is especially salient here. The outcome of the 28 GHz auction could significantly influence bidders’ behavior in the 24 GHz auction. For example, the 28 GHz spectrum available in smaller markets could attract interest from nationwide providers, rural and regional carriers, and new entrants interested in providing 5G services in these areas. Following

⁷ 47 U.S.C. § 309(j)(3)(E)(ii).

the close of Auction 101, these and other participants will require time to reevaluate their spectrum holdings, conduct the necessary economic and engineering analysis, structure the appropriate commercial arrangements, and formulate bidding strategies in advance of Auction 102's short-form deadline. For that reason, the Commission should allow operators enough time between auctions and release the Auction 101 results in advance of Auction 102.

The Commission has repeatedly invoked section 309(j)(3) and reasonably postponed spectrum auctions to afford participants the time and certainty necessary to develop business plans in advance of the relevant deadlines. When the Commission delayed the 700 MHz auction by six months, for example, it found that a "factor in favor of postponing the auction" included parties' feedback that "in order to allow them to properly assess their spectrum needs, the 700 MHz auction should follow the close of the C and F block auction scheduled to begin November 29, 2000."⁸ In the Location Management Services auction, moreover, the Commission postponed the auction by three months "to give potential bidders a reasonable opportunity to consider deployment and technical information that NTIA is currently compiling regarding government primary users occupying the 902-928 MHz band."⁹ Similarly, the Commission postponed the 1670-1675 MHz auction by six months "to provide additional time for bidder preparation and planning."¹⁰

⁸ *Cellular Telecommunications Industry Association, et al.*, Memorandum Opinion, 15 FCC Rcd 17406 ¶ 10 (2000).

⁹ *Wireless Telecommunications Bureau Postpones Dec. 15, 1998 Auction Date for 528 Multilateration Location & Monitoring Serv. Licenses*, Public Notice, 13 FCC Rcd 22608, 22609 (1998).

¹⁰ *1670-1675 MHz Band Auction (Auction No. 46) Postponed Until Apr. 30, 2003*, Public Notice, 17 FCC Rcd 18325 (2002).

Section 309(j) also directs the Commission to structure competitive bidding rules to “promot[e] economic opportunity and competition”¹¹ and ensure “recovery for the public of a portion of the value of the public spectrum resource made available for commercial use.”¹² As discussed below, creating breathing room between Auctions 101 and 102 would allow for a more inclusive auction with more bands of spectrum, which would, in turn, promote competition and economic opportunity by reducing participants’ exposure risk and eliminating hold-up problems involving speculators. Unlike the 28 GHz band, nearly all of which is held by Verizon, the 24 GHz band is largely greenfield. The 24 GHz auction therefore represents one of the first meaningful opportunities to unlock 5G spectrum resources for the benefit of the American public. Allowing sufficient time between the conclusion of Auction 101 and the short-form filing deadline of Auction 102 would permit bidders to analyze and understand price levels and demand for millimeter wave spectrum. It would also help mitigate the information deficits and asymmetries that could result in less competitive bidding and a less efficient allocation of spectrum resources.

Opening a window of time between Auction 101 and Auction 102, especially if combined with the introduction of additional millimeter wave spectrum bands into Auction 102, would allow bidders to make the kinds of informed tradeoffs among spectrum, technology, and capital

¹¹ 47 U.S.C. § 309(j)(3)(B).

¹² 47 U.S.C. § 309(j)(3)(C). Achieving these objectives will require broad auction participation. In this regard, the announced merger between T-Mobile and Sprint is not the type of arrangement the Commission’s rules governing joint bidding have sought to prohibit. *See* 47 C.F.R. § 1.2105(a)(2)(ix). In 2015, the Commission defined the definition of “joint bidding arrangements” and excluded agreements that address only operational aspects of providing a mobile service, along with arrangements regarding the transfer or assignment of licenses existing at the deadline for filing short-form applications. *See Updating Part 1 Competitive Bidding Rules*, 30 FCC Rcd 7493 ¶¶ 182-186 (2015); *see also* 47 C.F.R. § 1.2105(a)(2)(ix).

investments that will determine whether the United States leads or follows other industrialized nations in the race to 5G.

III. SOME OF THE PROPOSED AUCTION PROCEDURES THREATEN TO FRUSTRATE 5G INVESTMENT AND INNOVATION WHILE REDUCING REVENUES FOR THE U.S. TREASURY.

A. Including the 37 GHz, 39 GHz, and 47 GHz Bands in the 24 GHz Auction Would Increase Auction Revenues and Minimize Bidders' Exposure Risk.

The *Public Notice*'s proposal to schedule the millimeter wave auctions in a piecemeal fashion represents poor economics and unsound auction design. Rapidly releasing all millimeter wave bands to market at once would better foster more efficient network deployment, allow operators to plan for and use multiple millimeter wave spectrum bands, and reduce competitive disparities.

The Commission recognized when it adopted the millimeter wave spectrum screen that the 24 GHz spectrum represents a possible substitute or complement for other bands, including the 37 GHz, 39 GHz, and 47 GHz bands.¹³ All four bands use the same geographic license sizes,

¹³ See *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988 ¶ 74 (2017) (“*Spectrum Frontiers Second Report & Order*”) (“Given that the 24 GHz and 47 GHz bands share similar technical characteristics and potential uses with the 28 GHz, 37 GHz, and 39 GHz bands already included in the mmW spectrum threshold, we will group all five bands together for purposes of applying the mmW spectrum threshold to review secondary market transactions.”); *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 ¶ 186 (2016) (“*Spectrum Frontiers First Report & Order*”) (“We find that grouping the 28 GHz, 37 GHz, and 39 GHz bands together for purposes of applying these spectrum holdings policies, either at auction or in the secondary market, is appropriate in view of the interchangeability of the spectrum in these bands, *i.e.*, similar technical characteristics and potential uses of this spectrum that are unique to the mmW bands. While certain differences across the mmW bands exist, we find these technical differences are not sufficient to significantly affect how these spectrum bands might be used and to require separate band-specific limits.”).

namely Partial Economic Areas,¹⁴ and the development of 24 GHz equipment, which does not yet exist, is likely to commence only after the release of the other millimeter wave bands. All four bands are equally ripe for auction, moreover, because the Commission has already adopted licensing and technical rules. When some bands are possible substitutes or complements for others, auctioning them together leads to more efficient outcomes by allowing operators to assemble contiguous holdings, whether by geography or frequency.¹⁵ Because these bands have been the focus of common standards and technology development, releasing them together would enable providers to more quickly deploy 5G services.

Auctioning bands simultaneously encourages the acquisition of contiguous spectrum bands, which increases efficiency for bidders and enables more cost-effective and functional wireless 5G deployments for consumers. A single auction of the allocated millimeter wave bands would provide potential bidders a better understanding of price levels and license differences across bands and allow tradeoffs between the spectrum bands. Conducting a single auction of multiple bands would also encourage interoperability of devices across bands—a longstanding Commission objective that helps lower the cost of consumer equipment and encourages innovation in the design of mobile broadband products and services. Promoting better spectrum planning would, in turn, draw more participants, foster efficiency, and improve 5G network architecture. By contrast, targeting only a single band for bidding would create a material risk of auction failure. The Commission’s decision not to auction the AWS-3 and H

¹⁴ *Spectrum Frontiers Second Report & Order* ¶¶ 28, 50; *Spectrum Frontiers First Report & Order* ¶¶ 82, 111-113.

¹⁵ See, e.g., *Auction of Reg'l Narrowband PCS Licenses Scheduled for Sept. 24, 2003*, Public Notice, 18 FCC Rcd 6366, 6368 (2003) (“The *exposure problem* is a financial risk that occurs when a bidder, in hopes of also winning complementary items, bids more for a single object than the object alone is worth to that bidder. Package bidding allows bidders to mitigate the exposure problem by placing all-or-nothing bids on packages of licenses.”).

Block bands together, for example, led to an H Block auction with little meaningful competitive bidding and an ultimate sales price only just above the reserve below which the spectrum would not have sold.¹⁶ As T-Mobile noted at the time, the better way for the Commission to achieve its goals would have involved “auctioning the H Block together with the AWS-3 Bands, even though this would result in a brief delay in moving the H Block into the market.”¹⁷ To date, there is still no commercial deployment in the H Block.

The prospect of participating in multiple spectrum auctions *in seriatim* creates enormous strategic complexity and exposure risk for would-be auction participants.¹⁸ Exposure risk manifests itself in two ways. First, if a bidder successfully acquires only a portion of the package of licenses required for a successful business, that bidder might lose money by overpaying for the final pieces of its package, either by: (i) stopping bidding and being stuck with an insufficient set of licenses; or (ii) paying a bid withdrawal penalty to drop the incomplete package of licenses. Second, exposure risk occurs when a bidder cannot properly determine the value of spectrum in the initial auction when the other auctions have yet to occur.

The exposure problem implies that rational bidders in sequential auctions of multiple related frequencies would bid less than they would in a simultaneous auction. A simultaneous auction of multiple related bands makes it much easier to create large enough sets of spectrum assets—both in terms of geography and block sizes—to achieve efficiencies in deploying the new frequencies. In sequential auctions, by contrast, bidders that plan to use the spectrum for

¹⁶ See, e.g., Fred Campbell, *Why Did the FCC Adopt an Unusually High Reserve Price for the H Block Spectrum Auction?*, THE TECHNOLOGY LIBERATION FRONT (Oct. 3, 2013), <https://bit.ly/2jCuoko>.

¹⁷ See Reply Comments of T-Mobile USA, Inc., AU Docket No. 13-178, at 8 (Aug. 16, 2013).

¹⁸ See Peter Cramton *et al.*, *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 J. L. & ECON. 167, 183 (2011).

new services must take into account the option value of acquiring some alternative spectrum in subsequent auctions and the risk of not being able to acquire the “missing pieces” in those subsequent auctions. As a result, rational bidders are incentivized to reduce the amount they are willing to bid, and the final allocation is less likely to be efficient. As operators with every intention of deploying services rationally reduce their bids, it only increases the likelihood that arbitrageurs will succeed in securing blocking positions for speculative gain.

Speculation is not always inefficient. In commodities markets, for example, speculators can prevent shortages and smooth prices by using futures to encourage stockpiling or curtailing overproduction. But spectrum is not merely a commodity, and speculators approach spectrum auctions with a different set of goals than bidders who intend to deploy service in the band. Speculative bidders seek to buy and hold licenses, especially in areas that might prevent a national or regional provider from establishing a contiguous footprint or on particular frequency blocks that might preclude an operator from achieving valuable operating efficiencies. While an operator may choose to resolve one speculative blocking position through a secondary market transaction, the same operator may find it impracticable to resolve dozens or hundreds of blocking positions that speculators have acquired: the transaction costs of assembling a rational footprint—to say nothing of the increasing risk of failure as the number of transactions necessary to achieve a minimally acceptable result increase—are simply too great. The Commission has long recognized the economic inefficiencies of this speculative buy-and-hold strategy and has adopted steadily more aggressive buildout milestones to guard against this risk.¹⁹

But buildout milestones may not become binding until ten years following the date of licensing, which is a considerable length of time for operators—and American consumers—to

¹⁹ See *Spectrum Frontiers First Report & Order* ¶¶ 196-211.

wait to put valuable public resources to use. One of the most important transaction costs in the resale market is the classic “hold-up problem.” To overcome large fixed costs, a service provider that wants to deploy on the new frequencies must achieve economies of scale by assembling a sufficient package of geographic breadth and bandwidth depth. Compared to auctions, secondary markets are less effective at coordinating speculators, each of which has incentives to hold up the creation of such packages and extract a disproportional fraction of the surplus. Such rent-seeking behavior results in costly delays—instead of being used to serve customers and create consumer surplus, the spectrum remains fallow and wasted. While secondary market transactions can help rationalize disparate holdings, they are ill suited when the original distribution of spectrum is inefficient and wireless operators must acquire a critical package of licenses to make investments economically viable.

Piecemeal auctions thus inure to the benefit of speculators, which take advantage of reduced participation, and therefore less competition, in their attempt to hoard spectrum for subsequent resale. The Commission should strive to design the auctions for the millimeter wave spectrum to minimize the risk of inefficient allocation resulting from the exposure problem associated with serial auctions and to avoid promoting speculation in a standalone auction for the 24 GHz band spectrum. Combining multiple bands into one auction will diminish exposure risk and discourage the types of speculation that increase bidder exposure still further.

B. No Sound Engineering Rationale Justifies Auctioning the 24 GHz Band Before the 37 GHz, 39 GHz, and 47 GHz Bands.

The *Public Notice*'s proposal to auction the 24 GHz band by itself and before the other millimeter wave bands also makes little sense from an engineering perspective. The 37 GHz and 39 GHz bands are more developed than the 24 GHz band. Indeed, equipment development is the most advanced in the 39 GHz band, as the Commission recognized: “39 GHz licensees at the

bottom of the band will provide the first market for mmW mobile equipment as soon as it becomes available, and this will further the goal of interoperability by allowing fixed licensees to more rapidly foster the development of mobile in their bands.”²⁰

Auctioning the 37 GHz and 39 GHz bands together promotes interoperability because the 37 GHz band is immediately adjacent to 39 GHz band and because the Commission has adopted an interoperability requirement across the 37-40 GHz bands.²¹ Moreover, 3GPP recently designated the entire 37-40 GHz band for the 5G new radio.²² The Commission need not confront the challenges associated with repacking the encumbered portions of the 39 GHz band. No impediments prevent the Commission from auctioning off the 50 megahertz unpaired blocks it currently holds and deferring the repacked blocks for a future date.

The costs of opening a space between the conclusion of the 28 GHz auction and the start of the 24 GHz auction to include other millimeter wave bands would be minimal. No 24 GHz equipment exists yet, and development of such equipment would require diverting resources from development of the 39 GHz band and slow overall 5G deployment. Conversely, auctioning the 24 GHz band with complementary or substitutable millimeter wave bands will allow companies to benefit from and build on current technology development. Accordingly, creating an additional window of time between the end of Auction 101 and the start of Auction 102 would not jeopardize the timely development of 24 GHz equipment and instead may speed it up. By contrast, delaying or staggering the auction of the 37 GHz, 39 GHz, and 47 GHz bands could

²⁰ *Id.* ¶ 98.

²¹ *Id.* ¶ 323.

²² See 3GPP, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) radio transmission and reception (Release 15)*, 3GPP TS 38.104 V15.1.0, ¶ 5.2 (Mar. 2018) (identifying the 37-40 GHz band as operating band n260), <https://bit.ly/2KK2cbv>.

further delay the development of 24 GHz equipment and entrench the commanding positions the largest providers currently hold in the two millimeter wave bands furthest along in development. Consistent with the Commission’s longstanding policy of promoting equipment interoperability,²³ Auction 102 should include the 37 GHz, 39 GHz, and 47 GHz bands.

C. The Commission’s Proposed Upfront Payment and Reserve Price Levels Are Too High.

The proposed upfront payment and reserve price levels based on a valuation of \$0.001 per MHz-pop and \$0.002 per MHz-pop, respectively, do not advance the goals the *Public Notice* seeks to achieve.²⁴ While upfront payment and reserve price levels are necessary to discourage speculation, they can dampen auction participation when they are excessive.

Excessive upfront payment and reserve price levels could depress auction revenues by driving away participants that might otherwise bid in good faith. In the H Block auction, for example, the Commission’s reserve price was so high that it discouraged all but one bidder—DISH—from participating. As one commentator observed, “[b]ecause competitive bidding for the H block ended before the reserve price was met, DISH was forced to raise its own provisionally winning bids in the auction’s final rounds to meet its reserve price commitment

²³ See, e.g., *Spectrum Frontiers First Report & Order* ¶¶ 317-23; *Promoting Interoperability in the 700 MHz Commercial Spectrum*, Report and Order and Order of Proposed Modification, 28 FCC Rcd 15122 (2013) (implementing an industry-wide solution to interoperability); *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, & 2155-2180 MHz Bands*, Report and Order, 29 FCC Rcd 4610 ¶¶ 229-30 (2014) (mandating interoperability for some operators); *Service Rules for Advanced Wireless Services H Block – Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, Report and Order, 28 FCC Rcd 9483 ¶ 32 (stressing the importance of interoperability).

²⁴ The *Public Notice* proposes a reserve price equivalent to the minimum opening bid price. *Public Notice* ¶¶ 62, 103.

even though DISH was the only active bidder. In the H Block auction's final bidding rounds, DISH was bidding in ‘competition’ solely with itself.’²⁵

The same concerns exist here. Past secondary market transactions reveal that the \$0.002 per MHz-pop is too high of a reserve price for the 24 GHz and 28 GHz bands. AT&T, for example, acquired a nationwide tract of FiberTower’s 39 GHz spectrum for \$0.0018 per MHz-pop.²⁶ While Verizon acquired Straight Path’s licenses for more than \$0.002 per MHz-pop, many participants and observers in the market—including AT&T—said Verizon paid an amount grossly in excess of the licenses’ fair market value.²⁷ The technical characteristics of millimeter wave spectrum are such that operators will need much deeper spectrum holdings to provide services. Whereas 4G LTE networks require dozens of megahertz of low-band spectrum to meaningfully cover a single region, 5G networks will require hundreds of megahertz of high-frequency spectrum—an order of magnitude more—to satisfy the capacity and coverage requirements expected of next-generation applications. Accordingly, per MHz-pop prices may not be as high as they were for low-band spectrum, where a single megahertz could provide comparatively greater levels of coverage.

The Commission’s broader reliance on secondary market transactions to establish reserve prices can be problematic, too. Closed transactions reflect *average* MHz-pop prices, and those average amounts will likely exceed the fair market value in many rural areas where demand is

²⁵ See Fred Campbell, *H Block auction shows need for clearer limits on FCC spectrum authority*, FIERCEWIRELESS (Mar. 18, 2014), <https://bit.ly/2qWzXx4>.

²⁶ This number relies on a calculation of 114 billion MHz-pops based on the FCC’s settlement reinstating many previously terminated licenses and returning others to the Commission. At the time the AT&T deal was announced, FiberTower had only 12.3 billion MHz-pops of active/uncontested licenses.

²⁷ See, e.g., *Verizon: Did It Overpay For Straight Path?*, SEEKINGALPHA (May 17, 2017), <https://bit.ly/2vGGJg4>.

reduced. The millimeter wave band spectrum will have much smaller distances between transmitters than lower-frequency spectrum does. The very small inter-site distances between transmitters in the millimeter wave band frequencies means that deployment costs for millimeter wave band spectrum will be considerably higher in areas of low population density than comparable deployments using lower-band spectrum. Setting reserve prices for rural and urban at the average level of both geographies therefore creates a substantial risk of overpricing in rural areas because the differential, or “spread,” in pricing between rural and urban areas is likely to be much greater in the millimeter wave band auctions than in lower-frequency band auctions. Given the nascent nature of millimeter wave spectrum, moreover, bidders have had little opportunity for price discovery. Where, as here, valuation is uncertain and untested, maintaining low reserve price levels will encourage broad participation in the auction and allow bidders to make more intelligent decisions about where and how to invest capital resources. At a minimum, if the reserve price levels prove to be excessive in Auction 101, the Commission should preserve its ability to recalibrate those amounts prior to Auction 102 to better reflect market realities.

An alternative to the one-size-fits-all pricing scheme proposed in the *Public Notice* would be a three-tiered approach, under which the price levels vary by market population. For instance, the 50 most populous markets might retain the upfront and reserve prices of \$0.001 per MHz-pop and \$0.002 per MHz-pop proposed in the *Public Notice*. But markets 51-100 would be set at \$0.0002 per MHz-pop and \$0.0004 per MHz-pop. And all markets below the top 100 would have upfront and reserve prices of \$0.0001 per MHz-pop and \$0.0002 per MHz-pop. The unique propagation characteristics of the millimeter wave bands make deployments in rural areas considerably less cost effective than deployments in urban areas. If rural areas are to enjoy the

benefits of 5G deployment at a similar pace as urban areas, the proposed upfront payment and reserve price levels should reflect the physics of the band.

Whether through the use of tiered pricing that varies by population or some other arrangement, upfront and reserve prices should be set low enough to encourage the licensing of spectrum and the deployment of 5G operations in less densely populated areas of the United States.

IV. CONCLUSION.

The timing and procedures for the Auctions 101 and 102 represent a critical opportunity for the Commission to demonstrate global 5G leadership. A reasonable rescheduling of Auction 102 would give the Commission the opportunity to include the remaining millimeter wave bands in the auction, which would accelerate equipment development and interoperability while giving bidders the flexibility to efficiently bid on packages of interchangeable and complementary high-frequency spectrum. And recalibrating the reserve prices levels and upfront payment prices would best serve the price discovery mechanisms that represent a core purpose of competitive bidding.

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