



PUBLIC NOTICE

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BROADCAST INCENTIVE AUCTION SCHEDULED TO BEGIN ON MARCH 29, 2016

PROCEDURES FOR COMPETITIVE BIDDING IN AUCTION 1000, INCLUDING INITIAL CLEARING TARGET DETERMINATION, QUALIFYING TO BID, AND BIDDING IN AUCTIONS 1001 (REVERSE) AND 1002 (FORWARD)

AU Docket No. 14-252
GN Docket No. 12-268
WT Docket No. 12-269
MB Docket No. 15-146

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I. INTRODUCTION AND EXECUTIVE SUMMARY

1. This Public Notice (“*Auction 1000 Bidding Procedures Public Notice*”) determines procedures necessary to carry out the incentive auction, and resolves issues we raised in the *Auction 1000 Comment Public Notice* released December 17, 2014.¹ In particular, we establish final procedures for setting the initial spectrum clearing target, qualifying to bid, and bidding in the reverse and forward auctions. This Public Notice is organized from the perspective of potential bidders, with separate sections for the reverse and forward auctions, each ordered consistent with the overall sequence of procedures in the incentive auction. Bidding in the auction will begin on March 29, 2016, which will be the deadline for reverse auction applicants to commit to an initial bid option.

2. The incentive auction is composed of a reverse auction (“Auction 1001”) in which broadcasters will offer to voluntarily relinquish some or all of their spectrum usage rights and a forward auction (“Auction 1002”) of new, flexible-use licenses suitable for providing mobile broadband services.² Forward auction proceeds will be used to pay broadcasters that relinquish rights in the reverse auction.³ As part of the auction process, the broadcast television bands will be reorganized or “repacked” so that the television stations that remain on the air after the incentive auction occupy a smaller portion of the ultra-high frequency (“UHF”) band, thereby clearing contiguous spectrum that will be repurposed as the 600 MHz Band.⁴ Our decisions today implement our central objective for the incentive auction: to allow market forces to determine the highest and best use of spectrum.⁵ In response to the robust public record in this proceeding, our key decisions today include the following:

- *Initial Clearing Target Determination Procedure.* The procedure we adopt for selecting the initial clearing target will allow market forces to determine the highest and best use of spectrum on a near-nationwide basis, while permitting a limited amount of impairments in the repurposed 600 MHz Band to avoid the “least common denominator problem”: limiting the amount of spectrum available in most markets to the quantity that is available in the most constrained markets. To limit impairments, we modify our proposal in the *Comment PN* by adopting a scaled standard with a cap that will allow significantly less than the proposed 20 percent at higher

¹ See *Comment Sought on Competitive Bidding Procedures for Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002*, GN Docket No. 12-268, AU Docket No. 14-252, Public Notice, FCC 14-191, 29 FCC Rcd 15750 (2014) (*Auction 1000 Comment PN* or *Comment PN*). The *Auction 1000 Comment PN* initiated the pre-auction process by which we are developing, based on additional public input, the detailed procedures necessary to carry out the incentive auction consistent with the rules and policies adopted in the *Incentive Auction R&O* and related proceedings. *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6574, para. 15 (2014) (*Incentive Auction R&O*); see also *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6133, 6193, para. 146 (2014) (*Mobile Spectrum Holdings R&O*) (establishing a market-based 600 MHz Band spectrum reserve for eligible entities).

² See *Incentive Auction R&O*, 29 FCC Rcd at 6569, para. 1, 6572–73, paras. 9–10.

³ See *id.*

⁴ See *id.* at 6570–71, para. 3.

⁵ *Incentive Auction R&O*, 29 FCC Rcd at 6569, para. 2.

clearing targets,⁶ consistent with the consensus that impairments must be minimized, particularly at higher clearing targets. Our decisions to allow the optimization software to assign television stations within the 600 MHz Band so as to minimize impaired weighted-pops, and not to “discount” impairments located in the uplink portion of the Band, also will help the auction to repurpose as much near-nationwide spectrum as possible while minimizing impairments.

- *Opening Prices.* We adopt our proposal for calculating opening price offers for each eligible broadcaster based on a television station’s interference and population characteristics. This methodology, which will yield opening price offers in the reverse auction of up to \$900 million, should attract robust participation in all areas without undermining other goals of the auction. Opening prices in the reverse auction will be announced at least 60 days in advance of the deadline to file an application to participate in the reverse auction.
- For the forward auction, we adopt our proposal to assign a specific number of bidding units to each spectrum block that will be available in a Partial Economic Area (“PEA”) based on the number of weighted-pops in the PEA, and to use the bidding units to calculate minimum opening bids, upfront payments, and bidder eligibility, as well as to measure bidding activity. To facilitate bidding across license categories, each block available in a PEA will have the same number of bidding units. The minimum opening bid for each spectrum block will be equal to the number of bidding units assigned to the block times \$5,000, and upfront payments will be one-half that amount. Upfront payments will be due after the initial clearing target has been selected.
- *Reverse Auction Bidding.* Having considered the comments we received on our proposal for a Dynamic Reserve Price (“DRP”) mechanism, we have decided not to adopt DRP. This decision will encourage voluntary participation in the reverse auction by removing uncertainty among broadcasters, and maximize forward auction spectrum value by eliminating the possibility of additional impairments in the 600 MHz Band due to the operation of the DRP mechanism. In order to make bidding as simple as possible for reverse auction bidders, bidders will not be able to submit “intra-round” bids. We adopt our proposal to establish a simple proxy bid mechanism to make it easier for bidders to participate in the auction.
- We also adopt several measures to improve transparency for reverse auction bidders. First, the auction system will inform them, for each station on which they are bidding, of their bidding status and the new price offers for available bid options. Second, bidders also will be provided with “vacancy” information regarding the availability of channels in bands relevant to each of their stations given its bid options. Vacancy information may help reverse auction bidders assess the likelihood that the price offers for a bid option will continue to decrease, as well as how likely any bid option to move to another band is to be available through the current round. Once reverse auction bidding stops in any stage, the total dollar amount of provisionally winning reverse auction bids will be announced publicly.
- *Forward Auction Bidding.* We adopt our proposal to offer two categories of generic spectrum blocks for bidding in the clock phase of the forward auction: “Category 1” blocks with potential impairments that affect zero to 15 percent of the weighted population of a PEA; and “Category 2” blocks with potential impairments that affect between greater than 15 percent and up to 50 percent. Prices for frequency-specific licenses will be adjusted downward at the end of the assignment phase of the forward auction by one percent of the final clock phase price for each one percent of impairment to the license.
- We adopt several measures to improve transparency for forward auction bidders. First, the auction system will provide them in advance of bidding with specific information regarding impairments, including the actual source and location of the impairment. Second, during the

⁶ See § II (Background of Proceeding).

clock phase, aggregate price information that reflects the progress of the forward auction towards satisfying the final stage rule, as well as price and aggregate demand information for blocks in each PEA that reflects progress towards completion of bidding in the clock phase, will be publicly available.

- To implement our decision in the *Mobile Spectrum Holdings R&O*⁷ to incorporate a market-based spectrum reserve in the forward auction, we adopt our proposals to base the maximum number of reserved spectrum blocks in a given PEA on the total number of Category 1 and 2 blocks offered in that PEA; to limit the actual number to demand for Category 1 blocks by reserve-eligible bidders when the auction reaches the spectrum reserve trigger; to reserve only Category 1 blocks; and to limit the number of reserved blocks in a PEA to two if, when the trigger is reached, only one reserve-eligible bidder demands such blocks. We also affirm our decision that the spectrum reserve will be triggered by satisfaction of the final stage rule.
- To implement the final stage rule established in the *Incentive Auction R&O*, we adopt the proposed average price and spectrum benchmarks of \$1.25 and 70 megahertz of licensed spectrum, respectively. The benchmarks will help to ensure that winning bids for the licenses in the forward auction reflect competitive prices and return a portion of the value of the spectrum to taxpayers without reducing the amount of spectrum repurposed for new, flexible-use licenses. We also adopt our proposals for triggering an “extended round” to give bidders the opportunity to meet the final stage rule without moving to another stage, except that an extended round will not be triggered if the shortfall is greater than 20 percent.
- *Assignment Round.* We adopt the assignment round bidding procedures proposed in the *Comment PN*, with a modification: in addition to limiting PEA grouping to PEAs with the same mix of clock-phase winners and winnings, as proposed, we will limit PEA grouping to unimpaired PEAs. Winning clock-phase bidders will have the opportunity to bid for their preferred combinations of licenses, consistent with their clock-phase winnings, in a series of single sealed-bid rounds conducted by PEA or, in some cases, PEA group.
- The auction system will incorporate certain intra-market contiguity objectives in determining the frequency-specific license assignments available in the assignment round. To assist forward auction bidders in determining whether, and how much, to bid in each PEA during the assignment phase, all clock-phase winning bidders across all PEAs will be informed of the extent to which contiguous blocks feasibly may be assigned to winning bidders from the clock phase within each PEA. In addition, the auction system will provide each bidder with bidding options that satisfy the feasible contiguity objectives for each PEA in which the bidder may bid.
- *Final TV Channel Assignments.* We will use optimization techniques to determine a final TV channel assignment plan that satisfies the constraints adopted in the *Incentive Auction R&O* and strives for the additional policy goals of maximizing the number of stations that stay on their pre-auction channels, minimizing aggregate new interference to individual stations, and avoiding channel reassignments for stations with high anticipated costs. These goals, in turn, will help to ensure that the total reimbursement costs associated with the repacking process remain below the \$1.75 billion in the TV Broadcaster Relocation Fund that Congress made available, speed the post-auction transition process and minimize disruption for stations and viewers alike.

3. Consistent with our decision in the *Incentive Auction R&O* affirming the Wireless Telecommunications Bureau’s (“WTB’s”) delegated authority regarding auction procedure matters that it typically handles,⁸ at least 60 days before the deadline to file auction applications WTB will release a separate public notice which will address the pre-auction application process, including detailed

⁷ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd 6133.

⁸ See *Incentive Auction R&O*, 29 FCC Rcd at 6574, para. 15.

instructions and deadlines, as well as post-auction procedures (“*Auction 1000 Application Procedures Public Notice*” or “*Application Procedures PN*”). The *Application Procedures PN* will announce the filing window for applications to participate in the reverse and forward auctions, as well as upfront payments and minimum opening bids for the forward auction. In addition, the *Application Procedures PN* will include technical formulas implementing today’s final decisions regarding the initial clearing target determination procedure, the final television channel assignment plan, and the assignment of frequency-specific licenses to forward auction clock-phase winning bidders, as well as algorithms for bid processing.⁹ Today’s Public Notice, together with the *Application Procedures PN*, will provide prospective bidders with a complete guide to participating in the incentive auction.

II. BACKGROUND OF PROCEEDING

4. We will conduct Auction 1000 (including Auctions 1001 and 1002) pursuant to Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (“Spectrum Act”), which authorized incentive auctions to help meet the Nation’s accelerating spectrum needs and required the Commission to conduct a broadcast television spectrum incentive auction.¹⁰ Since enactment of the Spectrum Act, the Commission has released a number of decisions in which it has adopted rules and policies that provide the necessary framework for implementing the incentive auction.¹¹ In this Section, we provide a brief overview of these decisions, as they form the basis for the auction procedures we adopt today. Prospective applicants must be familiar with additional specific details from these decisions as well as with the Commission’s general competitive bidding rules in Part 1, Subpart Q of the Code of Federal Regulations and with the procedures, terms, and conditions contained in this Public Notice, and all other public notices related to Auction 1000, including Auctions 1001 and 1002.¹²

5. The repurposed spectrum that will be made available in the forward auction will be licensed on a geographic area basis. The licensed service areas will be PEAs.¹³ The repurposed spectrum will be licensed in 5+5 megahertz paired uplink and downlink blocks, which will be authorized for fixed and mobile Frequency Division Duplex (“FDD”) operations.¹⁴ In the *Incentive Auction R&O*, we adopted a “600 MHz Band Plan” consisting of an uplink band that will begin at channel 51 (698 MHz), followed by a duplex gap, and then a downlink band.¹⁵ Because we will not know the exact number of licenses or their frequencies when the incentive auction begins, the 600 MHz Band Plan includes different band plan

⁹ These final technical appendices will reflect any modifications made by the decisions in this Public Notice to the detailed proposals contained in the *Comment PN* Appendices.

¹⁰ See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402 (codified at 47 U.S.C. § 309(j)(8)(G)), 6403 (codified at 47 U.S.C. § 1452), 126 Stat. 156 (2012) (Spectrum Act); *Incentive Auction R&O*, 29 FCC Rcd at 6569, para. 1.

¹¹ In addition to the *Incentive Auction R&O*, these include the *Channel Sharing Report and Order*, the *Mobile Spectrum Holdings R&O*, and the *ISIX Order and Further Notice*. See *Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF*, ET Docket No. 10-235, Report and Order, 27 FCC Rcd 4616 (2012) (*Channel Sharing Report and Order*); *Mobile Spectrum Holdings R&O*, 29 FCC Rcd 6133; *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Second Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 13071 (2014) (*ISIX Order and Further Notice*) (as applicable, we refer below separately to the *ISIX Order* and *ISIX Further Notice*).

¹² See 47 C.F.R. §§ 1.2101–1.2114, 1.2200–.2209.

¹³ *Wireless Telecommunications Bureau Provides Details about Partial Economic Areas*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 6491 (2014) (*PEAs PN*). See also 47 C.F.R. § 27.6(l).

¹⁴ *Incentive Auction R&O*, 29 FCC Rcd at 6587, para. 51, 6706, para. 319.

¹⁵ *Id.* at 6585, para. 45. Consistent with the *Incentive Auction R&O*, we refer throughout this Public Notice to the UHF band spectrum that is repurposed through the incentive auction as “the 600 MHz Band,” and to the band plan scenarios adopted in the *Incentive Auction R&O* as “the 600 MHz Band Plan.”

scenarios associated with different spectrum clearing targets.¹⁶ Figure 1 shows the band plan scenario associated with each potential spectrum clearing target, along with the number of paired blocks offered in each band plan.

Number of Paired Blocks	Number of Total MHz	Band Plan Scenario
12	144	21 22 23 24 25 26 7 A B C D E F G H I J 3 37 3 K L 11 A B C D E F G H I J K L 700 MHz UL
11	138	21 22 23 24 25 26 27 11 A B C D E F G H 3 37 3 I J K 11 A B C D E F G H I J K 700 MHz UL
10	126	21 22 23 24 25 26 27 28 29 9 A B C D E F 3 37 3 G H I J 11 A B C D E F G H I J 700 MHz UL
9	114	21 22 23 24 25 26 27 28 29 30 31 7 A B C D 3 37 3 E F G H I 11 A B C D E F G H I 700 MHz UL
8	108	21 22 23 24 25 26 27 28 29 30 31 32 11 A B 3 37 3 C D E F G H 11 A B C D E F G H 700 MHz UL
7	84	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 3 3 A B C D E F G 11 A B C D E F G 700 MHz UL
6	78	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 7 A B C D E F 11 A B C D E F 700 MHz UL
5	72	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 11 A B C D E 11 A B C D E 700 MHz UL
4	60	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 9 A B C D 11 A B C D 700 MHz UL
3	48	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 7 A B C 11 A B C 700 MHz UL
2	42	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 11 A B 11 A B 700 MHz UL

Figure 1: Band Plan Scenarios¹⁷

6. The reverse and forward auctions will be integrated in a series of stages. Each stage will consist of a reverse auction and a forward auction, and multiple stages will be run if necessary. Prior to the first stage, the initial spectrum clearing target will be selected based on broadcasters’ collective willingness to relinquish spectrum usage rights at the opening prices, and will be publicly announced.¹⁸ Then the reverse auction will be run to determine the total amount of incentive payments required to clear that amount of spectrum.¹⁹ The clock phase of the forward auction will follow.²⁰ If the final stage rule is satisfied, the incentive auction will close after one stage.²¹ If the final stage rule is not satisfied, however, additional stages will be run, with progressively lower spectrum clearing targets in the reverse auction and less spectrum for licenses available in the forward auction, until the rule is satisfied.²²

7. Because the amount of spectrum repurposed through the reverse auction and the repacking process depends on broadcaster participation and other factors, we will allow limited market variation in the number of blocks available in the band plan associated with a given clearing target. Otherwise, the amount of spectrum recovered in all markets would be limited to the amount recovered in the most constrained or congested market. To accommodate market variation, the 600 MHz Band Plan will include some spectrum blocks in a limited number of PEAs subject to inter-service interference (“ISIX”) due to the assignment of television operations to frequencies in the 600 MHz Band.²³ In the

¹⁶ *Id.* at 6585, para. 46.

¹⁷ The lettered squares in the chart represent paired wireless blocks while the sequentially numbered (and 37) squares represent TV channels. The rectangles labeled 3, 7, 9, and 11 are the guard bands and duplex gaps, with the numbers representing their respective sizes in megahertz.

¹⁸ *Incentive Auction R&O*, 29 FCC Rcd at 6577–78, para. 25; *see also* § V.A (Reverse Auction – Availability of Auction-Related Information).

¹⁹ *Incentive Auction R&O*, 29 FCC Rcd at 6577–78, para. 25.

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

²³ *See ISIX Order*, 29 FCC Rcd at 13083–104, paras. 23–60. A PEA that has a television station assigned to the 600 MHz Band in that PEA (or a nearby PEA) would still follow the same band plan structure as the rest of the country, (continued....)

ISIX Order, we established a methodology for use during the incentive auction to predict ISIX in areas where, to accommodate market variation, broadcast services are provisionally assigned to operate on the same or adjacent channels as wireless services.²⁴ We proposed in the *ISIX Further Notice* to allow wireless carriers to operate in areas subject to ISIX where they may *receive* interference from TV stations,²⁵ but not in areas where they may *cause* any harmful interference to television stations.²⁶ We further proposed that a 600 MHz Band licensee with an “impaired” license (that is, a license to operate in a geographic area that is subject to inter-service interference) would hold the license for the entire PEA but would be limited to operations within the boundaries permitted under the ISIX rules.²⁷

8. The reverse auction will incorporate a repacking process to reorganize the broadcast television bands so that the stations that remain on the air after the auction occupy a smaller portion of the UHF band.²⁸ The repacking process will fulfill Congress’s mandate for the Commission to make “all reasonable efforts to preserve,” as of the date of the passage of the Spectrum Act, the coverage area and population served of each remaining broadcast television licensee.²⁹ Provisional TV channel assignments that satisfy applicable constraints will be identified, ensuring that a feasible channel is available for every station that chooses not to participate in the auction or elects to drop out of the auction during the bidding.³⁰ After the reverse auction bidding ends and the final stage rule is satisfied, final TV channel assignments will be optimized for additional goals.³¹

9. In the *Incentive Auction R&O*, we recognized the importance of finalizing *TVStudy*, the computer software that will be used in the repacking process, well in advance of the auction.³² On June

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but, depending on the location of the TV station, for example, the A block in that PEA might not be available in the forward auction and the B block would be considered impaired.

²⁴ See *id.*

²⁵ *ISIX Further Notice*, 29 FCC Rcd at 13109–10, para. 76; see also *Incentive Auction R&O*, 29 FCC Rcd at 6606, para. 86 n.276.

²⁶ *ISIX Further Notice*, 29 FCC Rcd at 13109–10, para. 76. The *ISIX Further Notice* proposed a methodology for use after the auction based on actual deployment of wireless networks—including a zero-percent threshold for interference to TV stations from wireless services—rather than the assumed deployments on which the ISIX methodology we adopted for use during the auction necessarily relies.

²⁷ *Incentive Auction R&O*, 29 FCC Rcd at 6606, para. 86. See also *ISIX Further Notice*, 29 FCC Rcd at 13109–10, para. 76. Such licensees would be required to meet the build-out requirements only for the area they are permitted to serve within each PEA. See *id.* at 13110–11, para.77; see generally *Incentive Auction R&O* at § VI.B.2.c.ii (Performance Requirements).

²⁸ See *Incentive Auction R&O*, 29 FCC Rcd at 6617–80, paras. 109–257.

²⁹ 47 U.S.C. § 1452(b)(2); see also *Incentive Auction R&O*, 29 FCC Rcd at 6622–25, paras. 120–26.

³⁰ Consistent with the constraints adopted in the *Incentive Auction R&O* to make all reasonable efforts to preserve each eligible station’s coverage area and population served, “[a] feasible assignment is one in which: (1) all stations are given a channel assignment, either to a channel or to go off the air; (2) a station can only be assigned to one of its allowable channels as defined in the domain.csv file; (3) stations’ channel assignments must not violate adjacent and co-channel pairwise interference restrictions as defined in the interference_paired.csv file; (4) all non-participating stations and stations that have dropped out of bidding in the reverse auction are assigned a channel in their pre-auction band; and (5) all participating stations in the reverse auction must be assigned to a valid relinquishment option, that is, an option consistent with the relinquishment options the bidder selected during the application process and with the bidding rules of the reverse auction.” *Auction 1000 Comment PN*, 29 FCC Rcd at 15792–93, para. 129 n.230; see also *Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 119.

³¹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15793–94, paras. 130–31.

³² *Incentive Auction R&O*, 29 FCC Rcd at 6635, para. 145; see *id.* at 6626–32, paras. 130–39 (adopting use of *TVStudy* software to implement the methodology described in OET Bulletin No. 69 (“OET-69”) for evaluating TV station coverage area and population served); 47 U.S.C. § 1452(b)(2) (directing FCC to use “the methodology

(continued....)

30, 2015, the Office of Engineering and Technology (“OET”) finalized *TVStudy* and released a detailed summary of baseline coverage area and population served by each station to be protected in the repacking process, based on then-current information in our databases regarding the stations’ facilities.³³ We direct OET to release final baseline coverage area and population served data no later than 60 days before the deadline for auction applications.³⁴

10. Once the final stage rule is met in the clock phase of the forward auction, a prescribed number of spectrum blocks in each PEA may be designated as reserved spectrum available for bidding only to non-nationwide service providers and nationwide providers holding less than a specified amount of below 1 GHz spectrum in that PEA.³⁵ The results of the reverse auction in the stage in which the final stage rule is satisfied will be used to determine the broadcasters that have been selected to relinquish spectrum usage rights and the amounts of their incentive payments.

11. After bidding in the forward auction clock phase meets the conditions of the stopping rule, the results of the forward auction clock phase will determine the winning bidders for categories of generic blocks of flexible-use 600 MHz Band licenses. The forward auction will move to an assignment phase that will determine the frequency-specific blocks won by each winning bidder of generic blocks. The assignment phase will not alter the number of blocks a winning bidder receives in each PEA and license category, but winning bidders will have the opportunity to bid for specific frequencies.³⁶ The results of bidding in the forward auction clock phase and any additional bidding in the assignment phase will determine the total amount paid for frequency-specific 600 MHz Band licenses.³⁷

III. INITIAL CLEARING TARGET DETERMINATION PROCEDURE

12. In this Section, we adopt the procedure for selecting an initial spectrum clearing target for the incentive auction.³⁸ Examination of the record reflects consensus on several basic principles: that the goal should be to allow market forces to determine how much spectrum is repurposed;³⁹ that flexibility to

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described in” OET-69 to determine the coverage area and population served of each broadcast television licensee that the FCC must use all reasonable efforts to preserve in the repacking process). *See also Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Second Order on Reconsideration, 30 FCC Rcd 6746, 6752–60, paras. 14–31 (2015) (*Incentive Auction Second Order on Reconsideration*).

³³ *Office of Engineering and Technology Releases Final Version of TVStudy and Releases Baseline Coverage Area and Population Served Information Related to Incentive Auction Repacking*, GN Docket No. 12-268, ET Docket No. 13-26, Public Notice, 30 FCC Rcd 6964 (OET 2015). *TVStudy* is available on the Commission’s LEARN website under the Repacking Section at <http://wireless.fcc.gov/incentiveauctions/learn-program/repacking.html>.

³⁴ The final baseline data released by OET will contain the final list of eligible stations based on corrections to eligible facilities resulting from their certification in the Pre-Auction Technical Certification Form and any granted Petitions for Eligible Entity Status or Petitions for Reconsideration of the *Incentive Auction R&O*.

³⁵ *See Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6208, paras. 184 *et seq.*

³⁶ *Incentive Auction R&O*, 29 FCC Rcd at 6780, paras. 516–17.

³⁷ *Id.* at 6781, para. 520.

³⁸ *See* § II (Background of Proceeding), Figure 1.

³⁹ *See, e.g.*, AT&T Comments at 1 (asserting that the Commission’s rules should maximize broadcaster participation); CCA Comments at 5 (arguing that the Commission should “free up as much spectrum as possible for mobile broadband use”); EOBC Comments at 8–9 (stating that “it is imperative that the FCC adopts rules that will permit the reallocation of as much spectrum through the Incentive Auction as market forces will permit”); Local Media Comments at 1, 6 (arguing that “the success of the AWS-3 auction demonstrates that the FCC should set the highest clearing target possible”); LPN Comments at 1–2, 8 (“the Commission . . . should adopt market-based policies and procedures that will serve the central goal of this entire exercise: to maximize to [sic] amount of

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allow some degree of impairment is critical to achieving that goal;⁴⁰ and that forward auction licenses should be as free from impairments as possible.⁴¹ Consistent with these principles, the procedure we adopt is modified in important respects from that proposed in the *Comment PN*. In particular, we adopt a one-block-equivalent standard with a cap for limiting impairments that will allow significantly less than the proposed 20 percent nationwide impairment level at higher clearing targets.

13. This Section provides a high-level overview of the procedure and then addresses in detail the elements of the procedure related to handling impairments. In Appendix A to this Public Notice, we provide a description of how our computer software will apply the procedure we adopt on a step-by-step basis. An updated version of Appendix C to the *Comment PN* setting forth the technical details and formulas associated with the procedure that we adopt will be included with the appendices to the *Application Procedures PN*.⁴²

A. Overview

14. Based on the array of stations that apply to participate in the reverse auction and the bidding options to which they initially commit,⁴³ the procedure we adopt will use mathematical optimization techniques to determine a provisional television channel assignment plan for every possible spectrum clearing target.⁴⁴ For each clearing target, the plan must include a feasible channel assignment—that is, a channel assignment that satisfies the constraints established in the *Incentive Auction R&O* to make all reasonable efforts to preserve each television station’s coverage area and population served⁴⁵—in its pre-auction band for every eligible station that does not participate in the

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unimpaired spectrum made available through the auction”); Sprint Reply at 16 (“Sprint has argued throughout this proceeding that the Commission should maximize the amount of spectrum in the forward auction.”).

⁴⁰ See, e.g., CTIA Comments at 4 (stating that a certain amount of market variation and impairment is “inevitable”); Letter from Preston Padden, EOBC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 3-4 (filed June 29, 2015) (EOBC June 29, 2015 *Ex Parte* Letter) (expressing concern about the Commission’s ability to achieve a 126 megahertz clearing target without allowing for some impairments at the border); NAB Comments at 10 (acknowledging that some level of impairment is prudent and recommending a three percent near-nationwide standard); Sprint Reply at 17 (supporting T-Mobile’s scaled approach to impairments which allows for less impairment at higher clearing targets); T-Mobile Comments at 17 (stating that “the voluntary nature of the incentive auction makes some degree of variation in the available spectrum nearly inevitable”).

⁴¹ See, e.g., AT&T Comments at 11 (arguing that the Commission should only auction unimpaired spectrum blocks except in border markets); Broadcaster Representatives Reply at 4 (arguing that if the Commission implements DRP, the impairment threshold should be no higher than three to five percent); CCA Comments at 12 (arguing for additional constraints on the 20 percent near-nationwide standard to further reduce impairments); CCA Reply at 25–26 (agreeing with CTIA’s principles for lowering impairments); CTIA Comments at 6 (outlining four principles for limiting impairments in the 600 MHz Band); Local Media Comments at 8 (recommending that the Commission not allow for any impairments in top markets); LPN Comments at 10 (advocating for both a lower near-nationwide standard and a lower cap on impairments at the license level); Mobile Future Reply at 2 (advocating for a “truly near-nationwide clearing target” that offers a single category of unimpaired licenses except in border markets); NAB Comments at 10 (recommending a near-nationwide standard of three percent); Verizon Comments at 1, 3–7 (arguing that impairments be limited to border markets).

⁴² See § I (Introduction and Executive Summary).

⁴³ The process by which applicants commit to relinquishment options and become qualified to bid in the reverse auction is detailed below. See § IV.A (Qualifying to Bid in the Reverse Auction).

⁴⁴ Station assignments to channels in the remaining television bands will change throughout reverse auction bidding. See § V.C (Reverse Auction – Bidding Mechanics) (describing how the auction system conducts “feasibility checking” to determine if a feasible channel exists in a station’s pre-auction band). See also § VIII (Final Television Channel Assignment Plan Selection Procedure) (describing how the final television channel assignment plan will be selected).

⁴⁵ *Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 119.

reverse auction and in the VHF band for every applicant designated to move to a VHF relinquishment option.⁴⁶ Each applicant station must be designated to a relinquishment option consistent with its initial bid commitment. If a station initially commits to move to a High- or Low-VHF channel as its preferred relinquishment option, and the auction system is unable to accommodate that option, the system must either designate that station to a fallback relinquishment option selected by the applicant or, if the system is unable to do so, to a feasible channel in the station's pre-auction band.⁴⁷ In the event that the procedure determines that relinquishment of a station's spectrum usage rights will be unnecessary to achieve a clearing target under any circumstances, the station will be assigned a feasible channel in its pre-auction band, and the applicant will be informed prior to the start of the clock rounds of the reverse auction.

15. Depending on broadcaster participation levels, there may not be a feasible channel available in the remaining UHF portion of the TV band⁴⁸ for all non-participating UHF stations and all UHF applicant stations that are not assigned to their initial commitment or fallback option(s). In such circumstances, as a last resort, the procedure will assign stations to channels in the 600 MHz Band according to the primary objective of minimizing the sum of "weighted-pops"—population weighted by an index of area-specific prices based on prior Commission spectrum auctions—impaired for all licenses by the assignments, and according to the additional objectives discussed below.⁴⁹ The location of impairing stations in the 600 MHz Band will not be limited for purposes of applying the clearing target objectives; impairing stations may be assigned to the uplink, downlink, and duplex gap portions of the Band in order to minimize impairments. In addition to the primary objective of minimizing impairments, the procedure will apply the secondary objective of maximizing the weighted number of "Category 1" licenses (those licenses with zero to 15 percent impairment) nationwide. In order to avoid any increase in impairment levels, the secondary objective will be constrained by the primary objective.⁵⁰

16. Having determined the provisional TV channel assignment plan for all clearing targets that best satisfies the objectives, the clearing target determination procedure, using the 2x2 cell calculations, will apply the near-nationwide standard described below for limiting impairments in order to select the highest possible clearing target that meets the standard.⁵¹ Under that standard, the amount of impaired weighted-pops on a percentage basis will be less than the equivalent of the weighted-pops of one paired 5+5 megahertz spectrum block. For example, if the provisional TV channel assignment plan is for a 126 megahertz spectrum clearing target, then the forward auction licenses in the associated 600 MHz

⁴⁶ *Auction 1000 Comment PN*, 29 FCC Rcd at 15767–68, para. 42, 15792–93, para. 129 n.230; see also *Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 119. Stations currently assigned to channels 50 or 51 will be provisionally assigned to different UHF channels. See § IV.A.3 (Committing to an Initial Relinquishment Option).

⁴⁷ The optimization procedure can always accommodate an initial bid commitment to go off-air, including a commitment to go off-air in order to channel share. Due to the limited availability of channels in the VHF band and the technical constraints on repacking established in the *Incentive Auction R&O*, the procedure may not be able to accommodate every station that commits to move to the Low- or High-VHF band. The procedure will try to accommodate initial bid commitments according to the priorities proposed in the *Comment PN*. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15782, para. 91. See also § IV.A.3 (Committing to an Initial Relinquishment Option). If a station's initial commitment(s) is not accommodated by the auction system, the applicant will be informed prior to the start of the clock phase of the reverse auction that the station will be assigned to a feasible channel in its pre-auction band. See § IV.A.4 (Reverse Auction – Final Auction Application Status).

⁴⁸ The remaining TV bands vary according to the spectrum recovery scenario. See § II (Background of Proceeding), Figure 1.

⁴⁹ We note that in creating the provisional TV channel assignment plans, the optimization tool applies first the primary objective, and then applies the additional objectives we adopt to break ties where there are multiple solutions. See § III.B.2 (Additional Objectives).

⁵⁰ Thus, the secondary objective seeks an assignment plan that satisfies the primary objective, and contains the highest weighted number of Category 1 licenses nationwide.

⁵¹ See § III.C (Standard to Limit Market Variation).

Band Plan (120 megahertz, or 10 paired license blocks) could only be subject to overall impairments on a near-nationwide basis of up to but not including 10 percent, or less than one out of 10 blocks. The procedure then will select the highest possible clearing target that satisfies the standard and the provisional TV channel assignment plan for that clearing target will be selected for the initial stage of the auction, along with the associated 600 MHz Band Plan. Application of this procedure will be subject to the international agreements we reach with Canada and Mexico.⁵²

B. Objectives in Determining a Provisional TV Channel Assignment Plan

1. Primary Objective: Minimizing Impaired Weighted-Pops

17. The primary objective of minimizing impaired weighted-pops nationwide is consistent with the consensus among both broadcasters and wireless providers for limiting the impact of impairments overall.⁵³ In addition, by using weighted-pops, the optimization tool will disfavor assigning impairing TV stations in major markets where they would have the greatest impact on forward auction spectrum prices, consistent with commenters' concerns.⁵⁴ Our decisions to allow the optimization software to assign television stations within the 600 MHz Band so as to minimize impaired weighted-pops in applying the primary objective, and not to "discount" impairments located in the uplink portion of the Band, also will promote our goal of allowing market forces to determine the highest and best use of spectrum.

a. Calculation of Weighted-Pops

18. "Weighted-pops" will be calculated using the same price index measure we adopt to calculate forward auction bidding units.⁵⁵ Specifically, to calculate weighted-pops, the index of area-specific prices from prior auctions is used to weight the population in each license area based on the relative price of each Economic Area ("EA") and Cellular Market Area ("CMA") license (for paired spectrum) in Auctions 66 (AWS-1), 73 (700 MHz), and 97 (AWS-3).⁵⁶ The price per MHz-pop of each license is divided into the average price per MHz-pop of the corresponding spectrum block to produce an index value of the license relative to the spectrum block.⁵⁷ Because the past prices are for EA and CMA

⁵² Although we generally agree with commenters who argue that we could miss the opportunity to clear more spectrum by skipping a clearing target, *see* §VII.A (Selecting a New Clearing Target), it may be necessary to skip the 144, 138, and/or 108 MHz clearing targets to better harmonize our band plan with Canada or Mexico. We expect that this issue will be addressed in our negotiations with those countries. We expect to reach timely arrangements with Canada and Mexico that will enable us to carry out the repacking process in a manner fully consistent with the requirements of the statute and our goals for the auction. *See Incentive Auction Second Order on Reconsideration*, 30 FCC Rcd at 6784, para. 84, 6786–87, para. 89 (noting that the Commission will release information regarding border stations and allotments prior to the start of the incentive auction).

⁵³ *See, e.g.*, AT&T Comments at 7–8; Broadcaster Representatives Reply at 4; CCA Comments at 12; CTIA Comments at 6; EOBC Comments at iv, 8–9; Local Media Comments at 8; LPN Comments at 10; Mobile Future Reply at 2; NAB Comments at 10; Verizon Comments at 1, 3–7.

⁵⁴ *See, e.g.*, AT&T Reply at 7–8; EOBC Reply at 11; CCA Comments at 12; CTIA Comments at 7; T-Mobile Comments at 18. *See also Incentive Auction R&O*, 29 FCC Rcd at 6570, para. 2 (identifying goal of maximizing forward auction spectrum value). Weighting will discourage assignment of impairing TV stations to 600 MHz Band frequencies in or near major markets by increasing the cost of such assignments in the optimization.

⁵⁵ *See* § IV.B.1 (Bidding Units).

⁵⁶ *See Auction 1000 Comment PN*, 29 FCC Rcd at 15766–67, para. 38, 15802–03, paras. 161–63, 15878, App. F. *See also Incentive Auction Task Force Releases Initial Clearing Target Optimization Simulations*, GN Docket No. 12-268, AU Docket No. 14-252, Public Notice, 30 FCC Rcd 4854, 4854–55, para. 2 n.5 (2015) (*Clearing Target Simulations PN* or *CTS PN*).

⁵⁷ For example, if the price per MHz-pop of the winning bid for an EA license equaled the average price per MHz-pop for that spectrum block, then the index value for that license would be 1; if the price per MHz-pop was half the

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licenses, the index value for each EA and CMA license area is broken down to the county level and averaged; the resulting county-level index values are aggregated to PEAs. The index values are aggregated to the PEA level by multiplying the county's index value by the percentage of the PEA's population within the county, and then summing those results for all of the counties in a PEA. In the *Comment PN*, we stated our intention to update the price index we provided in Appendix F to the *Comment PN* following Auction 97 to account for current values.⁵⁸ Those results as described above are now being incorporated into the price index to calculate weighted-pops for the incentive auction. An appendix providing the final index consistent with these decisions will be released with the *Application Procedures PN*.⁵⁹

19. Some commenters express concerns with the use of weighted-pops.⁶⁰ We disagree with AT&T that our approach using weighted-pops is imprecise and will tend to understate impairment levels because it ignores major highways, railways and airports where population levels may be low but spectrum values are high. Indeed, by incorporating spectrum values from past auctions into the determination of where to locate impairments, the optimization tool will be able to account for those areas where spectrum values are high for reasons not directly related to population, including transportation hubs, and will avoid locating impairments in those areas, consistent with our goal of maximizing spectrum value.⁶¹ Moreover, the detailed information the auction system will provide to forward auction bidders on the locations where it places impairments will enable bidders to evaluate precisely their potential impact. We also disagree with NAB, which argues that the weighted-pops concept is confusing and overly complex.⁶² As stated above, although this is the first time we apply this measure for purposes of impairments, the Commission has used weighted-pops in prior auctions to calculate bidding units. We disagree that use of weighted-pops adds undue complexity; rather, we agree with those commenters that suggest that using weighted-pops will simplify the auction and avoid locating impairments where they will unduly harm spectrum values.⁶³ By evaluating impairments based on weighted-pops rather than

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average, then the index value would be 0.5; if the price per MHz-pop was twice the average, then the index value would be 2; etc.

⁵⁸ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15766–67, para. 38 n.93.

⁵⁹ The explanation we provide here together with the *Application Procedures PN* appendix responds to interested parties' requests for additional information on how weighted-pops is calculated and how it will be used during the incentive auction in relation to impairments and to bidding. See CTIA Comments at 8–9 (“the Commission should provide additional information regarding the calculations it used to arrive at these numbers, including, at a minimum, the specific auction data it is relying upon and the mathematical formulas used to create this price index.”). See also Verizon Comments at 6.

⁶⁰ See, e.g., AT&T Comments at 20; EOBC Reply at 10; NAB Comments at 9–10.

⁶¹ AT&T Comments at 20. AT&T's criticism appears to concern how the ISIX methodology calculates impairments more than the use of weighted-pops. The former issue should have been raised in the ISIX proceeding.

⁶² NAB Comments at 9. *But see* CCA Reply at 27–28 (supporting the Commission's use of weighted-pops and calling NAB's criticism “difficult to fathom” and “internally inconsistent.”). CCA notes: “On the one hand, NAB opposes weighting because it could yield *too much* variability among markets to allow for economically efficient LTE deployments. On the other hand, NAB opposes weighting because it could yield *too little* variability, and in ways might somehow undervalue the residents of areas that have historically experienced lower demand for spectrum relative to those located in areas that have historically experience higher demand for spectrum. As NAB puts it, ‘each person is [sic] Buffalo counts for only four percent of themselves’ once weighting is taken into account. While it is difficult to understand NAB's precise objection to the use of standard statistical weighting, NAB is correct that impairments in large markets with historically high demand for spectrum can have an outsized effect on the economic viability of a particular band plan, whether or not the band plan is considered ‘nearly-nationwide.’” *Id.*

⁶³ C Spire Comments at 2–3 (“Utilization of this method [weighted-pops] would simplify the ability of carriers to gauge with certainty the potential effects of inter-service interference on a particular license.”). See also CCA

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population alone, the procedure we adopt can better account for the costs associated with impairing specific areas in order to identify a provisional TV channel assignment plan that minimizes impairments.

b. Measuring Potential Impairments

20. We adopt our proposed procedure for determining the extent of potential impairments, with the modifications described below.⁶⁴ Under the measurement procedure we adopt, the impairment level—the population subject to impairment—of each license that will be available in the forward auction under each spectrum clearing target will be pre-calculated for each station on each channel for each clearing target. More specifically, the ISIX methodology first will be used to predict potential inter-service interference between TV and wireless services.⁶⁵ The raw data the ISIX methodology produces at a two-by-two kilometer cell level⁶⁶ will be aggregated into county-level data sets for the uplink and downlink portions of the 600 MHz Band and mapped to specific forward auction licenses.⁶⁷ The percentage of the population of each county subject to inter-service interference then will be calculated for each potential channel assignment of a TV station to a location in the 600 MHz Band.⁶⁸ For any such assignment in which this percentage is more than 10 percent in either the uplink or downlink portion, the entire population of the county will be considered impaired for the license if the station is assigned to the channel. For a given TV channel assignment plan, the impairment percentage of a license is determined by dividing the sum of the populations of impaired counties by the population of the PEA.

21. We adopt a 10 percent limit on the amount of impairment allowed in a county before the entire population of the county is considered impaired for the purposes of the measurement procedure. We sought comment on setting this threshold between 10 and 20 percent.⁶⁹ In order to avoid under-predicting potential interference, we choose a more conservative threshold at the low end of the proposed range.⁷⁰ We emphasize that the optimization procedure will use the county measurement only to determine the provisional TV channel assignment plans; as described above, the selection of a specific clearing target will use the more granular 2x2 cell data to determine the near-nationwide impairments.⁷¹

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comments wherein CCA supports the use of weighted-pops, as proposed, to measure the effect of potential impairments. CCA Comments at 9; CCA Reply at 3, 27–28 (arguing that using weighted-pops will simplify auction administration).

⁶⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15819–20. The procedure we proposed for measuring impairments is set forth in detail in Appendix B to the *Auction 1000 Comment PN*. See *id.* at 15819–40, App. B. The technical formulas for implementing the modified procedure we adopt will be set forth in the *Application Procedures PN*. See § I (Introduction and Executive Summary).

⁶⁵ The ISIX methodology, which the Commission adopted for purposes of the incentive auction, predicts potential inter-interference based on deployment of a hypothetical wireless network. See *ISIX Order*, 29 FCC Rcd 13071.

⁶⁶ The ISIX methodology defines each two-by-two kilometer cell as “impaired” or “unimpaired” depending on whether it is subject to any inter-service interference. See *ISIX Order*, 29 FCC Rcd at 13087, para. 32.

⁶⁷ A table cross-referencing counties to PEAs is available on the Commission website at <http://transition.fcc.gov/oet/info/maps/areas/>.

⁶⁸ The procedure will avoid double-counting the population of a county that is subject to potential inter-service interference from more than one TV station through the use of overlap tables. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15819–20, App. B.

⁶⁹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15762, para. 28. No commenter supports a threshold outside of the range we proposed. CTIA expresses concern that the proposed range is too wide. CTIA Reply at 9. Our proposal, however, was to choose a specific number within the range.

⁷⁰ See Sprint *CTS PN* Comments at 5–6 (supporting the adoption of a 10 percent county threshold).

⁷¹ We note that because the initial clearing target is ultimately chosen based on the 2x2 grid cell data, using a 10 percent county threshold to aggregate the ISIX data up to the county level has very little impact on the overall result. See § III.A (Overview of the Initial Clearing Target Determination Procedure).

22. Rather than “discounting” the population for impairments located in the uplink portion of the 600 MHz Band, as proposed, the procedure we adopt will consider uplink and downlink impairments to have equal weight.⁷² Commenters generally oppose the proposal, arguing that it would tend to understate impairment levels.⁷³ We agree and conclude that adopting it would be inconsistent with the strong record support for minimizing impairments. Therefore, the percentage of population attributed to uplink impairments will not be discounted: if the percentage of population with predicted impairment in the uplink exceeds 10, the optimization will consider the county wholly impaired, just as it will for impairments in the downlink portion of the block.⁷⁴ The effect of this approach is that the optimization will not favor impairing the uplink over impairing the downlink but will focus instead on minimizing impaired weighted-pops in the 600 MHz Band overall.⁷⁵

23. The above-stated measurement procedure will be used in applying the additional objectives discussed below as well as the primary objective. In creating the provisional TV channel assignment plan for each clearing target, data must be aggregated to the county level, and a percentage threshold must be applied to determine whether a county is impaired, in order to reduce the volume of data inputs to a quantity that reasonably can be utilized.⁷⁶ For purposes of applying the near-nationwide

⁷² *Auction 1000 Comment PN*, 29 FCC Rcd at 15762–63, para. 29. We proposed to consider a county that is impaired in the downlink portion of the 600 MHz Band to also be impaired in the uplink portion, but not the reverse. Thus, only 50 percent of the population of a county with uplink impairments above the threshold would be considered impaired (i.e., the portion of the population representing the uplink block); 100 percent of the population of a county with downlink impairments above the threshold would be considered impaired (i.e., the population representing both the downlink and uplink blocks).

⁷³ See, e.g., AT&T Comments at 23–24; AT&T Reply at 9–10; Letter from Jeffrey H. Blum, DISH Network Corp., to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268, at 5 (filed May 29, 2015) (DISH May 29, 2015 *Ex Parte* Letter) (stating that discounting could result in windfalls for certain winners because uplink impairments may not hold the same value as downlink impairments for different bidders); NAB Comments at 9–10 (noting that with the discount, 20 percent impairment could mean 40 percent impairment if all impairments are located in the uplink band); Sprint Reply at 20; Sprint *CTS PN* Comments at 7 (supporting equivalent treatment of uplink and downlink impairments, stating that “[f]or competitive operators without existing low-band resources, uplink impairment has as harmful an effect on spectrum utility as impairment on the corresponding downlink.”). But see T-Mobile Reply at 15–16 (arguing that the Commission should consider a county with uplink impairments above a 15 percent threshold to be no more than 50 percent impaired, but a county with downlink impairments above a 15 percent threshold to be wholly impaired); T-Mobile *CTS PN* Comments at 10–11 (stating that “[b]y failing to weigh downlink impairments more heavily than uplink impairments, specifically on a 2-to-1 basis, the Task Force’s predictions may underestimate the amount of valuable spectrum licenses that would otherwise be available.”).

⁷⁴ For example, if the predicted impairment in the uplink or downlink exceeds 10 percent, the entire population of the county is counted as impaired. Alternatively, if the predicted impairment in the uplink is 10.0 percent and the predicted impairment in the downlink is also 10.0 percent, the entire population of the county is counted as unimpaired because neither the uplink nor the downlink impairment is greater than 10 percent.

⁷⁵ Further, the result of this approach is that any population that is not considered impaired will be usable for two-way communication (i.e., both its uplink and downlink blocks will be unimpaired).

⁷⁶ Given all of the possible TV station and channel combinations under every clearing target, the ISIX methodology produces a quantity of data that exceeds the current capabilities of optimization techniques. When aggregated to a county level, the ISIX methodology produces approximately 3.7 billion separate records of data for the roughly 3,000 counties in the United States. Use of data at the next possible level of granularity—the Census tract—would result in a 20-fold increase in the number of data records, and use of data at the cell level would result in a 650-fold increase. As it stands at the county level, the measurement procedure we adopt must consider more than 100,000 decision variables and over two million constraints. At a more granular level than the county, the number of decision variables and constraints that must be considered would increase to an unsolvable number.

standard to determine whether a plan satisfies the impairment limit, however, more granular, cell-level data will be used.⁷⁷

24. Likewise, forward auction licenses will be categorized as Category 1 (zero to 15 percent impaired) or Category 2 (greater than 15 percent and up to 50 percent impaired) based on cell-level impairment data, and forward auction bidders will be provided with cell-level data to inform their bidding strategies.⁷⁸ Specifically, ISIX data will be used to identify the impaired population in both the uplink and downlink portion in the license.⁷⁹ This data will show in which cells a potential licensee either will be restricted from operating due to harmful interference to an impairing TV station or may have its operations infringed upon by harmful interference from a TV station.⁸⁰ The population of impaired cells across the license—whether the impairment results in the uplink or downlink—will be added together and divided by the total population of the PEA to calculate the impairment percentage.⁸¹ The location of an impairment in the 600 MHz Band will not be determinative for the purposes of calculating the impairment percentage; the population of a cell will be considered impaired even if the impairment only affects the uplink or downlink portion of the paired 5+5 megahertz spectrum block.⁸² The effect of this approach is that any population that is not considered impaired will be fully usable for two-way communication (i.e., both its uplink and downlink blocks will be unimpaired), consistent with our prioritization of paired spectrum.⁸³

c. Assigning TV Stations to the 600 MHz Band to Accommodate Market Variation

25. We adopt our proposal to allow the optimization tool to assign television stations within the 600 MHz Band where necessary to accommodate market variation in a manner that best fulfills the clearing target objectives, and not to restrict it to assignments in specific portions of the 600 MHz Band—downlink, uplink, or duplex gap.⁸⁴ Restricting the optimization tool to certain portions of the 600 MHz Band would undermine its efficacy in carrying out the primary objective, likely resulting in more impairment of forward auction licenses and the selection of a lower spectrum clearing target. Such an

⁷⁷ See § III.C (Standard to Limit Market Variation).

⁷⁸ See § VI.A.2.a (Forward Auction – Bidding Categories).

⁷⁹ See *ISIX Order*, 29 FCC Rcd at 13089 *et seq.* (Section II.B.2).

⁸⁰ See *id.* at 13083, para. 23; *Auction 1000 Comment PN*, 29 FCC Rcd at 15819–40, App. B.

⁸¹ If the total population of the impaired cells within a block is less than or equal to 15 percent of the total population of the block, the block will be offered as a Category 1 block. If the total population of the impaired cells is more than 15 percent but less than or equal to 50 percent, the block will be offered as a Category 2 block. See § VI.A.2.a (Forward Auction – Bidding Categories).

⁸² This conservative approach avoids both the weighting proposed in the *Comment PN* and double counting. For example, assume a PEA with a population of 100,000 has impairments that affect 10,000 people in the downlink portion of the A block and 5,000 of the same people in the uplink portion of the A block. The A block would be considered 10 percent impaired (10,000 impaired pops divided by 100,000 total pops in the PEA). Though the impairment affects a population of 5,000 in both the uplink and the downlink portion of the A block, 5,000 is not added to the total impaired pops because that would result in double counting—the population of 5,000 was already included when tallying the downlink impairments.

⁸³ *Incentive Auction R&O*, 29 FCC Rcd at 6587, para 51.

⁸⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15765, para. 35. The 600 MHz Band Plan includes an uplink and a downlink portion, as well as guard bands between the uplink and downlink bands (the duplex gap) and between TV and wireless services. *Incentive Auction R&O*, 29 FCC Rcd at 6585, para. 45. Under this procedure, impairing TV stations could be assigned to channels that are located in the uplink, downlink, or the guard bands, including the duplex gap. We note that in creating the provisional TV channel assignment plans, the optimization tool will apply first the primary objective, and then the additional objectives we adopt to break ties where there are multiple solutions.

outcome is not justified by the competing policies that some commenters advocate in support of restrictions.

26. Commenters express conflicting views on where to assign impairing television stations, arguing for various reasons that impairments should be restricted to the uplink, downlink, and/or the duplex gap portion of the 600 MHz Band and identifying problems with every possible location within the 600 MHz Band.⁸⁵ For example, CCA, C Spire, and T-Mobile assert that stations should be assigned to the uplink because consumer demand is driving the need for more unimpaired downlink spectrum than uplink spectrum.⁸⁶ T-Mobile and Verizon also suggest that assigning stations to the uplink is preferable because carriers can employ mitigation methods, such as base station filters, to guard against inter-service interference.⁸⁷ On the other hand, Sprint supports assigning TV stations on contiguous channels starting at the bottom end of the downlink band to facilitate filter design in devices, reduce the number of filters needed for base stations, and maximize two-way spectrum.⁸⁸ Sennheiser supports assigning stations to

⁸⁵ See, e.g., AT&T Comments at 12–13 (noting that TV stations assigned to the uplink “can cause extensive and geographically widespread inter-service interference”); *id.* at 13–14 (claiming that assigning TV stations to the downlink gap would result in extensive adjacent channel interference, which would be difficult to mitigate through filter design in mobile devices); CTIA Comments at 5 (urging that TV stations not be placed in duplex gap); NAB Reply at 5–6 (arguing that the duplex gap should be reserved for exclusive use by wireless microphones).

⁸⁶ See CCA Comments at 4–6 (noting that “mobile broadband providers currently require significantly more downlink than uplink spectrum to meet consumer demand,” but cautioning that impairment of the uplink should not continue to the point where all uplink channels are unavailable for use in a PEA); C Spire Comments at 3–4 (noting that carriers “currently require significantly more downlink than uplink spectrum to meet consumer demand,” and that assigning TV stations in the uplink portion of the Band “accurately reflects mobile broadband usage patterns.”); T-Mobile Comments at 10–15 (stating that assigning TV stations in the uplink would: (1) reduce the scope of the impairment on a MHz-pop basis in many situations; (2) offer more options for overcoming interference than impairing downlink blocks; and (3) employ different types of LTE base station filtering to prevent strong DTV signals from overloading the unimpaired uplink blocks); T-Mobile Reply at 29 (“3GPP standards support inter-band carrier aggregation with a single uplink and would not require any new hardware.”); Verizon Comments at 17–20 (stating that carriers can design “market-specific base station receiver filters to protect against interference,” and market-specific filtering methodologies in handsets “[are] not possible” because they must roam to all markets).

⁸⁷ T-Mobile Comments at 12 (stating that mitigation options include “[c]ommercially available base station filtering,” uplink resource block banking, or cooperation with broadcasters to manage DTV out-of-band emissions); T-Mobile Reply at 28–30 (noting that 3GPP standards support inter-band carrier aggregation with a single uplink and would not require any new hardware, thus keeping equipment cost at a minimum, and that there is greater value in downlink spectrum than uplink for mobile broadband providers); Verizon Comments at 17–20 (noting that carriers can design market-specific base station receiver filters to protect against broadcaster interference because the base station is not mobile). See also Sprint Comments at 39 n.63 (“In cases of [TV] stations located in the uplink, this allows for the development of base station filters.”). But see AT&T Comments at 12–13 (stating that assigning TV stations channels in the uplink “can cause extensive and geographically widespread inter-service interference” by: (1) creating adjacent channel interference to other uplink blocks in the same PEA; and (2) creating co-channel interference with neighboring PEAs).

⁸⁸ Sprint Reply at 18–20 (noting that receiver technology will be developed to prevent overload from downlink impairments, but “there is no apparent solution—except for distance separation—for harmful interference that may be caused to 600 MHz base stations from the out-of-band emissions of television stations operating in the uplink.”); Sprint *CTS PN* Comments at 7–8 (encouraging that remaining TV stations be located on common frequencies within the 600 MHz Band to the maximum extent possible); Letter from Rafi Martina, Counsel, Sprint Corp., to Marlene H. Dortch, Secretary, FCC, AU Docket 14-252, GN Docket No. 12-268, at 2 (filed July 30, 2015) (Sprint July 30, 2015 *Ex Parte* Letter) (“[P]lacing [TV stations] in the downlink portion of the band is preferable since it will maximize the amounts of low-impairment, bi-directional spectrum available for auction. . . .”). See also Sprint *CTS PN* Comments at 7 (stating that if the impairments must be assigned to the uplink, they should go “closest to the duplex gap, without regard to whether the station would slightly overlap the duplex gap” because the FCC simulations reveal that “absolute protection of the duplex gap significantly increases the level of impairment to auction spectrum . . . particularly in the case of lower clearing targets”).

channels in the downlink portion of the band in order to provide greater certainty for unlicensed users in the duplex gap.⁸⁹ In contrast, AT&T and Verizon oppose assigning TV stations to the downlink band because of complications to mobile device filter design.⁹⁰ Several commenters caution against assigning stations to channels in the duplex gap.⁹¹ Conversely, AT&T, CCA, Sprint and T-Mobile support assigning stations to the duplex gap. AT&T states that it would likely be less harmful as a technical matter, and therefore preferable to assignment elsewhere in the 600 MHz Band,⁹² and T-Mobile argues that it “will allow for more extensive, higher performance 600 MHz broadband transmissions in the affected geographic area license(s) than would be possible if the broadcast impairment were co-channel with broadband operations.”⁹³ Sprint states “in the event of less robust broadcaster participation, in which fewer blocks of competitively critical low-band spectrum can be repurposed, repacking television stations in the duplex gap may be the only way to conduct an auction with a modestly successful amount of

⁸⁹ Sennheiser Comments at 2–3.

⁹⁰ AT&T Comments at 13–14 (arguing that the proposed interoperability mandate would limit the ability to protect against adjacent channel interference, and it would be difficult to mitigate through filter design in mobile devices); Verizon Comments at 18 (arguing that the use of market-specific filtering methodologies in roaming-capable handsets is impossible, and that stations in the downlink could damage user devices due to burn-out and cause operational overload). AT&T further argues that TV stations in the downlink would cause co-channel interference to devices attempting to use the same spectrum blocks in adjacent PEAs, and necessitate “exclusion zones” to protect TV receivers from interference caused by base station transmissions. AT&T Comments at 14. *See also* Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 2-3 (filed July 15, 2015) (AT&T July 15, 2015 *Ex Parte* Letter) (arguing that assigning a TV station to a channel in the downlink band could make as many as 3 or 4 blocks of an 84 megahertz band plan unusable in the TV station’s broadcast area).

⁹¹ A number of commenters argue that TV stations assigned to the duplex gap could interfere with licensed operations in the 600 MHz Band. *See, e.g.*, CTIA Comments at 5 (citing Comments of AT&T Inc., GN Docket No. 12-268, at 24–26 (Jan. 25, 2013); Comments of Motorola Mobility LLC, GN Docket No. 12-268, at 9–10 (Jan. 25, 2013)); Verizon Comments at 19; Verizon Reply at 11. Other commenters argue that assigning TV stations to the duplex gap will negatively affect wireless microphone operations. *See, e.g.*, NAB Reply at 5–6; NAB *CTS PN* Comments at 6–7; Shure Comments at 1–2; Sennheiser Comments at 2–3; RTDNA Reply at 1–4; Letter from Catherine Wang, Morgan, Lewis & Bockius LLP, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, GN Docket No. 14-166, ET Docket No. 14-165 at 3–4 (filed June 24, 2015); Letter from Michael Calabrese, Open Technology Institute at New America Foundation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1–2 (filed July 7, 2015) (Broadcasting & Unlicensed Coalition July 7, 2015 *Ex Parte* Letter); Letter from Broadcast Networks and their Affiliates Associations to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, WT Docket No. 12-269 (filed July 15, 2015). Other commenters argue that assigning TV stations to the duplex gap could limit the availability of spectrum for unlicensed use. *See, e.g.*, Broadcasting & Unlicensed Coalition July 7, 2015 *Ex Parte* Letter at 1–2; Letter from Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 (filed July 9, 2015) (Public Knowledge July 9, 2015 *Ex Parte* Letter).

⁹² AT&T Comments at 14–15 (stating that while assigning TV stations in the duplex gap is preferable, it would still cause significant interference to mobile spectrum). AT&T also states that if the Commission does find it necessary to assign TV stations to channels in the 600 MHz Band, they should be assigned only to channels in the duplex gap because it will preserve the maximum amount of spectrum blocks for auction, provide a natural guard band between the TV station and licensed spectrum, and allow filters to more effectively protect licensed spectrum from adjacent channel interference. *Id.* at 28. *See also* Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1 (filed July 10, 2015) (AT&T July 10, 2015 *Ex Parte* Letter) (“[P]lacement of stations in parts of the duplex gap, while far from ideal, is the approach that best minimizes in-band impairments.”). AT&T also states that while “[m]any in the industry believe that separation [between an in-band broadcaster and the downlink] needs to be at least 10 MHz,” they find that a 5 megahertz separation is sufficient, and therefore supports placing broadcasters in the duplex gap adjacent to the uplink. *Id.* at 2.

⁹³ Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, at 3 (filed Apr. 2, 2015) (T-Mobile Apr. 2, 2015 *Ex Parte* Letter).

auctioned spectrum.”⁹⁴ CCA cautions that protecting the duplex gap will “reduce the amount of spectrum available in the forward auction.”⁹⁵ Henry A. Waxman advocates for an alternative approach in which the assignment of TV stations to the duplex gap is dependent upon whether the clearing target exceeds 84 megahertz.⁹⁶ Some commenters oppose repacking TV stations anywhere in the 600 MHz Band.⁹⁷

27. As an initial matter, we emphasize that the optimization tool will assign television stations anywhere in the 600 MHz Band “only where absolutely necessary.”⁹⁸ As we determined in the *Incentive Auction R&O*,⁹⁹ however, and as many commenters acknowledge,¹⁰⁰ flexibility to accommodate

⁹⁴ Sprint July 30, 2015 *Ex Parte* Letter at 3 (“The additional data released on July 10th conclusively show that absolute protection of the duplex gap . . . significantly increases the level of impairment to forward auction spectrum – thereby reducing the number of Category 1 channels available and potentially resulting in smaller band plans.”).

⁹⁵ Letter from Rebecca Murphy Thompson, General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1–2 (filed July 9, 2015) (CCA July 9, 2015 *Ex Parte* Letter). CCA also cautions that “reducing the quantity of cleared spectrum to protect unlicensed users would violate Congress’s intent in establishing the incentive auction.” *Id.* at 2 (citing 47 U.S.C. §§ 1452(c)(1)(A), 1454(c), (e)); *see also* Letter from Rebecca Murphy Thompson, General Counsel, CCA to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1 (filed July 14, 2015) (CCA July 14, 2015 *Ex Parte* Letter) (“The incentive auction will not clear enough spectrum to satisfy consumer demand for wireless broadband services unless the FCC retains the flexibility to use the 600 MHz duplex gap for broadcast relocation.”). NAB proposes that the Commission impair the duplex gap in no more than six markets and no more than one market in the top 25. Letter from Rick Kaplan, General Counsel and Executive Vice President, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 (filed July 21, 2015) (NAB July 21, 2015 *Ex Parte* Letter). *But see* Sprint July 30, 2015 *Ex Parte* Letter at 4 (opposing NAB’s proposal to limit the markets in which TV stations can be assigned to the duplex gap because “it could deprive the Commission of valuable repacking flexibility, thereby creating unnecessary constraints that could drive the clearing target optimization process to an unduly small band plan”).

⁹⁶ Letter from Henry A. Waxman, Chairman, Waxman Strategies, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252 at 2 (filed July 9, 2015) (Waxman July 9, 2015 *Ex Parte* Letter). Specifically, Waxman proposes that for clearing targets of 84 megahertz or less, “the Commission must, by necessity, focus on low-band spectrum availability [for licensed operations]” by permitting TV stations to be assigned to the duplex gap as necessary. *Id.* For clearing targets above 84 megahertz, Waxman proposes that the Commission prohibit the assignment of TV stations to the duplex gap. *Id.* Waxman also proposes an alternative spectrum reserve trigger at clearing targets above 84 megahertz which we discuss below. *See* § IV.A.2.b.ii (Spectrum Reserve Trigger).

⁹⁷ *See, e.g.*, AT&T Comments at 12; AT&T Reply at 5–7; Communications Technologies, Inc. Reply at 2; Sinclair Comments at 5 (“The FCC should not set a higher clearing target than the market itself would dictate or otherwise resort to measures that would result in the systematic placement of broadcasters in the wireless band.”); NAB Comments at iii (Relocating television stations in the wireless portion of the new 600 MHz band will negatively impact the value of the spectrum); Media General Comments at 5 (“the post-auction assignment of TV stations to 600 MHz channels assigned to wireless carriers in many markets will lead to harmful interference and endless disputes between broadcasters and wireless companies.”); PTV Comments at 2–5 (urging that no TV stations be assigned within the repurposed 600 MHz Band and cautioning that it is unclear how stations could proactively enforce their protections against interfering consumer mobile devices). To the extent that commenters raise concerns about the use of market variation generally, we found that accommodating market variation is necessary in the *Incentive Auction R&O* and in the *Incentive Auction Second Order on Reconsideration*. *See Incentive Auction R&O*, 29 FCC Rcd at 6604–07, paras. 81–87; *Incentive Auction Second Order on Reconsideration*, 30 FCC Rcd at 6748–50, paras. 6–8.

⁹⁸ CTIA Comments at 4–5 (“[T]he Commission can promote a successful incentive auction by placing television stations in the 600 MHz band only where absolutely necessary, and in a manner that causes minimal disruption to future 600 MHz licensees.”).

⁹⁹ *Incentive Auction R&O*, 29 FCC Rcd at 6605, para. 84. *See also Auction 1000 Comment PN*, 29 FCC Rcd at 15765, para. 35.

some level of market variation—thus requiring some level of impairment to 600 MHz Band licenses—is critical to avoiding the least common denominator problem. The procedure we adopt always will favor assigning television stations to channels in the remaining TV bands if possible, and, as discussed below, will select a clearing target selection that reflects an appropriate trade-off between the amount of spectrum cleared and the overall impairment level. Further, we disagree with AT&T that assigning TV stations to the 600 MHz Band will create problems similar to those in the 700 MHz Lower A Block caused by TV stations in channel 51.¹⁰¹ We developed the ISIX methodology to address this issue specifically by creating a methodology to predict where inter-service interference is likely to occur and proposing to restrict licensees' service in these areas where "impairments" are created.¹⁰² Moreover, wireless licensees will be aware of these impairments in advance: we will provide bidders with detailed information about impairments in the blocks offered prior to the start of the forward auction, including the facility causing the impairment, and the resulting areas where they will be restricted from operating or not be required to operate due to inter-service interference.¹⁰³ As a result, bidders can use the facility information about the impairing station to determine how their wireless networks could be deployed around the impairment, or whether they should not bid on impaired licenses in that area.

28. We decline to restrict the optimization procedure from assigning TV stations to the uplink, downlink and/or duplex gap portions of the 600 MHz Band in order to carry out the clearing target objectives. As set forth above, views on where to assign impairing TV stations differ starkly among all commenters and particularly wireless providers. We are not persuaded that any of the technical issues identified by commenters justify restricting the optimization procedure to create more license impairments and/or a lower initial clearing target. Despite the lack of consensus on where to locate impairments, most commenters agree with the principles that impairments should be minimized to the greatest extent possible, and that the goal of the auction should be to repurpose as much spectrum as market forces allow.¹⁰⁴ The procedure we adopt is consistent with this view because it provides the fullest possible scope for implementing the primary objective of minimizing the impact of impairments on 600 MHz licenses.

29. In particular, we disagree with AT&T and Verizon that technical issues justify restricting the optimization procedure from assigning stations to the downlink portion of the 600 MHz Band.¹⁰⁵ AT&T argues that we underestimate the "real world" impact of placing a TV station in the downlink portion of the 600 MHz Band because the ISIX methodology only measures potential interference within

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¹⁰⁰ See, e.g., CTIA Comments at 4; T-Mobile Comments at 17; Verizon Comments at 4.

¹⁰¹ AT&T July 15 *Ex Parte Letter* at 4.

¹⁰² See *ISIX Order* and *ISIX Further Notice*.

¹⁰³ See § VI.A.1.a (Impairment Information for Bidders). See also discussion of excluding channels 50 and 51 from TV station assignment, below.

¹⁰⁴ See, e.g., AT&T Comments at 1 ("[S]pectrum included in the forward clock auction must be as unambiguously fungible and free from interfering uses as possible."); Broadcaster Representatives Reply at 41 (stating that "auction success should be measured by maximum spectrum recovery"); CCA Comments at 10; C Spire Comments at 3; CTIA Comments at 1; EOBC Comments at iv; Local Media Comments at 8; LPN Comments at 2, 9–10; Mobile Future Reply at 2; NAB Comments at iii–iv; Verizon Comments at 1, 4. U.S. Cellular supports our proposal to assign TV stations to the 600 MHz Band "on the basis of minimizing the total impaired weighted-pops nationwide" because, among other things, it "could help to allay lingering interoperability concerns." Letter from Leighton T. Brown, Counsel for U.S. Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 2 (filed May 12, 2015) (U.S. Cellular May 12, 2015 *Ex Parte Letter*).

¹⁰⁵ See AT&T July 15, 2015 *Ex Parte Letter* at 2–3; AT&T July 27, 2015 *Ex Parte* at 3–4; Verizon Comments at 18. We note that AT&T advocated against our proposal to weight the downlink more heavily than the uplink, which would have resulted in the optimization tool assigning fewer TV stations to downlink channels. See § III.B.1.b (Measuring Potential Impairments).

5 MHz of a channel's edge and thus does not adequately predict the effect of placing a TV station in the downlink; and because wireless user equipment (i.e., mobile and portable devices) cannot prevent interference into any frequency within the same filter or "duplexer."¹⁰⁶ AT&T's criticism of the ISIX methodology is unfounded. The ISIX methodology is consistent with our rules, which do not offer interference protection beyond the first adjacent channel.¹⁰⁷ Moreover, AT&T ignores the fact that wireless user equipment is capable of attenuating interfering signals at frequencies separated beyond the first adjacent channel, as required by 3GPP standards.¹⁰⁸ AT&T's criticism of the ISIX methodology also is untimely. AT&T failed to seek reconsideration of the final order adopting the ISIX methodology, or to raise its criticisms of the ISIX methodology before the Commission adopted that order.¹⁰⁹

30. AT&T's filter concerns also lack merit. With regard to blocks co-channel with or first adjacent channel to an impairing TV station, our approach recognizes that filters may be ineffective in impaired areas by not requiring wireless user equipment to operate in such areas.¹¹⁰ Beyond the first adjacent channel, the signal attenuation required by 3GPP standards will limit interference regardless of duplexer performance, as stated above. The likely use of two or more duplexers also makes it less likely that a TV station assigned to a portion of the downlink will render the entire downlink unusable by wireless user equipment.¹¹¹ To the extent that an impairing TV station is located in the non-overlapping part of one duplexer, the non-affected duplexer will be able to filter out the interfering signals, a fact that even AT&T appears to concede.¹¹² Because the optimization tool will prefer TV station assignments that

¹⁰⁶ AT&T July 27, 2015 *Ex Parte* Letter at 3 ("Modern interoperable devices are capable of receiving signals across 4 to 5 LTE blocks in one pass band of the duplexer and high power TV transmission into any open LTE block is likely to cause interference into all open blocks within a single duplexer."). See Verizon Comments at 18 (arguing that the use of market-specific filtering methodologies in roaming-capable wireless user equipment is impossible, and that stations in the downlink could damage user devices due to burn-out and cause operational overload). Duplexers are pairs of filters, one transmit and one receive, that function together to reduce the potential for interference between a transmitter and a receiver in the same piece of equipment. *Incentive Auction R&O*, 29 FCC Rcd at 6968, App. C, Technical Appendix at para. 5.

¹⁰⁷ For example, the Commission's rules do not provide for interference protection from DTV signals on other channels beyond the first adjacent channel. See *Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Sixth Report and Order, 12 FCC Rcd 14588, 14685-88, paras. 215-22 (1997); see also *Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order, 13 FCC Rcd 7418, 7429, para. 26 (1998) (*inter alia* affirming interference protection criteria). See 47 C.F.R. § 73.623(c).

¹⁰⁸ See *Incentive Auction R&O*, 29 FCC Rcd at 7018, App. C, Technical Appendix at para. 86 ("Once there is no overlap, with an edge-to-edge separation, or guard band, of zero, the rejection climbs to 32 dB for the LTE UE and . . . the UE continues to improve up to 38 dB at five megahertz and to 50 dB at 10 megahertz.").

¹⁰⁹ See generally *ISIX Order*, 29 FCC Rcd 13071.

¹¹⁰ See *id.* at 13089-92, paras. 36-41. In addition, wireless user equipment is prohibited from operating where such equipment could interfere with digital television receivers. See *id.* at 13102-03, paras. 56-58 ("wireless user equipment . . . will be prohibited from co-channel or adjacent-channel operations within a television station's contour and within . . . five kilometers for co-channel operations . . . and one-half kilometer for adjacent-channel operations.").

¹¹¹ As AT&T points out, two (or more) overlapping duplexers will likely be used in the downlink portion of the Band, particularly for clearing targets of 84 MHz or greater. AT&T July 27, 2015 *Ex Parte* Letter at 3.

¹¹² See AT&T July 27 *Ex Parte* Letter at 3 ("[T]he presence of an interferer in the duplexer band would impair ALL blocks (not just the blocks measured by ISIX) using that duplexer. . . . [T]his would include impacts from TV Channels 38-41 into an A/B/C/D block duplexer and TV Channels 39-46 into a D/E/F/G block duplexer.") (emphasis added). For example, for an 84 megahertz clearing target (encompassing blocks A-G), if a TV station is co-channel with the A block, using two duplexers (one covering blocks A-D; the other covering blocks D-G), the duplexer covering blocks D-G at the opposite end of the downlink band will be able to filter out the interfering TV

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overlap with the guard bands where possible in order to minimize the impaired weighted-pops pursuant to the primary objective we adopt herein, TV stations are more likely to be assigned to the non-overlapping part of one duplexer than to the central part of the downlink where the duplexers overlap. Furthermore, technical solutions and enhanced filter technologies can mitigate the potential for interference once the 600 MHz Band Plan is finalized following the auction. As Sprint suggests, enhanced filter technologies will make it possible to use separate filters for separate frequencies in the future, further limiting the impact of a TV station in the downlink portion of the band by the time this band is deployed.¹¹³ The technical details on the 600 MHz duplexers will not be contemplated by 3GPP until the band plan and potential market variations are finalized after the auction.¹¹⁴ Once they are finalized, technical solutions, such as Sprint's, can mitigate the potential for interference given the actual frequencies affected.

31. Further, we cannot conclude that protecting the duplex gap from any impairment is warranted at the risk of repurposing less spectrum. Our analysis indicates the duplex gap will not be subject to any impairment in most markets even if the optimization procedure tool is not restricted in assigning impairing stations.¹¹⁵ Thus the duplex gap will remain free from impairment across most of the country except for in a relatively small number of markets. Conversely, protecting the duplex gap in every market is likely to lead to the selection of a lower clearing target as a result of increased nationwide impairment levels.¹¹⁶ By reducing the amount of spectrum available to generate forward auction proceeds, protecting the duplex gap could threaten the overall success of the auction, as well as our competition goals for licensed providers in the 600 MHz Band.¹¹⁷ Our policy regarding impairments will also affect broadcasters and 600 MHz licenses, wireless microphones, and unlicensed devices in this

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signal. Consequently, wireless user equipment operating in those blocks should not experience harmful interference from the impairing TV station.

¹¹³ Sprint Reply at 18–19.

¹¹⁴ AT&T July 27, 2015 *Ex Parte* Letter at 3 n.4.

¹¹⁵ In scenarios 1, 2, and 3, the maximum number of TV stations assigned to channels that impair the duplex gap are 6, 7, and 2, respectively. Letter from Gary M. Epstein, Chair, Incentive Auction Task Force, FCC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252, App. at 3–5 (filed July 10, 2015) (IATF July 10, 2015 *Ex Parte* Letter). See also *CTS PN*, 30 FCC Rcd at 4858, App. § I (Overview) (demonstrating that in scenarios 1, 2, and 3, a vast majority of licenses are unimpaired (93.8, 94.7, and 95.3 percent, respectively)).

¹¹⁶ *CTS PN*, 30 FCC Rcd at 4856, para. 6, 4858, App. § I (Overview). In simulation scenarios 1 and 2 (40–50 percent and 50–60 percent broadcaster participation in the reverse auction, respectively), protecting the duplex gap from the assignment of TV stations raises the nationwide impairment percentage beyond the standard for limiting impairment, thereby requiring the optimization procedure to drop down to a lower clearing target. Protecting the duplex gap also reduced the number of relatively unimpaired Category 1 licenses in each scenario. See also *id.* at 4862–63, App. § V (Impact of Protecting the Duplex Gap Chart).

¹¹⁷ See *Incentive Auction R&O*, 29 FCC Rcd at 6609, para. 91 (“The statute requires that the forward auction proceeds cover the costs of incentive payments to clear broadcasters from the 600 MHz Band and other identified costs. The amount of spectrum available to generate such proceeds decreases with increases in guard band size . . . [W]e must be mindful of the objective of repurposing spectrum for new, flexible uses, which can be fulfilled only if the forward auction generates sufficient proceeds.”). We note that the Spectrum Act prioritizes licensed 600 MHz Band services over services operating in the guard bands. See 47 U.S.C. § 309(j)(8)(G)(i) (providing that the Commission may incent the relinquishment of broadcast licenses “in order to permit the assignment of *new initial licenses*”) (emphasis added); 47 U.S.C. § 1454(e) (prohibiting any use of the guard bands that could cause harmful interference to licensed services). By contrast, our decision to authorize guard band use by wireless microphones and unlicensed devices was wholly within our discretion. See 47 U.S.C. § 1454(c); *Incentive Auction R&O*, 29 FCC Rcd at 6684–85, 6703–04, paras. 270–71, 313–15. See also CCA July 9, 2015 *Ex Parte* Letter at 2 (“Congress authorized . . . the 600 MHz incentive auction to clear broadcast spectrum for use by licensed operations, not unlicensed devices.”).

limited number of markets.¹¹⁸ While commenters have identified a range of issues associated with assigning stations to the duplex gap,¹¹⁹ the goals of repurposing spectrum for mobile broadband use, minimizing impairments, and ensuring a successful auction militate in favor of flexibility and outweigh the potential benefits of protecting the duplex gap from any impairment.

32. To mitigate the potential impact on white space devices and wireless microphones in areas where the duplex gap is subject to impairment, we tentatively conclude that we will designate a second available television channel in the remaining television band in such areas for shared use by white space devices and wireless microphones, in addition to the one such channel we have tentatively concluded will be made available in each area of the United States for shared use by these devices and microphones.¹²⁰ Recognizing the significant public benefits provided by white space devices and wireless microphones, the Commission in the *Incentive Auction Report and Order* stated that it was making the duplex gap available for use by these services, subject to appropriate technical rules.¹²¹ In the *Vacant Channel NPRM*, we tentatively concluded that preserving a vacant channel in the remaining television band in each area of the United States for shared use by these devices and microphones will help to ensure that the public continues to have access to the benefits they provide across the nation.¹²² White space devices and wireless microphone advocates maintain that lack of access to the duplex gap in areas where it is subject to impairment will limit the public's access to the benefits these services provide.¹²³ We propose to address this concern by requiring demonstration of the availability of a second television channel in accordance with the procedures proposed in the *Vacant Channel NPRM* in geographic areas where the duplex gap is subject to impairment.¹²⁴ We invite interested parties to comment on this tentative conclusion in MB Docket No. 15-146.¹²⁵

¹¹⁸ The Commission recently affirmed its decision to make the 600 MHz Band guard bands available for use by wireless microphones and unlicensed devices. See *Incentive Auction Second Order on Reconsideration*, 30 FCC Rcd at 6792–93, paras. 100–02. In addition, in the limited number of areas where the duplex gap is subject to impairment, it may also not be available to protect against interference between licensed services. In such areas, the methodology proposed in the *ISIX Further Notice* will be used to prevent inter-service interference, rather than the guard band. See *ISIX Further Notice*, 29 FCC Rcd at 13109–10, para. 76.

¹¹⁹ See *Auction 1000 PN*, 29 FCC Rcd at 15764, para. 34. See also discussion of record in response to the *Auction 1000 Comment PN* above.

¹²⁰ See *Amendment of Parts 15, 73, and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band for Use by White Space Devices and Wireless Microphones*, Notice of Proposed Rulemaking, MB Docket No. 15-146, GN Docket No. 12-268 (rel. June 16, 2015) (*Vacant Channel NPRM*). Consistent with the *Vacant Channel NPRM*, licensed as well as unlicensed wireless microphones would have access to the second available television channel. See *id.* at para. 10.

¹²¹ See *Incentive Auction R&O*, 29 FCC Rcd at 6681, para. 259, 6696–97, para. 300, 6684–86, paras. 270–73, 6703–04, paras. 313–15. The Commission specifically noted that it was deferring a decision on whether to place television stations in the duplex gap. See *id.*, 29 FCC Rcd at 6616, para. 105, n. 342.

¹²² *Id.* at 6668–84, para. 269; see also *id.* at 6701–02, para. 310.

¹²³ See, e.g., Broadcasting & Unlicensed Coalition July 7, 2015 *Ex Parte* Letter at 1–2; Letter from Michael Calabrese, Open Technology Institute at New America Foundation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1–2 (filed July 7, 2015); RTDNA Reply at 1–4; Public Knowledge July 9, 2015 *Ex Parte* Letter.

¹²⁴ More specifically, under this proposal such a demonstration would be required in geographic areas where the protected contour of a television station assigned to the 600 MHz Band impairs the duplex gap. We propose that applicants for new, displaced, or modified television station or Broadcast Auxiliary Station facilities use existing tools to determine whether the proposed facility overlaps with a geographic area where the duplex gap is impaired, and then use the white space databases to determine vacant channel availability in the overlap areas. See *Vacant Channel NPRM*, MB Docket No. 15-146 at paras. 42–43. We invite comment on this proposal.

¹²⁵ On July 29, 2015, the Media Bureau suspended the comment and reply comment deadlines in MB Docket No.

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33. We also reject arguments that impairing stations should be restricted to the same portion of the 600 MHz Band. For example, Sprint proposes that impairing TV stations should, to the extent possible, be assigned to channels side-by-side in any market in which multiple stations remain and on common frequencies.¹²⁶ CCA proposes an alternative “channel stacking plan,” which would create a pattern for impairing station assignments specific to the 600 MHz Band Plan associated with the selected clearing target.¹²⁷ CTIA also urges consistency in assignment of TV stations to the 600 MHz Band.¹²⁸ For the reasons discussed above, the potential costs of such restrictions—reducing the optimization procedure’s efficacy in minimizing impairments and risking the selection of a lower clearing target—outweigh the potential benefits that these commenters identify. The unrestricted approach we adopt is consistent with the consensus for minimizing impairments and maximizing potential spectrum recovery.

34. Further, we reject Sinclair’s request to impose constraints to ensure that no licensee of multiple television stations is disproportionately affected by channel assignments in the 600 MHz Band.¹²⁹ We disagree with Sinclair’s premise that stations assigned to the 600 MHz Band will be disadvantaged in comparison to stations located in the remaining TV bands. Such stations will be entitled to the same robust protections in the repacking process as all other eligible TV stations, including preservation of coverage area and population served pursuant to the constraints established in the *Incentive Auction R&O*,¹³⁰ reimbursement for reasonable relocation costs,¹³¹ and protection from inter-service interference.¹³² In addition, by requiring the optimization tool to potentially forego channel assignments

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15-146 in response to a request filed by NAB. *See Amendment of Parts 15, 73 and 74 of the Commission’s Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band For Use By White Space Devices and Wireless Microphones*, Order, MB Docket No. 15-146, GN Docket No. 12-268, DA 15-867 (rel. July 29, 2015). We direct the Media Bureau to establish new comment and reply deadlines of September 30 and October 30, 2015, respectively, for the proposals in the *Vacant Channel NPRM* as well as the proposals above. We intend to address all of the proposals in the same order.

¹²⁶ Sprint Comments at 39 (arguing that locating TV stations to contiguous frequencies will: minimize market variability; promote bidder confidence by allowing bidders to pursue common frequencies; and better allow future 600 MHz licensees to build equipment to filter out harmful interference from broadcast stations with equipment targeted to filter specific frequencies).

¹²⁷ *See* CCA Comments at 6–8. Specifically, CCA’s proposed channel stacking plan will assign TV stations to the 600 MHz Band beginning with the uplink blocks most closely located to the duplexer, then once those blocks are fully impaired, it will impair the downlink blocks associated with the same duplexer. *Id.* (noting that certain band plans would deviate from this pattern where “an especially large guard band or an unusually favorable channel configuration could create an opportunity for additional efficiencies,” such as the band plan associated with clearing 11 blocks or 138 MHz of spectrum). *See also* CCA Reply at 20–24. *But see* Sprint Reply at 18 n.35 (opposing CCA’s stacking plan because it would first place television stations into multiple uplink channels and only put television stations onto downlink channels if necessary, resulting in less uplink spectrum being available than is needed).

¹²⁸ CTIA Comments at 5 (opposing any approach that would scatter TV stations throughout the band interleaved by wireless operations). *See also* PTV Comments at 2–3 (arguing that TV stations should not be interspersed throughout the 600 MHz Band because inter-service interference issues with the lower 700 MHz A Block is an example of the potential problems).

¹²⁹ Sinclair Comments at 10 (“[T]he FCC should take steps (such as modifying the constraint files, or some other means) to ensure that no broadcast group has a significantly disproportionate number of stations repacked into the wireless band, or a disproportionate number of stations otherwise repacked post-auction.”).

¹³⁰ *See generally Incentive Auction R&O*, 29 FCC Rcd at 6642–51, paras. 162–82 (discussing the protections for full power stations’ coverage areas and Class A stations’ contours).

¹³¹ *See generally Incentive Auction R&O*, 29 FCC Rcd at 6812–33, paras. 598–654 (§ V.C.5).

¹³² *See ISIX Further Notice*, 29 FCC Rcd at 13107, para. 68, 13109–11, paras. 76–78 & Appendix E; *Auction 1000 Comment PN*, 29 FCC Rcd at 15763, para. 32.

that minimize impaired weighted-pops in light of station ownership concerns, Sinclair's proposal would risk greater impairments to 600 MHz Band licenses and recovery of less spectrum through the incentive auction. Accordingly, we conclude that the potential benefits of Sinclair's proposal are outweighed by the costs.

35. In determining a provisional TV channel assignment plan, the optimization tool will not assign impairing stations to channels 50 or 51.¹³³ Many commenters caution against the assignment of stations to channel 51 due to potential interference with Lower 700 MHz A Block operations.¹³⁴ Recognizing the existing interference concerns between television stations on channel 51 and the Lower 700 MHz A Block, we took action in the *Incentive Auction R&O* to encourage early, voluntary relocation of channel 51 stations to further mitigate any potential interference.¹³⁵ Further, our decision to create a 600 MHz Band Plan in which channels 50 and 51 would be repurposed for the 600 MHz wireless uplink band under every spectrum recovery scenario was intended to improve the interference environment for 700 MHz licensees.¹³⁶ Unlike the 700 MHz service, which is already in operation, 600 MHz Band licensees will be able to account for potential loss in the value of their licenses as a result of impairments through the mechanism of the forward auction, and will have full prior knowledge of the areas of operation that may be affected by inter-service interference. Moreover, the proposed ISIX methodology would apply only to licenses in the 600 MHz Band and, therefore, no mechanism is available to prevent interference between impairing TV stations and the 700 MHz service.¹³⁷

2. Additional Objectives

36. We also adopt our proposal to include a secondary objective: maximizing the weighted number of Category 1 blocks available in the forward auction.¹³⁸ Commenters raise concerns that the impact of impairment on the value of spectrum licenses to forward auction bidders cannot be measured

¹³³ See *Promoting Interoperability in the 700 MHz Commercial Spectrum*, WT Docket No. 12-69, WT Docket No. 12-332, Report and Order, 29 FCC Rcd 15122, 15141-42, paras. 43-45 (2013) (*700 MHz R&O*).

¹³⁴ See CCA Reply at 20 ("Given the problematic nature of Channel 51 for two separate sets of broadband frequencies, broadcast stations located on Channel 51 should be the first out of the 600 MHz band and . . . the last channel within the 600 MHz band that is permitted to remain."); CTIA Comments at 5-6 ("[N]o television station should be assigned to former Channel 51 spectrum."); C Spire Comments at 3 (urging that the FCC to "ensure that no broadcaster remains in the current Channel 51"); T-Mobile Comments at 11 n.30 (citing Comments of Verizon and Verizon Wireless at 37-38 (filed Jan. 25, 2013); Comments of AT&T at 37 (filed Jan. 25, 2013); Supplemental Reply Comments of Cellular South at 2 (filed June 28, 2013); Supplemental Comments of the Competitive Carriers Association at 5 (filed June 14, 2013)); U.S. Cellular May 12, 2015 *Ex Parte* Letter, Bidding Procedures Attachment at 5; Verizon Comments at 19-20 ("[C]hannel 51 must be used as a guard band for Band 12 protection."). Cf. Media General Comments at 4 (noting efforts to move TV stations off of channel 51); PTV Comments at 4 (discussing the establishment of "exclusion zones" to address interference between channel 51 and Lower 700 MHz Band operations); NAB Comments at ii (discussing channel 51-related 700 MHz Band interference issues); AT&T Comments at 20 (discussing 700 MHz Band auction results related to channel 51 interference).

¹³⁵ See *Incentive Auction R&O*, 29 FCC Rcd at 6658-59, para. 203 (protecting the substitute channel facilities of former channel 51 licensees that relocated from channel 51 pursuant to a voluntary relocation agreement with Lower 700 MHz A Block licensees, and allowing for reimbursement of any station formerly on channel 51 that must relocate because its channel is reassigned in the repacking process even if it previously relocated from channel 51 pursuant to a private agreement).

¹³⁶ See *Incentive Auction R&O*, 29 FCC Rcd at 6591, para. 59.

¹³⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15842, App. C (§ 2.1). The decision to exclude both channels 50 and 51 (each totaling six megahertz) will ensure interference protection consistent with our use of technically reasonable guard bands of at least seven megahertz. *Incentive Auction R&O*, 29 FCC Rcd at 6607-09, paras. 89-91.

¹³⁸ To calculate the weighted number of Category 1 blocks, we sum the Category 1 blocks in each PEA, multiply the result by the value weighted price index for the PEA, and add those results for all PEAs.

strictly in terms of nationwide percentages. We agree that we should strive to offer as many unimpaired licenses as possible.

37. In order to avoid any increase in impairment levels, the secondary objective will be constrained by the primary objective. Specifically, the secondary objective will be constrained by the nationwide impairment percentage determined by the primary objective, rounded up to the nearest integer.¹³⁹ Thus, the secondary objective will function primarily as a tie-breaker in choosing a provisional TV channel assignment plan: when more than one potential plan exists with the same minimum level of impairment identified through application of the primary objective, the secondary objective will cause the optimization tool to choose the one that maximizes the weighted number of Category 1 licenses. Constraining the secondary objective in this manner is consistent with the consensus in favor of minimizing impairments and maximizing potential spectrum recovery.

38. The provisional TV channel assignment plan determined based on application of the first two objectives may include licenses that cannot be offered in the forward auction because greater than 50 percent of the population is subject to impairment.¹⁴⁰ The optimization procedure will apply a tertiary objective in order to maximize their potential value in a subsequent spectrum auction.¹⁴¹ More specifically, the tertiary objective will seek to minimize impaired weighted-pops over all licenses, including licenses with greater than 50 percent of the population subject to impairment.¹⁴² The tertiary objective will be constrained by the first two objectives: it will be applied only to the extent that it neither increases the nationwide impairment percentage resulting from application of the primary objective nor reduces the weighted number of Category 1 licenses resulting from application of the secondary objective.¹⁴³ Further, it will not decrease the weighted number of Category 2 licenses existing after the application of the primary and secondary objectives.¹⁴⁴

¹³⁹ For example, if after applying the primary objective, the nationwide impairment percentage is 4.4, the procedure will maximize the weighted number of Category 1 licenses up to an impairment percentage of five.

¹⁴⁰ See § VI.A.2.a (Forward Auction – Bidding Categories).

¹⁴¹ Several commenters have argued that these heavily impaired licenses still have value and recommend offering them in a later auction. See, e.g., CCA Comments at 26–27 (noting that these licenses “will likely attract significant interest from carriers,” and that by offering these licenses at a later point in a single-round, sealed bid auction limited to reserve eligible participants, the Commission can bring more low-band spectrum to market, promote competition and increase auction revenues); CTIA Comments at 18–19 (stating that while there may be interest in these licenses, bidders may not be able to evaluate this until after the assignment phase is complete and therefore suggest offering them in a subsequent auction); T-Mobile Comments at 32–33 (stating that this spectrum should not be included in the forward auction because it is not fungible, and suggesting a “remainders” auction be held after the incentive auction); Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3 (filed Apr. 24, 2015) (T-Mobile Apr. 24, 2015 *Ex Parte* Letter) (“[S]pectrum with impairments of up to 50 percent nonetheless retains considerable value and should be auctioned.”); U.S. Cellular Reply at 43 (agreeing with Commenters that heavily impaired licenses should be offered in a subsequent auction, preferably not long after the conclusion of the incentive auction).

¹⁴² The primary and secondary objectives will not take account of any license with greater than 50 percent impaired weighted-pops.

¹⁴³ The tertiary objective will be constrained by the nationwide impairment percentage determined by the primary objective, rounded up to the nearest integer. See note 139 (noting how integer rounding works).

¹⁴⁴ Solely for clearing targets where the lower guard band is 11 MHz, we adopt a quaternary objective of minimizing the number of stations placed on the lower channel in the lower guard band to the extent it does not increase the total number of stations assigned to the 600 MHz Band or to any channel in that Band. This objective will not affect the results of the other objectives.

C. Standard to Limit Market Variation

39. We adopt a scaled standard that will limit impairments to a level significantly less than the proposed 20 percent nationwide level at clearing targets above 72 megahertz, while ensuring an appropriate tradeoff between spectrum recovery and impairment level. Instead of a percentage-based standard, the standard we adopt is equivalent to the weighted-pops of one paired 5+5 megahertz spectrum block nationwide, which translates into the percentages set forth in the table below at each potential clearing target in the 600 MHz Band Plan. At clearing targets below 72 megahertz, the standard is capped at 20 percent.

Clearing Target (Number of Blocks Offered)	Percentage of Impaired Weighted-Pops
144 MHz (12 blocks)	8% (approx.)
138 MHz (11 blocks)	9% (approx.)
126 MHz (10 blocks)	10%
114 MHz (9 blocks)	11% (approx.)
108 MHz (8 blocks)	13% (approx.)
84 MHz (7 blocks)	14% (approx.)
78 MHz (6 blocks)	17% (approx.)
72 MHz (5 blocks)	20%
60 MHz (4 blocks)	20% (cap)
48 MHz (3 blocks)	20% (cap)
42 MHz (2 blocks)	20% (cap)

Figure 2: Near-Nationwide Standard for Impairments

40. This “one-block-equivalent” standard responds to concerns expressed by commenters that the proposed 20 percent standard would allow excessive impairment, particularly at higher clearing targets.¹⁴⁵ It also responds to concerns that repurposing more spectrum may not be justified at the cost of

¹⁴⁵ See, e.g., AT&T Comments at 6, 21–24 (stating that the nationwide cap should be substantially lower than 20 percent); AT&T July 10, 2015 *Ex Parte* Letter at 2; ATBA *CTS PN* Comments at 11–12 (opposing the 20 percent threshold and the *CTS PN* threshold as too high); CTIA Comments at 7–9 (expressing concern that a 20 percent threshold would lead to significant impairments in major markets); CTIA *CTS PN* Comments at 2–4 (supporting the apparent reduction of the 20 percent standard); NAB Comments at 10 (arguing that the Commission should limit the amount of impairment to three percent of actual pops across the country); NAB Reply at 4–5; Letter from Rick Kaplan, General Counsel and Executive Vice President, Legal and Regulatory Affairs, NAB, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed May 12, 2015) (NAB May 12, 2015 *Ex Parte* Letter); NAB *CTS PN* Comments at 4–6 (continuing to advocate for a three percent standard); LPN Comments at 10 (explaining that “[u]nder a 20 percent impairment cap, it is possible that a major market (e.g., New York, Los Angeles, Chicago) could have significant impairment, depressing the value of the entire 600 MHz band to wireless carriers. This 20 percent impairment threshold should be adjusted lower so that it does not severely impair the value of the repurposed mobile broadband spectrum.”); Media General Comments at 5 (arguing that the 20 percent standard will lead to “far too many TV stations in the 600 MHz band and far too much encumbered spectrum that is of limited utility to wireless carriers”); Mobile Future Reply at 2 (stating that the 20 percent standard would lead to a “patchwork of licenses with varying impairment levels across the United States”); Sprint *CTS PN* Comments at 4–5 (supporting the scaled approach with a lower standard for higher clearing targets); T- (continued....)

allowing more impairment.¹⁴⁶ Instead, T-Mobile argues, proportionally *less* impairment should be allowed at higher clearing targets, and more at lower clearing targets.¹⁴⁷ Under the standard we adopt, the percentage of impairment that is allowed is scaled to the amount of licensed spectrum that would be repurposed at each clearing target, increasing target by target from approximately eight percent at the highest clearing target to 20 percent at targets of 72 megahertz and lower.¹⁴⁸ The standard is capped at 20 percent at clearing targets below 72 megahertz because otherwise the one-block-equivalent approach would allow more impairment than the proposed 20 percent.¹⁴⁹ Commenters raise concerns that these impairment levels are still too high overall.¹⁵⁰ Even if that proves true in a given stage, however, the auction design includes a self-correcting mechanism: if the blocks offered in a stage are insufficiently valuable to produce the forward auction revenues necessary to meet the final stage rule, the auction would

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Mobile Comments at 18–20 (supporting the 20 percent near-nationwide weighted-pop standard at clearing targets of 84 megahertz or below, and a standard of 10 percent for clearing targets of more than 84 megahertz, arguing that at higher clearing targets, “the benefits of a less fragmented clearing market with greater economies of scale and scope outweighs the cost of achieving a nominally lower spectrum-clearing target.”); Letter from Mace Rosenstein, Counsel for Univision, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed Mar. 26, 2015) (Univision Mar. 26, 2015 *Ex Parte* Letter) (suggests an impairment standard of no more than three to five percent); Verizon Comments at 4 (explaining that the 20 percent impairment proposal could mean as many as 62 million people would reside in impaired areas).

¹⁴⁶ See, e.g., AT&T Comments, Attachment A at 32 (stating that impairments may actually reduce usable wireless spectrum, meaning that the amount of useable spectrum provided by a higher clearing target with impairment might actually be less than that provided by a lower target without impairment); CTIA Reply at 6 (stating that there are several flaws in the 20 percent standard, namely, that for any given clearing target, there could be multiple repacking solutions that would satisfy the 20 percent standard but that we may not choose the best solution; that the 20 percent approach will always prioritize the highest possible clearing target, even if there is a drastic reduction in the number of impaired licenses at the next-lowest clearing target; and that it could lead to absurd results, such as having more than half of the available blocks in major cities more than 50 percent impaired and therefore not auctioned); T-Mobile Comments at 18–20 (“the benefit of a less fragmented market with greater economies of scale and scope outweighs the cost of achieving a nominally lower spectrum-clearing target.”).

¹⁴⁷ T-Mobile Comments at 18–20 (supporting a 20 percent standard at clearing targets of 84 megahertz or below, and a 10 percent standard at clearing targets of more than 84 megahertz). See *id.* at 19 (“At the 144 megahertz target . . . the 20% variation would allow for an average of 2.4 licenses to be completely impaired in every PEA. By contrast, at a lower 84 megahertz target (7 paired licenses), a 20% standard would on average only allow only [sic] 1.4 licenses to be impaired. With an average of 2.4 licenses impaired per market, the 20% threshold at 144 megahertz allows for substantially more variation in clearing across markets than the average of 1.4 licenses per market.”). See also Sprint Reply at 16–17 (supporting T-Mobile’s “scaled approach”).

¹⁴⁸ Because the impairment percentage is scaled to the amount of licensed spectrum that would be repurposed at each clearing target, the standard we adopt also responds to criticisms that the proposed 20 percent standard was arbitrary and overly complex. See, e.g., AT&T Comments at 6, 21–22 (arguing that the Commission’s original proposal is arbitrary); CTIA Reply at 8 (stating that 20 percent is arbitrary); Local Media Comments at 8 (stating that the original proposal is arbitrary); LPN Comments at 9–10 (arguing that the original proposal is overly complex); LPN Reply at 5; Verizon Comments at 2, 6. As T-Mobile states in arguing for a similar approach, a scaled standard is “easier to define and implement than a uniform formula.” T-Mobile Comments at 21. We note that the one-block-equivalent standard is the same number of weighted-pops across all clearing targets and is based on the total nationwide 2010 census population multiplied by the index of area-specific prices from prior auctions based on the relative price of each EA and CMA license (for paired spectrum) in Auctions 66 (AWS-1), 73 (700 MHz), and 97 (AWS-3).

¹⁴⁹ Sprint points out that at lower clearing targets the one-block-equivalent approach could lead to extremely high percentages of nationwide impairment. Sprint *CTS PN* Comments at 5.

¹⁵⁰ See, e.g., AT&T July 15, 2015 *Ex Parte* Letter at 4; ATBA *CTS PN* Comments At 11–12; NAB *CTS PN* Comments at 4–6; Univision Mar. 26, 2015 *Ex Parte* Letter at 2.

transition to a new stage with a lower clearing target and a lower level of aggregate impairment.¹⁵¹ Thus, the auction system relies on market forces to determine whether blocks offered in the forward auction are too impaired, even within the limits we adopt today. This market-based approach avoids unduly constraining the flexibility to set reasonable clearing targets that reflect the level of broadcaster participation.

41. The standard we adopt also accounts for the tradeoff between the benefits of repurposing spectrum and the costs of allowing impairments at different clearing targets. For example, a 126 megahertz clearing target would repurpose 100 megahertz of licensed spectrum, or 10 paired blocks, so the impairment limit at that clearing target is the nationwide equivalent of one of the ten blocks. If aggregate impairments equal or exceed the equivalent of the population of one spectrum block nationwide at that target, the optimization procedure will move to the next lower clearing target. An 84 megahertz clearing target would repurpose 70 megahertz of licensed spectrum, or seven paired blocks, so the standard will tolerate a higher proportion of impairment—up to the equivalent of one out of seven blocks nationwide, or approximately 14 percent—but the optimization procedure likewise will move to the next lower clearing target if aggregate impairments equal or exceed that amount.¹⁵² Thus, the standard has the effect of moving to a lower clearing target with one less spectrum block to offer if impairments equal or exceed the equivalent of one block nationwide. The standard tolerates a higher proportion of impairment at lower clearing targets because the tradeoff is different: the record reflects that more flexibility to accommodate market variation is appropriate at lower clearing targets in order to ensure the auction’s overall success. While commenters agree that minimizing impairments should be a high priority, many commenters also urge the Commission to balance this goal against the goal of ensuring that sufficient spectrum is made available in the forward auction.¹⁵³ We agree with T-Mobile that at higher clearing targets the balance favors achieving greater uniformity across the band plan (by tolerating a lower percentage of impairment) and at lower clearing targets the balance favors repurposing spectrum by tolerating a greater percentage of impairment.¹⁵⁴

42. We emphasize that the population in most PEAs will not be subject to any impairment under the standard we adopt, which will be applied on a nationwide, aggregate basis. In fact, we expect that the vast majority of PEAs will have no impaired blocks, although there may be some PEAs with more than one impaired block.¹⁵⁵ Staff simulations project that at a range of clearing targets, the overwhelming majority of spectrum blocks would be unimpaired or nearly unimpaired.¹⁵⁶

¹⁵¹ See § VII (Transition, if Necessary, to Any Subsequent Stage).

¹⁵² As noted above, T-Mobile proposes an alternative standard that would limit impairment to the equivalent of 1.4 spectrum blocks at each clearing target. T-Mobile Comments at 20–21. T-Mobile’s proposed standard would allow a higher percentage of impairment at each clearing target: for example, the limit at the 84 megahertz clearing target would be 20 percent. The standard we adopt is more responsive to concerns that the standard we proposed was too high, and better reflects the tradeoff between spectrum recovery and impairment level at different clearing targets. *But see* T-Mobile *CTS PN* Comments at 8 (stating that 14 percent impairment at 84 megahertz is “lower than necessary or desirable” and that “numerous bands have faced much larger encumbrances when those licenses were made available for competitive bidding or when they were purchased in the secondary market.”).

¹⁵³ See, e.g., AT&T Comments at 1; CCA Reply at 23–24; Local Media Comments at 1, 6; LPN Comments at 1–2, 8; see also T-Mobile Comments at 19–21.

¹⁵⁴ T-Mobile *CTS PN* Comments at 7–8.

¹⁵⁵ For example, in the *CTS PN* the simulation resulting in the 84 megahertz initial clearing target shows that in 406 PEAs, all but 62 have only Category 1 licenses. The same is true for all but 53 in the 114 megahertz scenario and all but 47 in the 126 megahertz scenario. *CTS PN*, 30 FCC Rcd at 4856, para. 6 n.15. In its analysis, AT&T similarly found that in an 84 megahertz initial clearing target all but 64 PEAs will have only Category 1 licenses. See AT&T July 27, 2015 *Ex Parte* Letter, Attachment at 2. AT&T acknowledges that its results “align closely with the published FCC results for the top 20 markets” and that differences may be attributed to the power and geography differences of stations assigned to the 600 MHz Band. *Id.* at 2. Although AT&T argues that both sets of results

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43. To promote transparency and provide information about the potential results of the clearing target determination procedure, Commission staff released a public notice in May 2015 showing the results of simulations of the procedure based on certain assumptions regarding broadcaster participation levels and impairments along the borders.¹⁵⁷ These simulations project that the procedure, including the “one-block-equivalent” standard, would result in the selection of a high initial clearing target with the vast majority of licenses available in Category 1.¹⁵⁸ In particular, these simulations result in an initial clearing target of 84 megahertz assuming 40 to 50 percent of broadcasters participate in the reverse auction (Scenario 1); an initial clearing target of 114 megahertz assuming 50 to 60 percent participate (Scenario 2); and an initial clearing target of 126 megahertz assuming 60 to 70 percent participate (Scenario 3). In Scenario 1, of the 2842 possible licenses, only 46 are Category 2 licenses. In Scenario 2, of the 3654 possible licenses, only 50 are Category 2 licenses. And in Scenario 3, of the 4060 possible licenses, only 48 are Category 2 licenses. In all three scenarios, 88 to 93 percent of the licenses in the high-demand markets (i.e., PEAs 1–40) are Category 1 licenses and 84 to 88 percent of PEAs contain *only* Category 1 licenses.¹⁵⁹

44. While commenters generally support the release of the simulations to provide greater transparency,¹⁶⁰ some question the staff’s assumptions, request release of all of the underlying data or request additional simulations based on different assumptions.¹⁶¹ We conclude that additional simulations are not necessary.¹⁶² The *Clearing Target Simulations PN* provided information regarding a range of illustrative participation scenarios and clearing targets that afforded the public ample opportunity to understand and comment on the clearing target determination procedure that we adopt today, which procedure is identical to the one used in the *Clearing Target Simulations PN*.¹⁶³ We also decline to

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understate potential inter-service interference levels if the downlink portion of the 600 MHz Band is impaired, we disagree with these arguments for the reasons set forth above. *See* § III.B.1.c (Assigning TV Stations to the 600 MHz Band to Accommodate Market Variation).

¹⁵⁶ In each of the simulations in the *CTS PN*, at least 93.4 percent of licenses are Category 1 licenses, and Category 2 licenses comprise at most 1.3 percent of total possible licenses. *CTS PN*, 30 FCC Rcd at 4856, para. 6 n.13.

¹⁵⁷ As noted in the *CTS PN*, the procedure used in the simulations varies from the *Comment PN* proposal in several respects, and is identical to the procedure we adopt in this Public Notice. *See generally CTS PN*, 30 FCC Rcd 4854.

¹⁵⁸ We note that for purposes of the *CTS PN* impairment analysis, the total number of licenses analyzed at each clearing target level included only those licenses that could be offered in the continental United States (i.e., in 406 out of the 416 PEAs). *CTS PN*, 30 FCC Rcd at 4856, para. 6 n.14. When calculating impairments for the incentive auction, the procedure will include all 416 PEAs.

¹⁵⁹ *See generally PEAS PN*, 29 FCC Rcd 6491. Under Scenario 1, of the 2654 Category 1 licenses, 2535 are entirely free of impairments (i.e., zero percent of the weighted-pops in the PEA are impaired). In Scenario 2, of the 3469 Category 1 licenses, 3334 are entirely free of impairments; and in Scenario 3, of the 3886 Category 1 licenses, 3753 are entirely free of impairments. *CTS PN*, 30 FCC Rcd at 4856, para. 6. For a more detailed discussion of “high-demand markets,” *see* § VI.A.7 (Final Stage Rule).

¹⁶⁰ *See, e.g.,* CTIA *CTS PN* Comments at 1; Sprint *CTS PN* Comments at 1; T-Mobile *CTS PN* Comments at 2.

¹⁶¹ *See, e.g.,* ATBA *CTS PN* Comments at 4, 6–7; CTIA *CTS PN* Comments at 4–7; NAB *CTS PN* Comments at 2–3; Letter from Rick Kaplan, General Counsel and Executive Vice President, Legal and Regulatory Affairs, NAB, to Gary M. Epstein, Chair, Incentive Auction Task Force, FCC, GN Docket No. 12-268, WT Docket 12-269, AU Docket No. 14-252 (filed July 13, 2015) (NAB July 13, 2015 *Ex Parte* Letter); Sprint *CTS PN* Comments at 2, 9.

¹⁶² On July 10, 2015 the Incentive Auction Task Force provided additional data for each of the six scenarios released in the *CTS PN*, including the assumptions regarding broadcaster participation, the specific DMAs with impairing TV stations and with stations in the duplex gap, and the channel to which each impairing station was assigned. *See* IATF July 10, 2015 *Ex Parte* Letter.

¹⁶³ NAB’s arguments that the data provided is insufficient for meaningful public input lack merit. In particular, NAB’s comparison is inapt between the clearing target determination procedure simulations and the repacking

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release all of the data underlying the simulations: the *Clearing Target Simulations PN* identified the critical information necessary to evaluate our clearing target determination procedure, and we are not persuaded that the release of more data is warranted.¹⁶⁴ With regard to broadcaster participation, rather than attempt to predict whether thousands of individual stations will choose to participate based on subjective factors, for purposes of the simulations certain categories of stations were assumed not to participate based on objective factors (e.g., major network affiliates, the major PBS station in an area, etc.). Because the simulations require some assumptions regarding participation, it was reasonable to base those assumptions on such objective factors rather than merely a randomized array of stations. In any event, the purpose of the scenarios described in the *Clearing Target Simulations PN* was to test the results of the clearing target determination procedure against a range of potential broadcast stations in the reverse auction.¹⁶⁵

45. With regard to impairments along the borders, some commenters question why the simulations did not include assumptions based on information about interference from Mexican television stations that AT&T has placed in the record of this proceeding.¹⁶⁶ Reliable information about potential interference from Mexican TV stations is not publicly available at present,¹⁶⁷ and AT&T's filing does not reflect Mexico's plans to change its television service in the near future.¹⁶⁸ Instead, Commission staff chose to use the information reflecting current treaty agreements with Mexico—that is, to protect all Mexican allotments—but not to consider interference from Mexican stations into the U.S.¹⁶⁹ Thus, the only potential impairments excluded from the simulations are areas in which 600 MHz licensees could

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simulations released in a June 2014 staff analysis of the potential for individual stations to experience substantial amounts of aggregate new interference. NAB July 14, 2015 *Ex Parte* Letter; NAB July 13, 2015 *Ex Parte* Letter; see *Incentive Auction Task Force Releases Updated Constraint File Data Using Actual Channels and Staff Analysis Regarding Pairwise Approach to Preserving Population Served*, GN Docket No. 12-268, ET Docket No. 13-26, Public Notice, 29 FCC Rcd 5687 (WTB 2014). For purposes of the interference analysis, staff had to conduct numerous simulations of the incentive auction, because specific outcomes depend on which individual stations participate in the auction, which ones are selected to go off the air, the clearing target, and other factors. The purpose of the clearing target determination procedure simulations was not to predict specific outcomes for individual stations, but rather to identify the clearing target and impairment level based on reasonable assumptions about broadcaster participation generally. For this purpose, we believe the simulations we released were sufficient. For the same reasons, we are not persuaded that the staff should have released additional data related to the simulations to the public. NAB's argument that simulations based on alternative impairment thresholds would contribute to the public debate is speculative. In any event, the Commission has made publicly available all the information interested parties need to run their own simulations of the clearing target determination procedure.

¹⁶⁴ See *B.F. Goodrich Co. v. Dept. of Transportation*, 541 F.2d 1178, 1184 (6th Cir. 1976) (“The Administrative Procedure Act does not require that every bit of background information used by an administrative agency be published for public comment.”), *cert. denied*, 430 U.S. 930 (1977).

¹⁶⁵ For further explanation on broadcaster participation, see IATF July 10, 2015 *Ex Parte* Letter.

¹⁶⁶ Letter from Michael P. Goggin, Counsel for AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Impairment Analysis attachment at 4–10 (filed Apr. 14, 2015) (AT&T Apr. 14, 2015 *Ex Parte* Letter) (analyzing two scenarios regarding the impact of Mexican stations on nationwide impairment percentages: the first scenario protects both vacant and operating Mexican stations; the second scenario protects only operating stations). See ATBA *CTS PN* Comments at 6–7; CTIA *CTS PN* Comments at 4–5; NAB *CTS PN* Comments at 3. *But see* T-Mobile *CTS PN* Comments at 3 (calling the Commission's assumptions regarding constraints along the borders “reasonable and well-supported.”).

¹⁶⁷ *CTS PN*, 30 FCC Rcd at 4855, para. 3.

¹⁶⁸ See IFT Press Release 12/2014 *The Federal Telecommunications Institute plenary approves for the first time in the country the call to tender for broadcast television frequencies to form at least two new networks with national coverage*, Mar. 6, 2014, available at <http://www.ift.org.mx/node/2678>.

¹⁶⁹ *CTS PN*, 30 FCC Rcd at 4855, para. 3. See also IATF July 10, 2015 *Ex Parte* Letter.

operate but might experience interference from Mexican TV stations that may or may not exist.¹⁷⁰ While that approach may under-predict such interference to a limited extent, we cannot conclude that it was unreasonable.¹⁷¹ Further, we note that the Instituto Federal de Telecomunicaciones (“IFT”) and the FCC are working on a joint repurposing of the 600 MHz Band that places Mexican TV stations below channel 37 while providing additional channels for U.S. stations to use in the reorganized TV band.¹⁷²

46. We reject arguments by AT&T, Verizon, and others for a standard that allows no impairment except in border areas.¹⁷³ Such an approach would not provide the flexibility that is necessary to account for the unique challenges the incentive auction presents. Market variation may be caused by a variety of factors, including varying levels of spectrum congestion and broadcaster participation in different areas, as well as border-related constraints.¹⁷⁴ Although AT&T argues that 84 megahertz or more of spectrum could be repurposed under an approach allowing for impairments only in border markets, its analysis relies on optimistic assumptions about reverse auction participation by broadcasters.¹⁷⁵ We fully expect high levels of participation by broadcasters; indeed, achieving such participation is a chief goal of our decision today. At the same time, the purpose of the nationwide

¹⁷⁰ The simulations do include impairments in areas in which wireless carriers would be restricted from operating pursuant to our rules. See *Incentive Auction R&O*, 29 FCC Rcd at 6604–05, para. 81.

¹⁷¹ As discussed in the *CTS PN*, we assure forward auction bidders that this information will be made available before the forward auction to allow bidders to evaluate all types of potential impairments caused by international TV stations, in addition to domestic ones. *CTS PN*, 30 FCC Rcd at 4855, para. 3 n.10. We also did not want to over-predict Mexican interference into the U.S. given Mexico’s suggestions that it will try to keep all radio and television broadcast below channel 37. See IFT Press Release 71/2014 *The Plenary of IFT Approves to Grant to SCT the Experimental Use Concessions in the Band 700 MHz*, Dec. 17, 2014, available at <http://www.ift.org.mx/sites/default/files/comunicacion-y-medios/comunicados-ift/comunicado71.diciembre17de2014.pdf> (explaining future plans to keep radio and broadcast allocations below channel 37).

¹⁷² Mindel De La Torre, FCC, *Reaffirming Cross-Border Relations* (June 19, 2015), <https://www.fcc.gov/blog/reaffirming-cross-border-relations> (noting recent meetings and ongoing work with Mexico on joint repurposing of 600 MHz Band); see also IFT Press Release 43/2015 *Mexico and United States Held Bilateral Meetings to Discuss Various Issues Related to the Use of Spectrum on the Common Border*, June 11, 2015, available at <http://www.ift.org.mx/comunicacion-y-medios/comunicados-ift/es/mexico-y-estados-unidos-de-america-celebran-reuniones-bilaterales-para-tratar-diversos-temas>.

¹⁷³ See AT&T Comments, Attachment A at 26–31; Verizon Comments at 3–6; Verizon Reply at 10 (Verizon argues for impairments only up to 15 percent in border areas). In its May 1, 2015 *Ex Parte* Letter, AT&T acknowledges that “an approach that permits the Commission absolutely no flexibility” except in border areas “is probably too stringent” and instead suggests allowing up to three percent impairment outside border areas plus eight to nine percent in border areas. Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1–2 (filed May 1, 2015) (AT&T May 1, 2015 *Ex Parte* Letter). The resulting 11–12 percent standard is similar to the standard we adopt at a number of clearing targets and, indeed, more stringent than what we adopt for higher clearing targets. Subsequently, in its July 1, 2015 *Ex Parte* Letter, AT&T proposed that we allow impairments at the border, without a set maximum percentage, and a three percent cap on non-border-related impairments. Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed July 1, 2015) (AT&T July 1, 2015 *Ex Parte* Letter). As discussed below, this approach would not provide sufficient flexibility to accommodate market variation.

¹⁷⁴ See *Incentive Auction R&O*, 29 FCC Rcd at 6604, para. 81 (“Because the amount of UHF spectrum recovered through the reverse auction and the repacking process depends on broadcaster participation and other factors, the Commission explained in the *NPRM* that any band plan it adopted would have to accommodate variation in the amount of spectrum recovered in different geographic areas; otherwise, the amount recovered in most markets nationwide would be limited if less spectrum is recovered in certain markets.”).

¹⁷⁵ AT&T Comments at 23. *But see* T-Mobile Reply at 22 (arguing that AT&T’s own auction simulations do not support its claim that 84 megahertz or more of spectrum could be repurposed without assigning any TV stations to the 600 MHz Band outside of border areas).

aggregate approach we adopt is to provide flexibility in the event of non-participation by broadcasters in certain areas or other factors that we cannot fully predict in advance.

47. We also reject EOBC's proposal to base the selection of an initial clearing target on the degree of impairment in Los Angeles or New York in the interest of simplicity.¹⁷⁶ Like AT&T's proposal, EOBC's simply does not provide sufficient flexibility to accommodate market variation. Indeed, depending on levels of broadcaster participation, EOBC's approach could defeat the purpose of our decision to accommodate market variation in the first place by constraining the choice of an initial clearing target to the two markets with the most highly congested broadcast spectrum in the nation.¹⁷⁷ EOBC's approach also would sacrifice the precision of the optimization-based approach we adopt, focusing exclusively on two important markets, but which are not necessarily proxies for the rest of the nation. Accordingly, we conclude that EOBC's approach would risk our goal of allowing market forces to determine the highest and best use of spectrum.¹⁷⁸ For the same reason, we also reject AT&T's proposal to allow for only three percent of the population nationwide to be affected by non-border related impairments.¹⁷⁹ Given that the top two PEAs each comprise well over three percent of the U.S. population and the next two PEAs each comprise approximately three percent,¹⁸⁰ to adopt EOBC's or AT&T's approach would also undermine the purpose of adopting market variation in the first place: to prevent the lack of spectrum in one or two markets from lowering the clearing target. EOBC's and AT&T's approaches also fail to reflect that different tradeoffs are appropriate between spectrum recovery and impairment level at different clearing target levels in order to ensure the auction's overall success.¹⁸¹

48. Finally, we decline to establish a separate standard to limit impairment levels in major markets.¹⁸² The procedure we adopt protects major markets from impairment by weighting the population

¹⁷⁶ EOBC Comments at 29–30; EOBC Reply at 19 (arguing that EOBC's proposal is "simpler, more transparent, and ensures that the clearing target will maximize spectrum value nationwide"); Joint Media Parties Reply at 14 (supporting EOBC proposal); LPN Reply at 5–6 (supporting EOBC proposal). *But see* T-Mobile Reply at 17–18 (stating that EOBC's proposal is "insufficiently representative of other major markets that contribute to scale economies and enable a consistent consumer experience.").

¹⁷⁷ *See Incentive Auction R&O*, 29 FCC Rcd at 6605, para. 82 ("We find that accommodating market variation is necessary. If the 600 MHz Band Plan could not accommodate some market variation, we would be forced to limit the amount of spectrum offered across the nation to what is available in the most constrained market (the 'least common denominator'), even if more spectrum could be made available in the vast majority of the country."). Further, EOBC's simulations showing that the Commission can reallocate at least 126 MHz in New York and Los Angeles are simply not possible. *See* Letter from Preston Padden, Executive Director, EOBC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 13-252, Attachment at 1 (filed Apr. 29, 2015) (EOBC Apr. 29, 2015 *Ex Parte* Letter). Even under the most optimistic assumptions regarding broadcaster participation, the simulations analyzed in the *Clearing Target Simulations PN*, did not result in 10 unimpaired pairs in both New York and Los Angeles. *CTS PN*, 30 FCC Rcd at 4862, App. § V.

¹⁷⁸ For example, in Scenario 1 of the simulations run for the *Clearing Target Simulations PN*, the initial clearing target would have to be lowered from 84 megahertz to 78 megahertz because there are only six unimpaired blocks available in the New York PEA. *CTS PN*, 30 FCC Rcd at 4862, App. § V.

¹⁷⁹ AT&T July 1, 2015 *Ex Parte* at 2.

¹⁸⁰ *PEAs PN*, 29 FCC Rcd at 6492, App. A. PEA 1 (New York) and PEA 2 (Los Angeles) comprise approximately eight and six percent, respectively, of the U.S. population. Further, PEA 3 (Chicago) and PEA 4 (San Francisco) each have populations that are approximately three percent of the U.S. population.

¹⁸¹ *See* discussion above regarding EOBC's market variation standard.

¹⁸² *See, e.g.,* CCA Comments at 12; CTIA Comments at 7 (proposing that a certain number or percentage of the largest markets should be required to contain a certain number or percentage of unimpaired licenses); Local Media Comments at 8; LPN Comments at 9 (expressing concern that the weighted-pops approach in combination with DRP raises the risk that more spectrum than necessary will become impaired in areas where demand for spectrum will be highest); T-Mobile Comments at 18 (proposing a requirement that at least four licenses be available in at least nine of the top 10 PEAs regardless of the clearing target); T-Mobile Reply at 17; AT&T Reply at 7–8

(continued....)

in such markets more heavily,¹⁸³ and the one-block-equivalent standard strictly limits impairment levels on a nationwide, aggregate basis. Accordingly, and based on staff simulations reflecting the number of Category 1 licenses that we project would be available in major markets under the procedure we adopt,¹⁸⁴ we are not persuaded that a separate standard to limit impairment levels in major markets is necessary, particularly at the cost of added complexity and less flexibility in accommodating market variation.

IV. QUALIFYING TO BID

A. Qualifying to Bid in the Reverse Auction

49. In order to qualify to bid in the clock phase of Auction 1001, the reverse auction, an eligible broadcast television licensee interested in voluntarily relinquishing spectrum usage rights in exchange for an incentive payment must submit an application in which it identifies, for each station that it wishes to enter in the clock phase of the reverse auction, every relinquishment option for which it would consider bidding for that station.¹⁸⁵ If the broadcaster's application is timely filed and deemed complete, it must then commit to at least one relinquishment option per station at the opening price for that option for that station. Administrative details regarding the application and initial bid commitment procedures, including the application deadline, will be addressed in the *Application Procedures PN*.¹⁸⁶

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(expressing concern that to permit impairments at 20 percent of the weighted population could result in little or no spectrum available in important metropolitan areas). *But see* EOBC Reply at 9–11 (arguing that the proposals made to address top markets are inadequate and that the risk of impairing markets where there is both adequate supply and demand remains); Sprint Reply at 15–16 (arguing that these proposals do not go far enough to address Sprint's concerns about heterogeneity in licenses); Verizon Reply at 9–10 (arguing that T-Mobile's approach to protect top markets "adds extra layers of complexity, and are based on arbitrary assumptions about what might or might not be attractive to bidders").

¹⁸³ See § III.B.1.a (Calculation of Weighted-Pops). We reject arguments that the procedure we adopt might disproportionately impair top markets. See LPN Comments at 9. These commenters express concern that the optimization procedure will impair top markets to allow for fewer impaired markets nationwide. On the contrary, the procedure will seek to avoid impairing high-demand markets due to the added cost of such impairments in the mathematical optimization. See § III.B.1.a (Calculation of Weighted-Pops).

¹⁸⁴ As stated above, even under the conservative assumption that only 40 to 50 percent of eligible stations participate in the reverse auction, our analysis projects that the procedure we adopt would select an initial clearing target of 84 megahertz, that 2,535 of the total 2,654 Category 1 spectrum blocks available in the forward auction would be without any impairments, and that there would be only nine Category 2 blocks high-demand markets. See *CTS PN*, 30 FCC Rcd at 4856, para. 6, 4858, App.; § I (Overview of the Initial Clearing Target).

¹⁸⁵ See generally *Incentive Auction R&O*, 29 FCC Rcd at 6744, para. 417. The Commission is currently developing a reverse auction application form. In the *Auction 1000 Comment PN*, we proposed that each applicant to participate in the reverse auction must indicate for each station listed in its application all of the spectrum relinquishment options available to it that it may be willing to consider. 29 FCC Rcd at 15780, para. 88; see 47 C.F.R. § 1.2204(c)(3)(v) ("An applicant may be required to provide the following information in its application to participate in the reverse auction: . . . The types of reverse auction bids that the applicant may submit.")

¹⁸⁶ See § I (Introduction and Executive Summary). We adopt our proposal with respect to an additional certification by applicants in the reverse auction regarding their exercise of due diligence. In the *Auction 1000 Comment PN*, we sought comment on requiring all applicants in the reverse auction to certify to the truth of the following statement: "The applicant acknowledges and agrees that any information provided by the Commission's outside contractors who are advising and assisting the Commission with education and outreach in connection with the reverse auction is for informational purposes only and that neither the Commission nor any of the Commission's outside contractors makes any representations or warranties with respect to any such information and shall have no liability to the applicant in connection therewith." *Auction 1000 Comment PN*, 29 FCC Rcd at 15780, para. 87. We noted that this certification will help assure that each applicant accepts responsibility for its bids and will not attempt to place responsibility for its bids on either the Commission or the information provided by third parties as part of the Commission's outreach. We received no comments in response. The additional certification serves the intended purpose and we therefore will require all applicants in the reverse auction to make the certification.

Below we describe the available bid options, adopt procedures for setting the opening prices, and adopt the process by which applicants that are willing to accept the opening price for one or more relinquishment options will commit to that option and a fallback option(s), if they so choose, in order to become qualified to bid in the clock phase of the reverse auction.

1. Options for Relinquishing Spectrum Usage Rights

50. Reverse auction applicants will be able to select from three possible bid options to relinquish their spectrum usage rights on their auction applications.¹⁸⁷ These options correspond to the bid options that will be available to bidders in the clock phase of the reverse auction. The three bid options are a bid to go off-air (available to all stations), a bid to move to a Low-VHF channel (available to UHF or High-VHF stations), and a bid to move to a High-VHF channel (available only to UHF stations).¹⁸⁸ A participant that intends to share a channel with another station post-auction will bid to go off-air.¹⁸⁹ The auction system will treat the intention to relinquish spectrum usage rights in order to channel share the same as a bid to go off-air because “from the perspective of the auction system, a channel sharing bid is identical to a license relinquishment bid.”¹⁹⁰ No parties filed comments directly addressing the proposed bid types.¹⁹¹ We conclude that offering these three bid options is appropriate to implement the relinquishment options that we adopted in the *Incentive Auction R&O* and is consistent with our goal of making reverse auction participation straightforward for broadcasters.

51. *Option Hierarchy.* The auction system will treat the three possible bid options as a one-way hierarchy during the clock phase of reverse auction bidding.¹⁹² As discussed below, the hierarchy reflects the relative value of the relinquishment options to the auction system’s ability to recover spectrum and simplifies the bidding process. Of greatest value in the hierarchy is a bid to go off-air, which is a bid

¹⁸⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15776, para. 72. An applicant’s ability to select options on its application will be limited by its pre-auction band and the hierarchy of relinquishment options; i.e., a High-VHF station will not be able to select moving to High-VHF as an option or a Low-VHF station will not be able to move to High-VHF.

¹⁸⁸ See *id.* The Spectrum Act requires the Commission to provide three relinquishment options in the reverse auction: total relinquishment; a move from a UHF channel to a VHF channel; and channel sharing. 47 U.S.C. § 1452(a)(2). We refined the UHF-to-VHF option to allow bidders to choose High-VHF (channels 7–13) or Low-VHF (channels 2–6). *Incentive Auction R&O*, 29 FCC Rcd at 6725, para. 370. We also decided to offer an option to move from a High- to a Low-VHF channel. *Id.* at 6730, para. 380.

¹⁸⁹ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15777, para. 75; see also 47 U.S.C. § 1452(a)(2) (providing that options available in the reverse auction shall include a bid to relinquish usage rights in order to share a channel with another licensee). Parties intending to channel share may be required to provide additional information on their auction application. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15778, para. 81; see also 47 C.F.R. § 1.2204(c)(5). Details regarding the precise information to be provided to meet these requirements will be set forth in the *Application Procedures PN* and the final application form.

¹⁹⁰ *Auction 1000 Comment PN*, 29 FCC Rcd at 15777, para. 75. Several commenters made suggestions related to channel sharing agreements. See *Local Media Comments* at 8–9; *Media General Comments* at 4–5; *PTV Comments* at 9–11. The Commission recently addressed several channel sharing issues in a separate order, including those raised in the comments to this proceeding, and these comments are outside the scope of this proceeding. See *generally Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, First Order on Reconsideration and Notice of Proposed Rulemaking, 30 FCC Rcd. 6668 (2015).

¹⁹¹ Marquee states that the Commission should encourage voluntary moves from UHF to VHF prior to the auction by “qualify[ing] such moves for the displacement funds available to stations that are repacked . . . and allow[ing] these stations to [make a major modification to their application by] chang[ing] city of license by a distance of up to 25 miles . . . and permit[ting] a change of tower and contour with their new VHF assignment[.]” Marquee Comments at 1. This proposal falls outside the scope of this Public Notice and we decline to address it. See also 47 U.S.C. § 1452(b)(4) (specifying the options eligible for payment of relocation costs).

¹⁹² See *Auction 1000 Comment PN*, 29 FCC Rcd at 15776–77, paras. 72–75.

to relinquish all spectrum usage rights to a particular channel.¹⁹³ This option is followed in order of value by a bid to move to the Low-VHF band, then a bid to move to the High-VHF band.¹⁹⁴ The option to which a bidder is designated pursuant to its initial commitment will represent the most spectrum rights it will be able to bid to relinquish in the auction. If the bidder subsequently decides to switch its bid option in accordance with the reverse auction bidding procedures,¹⁹⁵ the only bid option(s) available to the bidder will be options that relinquish less spectrum usage rights. The one-directional nature of the bid options is important for bidders to consider when filling out their auction applications and committing to an initial relinquishment option.¹⁹⁶

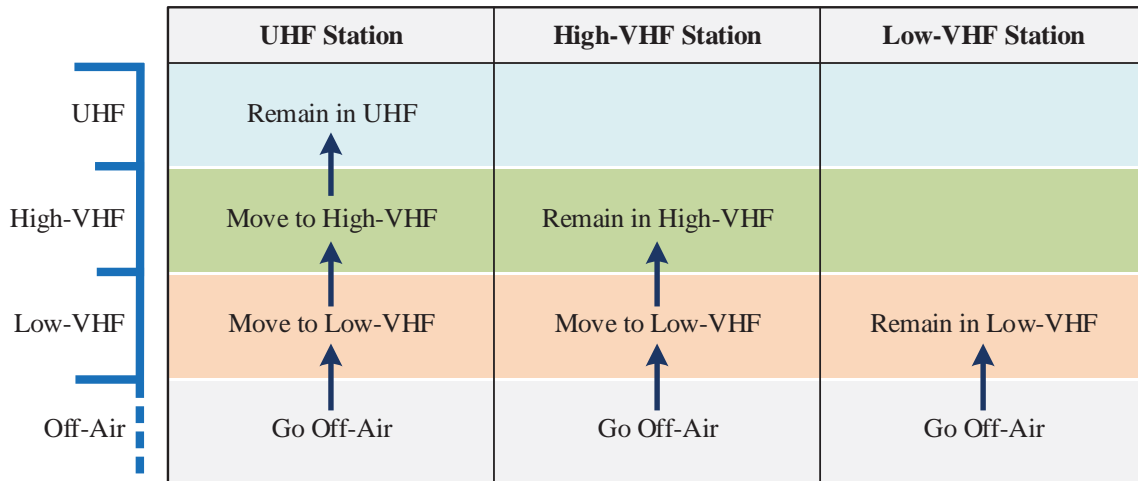


Figure 3: One-way Hierarchy of Bid Options Available to Stations in Each Band During Bidding

52. Some broadcasters support the one-way option hierarchy because it will “facilitate the orderly conduct of the reverse auction,”¹⁹⁷ while others advocate for flexibility to switch between bid options without restriction.¹⁹⁸ Contrary to concerns that our design will discourage participation or complicate decision-making,¹⁹⁹ we conclude that limiting the direction in which bidders may switch bid options—from greater to lesser relinquishments—will make bidding easier because it will establish a simple framework for evaluating options and will improve price predictability.²⁰⁰ Furthermore, allowing bidders to “move freely between any relinquishment options” as Joint Broadcasters suggest would create

¹⁹³ As noted above, to the auction system, a bid to channel share is a bid to go off-air.

¹⁹⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15776, para. 73. For each station, the final option in the hierarchy is always to exit the auction in order to remain on the air in its pre-auction band.

¹⁹⁵ See §§ V.C (Reverse Auction – Bidding Mechanics), V.D (Processing Between Clock Rounds).

¹⁹⁶ See § IV.A.3 (Committing to an Initial Relinquishment Option); see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15781–82, para. 90, 15791, para. 120 n.222.

¹⁹⁷ See, e.g., LPN Comments at 12; LPN Reply at 7 n.17 (“LPN agrees with the Commission that allowing a station that has switched from a Go-Off-Air bid to a switch back would be administratively unworkable.”).

¹⁹⁸ See CTIA Reply at 18–19; Joint Broadcasters Comments at 12; see also Sandholm Comments at 3, Attachment at 19 (noting that they do not necessarily agree with the one-way hierarchy, but including modeling and optimization techniques that adapt to that setting).

¹⁹⁹ See, e.g., CTIA Reply at 18–19; Joint Broadcasters Comments at 11–12.

²⁰⁰ A bidder that wishes to preserve flexibility to bid for all the options may do so by selecting all of its options on its auction application and committing to go-off-air as its preferred initial relinquishment option.

a significant risk of harmful strategic bidding.²⁰¹ Creating such strategic opportunities would actually make bidding more complicated for broadcasters because they would have to consider a broader range of strategies prior to and during the bidding.

53. Joint Broadcasters posit that the one-way hierarchy will create inefficiencies since a bidder might be willing to bid to go off-air once the price to move to VHF falls too low, but such a bidder would be precluded from doing so by the one-way-hierarchy.²⁰² We disagree. The one-way hierarchy, together with the reverse auction bid processing system we adopt, will provide for a more efficient repacking than if broadcasters were able to shift among the options without restriction. Based on the available vacancy in the VHF band, the reverse auction bid processing system will reduce the price differential between the off-air and VHF prices, in order to encourage bidders that can be accommodated in the VHF band to bid to move to VHF rather than to go off-air. Substantial movement back and forth between options could reduce the overall efficiency of repacking in the VHF bands. Additionally, bidders that move to VHF are unlikely to want to switch to off-air bids, as Joint Broadcasters posit, because generally the price to go off-air will decline more rapidly than the price to move to High- or Low-VHF.²⁰³ Accordingly, we are unconvinced that the one-way hierarchy design will unduly restrict bidders. The benefits of the one-way hierarchy in terms of added simplicity, preventing harmful strategic bidding, and repacking efficiency outweigh any costs in terms of lost bidder flexibility.

2. Opening Price Offers

54. We adopt our proposal for calculating opening price offers for each station using two factors: (i) a base clock price of \$900, which represents the full per-unit of volume value to the auction of clearing a channel in the UHF band; and (ii) a station-specific “volume” factor that equally weights a station’s interference-free population and the number of constraints that it imposes on the auction system’s ability to repack other stations. We will calculate opening price offers for UHF stations to go off-air by multiplying the base clock price of \$900 by their station-specific volumes. Opening price offers for bid options other than a UHF station bidding for off-air relinquishment will be calculated by multiplying fractional portions of the nationwide uniform \$900 base clock price by a station’s volume.²⁰⁴ We will publicly announce opening price offers for each bid option available to each station eligible to participate in the reverse auction at least 60 days in advance of the deadline to file an application to participate in the reverse auction.²⁰⁵ We discuss the factors used to calculate opening price offers below.

²⁰¹ Joint Broadcasters Comments at 12; *see also* CTIA Reply at 19. Allowing bidders to switch bids unrestricted by the hierarchy would create opportunities for them to manipulate prices in the auction by moving back and forth between off-air and VHF options. For example, a UHF bidder could offer to switch to VHF, which would result in lower price offers for the VHF option, which could encourage neighboring UHF stations to drop out of the auction without ever offering to move to VHF. Then, if there were no hierarchy, the bidder could switch back to off-air and potentially be frozen at a higher price than it would have been otherwise. This would also have the effect of reducing the utilization of the VHF band. Under the hierarchy we adopt, a broadcaster can have no effect on the VHF prices without giving up its opportunity to go off-air, so it cannot manipulate the price that it might actually be paid to go off-air.

²⁰² *See* Joint Broadcasters Comments at 10–11.

²⁰³ *See* § V.B (Determining Price Offers in Clock Rounds) (describing how pricing will encourage moves to VHF when there is room in the VHF band). As the price to go off-air approaches the price to move to a VHF option, bidders may prefer to retain a full six megahertz VHF channel rather than go off-air for a similar price.

²⁰⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15783, para. 95. As discussed below, the base clock price is also the clock price for a UHF station to go off-air, and the clock prices for VHF stations and for UHF stations to move to VHF are calculated as portions of the base clock price because different combinations of these relinquishment options result in fully clearing a channel in the UHF band.

²⁰⁵ As proposed in the *Comment PN*, if the auction system determines that a station is not needed in the auction (i.e., the station will always have a feasible channel assignment in its pre-auction band, *see* note 30, and could never

(continued....)

a. Base Clock Price and VHF Clock Prices

55. We adopt a slightly modified version of our proposal to set a nationwide uniform base clock price, representing the full per-volume value to the auction of clearing a channel in the UHF band, from which we will calculate the opening clock prices for each bid option for stations in each band.²⁰⁶ We will set the base clock price at \$900 per unit of volume so that the maximum opening price offer to any particular station is \$900 million. As discussed below, we will calculate a volume for each eligible station based on its interference and population characteristics. We will then re-scale this volume calculation so that the highest volume for a UHF station is one million, in order to yield the maximum opening price for a UHF station to go off-air of \$900 million.²⁰⁷ Although we proposed to scale the volume of other stations based on the highest volume station, regardless of its pre-auction band, we conclude that using the highest volume UHF station is more appropriate because that station's off-air price will reflect the greatest value to the auction.²⁰⁸

56. We conclude that a \$900 base clock price strikes the correct balance between attracting robust broadcaster participation across multiple markets and conducting an efficient—and ultimately, successful—auction. We disagree with broadcasters who argue that the base clock price should be increased to reflect the results of Auction 97 (AWS-3).²⁰⁹ Raising the base clock price would, according to these commenters, motivate greater broadcaster participation because stations would be offered higher opening prices, and this increased participation would ultimately result in more cleared spectrum. There is no basis to believe, beyond broadcasters' assertions, that opening prices of up to \$900 million will be insufficient to encourage reverse auction participation.²¹⁰ On the other hand, increasing the base clock

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become a winning bidder at any clearing target), prior to the application window, the station will be informed that it is not needed. *See Auction 1000 Comment PN*, 29 FCC Rcd at 15783 n.186.

²⁰⁶ *Auction 1000 Comment PN*, 29 FCC Rcd at 15784, para. 97; *see also id.* at 15852–53, App. D (detailing the four combinations of relinquishment options that result in clearing one UHF channel and the price relationships of each relinquishment relative to the base clock price).

²⁰⁷ If any VHF stations have a higher calculated volume than the highest volume UHF station, such stations may have their volume re-scaled to greater than one million. However, because the opening clock prices for VHF stations are calculated as fractional portions of the base clock price as set forth below, we expect that the opening price offers for VHF stations will always be lower than \$900 million. By scaling based upon the highest volume UHF station, we can ensure that one station will be offered an opening price of exactly \$900 million.

²⁰⁸ *See generally* Letter from Preston Padden, Executive Director, EOBC, to Marlene H. Dortch, Secretary, AU Docket No. 14-252, FCC, GN Docket No. 12-268 at 3 (filed July 3, 2015) (advocating for scaling the volume of stations based upon the UHF station with the highest volume).

²⁰⁹ EOBC Comments at 26–28; Local Media Comments at 6; Broadcaster Representatives Reply at 3; EOBC Reply at 7; Local Media Reply at 13–14. EOBC asserts that the \$900 base clock price was proposed prior to considering the higher than expected revenues in Auction 97, where wireless companies bid a total of over \$44 billion. EOBC Comments at 26–27; EOBC Comments, Crampton Study at 35–36; *see also* Local Media Reply at 13. EOBC estimates that the incentive auction could raise between \$60 and \$80 billion. EOBC Comments, Kagan White Paper at 8. While Auction 97 did not conclude until after the release of the *Auction 1000 Comment PN*, we were fully aware—and took into account—that bidding in that auction had vastly exceeded pre-auction estimates when we proposed a \$900 opening base clock price. Indeed, more than two weeks prior to our adoption of the *Auction 1000 Comment PN*, bidding in Auction 97 had already exceeded \$38 billion. *See* Editorial, *A Blockbuster Wireless Auction*, N.Y. Times, Nov. 30, 2014, <http://www.nytimes.com/2014/12/01/opinion/a-blockbuster-wireless-auction.html>.

²¹⁰ *See, e.g.,* Stephen Battaglio, *CBS' Leslie Moonves says selling TV spectrum is a possibility*, L.A. Times, Dec. 10, 2014, <http://www.latimes.com/entertainment/envelope/cotown/la-et-ct-les-moonves-cbs-selling-stations-20141210-story.html>; Harry A. Jessell, *NBCU Interested in Spectrum Auction Options*, TVNewsCheck, May 25, 2015, <http://www.tvnewscheck.com/article/84001/nbcu-interested-in-spectrum-auction-options>; Letter from Mace Rosenstein, Counsel for Fox Television Stations, ION Media Networks, Tribune Media Company, and Univision

(continued....)

price as suggested would raise the cost of repurposing spectrum and likely reduce the amount of repurposed spectrum.²¹¹ Thus, increasing the opening prices in actuality would likely result in fewer stations having the opportunity to become winners in the auction. In addition, increasing the base clock price would risk increasing the length of the auction, making participation more difficult and costly for both forward and reverse auction bidders. Accordingly, we adopt the \$900 base clock price to ensure robust broadcaster participation without undermining our other auction goals.

57. While opening price offers for a UHF station to go off-air will always equal the base clock price multiplied by the station's volume, opening price offers for other bid options—for a UHF station to move to VHF or for VHF stations to move to a lower band or to go off-air—will equal the station's volume multiplied by a portion of the base clock price. Because the value to the auction of a cleared channel in the UHF band is the same whether a UHF station relinquishes its spectrum by going off-air or the channel is cleared through a series of intermediate moves involving VHF bids, we will calculate the per-volume opening prices for intermediate moves to add up to the per-volume opening price for a UHF station to go off-air.²¹² Thus, the per-volume opening prices for a UHF station to move to High-VHF, a High-VHF station to move to Low-VHF, and a Low-VHF station to go off-air will add up to equal the base clock price, since these three moves are equivalent to a UHF station going off-air in terms of value to the auction.²¹³ Likewise, the per-volume opening prices for other intermediate moves will add to the opening price for an equivalent direct move. Thus, in per-volume terms, the opening price offer for a direct move from High-VHF to off-air will equal the sum of the opening price for a move from High-VHF to Low-VHF and the opening price for a move from Low-VHF to off-air.²¹⁴

58. More specifically, we will apportion the base clock price for a station to move from the UHF band to off-air among the equivalent series of intermediate moves using the midpoint of the ranges we proposed in the *Comment PN*.²¹⁵ The per-volume opening price for a UHF station to move to Low-VHF will be 75 percent of the base clock price (or \$675), and the per-volume opening price to move from UHF to High-VHF will be 40 percent of the base clock price (or \$360). The ranges that we proposed represent the relative value of each band and its related relinquishment options to the auction, and reflect the scarcity of channels and different technical characteristics of each VHF band.²¹⁶ In response to

(Continued from previous page) _____
Communications, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No 12-268 at 1–2 (filed Feb. 6, 2015).

²¹¹ Increasing the base clock price would raise clearing costs for a given clearing target, increasing the likelihood of not meeting the final stage rule, necessitating additional stages at lower spectrum clearing targets. These risks would be compounded by the absence of a dynamic reserve pricing (DRP) mechanism, *see* § V.D.2 (Dynamic Reserve Prices), because the auction system will not have a mechanism to mitigate the risk that a station will receive its opening price. *See Auction 1000 Comment PN*, 29 FCC Rcd at 15787–78, para. 106.

²¹² *Auction 1000 Comment PN*, 29 FCC Rcd at 15783, para. 95. This lower opening price for VHF options also reflects the fact that the winning bidder will retain a full six megahertz channel. *Id.*

²¹³ *See id.* at 15852–56, App. D.

²¹⁴ During the clock rounds, however, the portion of the base clock price attributable to each intermediate move will vary from round-to-round, since price offers to stations during the clock rounds will also depend upon the availability of channels in the VHF bands in the station's area. For example, while the per-volume opening price for a High-VHF station to go off-air will be 40 percent of the opening base clock price, this percentage will vary in subsequent clock rounds depending upon congestion in the VHF bands. *See* § V.B (Determining New Price Offers in Clock Rounds).

²¹⁵ *Auction 1000 Comment PN*, 29 FCC Rcd at 15785, para. 99 (“For moving from UHF or High-VHF to Low-VHF, we tentatively conclude that a station's opening price should be between 67 and 80 percent of the station's price to go off-air. For moving from UHF to High-VHF, we tentatively conclude that a station's opening bid price should be between 33 and 50 percent of the station's off-air price.”).

²¹⁶ *Id.* at 15785–86, paras. 100–01.

commenters that urge us to increase the opening prices for VHF options,²¹⁷ we are persuaded that we should not choose opening prices at the bottom of the proposed ranges in order to avoid discouraging broadcasters from choosing these options. At the same time, choosing opening prices at the top of the ranges proposed would run the risk of under-incentivizing the option to go off-air or to consider channel sharing.²¹⁸ We conclude that the values we choose strike the right balance between conducting an efficient auction and encouraging bidders to consider all bid options, include the VHF options.

59. The per-volume opening prices that result from our approach are shown in the figure below. Because the opening price for a UHF station to move to Low-VHF will be 75 percent of the base clock price, the opening price for a move from Low-VHF to off-air must be 25 percent of the base clock price for these two intermediate moves to add up to the base clock price (i.e., 100 percent). Similarly, because the opening price for a UHF station to move to High-VHF will be 40 percent of the base clock price, the opening price for a move from High-VHF to off-air must be 60 percent of the base clock price. Lastly, since the opening price for a UHF station to move to High-VHF is 40 percent and for a Low-VHF station to go off-air is 25 percent, the opening price for a move from High-VHF to Low-VHF must be 35 percent of the base clock for these intermediate moves to sum and equal the base clock price. Given a per-volume opening base clock price of \$900, the per-volume opening price for a Low-VHF station to go off-air will therefore be \$225 (25 percent of \$900), for a High-VHF station to go off-air will be \$540 (60 percent of \$900), and for a High-VHF station to move to Low-VHF will be \$315 (35 percent of \$900).

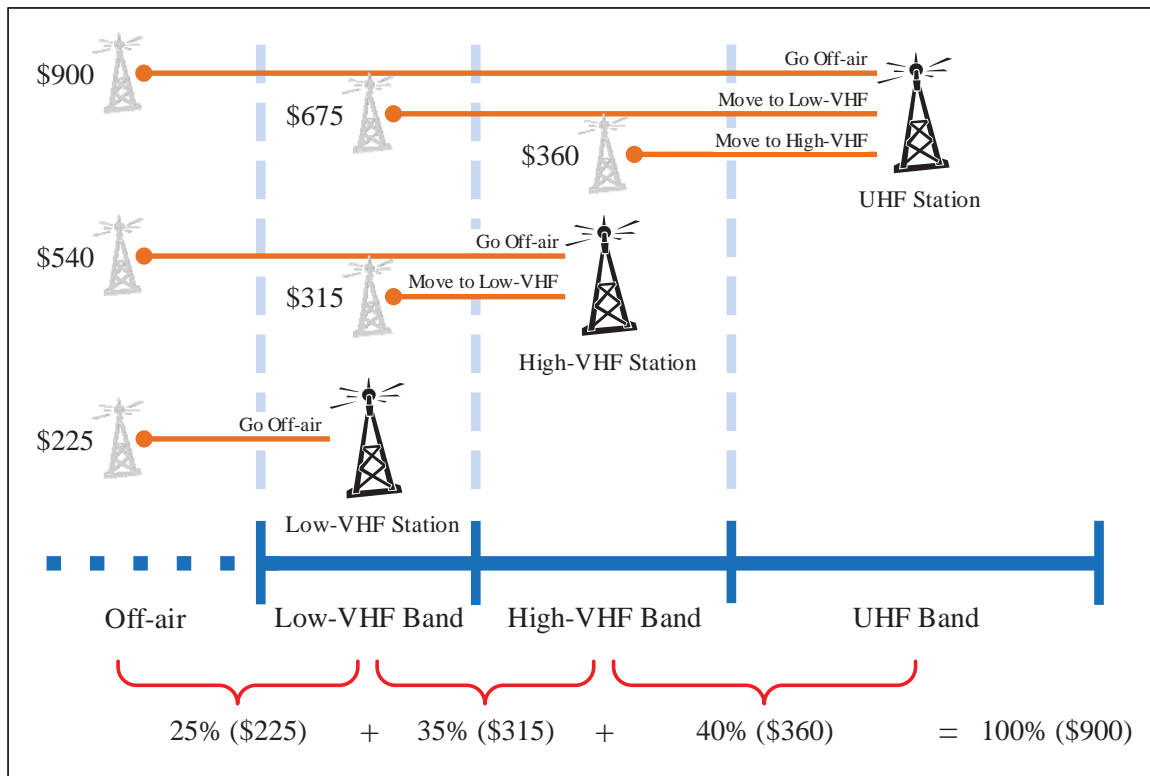


Figure 4: Portion of \$900 Per-volume Opening Base Clock Price for Intermediate Moves

²¹⁷ See, e.g., PBS Comments at 8–9 (recommending “that the Commission develop opening VHF bids that are comparable to full relinquishment, with downward pressure on the price resulting from the actual supply of VHF channels in a given market and the bidder demand for those channels”).

²¹⁸ See LPN Comments at 12–13 (suggesting that we “discount opening prices for VHF bid options by an even greater amount” to encourage channel sharing).

60. Several broadcasters oppose offering opening prices for the bid options to move to VHF that are lower than the bid option to go off-air.²¹⁹ As an initial matter, we reject NAB's unsupported claim that we lack the statutory authority under the Spectrum Act to offer different prices for VHF options.²²⁰ Although the statute does not expressly authorize different price offers for VHF options, it does not follow that we lack authority to offer different prices: such authority is inherent in our mandate to conduct a reverse auction—which requires establishing opening price offers—and nothing in the Spectrum Act's statutory language, context, or legislative history suggests that in doing so we cannot distinguish between relinquishment options.²²¹ We also reject PBS's argument that discounting UHF to VHF bid options "is inconsistent with the basic purpose of the auction" to discover prices through market-based means.²²² Setting opening price offers for bid options that are proportional to the value of the relinquishment to the auction will send the appropriate price signals to bidders regarding the relative value of the options to the auction system and encourage bidders to initially commit to go off-air, recognizing that as price offers are reduced, they may request to switch to one of the VHF options.²²³

61. We disagree with NAB and the Joint Broadcasters that the auction system should be indifferent between the relinquishment options available to UHF stations because each option will result in clearing a channel in the UHF band.²²⁴ In order to clear a UHF channel by paying a UHF station to move to the VHF band, the auction system may first have to pay one or more stations to relinquish spectrum usage rights in the VHF band.²²⁵ A bid to go off-air also is of greater value than a bid to change bands because it provides the auction system with more repacking flexibility: accepting an off-air bid by a UHF station clears a UHF channel without first requiring the system to find a feasible channel in another band. Conversely, a UHF station that agrees to move to one of the VHF bands is less valuable because it must be assigned a feasible channel in that band, limiting the auction's ability to assign another station to VHF, and significantly increasing the complexity of the repacking process.²²⁶

²¹⁹ Joint Broadcasters Comments at 6–9; NAB Reply at 12–14. *But see* Local Media Reply at 16; LPN Reply at 6–8.

²²⁰ NAB Reply at 13 ("The [Spectrum Act] does not contemplate that the FCC could effectively value these options at different levels, and indeed, doing so would only undermine one of the purposes of the Act; namely, to repurpose spectrum in a voluntary auction."). As discussed above, contrary to NAB's argument, discounting opening prices for VHF options will enhance the auction's ability to repurpose spectrum by pricing bid options in accordance with their value to the auction system.

²²¹ The Commission has historically set opening bid prices based upon the comparative value of the spectrum being offered. *See, e.g., Auction of Advanced Wireless Services (AWS-3) Licenses Scheduled for November 13, 2014; Notice and Filing Requirements, Reserve Prices, Minimum Opening Bids, Upfront Payments and other Procedures for Auction 97*, AU Docket No. 14-78, Public Notice, 29 FCC Rcd 8386, 8440–42 (WTB 2014) (*Auction 97 Procedures PN*).

²²² PBS Comments at 8.

²²³ Moreover, as discussed below, price offers for VHF options and VHF stations in subsequent rounds will be determined by the actual demand for VHF options and the availability of channels in the VHF bands. As a result, the relative values for the various bid options will not remain fixed at the opening bid offer amounts, and the ultimate prices paid to winning bidders will reflect market demand for the options in the auction. *See* § V.B (Determining New Price Offers in Clock Rounds).

²²⁴ *See* NAB Reply at 12; Joint Broadcasters Comments at 6–7.

²²⁵ Even in markets where a feasible channel assignment is available in either the Low-VHF or High-VHF bands, repacking a UHF station in that band can have a cascading effect on adjacent markets due to our pairwise interference constraints.

²²⁶ A station that agrees to move to Low-VHF is of greater value to the auction than one that agrees to move to High-VHF due to the greater availability of channels in the Low-VHF band and the greater number of stations for which that bid option will be available, both of which make repacking easier. Consequently, of least value to the auction is a station that agrees to move to High-VHF, since in many markets few channels are available, and only UHF stations may bid on this option.

62. We also disagree with NAB that offering the same price for all three bid options would better serve the public interest by encouraging stations to move to the VHF band and continue to provide broadcast television service.²²⁷ NAB's premise is flawed, because a UHF station moving to VHF may necessitate a VHF station going off-air first, as discussed above. In any event, in keeping with our goal of allowing market forces to determine the use of spectrum,²²⁸ the public interest will be best served by pricing bid options according to their value to the auction and the repacking process, rather than based on separate broadcast-related policy goals.²²⁹ We also reject PBS's suggestion that if we discount price offers for VHF options, we should provide a bidding credit for noncommercial educational ("NCE") stations that successfully bid to move to VHF in order to help pay for their relocation expenses.²³⁰ Unlike in the traditional auction context, where bidding credits are intended to help small or disadvantaged businesses that may lack the financial resources to effectively compete for licenses with larger ones, winning bidders in the reverse auction will receive—and not make—payments, and can factor their relocation expenses into their consideration of whether to accept a price offer.²³¹

63. We disagree with the Joint Broadcasters that our opening price offers for VHF bid options will fail to account for the "substantial technical inferiority of VHF channels" and to "provide the proper incentives for broadcasters to accept these limitations."²³² Contrary to Joint Broadcasters' argument, our approach does provide an incentive to accept the less favorable propagation characteristics and other technical properties of VHF channels—this is precisely the point of offering higher opening prices to UHF stations to move to Low-VHF than to move to High-VHF. Nor are we persuaded that requiring stations moving to VHF to pay relocation expenses will "greatly reduc[e] the desirability of a UHF-to-VHF move."²³³ Bidders can—and, we expect, will—factor their relocation expenses into their consideration of whether to accept a price offer. The value inherent in a station retaining the exclusive right to use a full six megahertz channel will encourage stations to seriously consider bidding for VHF options.

64. We also disagree with the Joint Broadcasters' argument that offering lower opening prices for VHF options will hinder the efficient use of spectrum by encouraging channel sharing over moving to VHF, thereby reducing our flexibility to repurpose additional UHF spectrum in the future.²³⁴ First, the Spectrum Act authorizes only one broadcast television spectrum incentive auction.²³⁵ Our goal, therefore, is to ensure the success of this auction. Second, contrary to the Joint Broadcasters' assumption, the two options are not mutually exclusive: two UHF stations may agree to share a channel in VHF (with one agreeing to go off-air, and the other bidding to move to a VHF channel which both stations would share) in order to receive greater compensation than if only one station participated in the auction.

²²⁷ NAB Reply at 13 ("Stations interested in moving to VHF bands should not be punished because they wish to continue serving their communities; they should be *encouraged* to do so.").

²²⁸ *Auction 1000 Comment PN*, 29 FCC Rcd at 15766, para. 37.

²²⁹ We further note that a station bidding to go off-air may be party to a channel-sharing agreement and could, in fact, continue to serve the public by offering broadcast television service.

²³⁰ See PBS Comments at 8–9.

²³¹ See *Incentive Auction R&O*, 29 FCC Rcd at 6813, para. 601 n.1694 (concluding that the Spectrum Act mandates reimbursement only for involuntary channel reassignments).

²³² Joint Broadcasters Comments at 5, 7–8.

²³³ *Id.* at 8.

²³⁴ *Id.* at 9.

²³⁵ See 47 U.S.C. § 1452(e).

b. Station-Specific Volume

65. The auction system will calculate each participating station's volume using the following formula:

$$\text{Station Volume} = (\text{Interference})^{0.5} * (\text{Population})^{0.5}$$

We will set the interference component to equal the number of co- and adjacent channel constraints a station would impose on repacking on a pairwise basis, and the population component to equal the number of people residing within the station's interference-free service area.²³⁶ Considering population will "enable[e] us to clear more spectrum in markets where the forward auction value of relinquished spectrum usage rights is apt to be higher,"²³⁷ and we conclude that a volume formula that equally balances interference and population components will best achieve the goals of the incentive auction.²³⁸ Once the auction system has calculated a station's volume, its volume metric will be fixed throughout the auction. While AT&T encourages us to consider a dynamic volume adjustment based upon the provisional assignment of stations to channels,²³⁹ we find that the approach we adopt below for calculating price reductions will capture similar efficiencies with less complexity.²⁴⁰

66. We reject arguments by EOBC and other broadcasters against considering population when calculating each station's volume metric.²⁴¹ As an initial matter, EOBC's argument that considering population is inconsistent with the policies we adopted in the *Incentive Auction R&O* is without merit.²⁴² We expressly stated in the *Incentive Auction R&O* that the factors to be used in setting prices could "include the number of stations that a station would interfere with and block from being assigned channels, the population the station covers, or a combination of such factors."²⁴³ Contrary to EOBC's

²³⁶ *Auction 1000 Comment PN*, 29 FCC Rcd at 15783–84, para. 96. Our approach to setting the interference component along the borders will be subject to the agreements we reach with Canada and Mexico. For instance, it may be necessary to adjust the interference component for the purpose of determining station-specific volume.

²³⁷ *Id.* at 15785, para. 98.

²³⁸ We note that some commenters, including NAB, agree that setting opening prices "requires consideration of both interference and population served." NAB Comments at 2; Letter from Christian French, Chief Operating Officer, WRNN-TV Associates, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed Feb. 5, 2015) (WRNN Feb. 5, 2015 *Ex Parte* Letter).

²³⁹ AT&T Comments, Attachment A at 36–38.

²⁴⁰ See § V.B (Determining New Price Offers in Clock Rounds).

²⁴¹ See EOBC Comments at 12; LPN Comments at 5; Local Media Reply at 10–11; Milachi Comments at 2–3; Letter from William D. deKay, CEO, LPN, and Ravi Potharlanka, President, LPN, to Howard J. Symons, Vice Chair, Incentive Auction Task Force, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed June 9, 2015).

²⁴² EOBC Comments at 12, 19 (asserting that "[i]n the *Incentive Auction R&O*, the Commission committed to setting reverse auction prices based on a station's 'impact on the repacking process'" and that "[t]he pricing methodology proposed in the *Comment PN* cannot be reconciled with the framework that the FCC adopted"); see also Local Media Reply at 9–11.

²⁴³ *Incentive Auction R&O*, 29 FCC Rcd at 6754, para. 451. EOBC points out that the *Incentive Auction R&O* "explained that a station's price would account for objective factors 'that affect the availability of channels in the repacking process and, therefore, the value of a station's bid to voluntarily relinquish spectrum usage rights.'" EOBC Comments at 18. Our volume formula is wholly consistent with this explanation. Likewise, our formula is consistent with our statement that "a station with a high potential for interference will be offered a price that is higher than a station with less potential for interference to other stations": between two otherwise identical stations, the one with more interference constraints will have a greater volume, and thus higher opening price offers. *Incentive Auction R&O*, 29 FCC Rcd at 6753, para. 450. We did not state that stations with more interference constraints would receive higher offers than those with fewer interference constraints regardless of other factors.

argument that population has nothing to do with a station's impact on the repacking process,²⁴⁴ "population served [is] one of the major constraints on the availability of channels in the repacking process" in light of the Spectrum Act's mandate that during the repacking process we make all reasonable efforts to preserve the population served of eligible stations that will remain on the air.²⁴⁵

67. Moreover, considering population alongside interference will allow the auction system to clear more spectrum in markets where the value to the forward auction is likely to be highest.²⁴⁶ The purely interference-based approach advocated by EOBC and other broadcasters would result in larger payments to stations that serve small populations and smaller payments to stations that serve particularly large populations—an outcome at odds with both the typical metric by which spectrum is valued in spectrum auctions (i.e., MHz-pops) and with stations' *own assessments*: as WRNN points out, "[p]opulation is one of the most, if not the most, important elements by which we and other broadcasters value our properties, and distinguish our stations from others. This is critical for the repacking process because participation of many stations with high population counts, especially in the major cities, is essential to meet larger clearing targets."²⁴⁷ While we affirm our determination in the *Incentive Auction R&O* not to set bid prices based upon a station's enterprise value,²⁴⁸ population is nevertheless an important metric for assessing *spectrum* value. Ignoring this metric would send the wrong price signals and discourage participation by large stations in major markets, thereby harming our ability to clear spectrum in such markets.²⁴⁹ For the above reasons, we also reject Local Media TV's proposal to calculate volume based entirely upon the pairwise interference constraint files.²⁵⁰

²⁴⁴ EOBC Comments at 20.

²⁴⁵ *Incentive Auction R&O*, 29 FCC Rcd at 6754, para. 451 n.1303.

²⁴⁶ *Auction 1000 Comment PN*, 29 FCC Rcd at 15785, para. 98.

²⁴⁷ See WRNN Feb. 5, 2015 *Ex Parte* Letter at 2. We note that high participation levels by stations that serve small populations in markets adjacent to high-demand markets will not make up for low participation levels by stations in high-demand markets that serve large populations. Participation by both types of stations is required in order to allow the auction to repurpose a significant amount of spectrum.

²⁴⁸ *Incentive Auction R&O*, 29 FCC Rcd at 6754, para. 451.

²⁴⁹ For example, in certain border markets, a small Class A station may serve only a small population but there may also be few channels available for repacking stations. In such markets, the value of clearing and selling this spectrum in the forward auction may likewise be low. Ignoring or reducing the weight of population, as proposed by EOBC, could potentially result in the Class A station being offered an opening price significantly higher than a full power station in a major market that serves many more people, regardless of the price at which each station values itself. Furthermore, the value of clearing and selling the spectrum in the forward auction in the larger market is likely to be much higher. Using the balanced volume formula that we adopt will help to avoid these results and will result in higher price offers to stations in markets where the spectrum is particularly valuable. We need not resolve EOBC's argument that we are not required to consider the statutory goals of recovering a portion of the spectrum value for the public and avoiding unjust enrichment in the context of the reverse auction because these statutory provisions apply only to auctions of licenses. See EOBC Comments at 15–17 (citing 47 U.S.C. § 309(j)(3)(C)). Even if EOBC were correct, nothing in the statute precludes us from considering these goals in designing the reverse auction, and we conclude that doing so will serve the public interest.

²⁵⁰ Specifically, Local Media proposes substituting for the population component the "domain" of a station—that is, adding one to the count of channels on which a station could not be repacked in its pre-auction band. Local Media Comments at 6–7. We note that Local Media's proposed "domain" factor is unnecessary because the bidding procedures we adopt below, under which stations with greater domain restrictions will see their price reductions "frozen" in earlier rounds, will capture this value. See § V.B (Determining New Price Offers in Clock Rounds).

68. We also disagree with arguments that, if we retain a population component, we should reduce its weight in our volume formula.²⁵¹ In particular, EOBC proposes a formula that would reduce the weight of the population component from 0.5 to 0.25, raising opening prices for almost all stations and de-emphasizing the impact of population in price offers.²⁵² We are not persuaded by the supposed benefits of this unbalanced weighting. We reject broadcasters' assertions that it more closely reflects the pricing policy we adopted in the *Incentive Auction R&O*, for much the same reason we rejected EOBC's consistency argument above. We have no reason to think, and broadcasters have not established, that our opening price methodology results in prices that are too low to attract robust participation.²⁵³ However, as discussed above, raising opening prices would raise the costs of repurposing spectrum, increase the likelihood of repurposing less spectrum, and could even jeopardize the success of the auction.²⁵⁴ On the other hand, using a balanced weighting where the sum of the exponents equals one will result in appropriate price signals for all stations: if a broadcast station has twice the number of constraints and twice the population of another, under our approach its opening prices will be twice as much. Furthermore, a square-root weighted volume score (i.e., using an exponent of 0.5) can improve the efficiency of algorithms similar to our pricing and bid processing algorithm.²⁵⁵

69. EOBC additionally argues that reducing the weight of population would be in the public interest because it would result in less loss in broadcast service, since smaller stations would more often become winning bidders.²⁵⁶ As stated above, in keeping with our goal of allowing market forces to determine the highest and best use of spectrum, the public interest will be best served by setting prices according to each station's value to the auction and the repacking process.²⁵⁷ While encouraging stations that serve smaller populations to go off-air might result in loss of service for fewer over-the-air viewers, it would do so at the risk of discouraging large stations in high-demand markets from participating in the auction. In order to fulfill the goals of the Spectrum Act, it is appropriate to set price signals that encourage broadcasters to relinquish their spectrum usage rights in the reverse auction, not to discourage certain stations from participating so that they will remain on the air. We conclude, therefore, that

²⁵¹ EOBC Comments at 24–25; Local Media Comments at 7; LPN Comments at 6; Anonymous Broadcaster Reply at 2–3; Joint Broadcasters Reply at 1–3; CPB Reply at 2; *see also* Marquee Comments at 3 (proposing to double the value of interference by increasing its weight to 1.0 while keeping population weighted at 0.5).

²⁵² EOBC Comments at 25.

²⁵³ *See* § IV.A.2.a (Base Clock Price and VHF Clock Prices).

²⁵⁴ Since, absent DRP, *see* § V.D.2 (Dynamic Reserve Prices), we no longer have any mechanism to reduce prices in markets that are particularly constrained (due to the impact of Canadian or Mexican stations, or non-participants), further increasing opening prices would decrease the likelihood of a successful auction. Reducing the weighting of population would also likely increase clearing costs significantly for the same amount of cleared spectrum, which could drive the auction to lower clearing targets because forward auction revenue is insufficient to close the auction in a given stage. *See id.*

²⁵⁵ When solving problems similar to efficiently repacking a set of broadcasters into a limited number of channels, the academic literature establishes that accepting feasible bids ordered by bid per volume, where the volume is proportional to the square root of the number of constraints affected, performs optimally when determining winners in combinatorial auctions with network linkage constraints. *See* Rica Goren & Daniel Lehmann, *Optimal Solutions for Multi-unit Combinatorial Auctions: Branch and Bound Heuristics*, 2000 Proc. of 2nd ACM Conf. on Elec. Com. 13, available at <http://arxiv.org/pdf/cs/0202032.pdf>; Magnus Halldorsson, *Approximations of Weighted Independent Set and Hereditary Subset Problems*, 4 J. Graph Algorithms & Applications 1, 10 (2000), available at <http://jgaa.info/accepted/00/Halldorsson00.4.1.pdf>.

²⁵⁶ *See, e.g.*, EOBC Reply at 5–7; *see also* LPN Reply at 4.

²⁵⁷ *See* § IV.A.2.a (Base Clock Price and VHF Clock Prices).

considering population and interference, in an equal, balanced weighting, will best achieve the goals of the incentive auction.²⁵⁸

3. Committing to an Initial Relinquishment Option

70. As the second condition for qualifying to bid in the clock phase of the reverse auction, an applicant that has submitted a timely and complete application must commit to a preferred relinquishment option for each station that it intends to bid for in the reverse auction, and under the circumstances described immediately below, it may commit to additional “fallback” options.²⁵⁹ An applicant will be able to commit only to relinquishment option(s) that it identified for a particular station when initially submitting its auction application.²⁶⁰ The commitment(s) will constitute an irrevocable offer by the applicant to relinquish the relevant spectrum usage rights in exchange for the opening price offer for that bid option.²⁶¹ Therefore, the auction will commence with the submission of initial bid commitments. An applicant that fails to commit to an initial relinquishment option for a given station by the applicable deadline will not be qualified to bid in the clock phase of the auction for that station.²⁶²

71. As part of determining an initial clearing target, the auction system will assign or designate each station to a relinquishment option consistent with its initial bid commitment in order of the priority rules proposed in the *Comment PN*,²⁶³ modified by the additional priority rules we adopt to take

²⁵⁸ We note that, prior to advocating a reweighted volume formula, EOBC advocated a proposal to calculate stations’ opening prices based on a measure of their “freeze probability” combined with the interfered-with population were the station to be repacked (that is, the populations served of other stations in the area). EOBC Comments at 23–24. Because it would ignore a station’s population served, we reject this proposal for the same reasons discussed above. See also WRNN Feb. 5, 2015 *Ex Parte* Letter at 2; NAB Comments at 2. EOBC’s proposed measure of “freeze probability” also would add undue complexity to the auction design, depends on simulation results that have not been made public, and would require choice of an initial clearing target to set opening prices before broadcaster participation levels are known, making it inappropriate for use in the incentive auction. See *Incentive Auction R&O*, 29 FCC Rcd at 6604, para. 81 (“the amount of UHF spectrum recovered through the reverse auction and the repacking process depends on broadcaster participation and other factors”).

²⁵⁹ Commenters did not comment directly on the proposals for committing to an initial relinquishment option in the *Comment PN*. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15780–82, paras. 88–91, 15841–51, App. C.

²⁶⁰ If an applicant did not identify a particular relinquishment option on its auction application, that option will not be available to the applicant when it logs in to the FCC software to commit to an initial relinquishment option for that station. For instance, an applicant with a station located in the UHF band will be given three options for that station on its auction application (go off-air, move to Low-VHF, and move to High-VHF). If the applicant only identifies move to Low-VHF and move to High-VHF on its application, when that applicant logs in to commit to a preferred option for its station, it will only be able to commit to move to Low-VHF or to High-VHF. Going off-air will not be available because the applicant did not identify that option on its auction application.

²⁶¹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15780–81, para. 88. A commitment to a fallback relinquishment option is treated as a binding commitment in the alternative to the preferred option. As described below, an applicant need only commit to a fallback option in the event that its preferred option is to move either to the Low- or High-VHF band.

²⁶² Joint Media argues that broadcasters should be allowed to tie their decision to participate to the clearing target. See Joint Media Reply at 15. We reject this proposal as inconsistent with our basic auction design, which as described above involves determining the spectrum clearing target based on the initial bid commitments from broadcasters. See § III.A (Overview of the Initial Clearing Target Optimization Procedure); see also *Incentive Auction R&O*, 29 FCC Rcd at 6604, para. 81 (“the amount of UHF spectrum recovered through the reverse auction and the repacking process depends on broadcaster participation and other factors”).

²⁶³ *Auction 1000 Comment PN*, 29 FCC Rcd at 15782, para. 91 (proposing the following priority order: (1) minimize the number of participating UHF stations that must be repacked in their pre-auction band; (2) minimize the number of participating VHF stations that must be repacked in their pre-auction band; (3) maximize the number of participating stations that will commence bidding on their preferred option; (4) maximize the number of

(continued....)

account of the secondary and tertiary objectives in the initial clearing target determination procedure.²⁶⁴ That relinquishment option will be the starting point for each station to bid in the clock phase of the reverse auction. Due to the limited availability of VHF channels and the technical constraints on repacking, the auction system may not be able to accommodate every station that commits to move to the Low- or High-VHF band.²⁶⁵ In order to increase the likelihood that stations will be able to participate in the auction, we establish procedures to allow applicants that commit to move to VHF as their preferred option to also commit to a fallback option(s) if they so choose.²⁶⁶ The auction system will attempt to designate a station to the preferred option for that station. If the auction system is unable to accommodate a station in its preferred option, the system will attempt to designate the station to its fallback option(s), if the applicant committed to any.²⁶⁷ If an applicant declines to commit to a fallback for a station and its preferred option for the station cannot be accommodated—or, if neither its preferred nor fallback options can be accommodated²⁶⁸—the station will be designated to be repacked in its pre-auction band and will not participate in the reverse auction bidding.

72. As applicants consider which option to commit to as the preferred option for a station, they should be mindful that once the bidding system designates a station to an initial relinquishment option, future bid options for that station will be limited by the one-way hierarchy of relinquishment options discussed above.²⁶⁹ For example, if a UHF bidder identified all three options on its auction application and then committed to go off-air, it may, in a subsequent bidding round, request to switch to Low-VHF or High-VHF. However, if that same bidder instead committed to move to Low-VHF as its

(Continued from previous page) _____
participating stations that will commence bidding on their alternative bid option to go off-air; and (5) minimize the sum of impaired weighted-pops across all licenses.).

²⁶⁴ See § III.A (Overview of the Initial Clearing Target Optimization Procedure). The technical details of the modification to take account of the additional clearing target objectives will be released in an appendix to the *Application Procedures PN*. See also Appendix A (providing a summary of software steps for the Clearing Target Determination Procedure).

²⁶⁵ See § III.A (Overview of the Initial Clearing Target Optimization Procedure). The auction system can always accommodate going off-air as a preferred option because going off-air does not require finding a feasible channel assignment. *Auction 1000 Comment PN*, 29 FCC Rcd at 15781, para. 89.

²⁶⁶ Applicants that commit to a preferred option may decline to commit to fallback options. In order to qualify to bid in the clock phase of the reverse auction, an applicant that identified only one relinquishment option on its auction application must still affirmatively commit to that option as its preferred option—it will not have any fallback options available to it.

²⁶⁷ See § II (Background of Proceeding) (describing a “feasible” channel). The auction system will always be able to accommodate a station going off-air, hence a bidder who commits to go off-air as its preferred relinquishment option will not need to commit to any other options and, if the station is needed, it will begin the clock phase of the auction bidding to go off-air. Such a bidder may later bid to switch to other relinquishment options during the course of bidding, consistent with the one-way hierarchy and the options selected on its auction application. See § V.C (Reverse Auction – Bidding Mechanics) (describing reverse auction bidding procedures).

²⁶⁸ This could happen if an applicant does not name going off-air as either its preferred or its fallback option. As noted above, the auction system can always accommodate a bid to go off-air. Thus, contrary to Joint Broadcasters’ assertion, any broadcaster that is willing to consider relinquishing its spectrum to go off-air or channel share will always be able to participate so long as it designates that option as either its preferred option or a fallback option and the station is needed in the auction. See Joint Broadcasters Comments at 11–12.

²⁶⁹ See §§ IV.A.1 (Options for Relinquishing Spectrum Usage Rights), V.C (Reverse Auction – Bidding Mechanics); see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15781–82, para. 90.

preferred option and the auction system were able to accommodate that option, that bidder would begin the auction bidding to move to Low-VHF and would be precluded from ever bidding to go off-air.²⁷⁰

4. Final Auction Application Status

73. Once the auction system processes the initial bid commitments and designates each station that can be accommodated to an initial relinquishment option, the Commission will send confidential letters to each reverse auction applicant to inform them of their status with respect to the clock phase of the reverse auction. The letters will notify applicants for each of their stations either that (1) the station is qualified to participate in the clock phase of the reverse auction; (2) the station is not qualified because no initial commitment was made, and therefore, that station will be designated to be repacked in its pre-auction band; (3) the commitment(s) made by the applicant for the station could not be accommodated, and therefore, that station is not qualified and will be designated to be repacked in its pre-auction band, or (4) the auction system determined that the station is not needed, and therefore, the station is not qualified and will be designated to be repacked in its pre-auction band.²⁷¹ Qualified bidders will begin the first round of the clock phase bidding for each station's designated initial relinquishment option.²⁷² Each applicant that submits an initial commitment is obligated to relinquish at the relevant opening price the spectrum usage rights associated with its initial relinquishment option if the auction system selects its station to relinquish its rights at the opening bid price.

74. Prior to the deadline to apply to participate in the reverse auction, the Commission intends to provide, in various formats, detailed educational information to would-be participants, including among other things an auction tutorial that will be available on the Auction 1000 web page for prospective bidders to walk through the auction process and the application and bidding screens. Once applicants have qualified to participate in the clock phase of Auction 1001, registration materials will be distributed. Additionally, all bidders qualified to bid in the clock phase will be able to participate in a mock reverse auction prior to bidding in the clock phase of Auction 1001, which will enable bidders to obtain hands-on experience with the auction system. Further details about the mock auction and the auction tutorial, including relevant dates and how to access these tools, will be announced in the *Application Procedures PN*.²⁷³

B. Qualifying to Bid in the Forward Auction

75. In order to qualify to bid in Auction 1002, an applicant must timely submit an auction

²⁷⁰ This is because going off-air would relinquish greater spectrum usage rights than the bidder's designated initial relinquishment option (i.e., moving to Low-VHF), which is not permissible under the bidding hierarchy. See § IV.A.1 (Options for Relinquishing Spectrum Usage Rights).

²⁷¹ As part of the process of determining the initial clearing target, the auction system may determine that certain stations will always have a feasible assignment in their pre-auction band at the initial and all subsequent clearing targets. Such stations' spectrum usage rights will never need to be purchased to meet the clearing target and their participation in the clock phase of the reverse auction is not needed. See § III.A (Overview of the Initial Clearing Target Optimization Procedure).

²⁷² As described in the reverse bidding section below, in the first round of the clock phase of the reverse auction, most bidders will be offered a lower price to relinquish those spectrum usage rights. Each time a bidder accepts a lower price it is committing to relinquish the relevant spectrum usage rights at the price offered. See § V.C (Reverse Auction – Bidding Mechanics).

²⁷³ Commenters note that there is a distinct need to hold a mock auction for the incentive auction. See, e.g., CTIA Comments at 4, 20 (suggesting that the Commission consider holding multiple mock auctions and leave time to adjust the auction design post-auction). We note that in accordance with our typical auction practices, a mock auction will be held for qualified bidders in advance of the auction. The Commission is planning to engage in extensive bidder education and outreach, and intends to provide tutorials and webinars well in advance of the auction to promote bidder confidence and education. In addition, Commission staff and technical support experts will be available to answer questions by phone.

application that is deemed complete and timely make a sufficient upfront payment.²⁷⁴ The amount of the upfront payment will determine a bidder's initial bidding eligibility in terms of bidding units, i.e., the maximum number of blocks, as measured by their associated bidding units, a bidder may demand in the clock phase of the forward auction. The *Application Procedures PN* will address the process of applying to participate in Auction 1002, including descriptions of the information required to be disclosed, instructions for completing the form, and specific deadlines for submission.²⁷⁵ Below we adopt procedures for assigning bidding units to each spectrum block that will be available in the forward auction. We also adopt a method for calculating the upfront payment each applicant must make to obtain bidding eligibility for forward auction spectrum blocks.

1. Bidding Units

76. We will assign to each spectrum block that will be available in the forward auction a specific number of bidding units and will use the bidding units to calculate minimum opening bids, upfront payments, and bidder eligibility, and for measuring bidding activity.²⁷⁶ In particular, as we proposed, we will assign bidding units to spectrum blocks in each PEA by using a weighted population method similar to the method we will use for measuring the extent of impairment in a PEA.²⁷⁷

77. The *Application Procedures PN* will set forth the updated indices and number of bidding units that will be assigned to spectrum blocks in each PEA under our adopted approach.²⁷⁸ We will derive these values by incorporating auction results from Auction 66, Advanced Wireless Services (AWS-1); Auction 73, 700 MHz Band; and Auction 97, Advanced Wireless Services (AWS-3) into an index of area-specific relative prices from prior auctions. This relative price index is the same index used for measuring the impaired weighted-pops for a license.²⁷⁹ Consistent with the approach used for Auction 96 (H Block) and Auction 97, we will multiply the population of each PEA by the index value for the PEA.²⁸⁰ We will incorporate the results from past auctions for spectrum licensed in Economic Areas ("EAs") and Cellular Market Areas ("CMAs") by breaking the data down to the county level and then aggregating the county-level data up to the PEA level.²⁸¹ For the purpose of assigning bidding units to spectrum blocks in each PEA, we will group the relative price index by deciles and apply the lowest index value in each decile to all PEAs in that decile.²⁸² Next, we will divide the result of the above calculation by 1,000 and round it

²⁷⁴ See 47 C.F.R. § 1.2106.

²⁷⁵ See, e.g., *Auction 97 Procedures PN*, 29 FCC Rcd at 8407, para. 62.

²⁷⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15802, para. 160.

²⁷⁷ See *id.* at 15802–03, para. 161. The only difference is that, in measuring the extent of impairment in a PEA, we will use the index value specific to the PEA—we will not group the price index by deciles and apply the lowest index value in a decile to all of the PEAs in that decile, as we do for calculating bidding units.

²⁷⁸ See § I (Introduction and Executive Summary). We note that some of the bidding unit values that will be announced will differ from those in Appendix F of the *Auction 1000 Comment PN* because they will incorporate the results of Auction 97.

²⁷⁹ See, e.g., CCA RFA Comments at 9 (urging the Commission to provide more information on the creation of the price index for determining bidding units); CTIA Comments at 6 (requesting more information on the price index used to calculate impairments).

²⁸⁰ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15803, para. 162.

²⁸¹ See § III.B.1.a (Calculation of Weighted-Pops); see also CCA RFA Comments at 9 (requesting more information on how results for past auctions for spectrum licensed in EAs and CMAs will be adapted for use with licenses to be offered based on PEAs).

²⁸² See *Auction 1000 Comment PN*, 29 FCC Rcd at 15803, para. 162.

using the Commission's standard rounding procedures for auctions.²⁸³ As a result, we will calculate bidding units for the spectrum blocks in most PEAs as (pops * index)/1000, rounded. Because not all of the licenses covering U.S. territories and protectorates had winning bids in past auctions, for spectrum blocks in the PEAs for Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, and American Samoa, we will divide the results of the weighted population calculation by 2,000 and round the results.²⁸⁴ Further, we will assign one bidding unit to spectrum blocks in the Gulf of Mexico PEA.²⁸⁵

78. Each block available in a PEA will have the same number of bidding units regardless of category. This approach will facilitate bidding across categories by enabling bidders to switch their demand for Category 1 blocks to Category 2 blocks and vice versa without affecting their bidding eligibility. The number of bidding units for the blocks in a given PEA will be fixed and will not change during the auction, regardless of price changes.

79. We disagree with arguments that we should determine bidding units (and, therefore, upfront payments and minimum opening bids)²⁸⁶ based solely on population or without regard for the final results from Auction 97.²⁸⁷ By incorporating past prices, our approach reflects the relative value bidders have assigned to the different markets in the past better than would a calculation based solely on population,²⁸⁸ and hence, is more likely to reflect the relative prices for markets in this auction.²⁸⁹ Our approach also helps ensure that bidders' upfront payments are reasonably proportional to the market prices of the spectrum blocks they demand. Further, using a price index rather than a population index ensures that we do not exclude significant past price differences between similarly-sized markets in our calculations. At the same time, using the results of several previous auctions and the decile approach helps to reduce the impact of any unusual price variation from a single auction. Thus, this approach addresses concerns about incorporating auction-specific anomalies from prior auctions.²⁹⁰

80. We are not persuaded by CCA's argument that including pricing data from Auction 97 will prejudice smaller bidders.²⁹¹ Prices from Auction 97 are useful in that they provide the most recent data on the relative prices bidders were willing to pay for spectrum licenses in various markets. While prices in Auction 97 generally were higher than in previous auctions, the Auction 97 information being incorporated consists of additional data on *relative* prices across markets and does not reflect overall price levels. The updates will have a varying effect on different markets, but it will not result in a substantial change in the total number of bidding units, upfront payments, and minimum opening bids.

²⁸³ See *id.* at 15803, para. 163. Specifically, we will round numbers greater than 10,000 to the nearest thousand; numbers less than 10,000 and greater than 1,000 to the nearest hundred; numbers less than 1,000 and more than 10 to the nearest ten; and numbers less than 10 to the nearest one. All PEAs will have at least one bidding unit.

²⁸⁴ *Id.*

²⁸⁵ See *id.*

²⁸⁶ See §§ IV.B.2 (Upfront Payment Due After Initial 600 MHz Band Plan Determined), VI.A.3.a (Forward Auction – Opening Bids).

²⁸⁷ See, e.g., Sprint Comments at 54; AT&T Reply at 29–30; see also CCA RFA Comments at 9–10.

²⁸⁸ See Sprint Comments at 54 (suggesting that “the Commission adopt a much simpler bidding unit approach rule that is based more closely on the actual POPs within the PEA”); AT&T Reply at 29–30 (supporting Sprint's bidding unit approach based on actual pops).

²⁸⁹ See CCA Comments at 17 (“By assigning bidding units to spectrum blocks based on historic prices rather than population covered, the Commission appropriately recognized that, on a per-pop basis, prices paid in urban markets are much higher than in rural markets. Therefore, assigning more bidding units to those blocks properly reflects market realities.”).

²⁹⁰ See AT&T Reply at 29. Sprint similarly argues that “SMRA outcomes can have some distortions in any given auction.” Sprint Comments at 53–54.

²⁹¹ See CCA RFA Comments at 9–10.

2. Upfront Payment Due After Initial 600 MHz Band Plan Determined

81. We adopt an upfront payment amount of \$2,500 per bidding unit—half of the amount of the minimum opening bid for each spectrum block.²⁹² The upfront payment amounts for generic blocks in every PEA for Auction 1002 will be announced in the *Application Procedures PN*. We will base the upfront payment for each generic block on the number of bidding units associated with the blocks in a specific PEA established as described above.²⁹³ This approach is consistent with our usual practice²⁹⁴ and supported by the record.²⁹⁵ Thus, to become a qualified bidder, a forward auction applicant must make an upfront payment sufficient to obtain bidding eligibility for the quantity of generic blocks in each PEA on which it may wish to bid in any round.

82. Our experience in past spectrum license auctions indicates that requiring upfront payments protects against frivolous or insincere bidding and provides the Commission with a source of funds from which to collect payments owed at the close of the auction. For these reasons, we decline to reduce the upfront payment to \$1,000 per bidding unit as suggested by CCA.²⁹⁶ Contrary to CCA's assertions, we find that insincere bidding is a real risk in any spectrum license auction.²⁹⁷ Moreover, we are not persuaded that setting an upfront payment amount at half of the minimum opening bid price will threaten small carrier participation. Even after applying discounts for license impairments and bidding credits, the final winning bid amount for a license will exceed the “cost” (i.e., upfront payment) to obtain enough eligibility to bid for the generic block. Thus, it is reasonable to require that forward auction applicants be willing and able to make upfront payments in the amount of \$2,500 per bidding unit.

83. We find it unnecessary to discount upfront payments for Category 2 licenses.²⁹⁸ The upfront payment is a refundable deposit meant to help ensure sincere bidding and to establish initial eligibility levels for use with the activity rules discussed below.²⁹⁹ Basing an upfront payment on a spectrum block's potential degree of impairment would not further the purpose of an upfront payment, especially since the number of spectrum blocks in each category and their respective degrees of impairment may change from stage to stage of the auction.³⁰⁰

84. Upfront payments will be due after the initial clearing target and associated band plan scenario has been determined.³⁰¹ This timing will enable an applicant to take into account the number of spectrum blocks in the band plan scenario associated with the initial clearing target when determining the

²⁹² See § VI.A.3.a (Forward Auction – Opening Bids).

²⁹³ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15804, para. 165. We note that in the *Auction 1000 Comment PN* we proposed to multiply the number of bidding units of a spectrum block by \$2,500 and then round the result of that calculation. The upfront payments we adopt here will use the same calculation, but the result will not be rounded so as to maintain a two to one relationship between minimum opening bids and upfront payments.

²⁹⁴ See 47 C.F.R. § 1.2106.

²⁹⁵ See, e.g., CCA Comments at 17–18 (supporting the use of weighted-pops when determining relative upfront payments).

²⁹⁶ See *id.* at 19.

²⁹⁷ See *id.* at 18.

²⁹⁸ See § VI.A.3.a (Forward Auction – Opening Bids) (discussing reasons why we will not discount minimum opening bids for Category 2 licenses).

²⁹⁹ See § VI.A.6 (Bidding Eligibility and Activity Rule).

³⁰⁰ A price adjustment to account for varying degrees of impairment to the offered licenses will be applied after the assignment phase. See § VI.A.2.a (Forward Auction – Bidding Categories).

³⁰¹ The initial clearing target and associated band plan scenario will be made public as soon as possible after completion of the initial clearing target optimization procedure. See § V.A (Reverse Auction – Availability of Auction-Related Information).

amount of its upfront payment. In keeping with the Commission's usual practice in spectrum license auctions, all upfront payments must be made by wire transfer in U.S. dollars.³⁰² Specific instructions for submitting upfront payments, including wiring instructions, will be set forth in the *Application Procedures PN*.

85. An applicant's total upfront payment must be enough to establish eligibility to bid on at least one block in one of the PEAs selected on its auction application for Auction 1002, or else the applicant will not be qualified to bid in the auction.³⁰³ Because bidding unit amounts pertain to a single paired 5+5 megahertz block for each PEA, a bidder that wishes to bid on multiple generic blocks within a PEA simultaneously will need to ensure that its upfront payment provides enough eligibility to cover more than one paired 5+5 megahertz generic block in the PEA.

86. An applicant does not have to make an upfront payment to cover blocks in all of the PEAs the applicant selected on its auction application, but it should make an upfront payment that covers the maximum number of bidding units that are associated with the quantity of blocks in the PEAs on which it wishes to place bids in any given round.³⁰⁴ The total upfront payment does not affect the total dollar amount the bidder may bid for quantities of generic blocks, nor will it be attributed to specific blocks or PEAs. Rather, the bidder may place bids for quantities of blocks in any combination of the PEAs it selects on its auction application, provided that the total number of bidding units associated with those blocks will not exceed its eligibility when it places the bid(s). Bidders will not be able to increase their eligibility during the auction; bidders only will be able to maintain or decrease their eligibility. Thus, in calculating its upfront payment and hence its initial bidding eligibility, an applicant must determine the maximum number of bidding units on which it may wish to bid in any single round and submit an upfront payment covering that total number of bidding units.

87. For example, under the approach we adopt, assume there are 27,000 bidding units associated with each block in the New York, New York PEA, and 21,000 bidding units associated with each block in the Los Angeles, California PEA. If a bidder wishes to bid on one block in both PEAs in a round, it must have selected both PEAs on its auction application and purchased at least 48,000 bidding units (27,000 + 21,000) of bidding eligibility. If a bidder only wishes to bid on a block in one of these PEAs, purchasing 27,000 bidding units would allow the bidder to bid on a block in either PEA, but not on a block in both PEAs at the same time. If the bidder purchased only 21,000 bidding units, it would have enough eligibility to bid on a block in Los Angeles, but not on a block in New York. If a bidder wishes to bid on more than one block in a PEA, it must have purchased sufficient eligibility for that number of blocks. Thus, continuing with our example, a bidder interested in bidding on three blocks in Los Angeles must purchase at least 63,000 bidding units (21,000 * 3) of bidding eligibility.

88. We note that our rules require that any auction applicant that certifies it is a former defaulter—i.e., has been in default on any Commission license or has been delinquent on any non-tax debt owed to any Federal agency—must submit an upfront payment equal to 50 percent more than that set for each spectrum block.³⁰⁵ Recently in the *Updating Part 1 Competitive Bidding Rules* proceeding, we

³⁰² 47 C.F.R. § 1.2106(b).

³⁰³ As will be discussed in the *Application Procedures PN*, an applicant must select on its auction application one or more PEAs in which it may place bids during the forward auction. An applicant will not be required to identify on its auction application the number of blocks within a PEA it demands because we will not know the maximum number of spectrum blocks that will be offered in the forward auction until the initial spectrum clearing target is determined.

³⁰⁴ See CCA Comments at 17 (“by allowing an applicant to make upfront payments based on the number of licenses it hopes to win rather than the number of licenses it bids on, the Commission will allow smaller carriers the flexibility they need to compete with larger incumbent carriers”).

³⁰⁵ 47 C.F.R. § 1.2106(a).

narrowed the scope of the defaults and delinquencies considered for purposes of this rule.³⁰⁶ Under our amended rules, applicants may exclude from consideration as a former default any cured default on a Commission license or delinquency on a non-tax debt owed to a Federal agency for which any of the following criteria are met: (1) the notice of the final payment deadline or delinquency was received more than seven years before the relevant auction application deadline; (2) the default or delinquency amounted to less than \$100,000; (3) the default or delinquency was paid within two quarters (i.e., six months) after receiving the notice of the final payment deadline or delinquency; or (4) the default or delinquency was the subject of a legal or arbitration proceeding that was cured upon resolution of the proceeding.³⁰⁷ Additional details concerning the application of the Commission's former defaulter rules to forward auction applicants, including any required certifications and the higher upfront payment requirement, will be set forth in the *Application Procedures PN*.³⁰⁸

3. Final Auction Application Status

89. Consistent with our normal auction procedures, a public notice will announce all qualified bidders for the forward auction ("*Qualified Bidders PN*").³⁰⁹ Qualified bidders are those applicants with submitted auction applications that are deemed timely-filed and complete, provided that such applicants have timely submitted an upfront payment that is sufficient to qualify them to bid.³¹⁰

90. Similar to what will be provided for potential reverse auction participants, the Commission intends to provide, in various formats, detailed educational information regarding the forward auction, including among other things an auction tutorial that will be available on the Auction 1000 web page for prospective bidders to walk through the auction process and the application and bidding screens.³¹¹ Registration materials will be distributed to qualified bidders prior to the auction. All qualified bidders will be eligible to participate in a mock auction prior to bidding in Auction 1002, which will enable bidders to obtain hands-on experience with the auction system prior to the auction. Further details about the mock auction and the auction tutorial, including relevant dates and how to access these tools, will be announced in the *Application Procedures PN*.

V. REVERSE AUCTION BIDDING

91. We will use a descending clock auction format in the reverse auction, in which participants will bid over a series of rounds by responding to new price offers for one or more relinquishment options.³¹² In this Section, we establish reverse auction bidding procedures and explain how the auction system will both calculate new price offers during the clock rounds and process bids to

³⁰⁶ See *Updating Part 1 Competitive Bidding Rules*, WT Docket No. 14-170, Report and Order, 30 FCC Rcd 7493, 7566-67, para. 173 (2015) (*Part 1 R&O*).

³⁰⁷ See *id.*

³⁰⁸ After the auction, applicants that are not winning bidders or are winning bidders whose upfront payment exceeded the total net amount of their winning bids may be entitled to a refund of some or all of their upfront payment. Procedures for requesting refunds will be addressed in the *Application Procedures PN*.

³⁰⁹ See, e.g., *Auction 97 Procedures PN*, 29 FCC Rcd 13465.

³¹⁰ Since the rule prohibiting certain communications applies to both reverse and forward applicants and the prohibition commences on the auction application deadline, we anticipate setting concurrent application filing deadlines for the reverse and forward applicants. See *Incentive Auction R&O*, 29 FCC Rcd at 6768, para. 487. Additional details addressing the application process, including the initial application filing deadline, will be set forth in the *Application Procedures PN*.

³¹¹ See, e.g., Letter from John T. Scott, III, VP & Deputy General Counsel, Verizon, to Marlene Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed July 7, 2015).

³¹² *Incentive Auction R&O*, 29 FCC Rcd at 6753-55, paras. 449-55; *Auction 1000 Comment PN*, 29 FCC Rcd at 15783, para. 94.

determine which bidders will be selected by the auction, and at what price, to relinquish spectrum usage rights.

92. We generally adopt the reverse auction bidding procedures proposed in the *Auction 1000 Comment PN*, except that we will not use dynamic reserve prices (DRP), and we adopt our alternative proposal to simplify the reverse auction bidding process by not providing an intra-round bidding option.³¹³ Notwithstanding the potential benefits of using DRP, we conclude that not using it will encourage voluntary participation in the reverse auction by removing uncertainty among broadcasters, and is consistent with the record consensus in favor of minimizing the potential for impairments. In addition to the information we proposed to provide, the auction system will provide information to each active bidder regarding the available room for repacking stations at the end of each round of the auction.

A. Availability of Auction-Related Information

93. We will make auction information public as soon as possible, consistent with the Commission's rules, policies, and procedures that help protect the competitiveness of the auction, as well as with applicable statutory requirements. As in past Commission auctions, the public will have access to certain auction information, while auction participants will have secure access to additional non-public information. Details of how to access auction information will be provided in the *Application Procedures PN*.

94. The *Application Procedures PN* also will detail the prohibition on communicating information relating to bids or bidding strategies, such as the non-public information that bidders may access in the auction system, to broadcast licensees eligible to participate in the reverse auction or to forward auction applicants, subject to specified exceptions.³¹⁴ We caution eligible broadcast licensees that communicating non-public information that they receive to others, whether directly or indirectly through third-parties or public disclosure, could violate that prohibition.

95. In response to the numerous commenters that contend that the Commission should make as much information available regarding the reverse auction as possible, either to the public or to the auction participants,³¹⁵ more information will be provided to both the public and reverse auction participants than was proposed in the *Auction 1000 Comment PN*. We will make public, before the deadline for filing applications to participate in the reverse auction, the opening prices for all stations whose spectrum usage rights are eligible to be offered in the auction and for each bid option available to each station.³¹⁶ We set forth the formula for these prices in this Public Notice.³¹⁷ Prices for each station and for each bid option for each station may be calculated using this formula and publicly available information. Rather than require each licensee to make these calculations separately, we will make them public. We do so to encourage participation, to further the transparency of the auction, and in response to comments requesting that we do so.³¹⁸

96. Reverse auction bidders will be informed of the initial bidding round schedule when they are informed that they are qualified to bid in the clock phase. The schedule will establish the length of

³¹³ *Auction 1000 Comment PN*, 29 FCC Rcd at 15782–92, paras. 92–124.

³¹⁴ See 47 C.F.R. § 1.2205.

³¹⁵ See CTIA Comments at 3 (“give[] bidders as much information as possible”); NAB Reply at 10–11.

³¹⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15780, para. 88.

³¹⁷ See § IV.A.2 (Reverse Auction – Opening Price Offers).

³¹⁸ See, e.g., EOBC Comments at 43; Local Media Comments at 2; Trinity Comments at 5.

time each round will last.³¹⁹ As detailed below, bidders may respond to price offers for available bid options in each round.³²⁰ Round results will be released to bidders after each bidding round.

97. We will make public the initial spectrum clearing target as soon as possible after completion of the initial clearing target determination procedure. Many commenters support this approach.³²¹ Some suggest that the Commission announce a clearing target before broadcasters make initial commitments, in order to assist broadcasters in doing so.³²² The initial commitments, however, are an essential component for determining the initial clearing target. We will announce the initial clearing target before any bidding takes place in the clock phase of the reverse auction.

98. Once the bidding in the clock phase of the reverse auction begins, we will make publicly available information about the current stage of the auction and whether or not reverse (or forward) auction bidding is currently open.³²³ In addition, the auction system will provide each reverse auction bidder with non-public information that it can use in determining how it will bid. More specifically, the auction system will provide to each bidder—but not to the public—each station’s bidding status and price offers for all options relevant given the station’s status.³²⁴

99. The auction system also will provide each reverse auction bidder with vacancy index information, indicating the relative availability of channels in each relevant band, as part of each round’s bidding results for active stations.³²⁵ Providing this information is consistent with the strong record support for providing reverse auction participants with as much information as possible to help with bidding.³²⁶ A broadcaster can use vacancy information to assess the likelihood of various developments, such as whether a price for a given option may continue to decline. Given that the auction system incorporates such information in price computations, and sophisticated bidders might be able to extract the information in a limited set of cases, we conclude that providing such information to each bidder will promote transparency and information parity among all bidders, and that the auction system can provide such information without unduly complicating participation or compromising the confidentiality of participation in the reverse auction.

100. The auction system calculates vacancy information when setting prices.³²⁷ For a given station, the auction system will determine the number of channels available in the station’s “neighborhood” for the relevant band. A station’s neighborhood consists of all active stations, i.e., all participating stations that have not exited or become provisional winners including the station itself, that

³¹⁹ See *Incentive Auction R&O*, 29 FCC Rcd at 6755, para. 453.

³²⁰ See § V.C (Reverse Auction – Bidding Mechanics); see also *Incentive Auction R&O*, 29 FCC Rcd at 6753, para. 450.

³²¹ See, e.g., Broadcaster Representatives Reply at 3; EOBC Comments at 43; Local Media Comments at 3; Trinity Comments at 5.

³²² Joint Media Parties Reply at 15.

³²³ *Auction 1000 Comment PN*, 29 FCC Rcd at 15777, para. 78. We discuss in detail elsewhere the information that will be public after reverse auction bidding stops in any stage. See § VI.A.1.b (Forward Auction – Bidding Information). Information regarding amounts necessary to meet the final stage rule will be public, as well as whether or not the final stage rule has been met. Such information will include the aggregate amount of provisionally winning reverse auction bids to relinquish spectrum usage right, which is part of the second component of the final stage rule.

³²⁴ See § V.D.3 (Reverse Auction – Bidding Status) (defining different potential bidding statuses).

³²⁵ See § V.D.3 (Reverse Auction – Bidding Status) (defining active stations).

³²⁶ See, e.g., Broadcaster Representatives Reply at 3; EOBC Comments at 43–44; Local Media Comments at 2–3; Trinity Comments at 5.

³²⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15852–68, App. D.

could interfere directly with the station in the relevant band and therefore potentially limit assigning the station to an available channel in that band.³²⁸ The auction system uses each station's volume to weight the number of channels available to it and then averages those weighted results for all stations in the station's neighborhood. The vacancy index information that the auction system will provide to bidders will indicate whether the average of weighted channels available to active stations in the neighborhood falls within one of three ranges, low, medium, or high.³²⁹ The range format should prevent the information from being used to identify the neighboring stations consistent with our obligation to protect the confidentiality of reverse auction participation.

101. More specifically, for each bidder with an active UHF station, the UHF vacancy index will indicate whether the average of weighted UHF channels available to the active stations in the neighborhood is: less than three (low); greater than or equal to three, but less than or equal to six (medium); or more than six (high). Given the smaller number of channels in the VHF band, the ranges will be narrower. For each bidder with an active VHF station, the vacancy index in the station's pre-auction band will indicate whether the average of weighted channels available to the active stations in the neighborhood for the pre-auction band of the bidder's station is: less than two (low); greater than or equal to two, but less than or equal to four (medium); or more than four (high). With respect to relevant bands other than a station's pre-auction band (i.e., for UHF stations, High-VHF and Low-VHF, and for High-VHF stations, Low-VHF), the values used to define the three ranges will be determined based on the ratio of the level of vacancy in that band to the level of vacancy in the station's pre-auction band.³³⁰ The auction system will report the values that define the ranges when providing the vacancy index information. The technical formulas for setting the values will be provided in the *Application Procedures PN*.

102. In all cases, a value in the low range for the index will indicate a higher potential for the relevant band to fill soon; a value in the medium range will indicate less likelihood; and a value in the high range will indicate still less likelihood. We emphasize that this information will be based on the results of the prior round and will provide no certainty with respect to developments in future bidding rounds. Ultimately, the bidding of other reverse auction participants will determine when any available channels are filled. Nevertheless, the vacancy index information based on past round results will help bidders make rough estimates of whether a particular bid option will continue to be available, as well as provide bidders with a sense of the relative likelihood that a station's various bid options will continue to be available.³³¹

103. We decline to adopt EOBC's proposed alternative to the vacancy index, which likewise uses the average of the weighted number of channels available to all stations in a given station's neighborhood, but instead of providing station-specific information on a confidential basis would involve

³²⁸ See § V.D.3 (Reverse Auction – Bidding Status) (defining different potential bidding statuses). Active stations in a station's neighborhood may be located outside the station's DMA.

³²⁹ We seek to reduce such risks in part owing to the Commission's statutory duty to maintain the confidentiality of Commission-held data regarding the identities of reverse auction participants. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15777, para. 77.

³³⁰ This ratio is already used in setting prices for moving to the same bands. See *id.* at 15852–68, App. D. Consequently, bidders with prices for a station that may move to a new band could infer the information without the vacancy index. The vacancy index puts it to use in an explicit report to the bidder.

³³¹ Changes to the vacancy index from round to round also may provide helpful information regarding changes in the status of neighboring stations at current clock prices. We note, however, that a station's vacancy index may change if a second neighboring station becomes provisionally winning, even though that did not change the number of available channels. For example, if a non-neighboring third station's decision to exit the auction made it infeasible to repack the neighboring second station, the neighboring station would become a provisional winner and therefore would no longer be included in the calculation of the first station's vacancy index. In that circumstance, the first station's index may change even though no available channel in its neighborhood was filled.

averaging that information across all stations in each Designated Market Area (“DMA”) and disclosing the information publicly.³³² The vacancy index will confidentially provide each bidder with information targeted to its station(s), which should better predict how soon a price offered that station is likely to freeze.³³³ The station-specific information provided by the vacancy index we adopt also will be more uniformly useful to all bidders than EOBC’s alternative. EOBC argues that a publicly disclosed metric is fairer as it would provide more uniform information, in particular assuring that the information each bidder possesses is the same regardless of the number of stations it offers in the auction.³³⁴ We disagree. Some bidders might be able to infer information unavailable to others based on a combination of average DMA vacancy information and station-specific vacancy information, which as indicated above is used by the auction system to calculate prices. The approach we adopt will provide each bidder with station-specific information without providing an advantage to some bidders. Further, providing vacancy index information for each station will avoid putting participants with fewer stations in the auction at a disadvantage, as bidders will have the same information relative to each of their participating stations.

104. Because the vacancy index we adopt will assist broadcasters seeking to forecast the outcome of the auction, it addresses requests by commenters for information regarding the reverse auction that would enable “outcome discovery” by broadcasters.³³⁵ The other information that will be provided satisfies many requests that commenters make for specific information regarding the reverse auction, such as the initial spectrum clearing target and opening prices for all stations.³³⁶ In combination, all of the above-stated information will facilitate efforts by broadcasters to forecast prices in the auction. We conclude that providing additional information to reverse auction bidders could unduly complicate participation in the reverse auction or compromise the confidentiality of such participation.

105. In addition to the bidding information described above, the Commission will use the auction system to make auction announcements regarding any other necessary information to reverse auction participants, such as schedule changes. Providing auction announcements through the auction system has been an effective and efficient way to communicate necessary information to auction participants in past auctions, and we expect that this will be the case for the reverse auction as well.

³³² See generally letter from Preston Padden, Executive Director, EOBC, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, Cramton Attachment (filed May 7, 2015) (EOBC May 7, 2015 *Ex Parte* Letter). Both EOBC’s proposal and the vacancy index reflect the measurement of vacancy in the auction system’s pricing process, as described in Appendix D of the *Auction 1000 Comment PN*, 29 FCC Rcd at 15852–68, App. D.

³³³ See generally EOBC May 7, 2015 *Ex Parte* Letter, Cramton Attachment.

³³⁴ *Id.* at 2, 4.

³³⁵ See EOBC Comments at 43–44 (Commission should “(3) release, at the end of each round, the amount of spectrum available for reallocation in each PEA and aggregate information about the number of stations that registered, were ‘frozen,’ or remain active; . . . (5) provide, on a round-by-round basis, anonymized information about the offers made to each station for each bid-type; (6) provide anonymized information about whether each station accepted the bid and which stations were ‘frozen’; (7) provide aggregate information about the actions of stations that are mutually exclusive (not compatible on one or more channels) with each participating station.”). Local Media similarly asserts that “[a]t a minimum, the Commission should provide the following information either publicly or to participating broadcasters: (1) the opening price and (if different) the reserve price for each station eligible to participate in the auction in advance of bidding commencement; (2) the clearing target at each stage of the reverse auction; . . . and (4) at the end of each round of bidding, a summary stating how close the Commission is to its clearing target, or alternatively the number of stations that remain active and the number of stations that were ‘frozen.’” Local Media Comments at 2–3; see also Trinity Comments at 5 (list similar to EOBC’s and Local Media’s). Requests for information regarding the status of any dynamic reserve price mechanism are moot, given our decision not to use such a mechanism.

³³⁶ See EOBC Comments at 43 (“the Commission should: (1) publicly announce in advance of the auction the opening price and (if different) the reserve price for every auction eligible station; (2) announce the clearing target before bidding commences in any reverse auction stage”). See also Local Media Comments at 2–3; Trinity Comments at 5.

106. We note that while reverse auction bidders will have access to far more information than we originally proposed, in order to serve the interests of broadcasters, we are required to make less information public regarding the reverse auction than we do regarding the forward auction. To begin with, the Spectrum Act expressly requires that we take reasonable steps to keep confidential Commission-held data of licensees with respect to their participation in the reverse auction, including their identities.³³⁷ Commission rules further extend confidential treatment with respect to non-winning bids and bidders for two years after the close of the auction, so that broadcasters may participate in the reverse auction without being compelled to disclose their willingness to relinquish spectrum usage rights for that longer period.³³⁸

107. Accordingly, we will not disclose the name of the licensee, the channel number, call sign, or facility identification number of its participating station(s), or its network affiliates in connection with the participation of any licensee in the reverse auction.³³⁹ We also will keep confidential any other information that may reasonably be withheld to protect the identity of the licensee as a reverse auction participant, such as information regarding the status of licensees as participants or provisional winners during the auction.³⁴⁰ To safeguard this confidential information, we will not make public any information relating to applications to participate in the reverse auction until after the auction concludes.³⁴¹ Unlike in conventional spectrum license auctions, we will not issue public notices with respect to the status of the reverse auction applications that are filed. Instead, we will communicate regarding these applications directly—and confidentially—with the respective applicants. Finally, because information regarding a participant's station is integral to determining the bids offered in the auction, information regarding specific bids during the course of the auction cannot be made public.

B. Determining New Price Offers in Clock Rounds

108. Under the descending clock auction format that we adopted for the reverse auction, in every clock round, the auction system will decrement the per-volume nationwide base clock price.³⁴² As with opening price offers,³⁴³ a UHF station will be offered a price to go off-air in each clock round that will equal the base clock price multiplied by its station-specific volume factor.³⁴⁴ Unlike opening price offers, however, the new price offers in clock rounds for UHF stations to move to the VHF bands, or for VHF stations to move to a lower band or go off-air, will reflect the relative availability of channels for each station in the VHF bands.³⁴⁵ These differences in relative price changes are intended to encourage

³³⁷ 47 U.S.C. § 1452(a)(3).

³³⁸ 47 C.F.R. § 1.2206(b). Broadcasters that participate and ultimately receive an incentive payment in exchange for relinquishing spectrum usage rights will have their participation disclosed at the end of the auction.

³³⁹ *Incentive Auction R&O*, 29 FCC Rcd at 6732, para. 388.

³⁴⁰ *Id.*

³⁴¹ Communication of information regarding reverse auction bids or bidding strategies, such as participation in the auction, may be prohibited pursuant to Commission rule. *See* 47 C.F.R. § 1.2205(b). Whether similar information was made public in prior spectrum license auctions, or has been provided on a non-public basis by the Commission, does not change whether the rule applies.

³⁴² *See* § IV.A.2 (Reverse Auction – Opening Price Offers) for a description of the base clock price. Price offers made to bidders in the first clock round will represent a decrease from the opening prices the bidders agreed to accept in their initial bid commitments. As in subsequent clock rounds, bidders can accept or reject those lower price offers. *Incentive Auction R&O*, 29 FCC Rcd at 6752–55, paras. 448–55.

³⁴³ *See* § IV.A.2 (Reverse Auction – Opening Price Offers).

³⁴⁴ The price offer for a UHF station to go off-air is the base clock price times the station's volume. Therefore, if the per-volume base clock price is decremented by five percent, the price offer will decrease by five percent.

³⁴⁵ For details of the pricing algorithm, see *Auction 1000 Comment PN*, 29 FCC Rcd at 15852–68, App. D. As addressed above, the opening prices for intermediate moves will in aggregate be equal to the full base clock price (or, in percentage terms, will sum to 100 percent) for a move from UHF to off-air since in terms of value to the

(continued....)

moves that promote more efficient repacking of the VHF bands. For example, if the High-VHF band is particularly congested in an area, the price offer for a UHF station in that area to move to High-VHF will decrease more quickly than if the High-VHF band were less congested. As a result, a UHF station will have less incentive to request a move to High-VHF than if the High-VHF band were less congested and price offers decrease more slowly. By setting price offers in this way, the auction system will encourage moves that are particularly beneficial to the reverse auction's goal of clearing spectrum in the UHF band.

109. In each round of the reverse auction, the base clock price decrement will be the larger of (i) five percent of the current base clock value or (ii) one percent of the \$900 opening base clock price.³⁴⁶ Although several commenters urge us to decrease prices by no more than one percent in each round,³⁴⁷ a decrement of five percent will better balance our interests in completing the reverse auction bidding within a reasonable amount of time while avoiding significant losses of efficiency or increases in costs. Because the forward and reverse auctions run sequentially within a stage and because there may be multiple stages, it is important to limit the number of reverse auction rounds. The combination of (i) and (ii) ensures that the reverse auction will require no more than 52 rounds in any stage.³⁴⁸ Using a decrement of one percent would require considerably more bidding rounds.³⁴⁹ We recognize commenters' concerns that larger decrements could cause some stations to drop out quickly, but find that with a decrement of five percent any loss of efficiency or increased costs is likely to be *de minimis*.³⁵⁰ Moreover, a decrement of one percent risks increasing the cost of repurposing spectrum. In the absence of the proposed DRP mechanism,³⁵¹ the prices offered to stations in some areas may "freeze" near opening price levels;³⁵² in such cases, a one-percent decrement might require higher payments to individual stations.³⁵³

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auction the intermediate moves, when taken together, are equivalent to a move from UHF to off-air, which is set by the base clock price. The opening prices for intermediate moves will form the starting point for the prices for such moves in the clock bidding rounds, but as relative vacancy rates change, these prices will vary. *See* § IV.A.2.a (Base Clock Price and VHF Clock Prices).

³⁴⁶ *See Auction 1000 Comment PN*, 29 FCC Rcd at 15787, para. 105 (proposing "to reduce th[e] base clock price by between three percent and 10 percent per round"). Consistent with our standard auction procedures and as proposed in the *Comment PN*, the size of the decrement may be adjusted in the reverse auction. Although we do not anticipate that the decrement in the reverse auction will need to be adjusted, if circumstances warrant, the change and the new decrement will be announced at least 24 hours in advance to all bidders, except as necessary to avoid rounds in which no bidders are able to place bids in a subsequent stage. *See* § VII.B (Transition – Reverse Auction Bidding).

³⁴⁷ LPN Comments at 11–12; Broadcaster Representatives Reply at 4. Recognizing our concerns that small price decrements may lead to an excessively lengthy auction, one commenter proposes using a fixed price decrement of one percent of the opening base clock price per round. EOBC Comments at 5.

³⁴⁸ In subsequent stages, the reverse auction may require even fewer rounds, depending on the level to which the base clock price must be reset after a new stage transition, and how quickly newly-active stations either drop out or become provisionally winning. *See* § VII (Transition, if Necessary, to Any Subsequent Stage).

³⁴⁹ For example, using just part (ii) of our price decrement rule—a price decrement of one percent of the base clock's opening value—would require 100 rounds, whereas using a price decrement of one percent of the current base clock value, without part (ii) or a similar mechanism, could cause the auction to continue for hundreds of more rounds as the decrement gets increasingly smaller.

³⁵⁰ *See* § V.C (Reverse Auction – Bidding Mechanics). Because the effects on cost or efficiency are of second order to the price decrement, we expect the base clock price decrement to have an effect of five percent squared, or 0.25 percent, on the efficiency and cost of the auction.

³⁵¹ *See* § V.D.2 (Dynamic Reserve Prices).

³⁵² *See* § V.C (Reverse Auction – Bidding Mechanics) (explaining circumstances under which the auction system will "freeze" a station's currently held bid option without reducing its current price).

³⁵³ Higher payments are likely when stations are able to engage in coordinated behavior to manipulate the point at which their prices "freeze." Our rules and procedures are intended to prevent such manipulation, but do not prevent coordinated behavior by bidders that own multiple stations within an individual market.

In addition, five percent price decrements would be small enough to allow the system to provide useful information to participants to guide their bidding.

C. Bidding Mechanics

110. Consistent with our proposed procedures, at the commencement of the clock phase of the reverse auction, each participating bidder will begin bidding for each of its stations at the opening price for that station's "currently held option," which will be the initial relinquishment option determined by the initial commitment procedures set forth above.³⁵⁴ So long as the auction system can determine a feasible channel assignment for that station in its pre-auction band—by conducting a "feasibility check" prior to the clock round³⁵⁵—the system will continue making new, reduced price offers to that station.³⁵⁶ The system will then ask the bidder to place a bid for that station by indicating whether it is willing to accept the new price offer for its currently held option, wishes to switch to a different bid option (if applicable), or wishes to drop out of bidding. If the system is able to find a feasible channel assignment for the station in its pre-auction band during bid processing, it will adjust the station's currently held option according to its bid (honoring its request to switch options if feasible) and reduce its current price to the accepted price offer for that option. Otherwise, the system will "freeze" that station's currently held option without reducing its current price.³⁵⁷ The system will freeze a station in its currently held option without reducing its current price regardless of whether the station submitted a bid to accept the new price offer for the option, requested to switch to a different option, or bid to drop out of the auction. This will provide strategic simplicity for bidders by ensuring that bidding to accept a new price offer will never result in a station receiving a lower price for its option than it could have received if it refused to accept the offer.

111. A bidder that has or is interested in only a single bid option will have a simple choice: whether to accept the lower clock price offered for its station's currently held option or to reject that offer and drop out of the bidding.³⁵⁸ A bidder that is considering more than one of the relinquishment options

³⁵⁴ See § IV.A.3 (Committing to an Initial Relinquishment Option).

³⁵⁵ As discussed below, see § V.D.1 (Bid Processing), for each station the auction system must, prior to processing its bid, find a feasible channel assignment in the station's pre-auction band—that is, an assignment that does not violate any of the pairwise constraints and is therefore consistent with the Spectrum Act's preservation mandate. See *Incentive Auction R&O*, 29 FCC Rcd at 6619–20, para. 114. To do this, the system conducts a "feasibility check" using mathematical satisfiability-solver software to quickly determine whether such a channel assignment exists. See generally *Incentive Auction Task Force Releases Information Related to Repacking; Announces Workshop/Webinar to Provide Additional Detail*, GN Docket No. 12-268, ET Docket No. 13-26, Public Notice, 29 FCC Rcd 47 (WTB 2014) (*Feasibility Checking PN*).

³⁵⁶ The bid options for which the system will calculate price offers will be based on the station's pre-auction band, the options the bidder selected for that station on its application, the currently held option for that station, and the hierarchy of bid options. *Incentive Auction R&O*, 29 FCC Rcd at 6756–57, paras. 457–58. If, however, a feasible channel assignment does not exist for a station in its pre-auction band in the first round, the station will be "frozen" in its currently held option from the start of the auction at the opening price offer to which it initially committed. See § V.D (Processing Between Clock Rounds).

³⁵⁷ Once a UHF station is frozen, it becomes a provisionally winning bidder and will not be asked to bid for the rest of the reverse auction in that stage. If a VHF station is frozen, however, it does not necessarily become provisionally winning if the station may be unfrozen later in the reverse auction in the same stage. This could occur, for example, if a UHF station that was bidding to move to VHF chooses to drop out of bidding, thus freeing up a channel in the VHF band. If this free channel enables the system to feasibly assign a frozen VHF station to a channel in its pre-auction band, the system will unfreeze the VHF station and ask it to bid at its new price offers. See § V.D.3 (Reverse Auction – Bidding Status).

³⁵⁸ *Auction 1000 Comment PN*, 29 FCC Rcd at 15789, para. 112. If a bidder fails to place a bid, the auction system will treat this bidder as unwilling to accept a lower offer.

currently available to its station will additionally be able to request to switch bid options,³⁵⁹ consistent with the hierarchy of options.³⁶⁰ Since the auction system may not always be able to find a feasible channel assignment for a station to switch to one of the VHF bands,³⁶¹ the system will prompt a bidder requesting to switch options to provide a fallback bid in case the system cannot accommodate its request. A fallback bid allows the bidder to choose either to accept the lower price offered for its station's currently held option or to drop out of bidding if the system cannot accommodate its request to switch bid options.³⁶² We remind bidders that each bid placed is a binding commitment by the bidder to accept a payment that is no less than the price offered in return for relinquishing the spectrum usage rights associated with its bid option should the auction system select the bid as a winning bid.

112. Responding to numerous commenters that urge us to make reverse auction bidding as simple as possible,³⁶³ we determine that we can reduce complexity without sacrificing efficiency by foregoing the use of intra-round bidding.³⁶⁴ In the *Auction 1000 Comment PN*, we sought comment on bidding procedures without intra-round bidding due to our concern that intra-round bidding could increase the complexity of auction participation for broadcasters.³⁶⁵ Absent intra-round bidding, bidders will face a simpler choice to accept or reject a new lower price, or to switch bid options at the lower price, rather than having to indicate precise prices at which their choices change. In addition, because the number of computationally complex feasibility checks that the system must solve during bid processing will be greatly reduced,³⁶⁶ the auction system will be able to report round results more quickly. Furthermore, not providing for intra-round bidding will have minimal effect on the reverse auction's efficiency and cost given the relatively small price decrements that we have chosen.³⁶⁷ The price

³⁵⁹ *Id.* at 15790, para. 119.

³⁶⁰ *See* § IV.A.1 (Options for Relinquishing Spectrum Usage Rights).

³⁶¹ *See* § IV.A.3 (Committing to an Initial Relinquishment Option).

³⁶² *Auction 1000 Comment PN*, 29 FCC Rcd at 15791, para. 121.

³⁶³ *See* Local Media Comments at 1 (Local Media “exhorts the FCC to adopt auction procedures and rules that are straightforward and transparent and to avoid creating an overly complex process that risks alienating broadcasters, the lynchpin of a successful auction.”); NAB Comments at i, iv; AT&T Comments at 39.

³⁶⁴ Accordingly, we disagree with EOBC that an intra-round bidding option would simplify rather than complicate the reverse auction for many bidders, and would avoid inefficient outcomes. EOBC Comments at 46–47. EOBC’s argument that “the Commission committed to ‘provide participating broadcasters with the optional flexibility of intra-round bidding’” also lacks merit. EOBC Comments at 46–47. *See also* Marquee Comments at 3. Although we allowed for intra-round bids, *Incentive Auction R&O*, 29 FCC Rcd at 6753, para. 449, 6755, para. 455, we explained that we may “vary aspects of the reverse auction bidding process . . . if circumstances or the record developed in the pre-auction process reflect the need to do so.” *Id.* at 6753, para. 449 n.1295; *see* 47 C.F.R. § 1.2202(b)(1); *Incentive Auction R&O*, 29 FCC Rcd at 6708, para. 323 (“The rules we adopt in this Order provide for the ability to refine aspects of the reverse and forward auctions if the record developed in response to the *Comment PN* during the pre-auction process reflects the need to do so.”). *See also Incentive Auction R&O*, 29 FCC Rcd at 6574, paras. 13–14.

³⁶⁵ *Auction 1000 Comment PN*, 29 FCC Rcd at 15790, para. 118 (recognizing that intra-round bidding creates “uncertainty about the price a bidder may receive at the start of the next round for the different relinquishment options”).

³⁶⁶ *See Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 117.

³⁶⁷ *Auction 1000 Comment PN*, 29 FCC Rcd at 15787, para. 105. For reasonably sized price decrements (within the three to 10 percent range that we proposed), the loss in efficiency and cost is of “second-order” to the size of the decrement because the likely number of instances in which there is any loss at all for any particular bidder and the magnitude of the loss when it occurs are both proportional to the percentage bid decrement. Specifically, the likelihood of loss is proportional to the bid decrement because there is a loss only when two competing bidders attempt to make incompatible changes to their bids in exactly the same clock round. The magnitude of the loss is

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decrements we choose are large enough to ensure a reasonably speedy reverse auction while at the same time small enough that removing intra-round bidding will not have a substantial impact on the outcome of the auction, as set forth above.³⁶⁸

113. We adopt a simple proxy bid mechanism to make it easier for bidders to monitor the auction.³⁶⁹ EOBC, the only commenter to address this proposal, urges us to adopt it.³⁷⁰ Under the bidding procedures we adopt, a bidder will be able to submit a proxy bid to continue bidding for its station's currently held option until the price offer drops below some specified price.³⁷¹ As suggested by EOBC, bidders will be able to revise or cancel any proxy bid before it is processed or in subsequent rounds while the proxy bid instructions are still in effect.³⁷² Proxy bids will remain confidential from other bidders and from Commission staff other than those staff authorized during the auction to monitor bidding and the operation of the bidding system.³⁷³

D. Processing Between Clock Rounds

114. Below we establish procedures by which bids will be processed at the conclusion of each round to determine new provisional channel assignments and the new bidding status for stations. We adopt the bid processing procedures detailed in Appendix D of the *Auction 1000 Comment PN*, except that as set forth below the auction system will not use DRP.³⁷⁴ As bids are processed, for each station bidding in the current round, the auction system will either process its bid and reduce its current price to the accepted price offer or freeze the station, keeping its current price and currently held option unchanged, depending on the results of feasibility checking during bid processing. Once all bids have been processed, the auction system will update the bidding status of all stations and begin a new round or, if the stopping rule described below has been met, the reverse auction will conclude for the stage.

1. Bid Processing

115. After a clock round closes, the auction system will process bids using the bid processing algorithm we proposed, except without intra-round bidding.³⁷⁵ Under these procedures, the auction system will first establish an order or "processing queue" for processing the bids of stations that are bidding in the current round. The system will order all such stations in descending order of the per-

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likewise proportional to the decrement because two competing bidders that try to change in the same round have the same value to the auction, within one decrement, in terms of cost and efficiency.

³⁶⁸ See § V.B (Determining New Price Offers in Clock Rounds).

³⁶⁹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15787, para. 105 n.205.

³⁷⁰ EOBC Comments at 47–48.

³⁷¹ A station that is frozen but not provisionally winning (i.e., that has the status of either "frozen – currently infeasible" or "frozen – pending catch up") may also place a proxy bid notwithstanding the fact that it is not given a price offer in the round and it is not otherwise submitting a bid, because the station may become unfrozen in a later round. See § V.D.3 (Reverse Auction – Bidding Status). Additionally, we will limit the range that a bidder can set its proxy bid, so that the specified price for a proxy bid may be no less than 75 percent of a station's price offer in the round. This limit may be adjusted up or down at any point in the auction. Such an adjustment will be announced at least one round before the new limit on proxy bids. Thus, a bidder who wishes to remain active in the auction may be required to submit a new proxy bid periodically.

³⁷² EOBC Comments at 47–48.

³⁷³ We note that, other than the comments specifically mentioned in this section and the proposal by Professors Sandholm and Nguyen addressed in § V.D.1 (Bid Processing), we did not receive comment on the reverse auction bidding procedures that we proposed in the *Auction 1000 Comment PN*.

³⁷⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15852–68, App. D.

³⁷⁵ *Id.* at 15861–68, App. D.

volume difference between the station's current price and its new price offer.³⁷⁶ The auction system will break any ties between stations following this calculation by using pseudo-random numbers.³⁷⁷ The system will then sequentially conduct feasibility checks for each station in the queue to find the first station in the queue that can feasibly be assigned a channel in its pre-auction band given the current provisional channel assignment.³⁷⁸ The system will consider the first feasible station and process its bid, removing it from the queue, before resuming its search for the next feasible station in the queue.³⁷⁹

116. Under the procedures that we establish, when the auction system considers a station that bids to accept the new price offer for the station's currently held option, the auction system will reduce the station's current price to the new price offer for that option. When the auction system considers a station that bids to switch relinquishment options, the system will first perform a feasibility check to determine whether the station's request can be accommodated: the system will only switch the station's currently held option if the station can feasibly be assigned to a channel in the requested VHF band. In that case, the auction system will update the station's currently held option and current price to the option and price offer for the requested bid option. If the station cannot be feasibly assigned to a channel in the new band, the system will instead process the station's fallback bid—either to accept the lower price offer for its currently held option or to drop out of bidding. If a station's fallback bid is to drop out of bidding, the system will mark the station as exited. Similarly, when the system considers a station whose only bid is to drop out of the auction, the system will mark the station as exited. An exited station will be assigned a provisional channel in its pre-auction band and will no longer be given price offers or asked to bid for the remainder of the auction.³⁸⁰ After bid processing, the auction system will again perform feasibility checks for all stations to determine if any stations processed earlier in the queue that had a feasible assignment are no longer feasible as a result of later processing. Any such stations will then be frozen in their currently held option at the already-reduced current price.³⁸¹ For all stations that will be active in the next round, the auction system will then calculate prices for the next round using the price reduction procedures established above.³⁸²

117. Two parties disagree with aspects of the bid processing procedures and algorithm we proposed, and filed comments proposing alternatives. AT&T proposes that, after each round, the auction system recompute the repacking constraint files based upon the provisional TV channel assignment plan in order to link price decrements to the difficulty of repacking a station in each round.³⁸³ Professors Sandholm and Nguyen propose to remove the hierarchical restriction on bid options and use mathematical

³⁷⁶ Specifically, this metric is calculated by subtracting the station's new price offer from its current price and then dividing by its volume. Since the system cannot change the status of provisionally winning stations within a stage or of exited stations at any point in the auction, the system does not consider such stations during bid processing. See § V.D.3 (Reverse Auction – Bidding Status).

³⁷⁷ *Auction 1000 Comment PN*, 29 FCC Rcd at 15862.

³⁷⁸ See note 355; *Auction 1000 Comment PN*, 29 FCC Rcd at 15789–90, para. 115.

³⁷⁹ The auction system will repeat this process of considering bidding stations until each station remaining in the queue is “frozen” in its currently held option at its current price.

³⁸⁰ See § V.D.3 (Reverse Auction – Bidding Status).

³⁸¹ Because the system will have already updated the currently held option and reduced the current price of stations that became infeasible due to later processing, these stations will be frozen at the lower price offer that they accepted or in the new bid option that they switched into at the start of the next round.

³⁸² The auction system will calculate prices for stations that are “frozen – currently infeasible” so that they may monitor price decreases in case they become unfrozen and must resume bidding in later rounds, but such stations will not be asked to submit a bid so long as they remain frozen. See § V.D.3 (Reverse Auction – Bidding Status).

³⁸³ AT&T Comments, Attachment A at 36–38.

optimization to calculate price offers and process bids.³⁸⁴ As an initial matter, neither of these commenters has demonstrated, either in theory or by means of simulations, that their proposals have significant advantages over the auction procedures we establish today. The pricing procedures we adopt take into account some measure of repacking difficulty for VHF options and VHF stations.³⁸⁵ However, in comparison to AT&T's proposed approach, the procedures that we adopt provide the significant advantage of greater price certainty and predictability for UHF stations bidding to go off-air, which should speed the auction and encourage bidders to consider this relinquishment option. We therefore are not persuaded that AT&T's proposal offers substantial benefits over the procedures we adopt.

118. We also reject the alternative approach proposed by Professors Sandholm and Nguyen. They argue that the sequencing of bids under the approach we adopt provides an unfair advantage to stations that are processed first.³⁸⁶ However, bids must always be processed sequentially due to the relationship between the reverse auction and the repacking process, which must guarantee a feasible assignment: stations face price competition in the reverse auction as a result of the number of stations that must be repacked into a limited number of channels. Thus, stations must always be repacked one at a time in order to guarantee a feasible assignment.³⁸⁷ While bids processed earlier may limit the options available to bidders later in the queue (e.g., if two otherwise identical stations both request to switch to High-VHF, but there is only one channel available in the band), this sequencing provides the best value to the auction, because the stations that have the largest price decreases will be processed first.³⁸⁸ Furthermore, stations processed later in the queue are more likely to be frozen at a higher price offer. Any price variation due to sequencing will be no larger than one price decrement for identical bidders, in line with the price variation found in the Commission's simultaneous multiple round auctions. We therefore do not regard this outcome to be problematic.

119. In addition, Professors Sandholm's and Nguyen's alternative procedures for eliciting information from bidders and for setting clock prices would add strategic complexity to the reverse auction and might deter participation. For eliciting bids, they propose that each bidder indicate a set of acceptable options, rather than a single preferred option in each round. For determining prices, they suggest optimization-based procedures to set clock prices in which a bidder's prices could continue to fall even after it can no longer be assigned a feasible channel in its pre-auction band. The Professors claim certain advantages of their proposed algorithm, but offer no comparison of their proposal to the algorithm described in the *Auction 1000 Comment PN*.³⁸⁹ Their proposed approach would create significant new opportunities for some bidders to affect final prices for their own bid options, adding strategic complexity to the auction. Such complexity would make bidding errors more likely, raise the costs of bidding, and potentially deter participation, making these procedures unsuitable for the reverse auction.

³⁸⁴ See generally Sandholm Comments.

³⁸⁵ See § IV.A.2.b (Station-Specific Volume).

³⁸⁶ See Sandholm Comments at 3 (arguing that the proposed algorithm provides an unfair advantage to bidders processed first "because their assignments significantly limit the options of the remaining stations in the later part of the queue. . . . Stations later in the queue are forced to take secondary options").

³⁸⁷ In any event, some bid sequencing (and thus possible price variation) is required for *any* processing algorithm. Indeed, even the optimization-based approach proposed by Professors Sandholm and Nguyen relies upon the sequencing of bids, they just disagree with how we achieve this sequencing and instead propose an optimization-based approach that would optimize to reduce costs. See *id.* at 2–3.

³⁸⁸ As explained above, our bid processing procedures sequence bids based upon a measure of the difference between a station's current price and its new price offer. See note 376.

³⁸⁹ See generally Sandholm Comments.

2. Dynamic Reserve Prices

120. We elect not to adopt DRP procedures, which would enable the bidding system to reduce the prices offered to all UHF stations in the early rounds of the reverse auction, regardless of whether a station could be feasibly repacked into its pre-auction band.³⁹⁰ By providing a “safety valve” for stations whose opening prices otherwise would remain frozen because no feasible channel assignment is available for them in the remaining television bands (due to international border constraints or other factors), we explained that DRP would allow us to set higher opening prices for all stations, reduce the overall cost of repurposing spectrum, and increase the likelihood of a successful auction.³⁹¹ Based on examination of the record, however, we conclude that the potential benefits of DRP are outweighed by its potential costs. Broadcasters unanimously oppose the use of DRP procedures, arguing that it will “artificially reduc[e] prices,” undermine trust in the fairness of our auction procedures, increase complexity and uncertainty, and discourage participation.³⁹² A broad range of commenters also oppose use of DRP because it risks increasing the degree of impairment to repurposed spectrum.³⁹³ Commenters argue that using DRP will inevitably increase the amount of impairments to or close to the near-nationwide standard and detract from the value of repurposed spectrum.³⁹⁴

121. We agree with commenters that we should adopt auction procedures that minimize impairments. By not using DRP procedures, we eliminate the possibility of creating additional impairments after the determination of a clearing target.³⁹⁵ In addition, based on examination of the record, we are concerned that using DRP as proposed would discourage voluntary broadcaster participation in the auction,³⁹⁶ contrary to our commitment to encouraging such participation.³⁹⁷

³⁹⁰ *Auction 1000 Comment PN*, 29 FCC Rcd at 15787–88, para. 106. Under our proposal, if a station without a feasible channel assignment in the UHF band were to refuse the lower price offer and drop out while DRP procedures were in effect, it would be grouped with the other stations that must be repacked in the UHF band, which could increase the number of stations that will be assigned to a channel in the 600 MHz Band, thereby increasing the extent of impairments. *Id.* at 15788, para. 107. Therefore, we proposed to discontinue DRP when the predicted aggregate level of impairments to licenses in the 600 MHz Band would approach the proposed near-nationwide limit to impairments. *Id.* at 15788, para. 108.

³⁹¹ *Id.* at 15788, para. 106.

³⁹² See Media General Comments at 3 (“Broadcasters participating in the auction must be able to trust that the FCC’s processes will result in fair market prices for their stations; DRP substantially undermines that trust and will significantly discourage auction participation.”); Trinity Comments at 4; Anonymous Broadcaster Reply at 5–6; LPN Comments at 7; Milachi Comments at 5; NAB Reply at 7.

³⁹³ See Anonymous Broadcaster Reply at 4; LPN Comments at 47; AT&T Comments at 42. Even CCA and T-Mobile, who argue in favor of “judicious” use of DRP in the reverse auction, urge us to adopt a conservative trigger to discontinue DRP in order to reduce the risk that these procedures create additional impairments. CCA Comments at 12–15 (“So long as the Commission judiciously employs DRP on a limited basis, the benefits of DRP both to reverse-auction participation and to overall spectrum clearing outweigh the costs of generating more broadband impairments in some markets.”); T-Mobile Reply at 25–27.

³⁹⁴ See AT&T Comments at 21–22; NAB Reply at 8 (“[DRP] ensures the Commission will wind up with market variability at or close to 20 percent impairment, which, as NAB has already shown, is a level of impairment that may threaten the success of the auction as a whole.”).

³⁹⁵ See § III.B.1.c (Assigning TV Stations to the 600 MHz Band to Accommodate Market Variation).

³⁹⁶ See, e.g., Trinity Comments at 4 (“The uncertainties inherent in the use of DRP will discourage broadcaster participation in the reverse auction, and therefore the Commission should abandon, or at least limit, the use of DRP.”).

³⁹⁷ See *Incentive Auction R&O*, 29 FCC Rcd at 6570, para. 2 (“[W]e emphasize that a broadcaster’s decision to participate in the reverse auction is wholly voluntary. We are committed to removing barriers to this voluntary participation.”).

Accordingly, we will not use DRP procedures. Instead, price offers will be reduced only in accordance with the procedures set forth above, and any stations with no feasible channel assignments at the beginning of the reverse auction bidding will be frozen at their opening prices. Combined with our decisions regarding the initial clearing target selection procedure and the information that will be available to bidders,³⁹⁸ not using DRP will promote our auction goals by encouraging reverse auction participation, minimizing impairments, and providing transparency for bidders.

122. We also decline to adopt EOBC's alternative proposal for a "round zero reserve" pricing mechanism which would offer, before bidding begins, an undefined (but high) take-it-or-leave-it price to each station that would otherwise begin the reverse auction bidding process "frozen" at its opening price.³⁹⁹ EOBC and others support this proposal only as a substitute for DRP,⁴⁰⁰ and we are not persuaded that EOBC's alternative would provide the benefits of our proposed DRP procedures.⁴⁰¹

3. Bidding Status

123. Based on the bid processing procedures described above, the auction system will determine the bidding status of each station prior to each round of the reverse auction.⁴⁰² The system will inform each bidder of the currently held option, the current price for this option, and the bidding status of each of its stations. As described below, the bidding status of each station will be one of the following: (1) *bidding in the current round*, (2) *frozen – provisionally winning*, (3) *frozen – currently infeasible*, (4) *frozen – pending catch up*, (5) *exited – voluntary*, or (6) *exited – not needed*.

124. *Bidding in the Current Round.* If the auction system determines that a station can be feasibly assigned a channel in its pre-auction band, its bidding status will be "bidding in the current round."⁴⁰³ and the system will offer a new reduced price offer for each of the options currently available to it, consistent with the bid option hierarchy and price determination procedures described above. A station will be offered lower prices and asked to submit a bid in each round so long as its status remains "bidding in the current round."

125. *Frozen – Provisionally Winning.* If the auction system determines that a station can never be assigned a feasible channel in its pre-auction band in the current stage, the station will be declared "frozen – provisionally winning." For the remainder of the stage, the current price and currently held option of a station with this bidding status will remain unchanged. If the final stage rule is met during that stage, such stations will become winning stations.⁴⁰⁴ Otherwise, at the beginning of the next

³⁹⁸ See §§ III (Initial Clearing Target Determination Procedure), VI.A.1.a (Impairment Information for Bidders).

³⁹⁹ EOBC Comments at 37–38.

⁴⁰⁰ *Id.* at 5 (arguing that "[i]f the Commission feels compelled to apply a reserve where there is little or no competition in the auction, it should instead adopt a more targeted approach, such as a Round Zero Reserve"); CTI Reply at 3–4. See also Local Media Comments at 8 (arguing that if we choose to adopt the proposal to use DRP, we should at least modify our proposal in order to avoid causing new, additional impairments to the 600 MHz Band); Broadcaster Representatives Reply at 4 (same).

⁴⁰¹ We also note that EOBC has not identified its preferred method of setting "round zero reserve" prices. See EOBC Reply at 18 (discussing one approach that would use a scaled value derived from the broadcaster outreach materials prepared by Greenhill & Co., and another that "would consider the expected forward auction spectrum value and the population that a broadcast station would block from service by other users").

⁴⁰² The auction system will also determine the bidding status of each bidder prior to the first round of the reverse auction after bidders commit to an initial relinquishment option, as well as prior to the first round after transitioning to a new stage. See §§ IV.A.3 (Committing to an Initial Relinquishment Option), VII (Transition, if Necessary, to any Subsequent Stage).

⁴⁰³ However, as discussed below, if the system determines that a station can be feasibly assigned a channel in its pre-auction band but will be *not needed* for the remainder of the auction, its status will become "exited – not needed."

⁴⁰⁴ See § VI.A.7 (Final Stage Rule).

stage, the auction system will again evaluate the feasibility of assigning the station to a channel in its pre-auction band, and the station's status may change to "frozen – pending catch up," "frozen – currently infeasible," "bidding in the current round," or "exited – not needed." If at any point the system is unable to find a feasible assignment for a UHF station, its status will become "frozen – provisionally winning."

126. *Frozen – Currently Infeasible.* If the auction system is currently unable to find a feasible channel assignment for a VHF station in its pre-auction band, but a feasible channel assignment could become available in a later round of the current stage, the station's bidding status will be "frozen – currently infeasible" and the system will freeze the station in its currently held option at its current price. A station with this status will not be asked to bid and will keep its currently held option and its current price in each round in which its status remains "frozen – currently infeasible." However, a station with this status may become unfrozen and resume bidding in later rounds if the system is able to find a feasible channel assignment for the station in its pre-auction band. Such a station will be able to monitor the price offers for its different options as clock prices are decremented, and may submit proxy bid instructions that will apply if and when it becomes unfrozen. Likewise, stations with this status may later become "frozen – provisionally winning" if the system determines that, for all possible future behavior of bidders in the current stage, a feasible assignment will never be found. This bidding status is only possible for a VHF station because a feasible channel assignment in the VHF band may become available in a subsequent round if a UHF station currently designated to move to this VHF option drops out of the bidding or switches to a different VHF option.

127. *Frozen – Pending Catch Up.* If, at the start of a new stage, the auction system determines that a station that was "frozen – provisionally winning" at the end of the prior stage is no longer provisionally winning, but the base clock has not caught up to the station's "catch up point," or the base clock price at the time that the station became provisionally winning in a previous stage, the station's bidding status will change to "frozen – pending catch up" and its currently held option and current price will remain unchanged.⁴⁰⁵ A station with this status will not be offered lower prices nor asked to bid in each round so long as the base clock remains above the station's catch up point. However, a station with this status may become unfrozen and resume bidding in later rounds if the base clock reaches this price. As a result, such a station will be able to submit proxy bid instructions that will apply in case it becomes unfrozen and its status changes back to "bidding in the current round." Likewise, stations with this status may later become "frozen – provisionally winning" if, prior to the base clock reaching the station's catch up point, the system determines that a feasible assignment will never be found for all possible future behavior of bidders in this stage.

128. *Exited – Voluntary.* If a bidder places a bid for its station to drop out (or the system placed this bid because the bidder failed to submit a bid for its station that had the status of "bidding in the current round") and the bid is processed, the station's status will become "exited – voluntary," and that station will no longer bid in the auction. Stations with this status will no longer be offered prices nor allowed to place bids in the auction, and will be designated for repacking in their pre-auction bands.

129. *Exited – Not Needed.* If the auction system determines at any point that a feasible channel assignment will always be available for a station in its pre-auction band, its status will change to "exited – not needed," and that station will no longer bid in the auction.⁴⁰⁶ Since the auction system will never freeze a station that has a feasible assignment, such a station will be dropped out of the bidding

⁴⁰⁵ See § VII (Transition, if Necessary, to Any Subsequent Stage).

⁴⁰⁶ In each round, the auction system will use a heuristic to quickly determine the minimum number of channels that would remain available to a station in its pre-auction band given the possible assignments available to all other stations that interfere with it. The system will determine that a station is not needed if this number is less than the number of channels available in the station's domain file—in other words, a feasible channel will always be available regardless of the assignment of other stations. The technical details of this heuristic will be provided in an appendix to the *Application Procedures PN*.

rather than forcing it to continue bidding until the price offer decreases to \$0. As with stations that voluntarily drop out, stations with this status will be designated for repacking in their pre-auction bands, and will not participate in the remainder of the auction.

E. Stopping Rule

130. Under the procedures we establish, bidding rounds in a stage of the reverse auction will continue until no participating stations are “active” and all participating stations have the status “frozen – provisionally winning,” “exited – voluntary,” or “exited – not needed.” At that point, each participating station will either have its currently held option tentatively accepted or it will be provisionally assigned to a feasible channel in its pre-auction band. The procedures we adopt answer EOBC’s objection that bidding should stop when the Commission “does not need any additional volunteers.”⁴⁰⁷ The Commission will “not need any additional volunteers” when no actively bidding stations remain in the auction and the reverse auction in that stage will end.

F. Final Winning Bids

131. If the current stage is the final stage of the incentive auction—that is, if the final stage rule is satisfied in the forward auction portion of the current stage—stations with “frozen – provisionally winning” status when the reverse auction stops in that stage will become winning stations, and the system will accept the currently held relinquishment option of each winning station. Bidders whose stations won will receive their current prices at the time the stations became “frozen – provisionally winning.”⁴⁰⁸

VI. FORWARD AUCTION BIDDING

A. Bidding in the Clock Phase

132. The forward auction will utilize an ascending clock auction format under which each qualified bidder will indicate in successive clock bidding rounds its demands for categories of generic license blocks in specific geographic areas.⁴⁰⁹ In this Section, we describe the specific procedures we adopt for the clock portion of the forward auction. We first address the auction-related information that will be provided to forward auction bidders. We then address the inventory of generic spectrum blocks on which bidders will bid, including implementation of the spectrum reserve when the final stage rule is met. We then address details of the clock phase bidding process, including bidding mechanics. We also adopt procedures whereby the auction system will determine if the final stage rule is met, and when met, how the auction system will incorporate bidding for reserved blocks.⁴¹⁰

133. The initial stage of the forward auction will begin on the second business day after the close of bidding in the reverse auction, but no sooner than 15 business days after the release of the *Qualified Bidders PN*.⁴¹¹ Forward auction qualified bidders will have access to the detailed impairment information discussed below once they receive their registration materials, which will be sent after release of the *Qualified Bidders PN*.⁴¹² Thus, we anticipate that forward auction qualified bidders will have at

⁴⁰⁷ EOBC Comments at 48 (“Extending the reverse auction bidding will yield no useful information”).

⁴⁰⁸ No commenters addressed the reverse auction final winning bid procedures proposed in the *Comment PN*.

⁴⁰⁹ After bidding stops in the clock phase of the forward auction, the forward auction assignment phase will be conducted to assign frequency-specific 600 MHz Band licenses consistent with the demands of specific bidders in specific geographic areas. See § VI.B (Assignment Phase).

⁴¹⁰ As determined by the Commission in the *Mobile Spectrum Holdings R&O*.

⁴¹¹ As discussed above in § IV.B.3 (Forward Auction – Final Auction Application Status), the *Qualified Bidders PN* will announce the list of forward auction qualified bidders—those applicants with submitted auction applications that are deemed timely-filed and complete, provided that such applicants have timely submitted an upfront payment that is sufficient to qualify them to bid.

⁴¹² As discussed below, detailed impairment information will be available only to forward auction qualified bidders. See § VI.A.1.a (Impairment Information for Bidders). Forward auction qualified bidders must use the SecurID®

(continued....)

least 10 business days after receiving their registration materials to analyze impairment data before the first round of bidding begins in the forward auction. In subsequent stages, if necessary, the forward auction will begin on the next business day after the close of bidding in that stage of the reverse auction.⁴¹³ Forward auction bidders will be given detailed impairment information for a subsequent stage prior to the start of the reverse auction in that stage, which will give them adequate time to analyze such information. Therefore, we decline to provide any additional time between the conclusion of the reverse auction and start of the forward auction in any subsequent stage.⁴¹⁴

1. Availability of Auction-Related Information

a. Impairment Information for Bidders

134. In order to make the forward auction transparent for bidders, and in response to commenters' concerns regarding the challenges associated with bidding for impaired licenses, more information regarding impairments will be available than what we proposed in the *Comment PN*. As described in the preceding section, forward auction qualified bidders will have access to detailed impairment information, including the actual source and location of any impairment, upon receipt of their registration materials.⁴¹⁵ More specifically, the auction system will give forward auction qualified bidders access to the following information about the licenses offered in all PEAs:

- Aggregated impairments at the license level (for every block of every PEA), with impairment level percentages calculated using population (pops) including the associated license category (i.e., Category 1 or Category 2), provided in two formats (CSV⁴¹⁶ and PEA maps);
- Uplink and downlink impairments at the license level (for every block of every PEA), with impairment level percentages calculated using pops, provided in two formats (CSV and PEA maps);
- Impairments measured in pops at the 2x2 kilometer cell level for each impairing station for ISIX Case 1, including the facility ID (i.e., the specific television station, domestic or international, that will cause the impairment) of and the channel assigned to the source of potential interference to the wireless base station as well as the difference between the interference threshold and the interfering field strength, provided in CSV format only;
- Impairments measured in pops at the 2x2 kilometer cell level for each impairing station for ISIX Case 2, including the facility ID, domestic or international, of and the channel assigned

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tokens included with their registration materials to access the impairment information. All forward auction qualified bidders will have an opportunity to participate in a mock auction prior to bidding in the clock phase of the forward auction.

⁴¹³ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15774, para. 66.

⁴¹⁴ A few commenters suggest that the Commission provide additional time between the reverse and forward auctions within a stage, arguing that forward auction bidders need additional time to analyze the results of the reverse auction and develop strategies for the forward auction, particularly with respect to analyzing impairment information. See, e.g., AT&T Reply at 31 (suggesting between five and 10 business days between the reverse and forward auctions); CTIA Reply at 13–14 (suggesting 10 business days after the release of a provisional 600 MHz band plan); Sprint Comments at 49 (suggesting two weeks after the release of impairment information); T-Mobile Comments at 38–39 (suggesting five business days in the first stage and three in subsequent stages); LPN Comments at 12.

⁴¹⁵ Information regarding the actual source and location of any impairment, i.e., the facility information of the impairing stations, will be determined when the clearing target for a stage is set. See § III.A (Overview of the Initial Clearing Target Determination Procedure).

⁴¹⁶ Comma-separated values (“CSV”) files provide tabular data in a plain text format.

to the source of potential interference to the user equipment as well as the difference between the interference threshold and the interfering field strength, provided in CSV format only;

- For ISIX Case 3, impairments measured in pops of counties containing the hypothetical wireless base station which causes interference to a 2x2 kilometer cell within a television station's protected contour, regardless of whether this cell has population⁴¹⁷ provided in CSV format only;
- Impairments measured in pops at the 2x2 kilometer cell level for ISIX Case 4, provided in CSV format only;⁴¹⁸
- Reference files giving the location of all 2x2 cells, the location of all hypothetical base stations, information on stations interfered with by hypothetical base stations, and information on the spectrum overlap, in megahertz, between the interfering transmitter channel and the interfered-with receiver channel.

This information will be provided to forward auction qualified bidders for each stage,⁴¹⁹ and will not become fixed unless and until the final stage rule is satisfied.⁴²⁰

135. Providing this detailed information responds to concerns commenters raised about whether forward auction bidders would have sufficiently detailed information to make informed bids on impaired licenses.⁴²¹ For example, NAB asserts that providing information about all potential impairments will aid transparency for bidders in the forward auction and prevent disputes as to whether or not winning bidders understood their future obligations with respect to inter-service interference.⁴²²

⁴¹⁷ As discussed in the *ISIX Order*, because 600 MHz Band wireless base stations will not be deployed until after the incentive auction, for purposes of applying the ISIX methodology during the auction, the optimization software will assume the location of hypothetical wireless base stations by applying uniformly spaced sample locations, spaced every ten kilometers within the boundaries of every wireless license area that is within 500 kilometers of the television station. *ISIX Order*, 29 FCC Rcd at 13088, para. 33.

⁴¹⁸ For more information on the ISIX cases, see generally *ISIX Order and Further Notice*.

⁴¹⁹ We reject Sprint's suggestion that we re-optimize the provisional channel assignment plan at the close of the reverse auction in a stage in order to further reduce impairments, then release this information to forward auction bidders who would have two weeks before the forward auction begins. Sprint Comments at 47–48. Because the reverse auction can only increase the number of stations that must be assigned channels in the UHF band between the start of a stage and the end of a stage, the potential efficiency gains of re-optimizing are extremely limited and do not warrant delaying the auction for two weeks.

⁴²⁰ If the final stage rule is not satisfied at a particular clearing target, the clearing target will be lowered, and forward auction bidders will be provided with new impairment information for the new clearing target. We also plan to release sample data in advance of the auction for bidders to examine, which—if desired—would allow bidders to build their own analysis tools.

⁴²¹ See, e.g., AT&T Reply at 2, Attachment A at 2–3; DISH May 29, 2015 *Ex Parte* Letter at 6 (recommending that the Commission provide bidders with granular cell level data for each interference scenario as well as the county and PEA level aggregated data for uplink and downlink impairments for each cleared block). Further, Verizon recommends Commission outreach in order to “educate potential forward auction bidders about how to participate from a technical and administrative point of view.” Verizon Reply at 11–12. The Commission provides extensive information prior to the bidding in every auction, including publicly available seminars and/or tutorials and—for qualified bidders—mock auctions. We intend that the education and outreach efforts in advance of Auction 1000 will be even more detailed and extensive than normal in light of the many new aspects of this auction and the procedures necessary to conduct it.

⁴²² NAB Comments at 16. NAB emphasizes that because actual impairments in a given PEA may vary considerably from the impairment threshold set for purposes of sale at auction, “the Commission [should] identify for bidders in the forward auction all counties with any non-zero impairment.” *Id.*

Sprint argues that bidders must know precisely how impairments may affect particular licenses.⁴²³ Similarly, CTIA states that detailed information regarding the location of impairments “would greatly enhance the ability of bidders to develop strategies and make sound choices.”⁴²⁴ Specifically, CTIA suggests that the FCC provide information regarding the impairing stations, including key operating parameters—such as station location, antenna height, and power level—to forward auction bidders on a confidential basis.⁴²⁵ As set forth above, bidders will know for each impaired license the percentage of impairment (by population), whether the impairment is located in the uplink or downlink portion of the license, and the geographic location of the impairment. Bidders can use the facility information about the impairing station to determine how their wireless networks could be deployed around the impairment.⁴²⁶

136. We find that providing information to forward auction bidders about impairing stations is consistent with our statutory confidentiality obligation because providing this data will not reveal the identity of licensees that elect to participate in any stage of the reverse auction.⁴²⁷ Impairing stations in the 600 MHz Band could be stations that elected not to participate in the reverse auction at all, stations that applied but failed to make an initial commitment and therefore did not become qualified to bid in the clock phase of the reverse auction, stations that the system could not accommodate during the initial commitment process, or stations that dropped out in a prior stage.⁴²⁸ Forward auction bidders will not be able to distinguish previously participating impairing stations from impairing stations that never participated.⁴²⁹ This impairment information will be available only to forward auction qualified bidders. As discussed above, forward auction participants need this information to make informed bids, but other parties do not need to know this information to participate effectively in the auction; in particular, we decline to provide this information to all auction participants, because knowing this type of information could lead to undesirable strategic behavior by reverse auction bidders.⁴³⁰ We caution forward auction

⁴²³ Sprint Comments at 13.

⁴²⁴ CTIA Comments at 13–14. *See also* CTIA Reply at 1 (arguing that the Administrative Procedures Act requires the Commission to “provide additional information and clarity to interested parties concerning impairments of 600 MHz licenses.”).

⁴²⁵ CTIA Comments at 11–12; Letter from Scott K. Bergmann, Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed June 24, 2015) (CTIA June 24, 2015 *Ex Parte* Letter).

⁴²⁶ Several commenters request that in addition to providing the ISIX data results based on the F(50,50) statistical measure incorporated into the Commission’s ISIX methodology, the auction system provide data using the F(50,10) statistical measure. CCA Comments at 31; CTIA Comments at 10–11; DISH May 29, 2015 *Ex Parte* Letter at 6; Sprint Comments at iv, 16; Sprint Reply at 9–10; T-Mobile Apr. 2, 2015 *Ex Parte* Letter at 2–3 (arguing that while the Commission need not rely on the F(50,10) statistical measure to assess broadcast contours, it should make enough information available to allow carriers to perform the F(50,10) calculations themselves); U.S. Cellular Reply at 2 (arguing that bidders do not specifically require the results of F(50,10) modeling as long as enough information is provided for bidders to run the analysis). While we decline to provide multiple sets of ISIX data results to bidders, the impairment information that will be provided will allow a forward auction bidder to analyze the potential interference employing any statistical measure it chooses. We will address Sprint’s pending Petition for Reconsideration of the use of the F(50,50) measure for the ISIX methodology in the ISIX proceeding.

⁴²⁷ 47 U.S.C. § 1452(a)(3).

⁴²⁸ In any subsequent stage, an impairing station may also have been a bidder in a prior stage that has dropped out.

⁴²⁹ Moreover, forward auction bidders will not be able to infer which licensees elected to participate in the reverse auction from the impairment information they receive. The vast majority of non-participating stations will be assigned to channels in the remaining TV bands, and forward auction bidders will not receive any information about those stations. Therefore, forward auction bidders will not have enough information about the full complement of non-participating stations from which to surmise the identity of participating stations.

⁴³⁰ Additionally, we will not provide this information to the impairing stations. The impairing stations’ assignments will remain provisional only until the final stage rule is satisfied and the final TV channel assignment plan is

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participants that communicating the non-public information that they receive to others, whether directly or indirectly through third-parties or public disclosure, could violate the Commission's rule prohibiting communication of certain auction information.⁴³¹

b. Bidding Information

137. As in past Commission auctions, the public will have access to certain auction information, while auction participants will have secure access to additional non-public information. Details of how to access auction information will be provided in the *Application Procedures PN*.

138. The *Application Procedures PN* also will detail the prohibition on communicating information relating to bids or bidding strategies, such as the non-public information that bidders may access in the auction system, to other forward auction applicants or to broadcast licensees eligible to participate in the reverse auction, subject to specified exceptions.⁴³² As in all recent Commission spectrum license auctions, we will limit the availability of forward auction information in order to prevent the identification of forward auction bidders placing particular bids until after the auction is over.⁴³³ This helps ensure the competitiveness of the bidding. We reiterate that auction applicants could violate the prohibition on communicating certain forward auction information by communicating non-public information that they receive to others, whether directly or indirectly through third-parties or public disclosure.

139. The public notice announcing qualified bidders for the forward auction also will announce the forward auction's initial bidding round schedule. The schedule will establish the length of time each round will last. As detailed below, bidders may respond to prices in each round.⁴³⁴ Each bidding round will be followed by the release of round results.

140. Before bidding begins in the forward auction clock phase, information on the target amount needed to satisfy each component of the final stage rule will be publicly available, based on the results of the reverse auction bidding for the current stage. Specifically, depending on whether or not the clearing target for the stage is above the spectrum clearing benchmark of 70 megahertz,⁴³⁵ the target gross proceeds or average price in relevant PEAs required to satisfy the first component of the final stage rule

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determined (the assignments will become permanent if the auction closes in the current stage, however, so forward auction bidders will know the actual impairing stations for any given stage). Thus, although we recognize that impairing stations may be interested in this information, we will not provide it to them.

⁴³¹ See 47 C.F.R. § 1.2105(c)(8)(ii).

⁴³² See 47 C.F.R. § 1.2105(c).

⁴³³ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15795–96, para. 138. Specifically, we will not make publicly available until after the auction concludes: the PEAs that an applicant selects for bidding in its application, the amount of any upfront payment made by or on behalf of the applicant, any information on any applicant's bidding eligibility, including whether an applicant is eligible to bid on reserve spectrum, and any other bidding-related information that might reveal the identity of the bidders placing bids and taking other bidding-related actions. We caution forward auction participants that communicating the non-public information regarding bids or bidding strategies, such as PEAs selected in the auction application, could violate the Commission's rule prohibiting communication of certain auction information. See 47 C.F.R. § 1.2105(c). These procedures have helped safeguard past auctions against potential anti-competitive behavior, such as retaliatory bidding, and should do so here as well. As in prior auctions, we will make available to the public before the bidding begins the other contents of applications to participate in the forward auction. The Commission retains the discretion not to limit information regarding the identities of forward auction bidders pursuant to the procedures described above if circumstances indicate that these procedures would not be an effective tool for deterring anti-competitive behavior.

⁴³⁴ See § VI.A.3 (Acceptable Bid Amounts).

⁴³⁵ See § VI.A.7.a (Final Stage Rule – First Component).

and the target estimated aggregate net proceeds required to satisfy the second component will be publicly announced.

141. After each round of forward auction clock phase bidding concludes, whether the final stage rule has been met and detailed information regarding the progress toward meeting it will be publicly available.⁴³⁶ Available detailed information will include the aggregate gross proceeds and average price in relevant PEAs with respect to the first component of the final stage rule, and the estimated aggregate net proceeds, rounded down to the nearest \$10 million, with respect to the second.⁴³⁷ In addition, for each category of license in each PEA in the just completed round, the supply, the aggregate demand, the price at the end of the last completed round, and the price for the next round, will be publicly announced. This detailed price information will indicate the progress of the auction, both towards satisfying the final stage rule and, separately, towards completion of bidding. We address the information that will be provided to forward auction bidders regarding the assignment phase of the forward auction below.⁴³⁸

142. In addition to the bidding information described here, the Commission will use auction announcements to report any other necessary information to forward auction participants, such as schedule changes. Providing auction announcements through the auction system has been an effective and efficient way to communicate necessary information to auction participants in past auctions, and we expect that this will be the case for the forward auction as well.

2. Available Generic Spectrum Blocks

143. In the clock phase of the forward auction, we will offer generic blocks in two bidding categories based on the extent to which the blocks may be impaired by broadcast television stations repacked in the 600 MHz Band. Below, we adopt our proposed approach to categorizing blocks for bidding, including how we define generic blocks in two categories. We also address implementation of the spectrum reserve established in the *Mobile Spectrum Holdings R&O*.⁴³⁹

a. Bidding Categories

144. We will offer two categories of generic blocks for bidding in the clock phase of the forward auction.⁴⁴⁰ “Category 1” will include any block with potential impairments that affect zero to 15 percent of the population of a PEA.⁴⁴¹ “Category 2” will include any block with potential impairments that affect greater than 15 percent but less than or equal to 50 percent of the population of a PEA. Any block with potential impairments that affect more than 50 percent of the population will not be offered in the forward auction. After the assignment phase, the auction system will provide a price adjustment to

⁴³⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15796, para. 141. Given the provision of this information regarding whether the final stage rule may be satisfied, we need not address U.S. Cellular’s argument that, if such information is not provided, the bidders should have an opportunity to change their bids when the rule is satisfied. U.S. Cellular May 12, 2015 *Ex Parte* Letter, Bidding Procedures Attachment at 17.

⁴³⁷ Rounding will help prevent any attempt to infer information about applicable bidding credits and the identity of bidders and rounding down will prevent any confusion that could result from a rounded amount appearing to meet the target before the actual estimate does so.

⁴³⁸ See § VI.B.1 (Assignment Phase – Availability of Auction-Related Information to Bidders).

⁴³⁹ See generally *Auction 1000 Comment PN*, 29 FCC Rcd at 15799–802, paras. 149–58; *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6193–219, paras. 146–217.

⁴⁴⁰ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15797–99, paras. 142–48.

⁴⁴¹ The impairment percentage will be calculated based on the population impaired in a PEA as measured at the two-by-two kilometer cell level. See § III.B.1.b (Measuring Potential Impairments).

the final clock phase price equal to one percent for each one percent of impairment to account for varying degrees of impairment to the licenses.⁴⁴²

145. *Category 1.* We adopt our proposal to establish a 15 percent threshold for Category 1 blocks. Many commenters agree that some level of impairment is acceptable in generic blocks, supporting a range of percentages.⁴⁴³ Moreover, the record reflects that wireless operators have the ability to mitigate the impact of impairments within license areas: operators normally expect some degree of signal degradation due to attenuation, scattering, interference, or other factors,⁴⁴⁴ and have various methods of mitigating interference from impairing TV stations.⁴⁴⁵ In choosing a specific threshold, we must balance the need to ensure fungibility of blocks within Category 1 with our auction design goal of maximizing the number of such licenses available in the forward auction, which in turn will promote our competitive goals and the overall success of the auction. We find that a 15 percent threshold strikes the appropriate balance. Our analysis projects that the vast majority of Category 1 blocks will have no

⁴⁴² *Auction 1000 Comment PN*, 29 FCC Rcd at 15798, para. 147. See also § VI.C (Forward Auction – Final Winning Bid Amounts).

⁴⁴³ See, e.g., Letter from Michael P. Goggin, General Attorney, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, at 2 (filed Apr. 14, 2015) (AT&T Apr. 14, 2015 *Ex Parte* Letter) (supporting the offering of one category “with no to very light (perhaps 10 percent or less) impairments, to make the objects in the clock phase workably fungible”); Verizon Comments at 7 (supporting impairments in border markets up to 15 percent); T-Mobile Comments at 22–23 (stating that even heavily impaired licenses have value and therefore should be auctioned); T-Mobile Reply at 20 (“A zero percent impairment level is not necessary for licenses to be fungible. Even heavily encumbered spectrum has engendered substantial investments at auction, as evidenced by the successful auctions of the AWS-1 and the AWS-3 bands.”); U.S. Cellular Reply at 41 (supporting the Commission’s proposal to categorize as Category 1 those licenses with predicted impairments affecting up to 15 percent of a PEA’s population); Letter from Stephen J. Berman, Counsel to Sprint Corp., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, WT Docket No. 12-269, WT Docket No. 14-170 at 1 (filed June 29, 2015) (Sprint June 29, 2015 *Ex Parte* Letter) (suggesting thresholds of zero to ten percent for Category 1 and 11 to 30 percent for Category 2).

⁴⁴⁴ See, e.g., Letter from AJ Burton, Counsel to T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, ET Docket No. 14-14, GN Docket No. 12-268 at 2 (filed Jun. 13, 2014) (T-Mobile June 13, 2014 *Ex Parte* Letter) (citing David L. Ndzi et al., *Vegetation Attenuation Measurements and Modeling in Plantations for Wireless Sensor Network Planning*, 36 *Progress in Electromagnetic Res. B* 283, 292 (2012)) (discussing “how clutter, such as vegetation, can have a significant effect on signal attenuation”). See also *Auction 1000 Comment PN*, 29 FCC Rcd at 15797–98, para. 145.

⁴⁴⁵ See T-Mobile June 13, 2014 *Ex Parte* Letter at 1–2 (“[U]nlike noise-limited broadcast television, LTE systems are interference-limited”); Comments of 4G Americas, GN Docket No. 12-268, ET Docket No. 14-14 at 4 (filed Mar. 17, 2014) (“OET correctly notes that advances in mobile technology, such as Multiple-Input Multiple-Output (MIMO) antenna technology and resource block provisioning, will enable mobile operators to mitigate potential interference”); Comments of Sprint, GN Docket No. 12-268, ET Docket No. 14-14 at 3 (filed Mar. 18, 2014) (“[W]ireless operators have a number of tools that can be used to deploy and adjust their networks so as to mitigate interference problems that otherwise might exist with remaining television broadcasters on the same frequencies . . . in different locations, or with television broadcasters operating in the same location on nearby . . . spectrum.”); Sprint Reply at 18–19 (“[T]echnical solutions (such as improved receiver dynamic range and switchable filter banks or tunable filters) can be developed in the 2019–2020 network implementation timeframe to prevent both receiver overload and receiver damage concerns”); T-Mobile Comments at 12 (stating that carriers can use commercially available LTE base station filtering or uplink resource blanking to mitigate interference, and noting that it “successfully employed these techniques to overcome interference concerns that adjacent-channel DTV operations posed to 700 MHz A Block uplink operations”); T-Mobile Apr. 24, 2015 *Ex Parte* Letter, App. A at 18 (noting that software solutions in the LTE network, such as blanking resource blocks and power controls in user equipment, can be used to prevent harmful interference to broadcast operations); Verizon Comments at 18–19 (“[W]ireless operators can design market-specific base station receiver filters to protect against broadcaster interference.”).

impairments.⁴⁴⁶ The 15 percent threshold we adopt provides the flexibility to include in this Category blocks with a limited range of impairments that should be manageable for wireless operators and are unlikely to affect major population centers within the PEA.⁴⁴⁷ The fungibility of such blocks will be enhanced by the discount that will be available at the end of the assignment phase of the forward auction, and bidders will be provided with detailed information in order to prevent uncertainty regarding the inventory of Category 1 blocks available in each PEA.⁴⁴⁸ For these reasons, we decline to adopt the proposed alternative to limit Category 1 to unimpaired blocks (and broaden Category 2 to blocks with impairments from one to 50 percent).⁴⁴⁹

146. The 15 percent threshold we adopt also serves our competition goals. For the reasons set forth below, only Category 1 blocks will be placed in the spectrum reserve.⁴⁵⁰ In addition, Category 1 blocks will be reserved after all bidders, including non-reserve-eligible bidders, have already established bidding interests in them.⁴⁵¹ The 15 percent threshold maximizes the number of Category 1 blocks, which will help to ensure that a full complement of reserved blocks can be made available in each market, while also allowing an equitable distribution of Category 1 blocks among reserve-eligible and non-reserve-eligible bidders.

147. *Category 2.* We also adopt our proposal to establish an impairment threshold for Category 2 blocks of greater than 15 percent but less than or equal to 50 percent. The record reflects that impaired spectrum blocks retain significant value and utility for wireless providers.⁴⁵² We conclude that

⁴⁴⁶ See *CTS PN*, 30 FCC Rcd at 4858, App. § I (Overview). In Scenario 1 (84 megahertz repurposed), 2535 of the 2654 Category 1 licenses in the continental United States would have no impairments. In Scenario 2 (114 megahertz), 3334 of the 3469 Category 1 licenses would have no impairments. And in Scenario 3 (126 megahertz), 3753 of the 3886 Category 1 licenses would have no impairments. See also T-Mobile *CTS PN* Comments at 13 (noting the uniformity and the low level of impairment of the licenses in staff simulations).

⁴⁴⁷ Major population centers in Category 1 blocks are likely to be unimpaired because in most PEAs, such areas would likely comprise more than 15 percent of the population in the PEA.

⁴⁴⁸ See § VI.A.1.a (Impairment Information for Bidders). We recognize that bidders will judge impairments and their impact on the value of a block differently. The detailed information the auction system will provide on the levels, including locations and types, of impairments in a block will enable bidders to reflect their own assessment of the impairment's impact on the value of the license with their bids both in the clock and assignment phase.

⁴⁴⁹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15797–98, para. 145. We also agree with CCA, T-Mobile and U.S. Cellular that adopting this alternative would create excessively wide disparities in the level of impairment in Category 2 licenses, ultimately harming their fungibility. See CCA Comments at 22–23 (arguing that the alternative proposal would reduce both the fungibility of Category 2 licenses and the number of Category 1 licenses available for reserve-eligible bidders); T-Mobile Comments at 22 (arguing that the alternative proposal would create a “cliff effect” that results in clock round bidders treating a block that is one percent impaired the same as a block that is 49 percent impaired); U.S. Cellular Reply at 42 (opposing the alternative proposal because it would reduce both the number of available Category 1 licenses and the fungibility of Category 2 licenses). *But see* Verizon Comments at 6–8 (proposing that licenses outside of border markets be unimpaired).

⁴⁵⁰ See § VI.A.2.b.v (Applying the Spectrum Reserve in PEAs with Category 1 and Category 2 Blocks). As noted in the *Auction 1000 Comment PN*, implementation of the reserve would be significantly complicated if more bidding categories were included, requiring additional measures to allocate bidder demands across categories and likely extending the length of the auction. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15800, para 154.

⁴⁵¹ The amount of reserved spectrum will be based on demand by reserve-eligible bidders at the time the final stage rule is met, in part so that “entities that acquire reserved spectrum would pay their fair share of the costs of the Incentive Auction.” *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6201, para. 164. This approach requires that blocks be reserved after bidders have already established bidding interests. See § VI.A.2.b (Market-Based Spectrum Reserve).

⁴⁵² See T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 3 (“[S]pectrum with impairments of up to 50 percent nonetheless retains considerable value and should be auctioned.”); U.S. Cellular Reply at 41–42 (supporting the proposed category thresholds “to help alleviate our nation’s spectrum crunch and to provide valuable mobile broadband

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the 15-to-50 percent range that we establish strikes a reasonable balance between ensuring the fungibility of blocks within Category 2 and our other goals.⁴⁵³ Blocks within Category 2 will be subject to significant impairment levels by definition, and we project that there will be very few of them available in the forward auction.⁴⁵⁴ In many cases, only one Category 2 block will be available in a PEA.⁴⁵⁵ Further, the variation in impairment levels among Category 2 blocks in a specific PEA likely will be minimal.⁴⁵⁶ Accordingly, we find that a wider range of impairments is appropriate for Category 2 than for Category 1.⁴⁵⁷ As with Category 1 blocks, the fungibility of Category 2 blocks will be enhanced by the discount that will be available at the end of the assignment phase, and bidders will be provided with detailed information to prevent uncertainty regarding the available inventory of Category 2 blocks.⁴⁵⁸

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services in currently unserved or underserved areas”); U.S. Cellular May 12, 2015 *Ex Parte* Letter, Bidding Procedures Attachment at 8 (“[H]eavily-impaired licenses nevertheless are likely to attract interest.”). *But see* LPN Comments at 10 (arguing for a reduction in the proposed ceiling for permissible impairment). T-Mobile also proposes that blocks with a wholly-impaired uplink should be sold as Category 2 so long as the downlink is not more than 25 percent impaired. T-Mobile Comments at 24. *But see* U.S. Cellular Reply at 43 (“Including downlink-only licenses . . . would also decrease the fungibility of the Category 2 licenses in PEAs that would fit within T-Mobile’s proposal.”). In the *Incentive Auction R&O*, we stated that we will offer paired spectrum blocks and declined to offer downlink-only blocks. *Incentive Auction R&O*, 29 FCC Rcd at 6589, para 54. The thresholds for Category 2 blocks are consistent with this policy, and therefore we decline to adopt T-Mobile’s proposal to revise the Category 2 thresholds.

⁴⁵³ So long as Category 2 blocks in a PEA are economic substitutes, which means that sufficiently raising the price of one license in a set of Category 2 blocks would cause demand to switch to a lower priced license in the set, the relative prices of the Category 2 licenses within a PEA can be determined by bidding in the assignment phase. The anticipated minimal range of impairments between Category 2 blocks within individual PEAs, as discussed below, means that the difference between the most impaired license, to which clock phase bidders bid, and the other Category 2 blocks will also be minimal and bidders, and therefore likely economic substitutes. *See* T-Mobile *CTS PN* Comments at 14 (“The simulations strongly suggest that concerns are about the burden of Category 2 spectrum and excessive heterogeneity among licenses are misplaced.”).

⁴⁵⁴ *See CTS PN*, 30 FCC Rcd at 4856, para. 6 n.15 (“In each of the simulations, at least 93.4 percent of licenses are Category 1 licenses, and Category 2 licenses comprise at most 1.3 percent of total possible licenses.”); *see also CTS PN*, 30 FCC Rcd at 4856, para. 6, 4858, App. § I (Overview) (projecting the total number of Category 2 licenses in Scenarios 1, 2 and 3 at 46, 50, 48, respectively).

⁴⁵⁵ *Compare CTS PN*, 30 FCC Rcd at 4856, para. 6 (across the 406 PEAs in the continental United States, 84 to 88 percent contain *only* Category 1 licenses), *with CTS PN*, 30 FCC Rcd at 4856, para. 6, 4858, App. § I (Overview) (projecting the total number of Category 2 licenses in Scenarios 1, 2 and 3 at 46, 50, 48, respectively). Staff simulations demonstrate that from among the top 20 PEAs, only 2 PEAs had more than one Category 2 block in Scenarios 1 & 3 and only three PEAs had more than one Category 2 block in Scenario 2. *See CTS PN*, 30 FCC Rcd at 4862, App. § V.

⁴⁵⁶ Category 2 blocks within a single PEA will likely be affected by the same impairing station, resulting in similar levels of impairment and geographic footprints across the Category 2 blocks. Thus, although the range of impairments in Category 2 is between 15 and 50 percent, the actual range in any one PEA is likely to be much smaller.

⁴⁵⁷ Given the minimal number of PEAs in which we expect multiple Category 2 blocks to be available, and the limited impairment range of Category 2 blocks within such PEAs, we are not concerned that our decision puts too much emphasis on bidding in the assignment phase, as some commenters suggest. *See* CCA Reply at 9 (“[I]f the difference between low- and moderately-impaired licenses is too great (or if the applicable discount is too small), bidders will hedge their bets and not bid more than the value of the most impaired license . . .”).

⁴⁵⁸ The fungibility of Category 2 licenses will be further enhanced by our decision not to weight impairments located in the downlink portion of the 600 MHz Band for purposes of measuring the extent of potential impairments, as the percentage of impairment permitted for Category 2 licenses will be lower for uplink impairments than we proposed initially. *See* § III.B.1.b (Measuring Potential Impairments).

148. The comparatively wide impairment range for Category 2 also serves our auction design goals by enabling us to limit the total number of generic blocks categories to two, thereby simplifying the auction and providing bidders with more flexibility. Limiting the number of categories to two will enable bidders to more easily switch their demands from one category to another or from one PEA to another than if the clock phase included more, but more narrowly defined, categories, as AT&T suggests.⁴⁵⁹ Given the need to assure that the final stage rule remains satisfied once it is met, the procedures we adopt herein will limit bidders' ability to reduce demand for blocks in a category unless there is excess demand in the category.⁴⁶⁰ With fewer categories for bidding, the likelihood that there will be excess demand in any one category is greater, giving bidders' greater flexibility to modify their bidding strategies. In addition, limiting the number of categories to two will simplify the auction interface and make the bidding process more manageable for forward auction bidders.

149. *Clock Phase Price Adjustment for Impaired Blocks.* To enhance the fungibility and offset the variation in value of the generic blocks within the two categories we adopt, we incorporate a price adjustment to account for impairment for both Category 1 and Category 2 blocks.⁴⁶¹ Specifically, for a given frequency-specific license, the final clock phase price in the assignment round will be discounted by one percent for each one percent of impairment to the license.⁴⁶² The price adjustment will be applied at the end of the assignment phase of the forward auction. While several commenters argue that the impact of impairments on forward auction license value will not necessarily be linear,⁴⁶³ most commenters either support or do not oppose a price adjustment, and no commenter identifies an alternative that would be more effective in enhancing fungibility.⁴⁶⁴ The value that bidders ascribe to

⁴⁵⁹ AT&T Comments, Attachment A at 7–8 (“If highly heterogeneous licenses are to be offered, these should be divided into a sufficient number of categories for licenses within each category to be substantially fungible.”).

⁴⁶⁰ See § VI.A.7 (Final Stage Rule).

⁴⁶¹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15798, para. 147.

⁴⁶² *Id.* As discussed above, we calculate the categories of generic licenses based on the percentage of the population impaired in each block as measured at the two-by-two kilometer cell level. See § III.B.1.b (Measuring Potential Impairments). For example, if a Category 1 block is ten percent impaired, it will be subject to a ten percent discount off the final clock phase price.

⁴⁶³ See AT&T Comments at 21 (stating that the *Auction 1000 Comment PN* “provides no basis for assuming that the costs of any given impairment increases in a linear fashion with the increase weighted population affected.”); CTIA Comments at 12 (“[T]he value of an impaired license does not decline in a linear fashion based on the degree of impairment”); DISH May 29, 2015 *Ex Parte* Letter at 5 (arguing “that not all impaired POPs can be valued equally”); Sprint Comments at 24–25, 29–30 (“Only where all bidders have the same valuations for impairments will the discount and assignment round produce efficient outcomes under the Commission’s proposed auction design.”); U.S. Cellular Comments at 7–8 (noting that a discount proportionate to the percentage of impairment would be inadequate to address impairments to a wireless operator’s key service areas).

⁴⁶⁴ See CCA Comments at 24–26 (“[A] price adjustment mechanism for impaired licenses will simplify the auction process while promoting participation in the forward auction and ultimately increasing competition in the wireless marketplace.”); CTIA Comments at 12 (suggesting consideration of a more holistic assessment of value for the price adjustment but not specifying how to apply such an assessment); T-Mobile Comments at 25 (arguing that, absent some type of equitable discount for both categories of spectrum, bidders would rationally bid no more than the value of the most impaired license offered in the forward auction to ensure they could save their remaining budget to compete for their preferred license during the assignment phase); T-Mobile Reply at 18–20 (“Adopting discounts proportionate to the population impaired will clear more spectrum for broadband use and promote other public interest objectives of the incentive auction.”); U.S. Cellular Reply at 5–7 (supporting price adjustment as “a simple mechanism for both the Commission and bidders to determine the discount that will apply to a particular license”). *But see* Sprint Comments at 29 (“[The] proposal to offer a post-clock phase discount to reduce exposure risks has at best a minimal benefit, at worst a distortive effect, and most likely no effect at all.”); Sprint Reply at 12–13 (noting the “absence of constructive refinements” as a reflection of the “impossibility of crafting an administrative remedy”). Consistent with our reasoning for adopting our proposed price adjustment, we decline to adopt T-

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each license is likely to vary based on a variety of factors in addition to the level of impairment, including the location of the impairments and the wireless operators' existing coverage area.⁴⁶⁵ The price adjustment we adopt is designed to accommodate a range in values and enhance fungibility, and is not intended to fully compensate for that range or resolve all differences in value, however.⁴⁶⁶ Indeed, the price adjustment remains consistent for all bidders, allowing them to assess each license, its level of impairment (if any), and its relative value, which they can then express through their bidding in the assignment round.

150. We also agree with T-Mobile that when the price adjustment is “accompanied by more granular information about the impairments,” it will provide “enough commonality among [blocks] to allow for generic . . . bidding.”⁴⁶⁷ By providing bidders with detailed information about impairments, including the impairing station, the auction system will enable bidders to assess whether they should bid on, and how much they should bid for, impaired licenses in a particular PEA. For example, if a bidder considers impairments in a particular block to be more detrimental to the value of the license than is accommodated by the discount, it can bid less or shift its preference to another block in the assignment round. This includes any valuation a bidder may have on either expanding its service footprint to currently unserved areas or acquiring more spectrum in its service area.⁴⁶⁸

151. *Alternative Proposals.* We decline to offer in the forward auction any spectrum blocks that are more than 50 percent impaired. Specifically, we decline to offer such blocks as “overlay” licenses in the assignment phase in conjunction with frequency-adjacent licenses in the same PEA.⁴⁶⁹ We find that doing so would unduly complicate the assignment phase of the forward auction, making bidder strategies more difficult and potentially interfering with the assignment phase's primary purpose: to optimally assign licenses to winning bidders consistent with their frequency preferences and the contiguity goals we adopt.⁴⁷⁰ Consistent with prior Commission actions with regard to licenses that remained unsold after an initial auction for a new spectrum band, the Commission could offer heavily impaired 600 MHz licenses in a subsequent auction.⁴⁷¹

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Mobile's proposal to offer different price adjustments for foreign-origin impairments. T-Mobile Comments at 29–32.

⁴⁶⁵ See CTIA Comments at 13; Sprint Comments at 25; U.S. Cellular Reply at 5.

⁴⁶⁶ See, e.g., Sprint Comments at 22 n.33, 24–25 (construing the proposed price adjustment as attempting to eliminate “any differences in value – and thus exposure risk – between such blocks”).

⁴⁶⁷ T-Mobile Reply at 18. See also CCA Comments at 24–26 (stating that discounts will simplify the auction process by “allow[ing] blocks with varying degrees of impairment in a single market to remain relatively generic during the bidding process;” promote forward auction participation by facilitating a variety of bidding strategies; result in the clearing of additional spectrum because more funds would be available to bid in additional markets; and increase competition).

⁴⁶⁸ We note that U.S. Cellular's assertion that “areas subject to inter-service interference could be concentrated in the portions of the PEA that encompass a carrier's current service area, and thus have the greatest value to the carrier,” assumes that all carriers will value spectrum in their existing service areas more than spectrum in areas they currently do not serve. See U.S. Cellular Comments at 7–8.

⁴⁶⁹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15799, para. 148.

⁴⁷⁰ See § VI.B (Assignment Phase). Specifically, this approach would complicate the assignment phase priority of assigning contiguous blocks. See CTIA Comments at 18–19 (arguing that while there may be interest in these licenses, bidders may not be able to evaluate this until after the assignment phase).

⁴⁷¹ See, e.g., *Auction of 700 MHz Band Licenses Scheduled for July 19, 2011; Notice and Filing Requirements, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 92*, AU Docket No. 10-248, Public Notice, 26 FCC Rcd 3342 (WTB 2011); *Auction of AWS-1 and Broadband PCS Licenses Rescheduled for August 13, 2008; Notice and Filing Requirements, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 78*, AU Docket No. 08-46, Public Notice, 23 FCC Rcd 7496 (WTB 2008). See also CCA Comments at 26–

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152. We reject commenters' proposals that we offer only one category of generic blocks in the forward auction or a single category of wholly-unimpaired licenses outside of border areas.⁴⁷² Although these commenters assert that their proposals would improve fungibility of the generic licenses, we find that the potential benefits in terms of increased fungibility would be outweighed by the harms to our other auction goals. Limiting available blocks to a single category of unimpaired or lightly impaired blocks, whether nationwide or outside of border areas, would limit the amount of spectrum available in the forward auction, potentially reducing auction revenues, complicating bidding for forward auction bidders, and undercutting our competitive goals.⁴⁷³ Further, we project that our approach will result in the vast majority of licenses available in the forward auction being unimpaired or only minimally impaired.⁴⁷⁴ For the reasons set forth above, we are persuaded that the categories we adopt strike the appropriate balance between ensuring fungibility and our other goals. Conversely, we reject CCA's suggestion that we offer a single category of generic blocks with a wider range of impairments because such an approach would fail to ensure the fungibility of generic blocks within the one category.⁴⁷⁵

153. We also reject Sprint's proposal for bidding on frequency-specific spectrum blocks in the clock phase rather than generic blocks as inconsistent with the basic auction design we established in the *Incentive Auction R&O*.⁴⁷⁶ Finally, we decline to treat impairments in border regions differently.⁴⁷⁷

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27 (suggesting that highly impaired licenses be offered later via a single round, sealed-bid auction and limited to reserve-eligible carriers); CTIA Comments at 18–19 (suggesting offering heavily impaired blocks in a subsequent auction); T-Mobile Comments at 32–33 (suggesting a “remainders” auction be held after the incentive auction); U.S. Cellular Reply at 43 (agreeing with commenters that heavily impaired licenses should be offered in a subsequent auction, preferably not long after the conclusion of the incentive auction); U.S. Cellular May 12, 2015 *Ex Parte* Letter, Bidding Procedures Attachment at 8 (noting that heavily-impaired licenses will likely attract interest because the unimpaired portions could cover a significant amount of geography, and thus have value for carriers seeking to expand their coverage footprints, and thus be well-suited for rural carriers). To ensure sufficient spectrum for unlicensed operations in the 600 MHz Band, the PISC proposes, among other things, that the Commission allow white space devices to operate in those blocks that are more than 50 percent impaired and not available in the forward auction. Letter from Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 3 (filed July 15, 2015). PISC's request is beyond the scope of this Public Notice; we note, however, that under the transition rules adopted in the *Incentive Auction R&O*, certain unlicensed users may continue to operate in those areas for a period of time. *See Incentive Auction R&O*, 29 FCC Rcd at 6843–44, paras. 680–81.

⁴⁷² *See* AT&T Comments at 24–27 (stating that only Category 1 spectrum outside international border regions should be auctioned); Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1–2 (filed Apr. 27, 2015) (AT&T Apr. 27, 2015 *Ex Parte* Letter) (proposing that the FCC auction a single category with impairments between zero and 10 percent); CCA Comments at 20–21 (supporting the elimination of “the distinction between different ‘categories’ of licenses”); Mobile Future Comments at 3–5 (opposing the creation of “separate categories of licenses based on differing impairment levels”); Verizon Comments at 7 (arguing that only a single category of license with no impairments should be auctioned, except for border area licenses, which can be impaired by up to 15 percent). *But see* U.S. Cellular Reply at 42 (opposing CCA's proposal to merge proposed generic license categories into a single category containing licenses with impairments affecting up to 50 percent of the PEA's population).

⁴⁷³ *See* U.S. Cellular Reply at 41–42 (opposing the proposal to offer only wholly-unimpaired licenses outside border areas or only Category 1 licenses because it would reduce the number of licenses offered at auction); T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 3 (“[S]pectrum with impairments of up to 50 percent nonetheless retains considerable value and should be auctioned.”). With staff simulations demonstrating that only a small portion of available licenses will be Category 2, and in light of the demonstrated interest in these moderately-impaired licenses, we find good reason to offer both types of licenses.

⁴⁷⁴ *See* above discussion of the *Clearing Target Simulations PN* and the number of licenses in each category.

⁴⁷⁵ *See* CCA Comments at 20–21.

⁴⁷⁶ Sprint Comments at 33–38; *see* DISH May 29, 2015 *Ex Parte* Letter at 5 (supporting Sprint's proposal to implement frequency-specific block bidding). *But see* Verizon Reply at 10 (opposing Sprint's proposal and noting (continued....))

Under the approach we adopt, bidders will know whether an impairing station in a PEA is domestic or foreign, and can adjust and prioritize their preferences accordingly.

b. Market-Based Spectrum Reserve

154. In this Section, we start by addressing issues related to the market-based spectrum reserve adopted in the *Mobile Spectrum Holdings R&O*.⁴⁷⁸ First, we deny a petition for reconsideration of the *Mobile Spectrum Holdings R&O* insofar as it seeks to change our determination that the spectrum reserve will be triggered when both components of the final stage rule are satisfied.⁴⁷⁹ We find that this determination continues to further our underlying goals, particularly in light of our adoption herein of \$1.25 as the average price component of the final stage rule. Second, we affirm that the maximum spectrum reserve will be set based on the initial clearing target and will be reduced in a PEA in the

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“[s]uch a major shift in auction design at this stage would cause as many problems as it would solve”). In the *Incentive Auction R&O*, we adopted an ascending clock mechanism to collect bids on generic categories, to be followed by a separate assignment mechanism to assign frequency-specific licenses. *Incentive Auction R&O*, 29 FCC Rcd at 6775–78, paras. 504–12. Because auction speed correlates to costs for both forward and reverse auction participants, we found that bidding on generic blocks enhances the speed and efficiency of the auction because bidders will not need to bid iteratively across rounds on several similar blocks. *Id.* at 6775, para. 505.

⁴⁷⁷ In this regard, a number of commenters assert that impairments caused by international television stations in border regions should be treated differently for the purposes of establishing categories of blocks, due in part to the potential for these impairments to be eliminated. AT&T Comments at 27 (offer licenses impaired by international stations in a simultaneous multiple round (SMR) auction conducted after the incentive auction); AT&T Reply at 17; CTIA Comments at 8 (differentiate cross-border license impairments either by only permitting license impairments greater than a set percentage where they are caused by an international TV station or by establishing a different threshold for impairments in border markets); LPN Comments at 9 n.21 (“The Commission must also take account of the complexities of our international border relationships and take care to balance impairments so as not [to] unfairly impair any particular border area.”); T-Mobile Comments at 26–28 (in categorizing licenses, include an adjustment for international impairments or, alternatively, reflect only permanent impairments remaining after international border-related issues have been resolved); T-Mobile Reply at 24–25; Verizon Comments at 6–8 (allow impairments only for those licenses affected by international interference and then only up to 15 percent of the population). *But see* Sprint Reply at 19 n.39 (opposing T-Mobile’s proposal to adjust license categories based on international impairments because it “exacerbate[s] heterogeneity within and across bidding categories.”); U.S. Cellular Reply at 41–42 (opposing proposals to differentiate impairment levels between border markets and non-border markets because it would reduce the number of licenses available).

⁴⁷⁸ *Mobile Spectrum Holdings Report & Order*, 29 FCC Rcd at 6208, para. 184.

⁴⁷⁹ *See* T-Mobile Petition for Reconsideration, WT Docket No. 12-269, GN Docket No. 12-268 (filed Aug. 11, 2014) (T-Mobile Petition for Reconsideration). We address this specific T-Mobile reconsideration request here, rather than in the *Mobile Spectrum Holdings* proceeding along with the other reconsideration requests filed in that proceeding. Unlike the other requests in the *Mobile Spectrum Holdings* proceeding, T-Mobile’s request that we reconsider the spectrum reserve trigger is interrelated with arguments in this proceeding that the \$1.25 benchmark that we adopt for the average price component of the final stage rule is not an appropriate benchmark for purposes of triggering the spectrum reserve. We note that T-Mobile’s Petition for Reconsideration also requests that the Commission change the size of the maximum spectrum reserve at initial clearing targets, an issue that was raised in several of the comments in response to the *Auction 1000 Comment PN*. *See, e.g.*, T-Mobile Comments at 3; T-Mobile Reply at 6–9; AT&T Reply at 3, 23–24, 26–27; CCA Comments at 28–29; CCA Reply at 14; Sprint Reply at 5, 22–23; Verizon Reply at 1, 3–4; Letter from Kathleen Grillo, Senior Vice President, Federal Regulatory and Legal Affairs, Verizon, to Tom Wheeler, Chairman, FCC, WT Docket No. 12-269, GN Docket No. 12-268 at 1, 3–4 (filed June 17, 2015); DISH May 29, 2015 *Ex Parte* Letter at 2; Letter from Jonathan Spalter, Chairman, Mobile Future, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, WT Docket No. 12-269, GN Docket No. 12-268 at 1–2 (file June 19, 2015); Letter from Phillip Berenbroick, Counsel Government Affairs, Public Knowledge and Todd O’Boyle, Program Director, Common Cause, to Tom Wheeler, Chairman, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed June 30, 2015). We do not address this issue here. Rather, we affirm in the *Mobile Spectrum Holdings Order on Reconsideration* that we will not increase the maximum amount of reserved spectrum.

transition to a new stage only if actual demand by reserve-eligible bidders in the prior stage does not reach the maximum. Third, we clarify the criteria determining whether an applicant will qualify to bid on reserved spectrum in a PEA.

155. Next, we address implementation issues raised in the *Auction 1000 Comment PN*. In particular, we adopt our proposals that, for a given PEA in which we offer fewer Category 1 blocks than the nationwide clearing target, the maximum number of reserved spectrum blocks, as set forth in the table below, will be based on the total number of Category 1 blocks and Category 2 blocks (if any) offered in that PEA. In addition, the spectrum reserve only will include Category 1 blocks, and the demand determining the actual amount of reserve at the time the spectrum reserve is triggered will be the demand by reserve-eligible bidders for Category 1 blocks. Further, we adopt our proposal that the actual spectrum reserve in a PEA with only one reserve-eligible entity bidding on Category 1 blocks at the time the spectrum reserve is triggered will be no more than 20 megahertz. However, we reject commenters' proposals to adopt a cap of 20 megahertz on the amount of reserved spectrum that any reserve-eligible bidder may acquire in a PEA if there is more than one reserve eligible entity bidding at the time the reserve is triggered. Lastly, we decline to adopt, for reasons described below, various other proposals offered by commenters in response to the *Auction 1000 Comment PN*.

(i) **Background**

156. In the *Mobile Spectrum Holdings R&O*, we established a market-based spectrum reserve.⁴⁸⁰ We first established the *maximum* amount of licensed spectrum that will be reserved in each PEA for reserve-eligible entities in the forward auction for different initial clearing targets, as set forth in this table:⁴⁸¹

Licensed Spectrum In the Initial Clearing Target (in megahertz)	100	90	80	70	60	50	40
Minimum Unreserved Spectrum	70	60	50	40	40	40	30
Maximum Reserved Spectrum	30	30	30	30	20	10	10

Figure 5: Reserved Spectrum Amounts

157. If the auction does not close, the maximum amount of reserved spectrum in each PEA in subsequent stages will be the smaller of the maximum amount of reserved spectrum in the previous stage or the amount that the reserve-eligible bidders demanded at the end of the previous stage.⁴⁸² In addition, we determined that the *actual* amount of reserved spectrum will depend on the demand by reserve-eligible bidders when the final stage rule is satisfied.⁴⁸³ To be reserve-eligible, an entity must not hold an

⁴⁸⁰ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6193, para. 146.

⁴⁸¹ *Id.* at 6208, para. 184, 6210, para. 189. As noted above, we affirm these maximum amounts in the *Mobile Spectrum Holdings Order on Reconsideration*. We note that if the available amount of spectrum (Category 1 and Category 2 licenses) offered in a PEA at the initial stage is 30 megahertz or less, there will be no spectrum reserved in that PEA, as the maximum reserve chart in the *Mobile Spectrum Holdings R&O* did not provide for a spectrum reserve at those clearing levels. *See id.* at 6208–09, para. 184 and associated chart.

⁴⁸² *Id.* at 6208, para. 184. For example, if the initial clearing target is 70 megahertz, the maximum reserve will be 30 megahertz in the next stage, provided that reserve-eligible bidders continue to demand that amount. If reserve-eligible bidders demand less than 30 megahertz at the end of the initial stage, the maximum reserve for the next stage will be that demand. *Auction 1000 Comment PN*, 29 FCC Rcd at 15760, para. 23 n.66. The same rule holds for any subsequent stages as well. *Id.*

⁴⁸³ *Id.* at 6209, para. 187.

attributable interest in 45 megahertz or more of below-1-GHz spectrum in a PEA, or must be a non-nationwide provider.⁴⁸⁴

158. In the *Auction 1000 Comment PN*, we proposed that in a given PEA, the maximum number of reserved spectrum blocks would be based on the total number of Category 1 and Category 2 blocks offered in that PEA, using the table above.⁴⁸⁵ Further, we proposed that the spectrum reserve would include only Category 1 blocks.⁴⁸⁶ Alternatively, we sought comment on whether we should include Category 2 blocks in the spectrum reserve in any PEAs with fewer Category 1 blocks than the maximum spectrum reserve.⁴⁸⁷ Further, we proposed that the amount of reserved spectrum in any PEA be limited to 20 megahertz if there is only one reserve-eligible bidder demanding blocks when the trigger is reached.⁴⁸⁸

(ii) Spectrum Reserve Trigger

159. The spectrum reserve is designed to provide the opportunity for multiple service providers to have access to low-band spectrum,⁴⁸⁹ while also ensuring that all bidders bear a fair share of the cost of the forward auction.⁴⁹⁰ To facilitate its underlying goals, the *Mobile Spectrum Holdings R&O* tied the *actual* amount of the spectrum reserve to the quantity demanded by reserve-eligible bidders in each PEA at the point the final stage rule is satisfied in the forward auction.⁴⁹¹ The final stage rule is a reserve price with two components, both of which must be satisfied. The first component requires that the average price per MHz-pop for licenses in the forward auction meets or exceeds a specified price per MHz-pop benchmark (average price component).⁴⁹² The second “requires that the proceeds of the forward auction be sufficient to meet mandatory expenses set forth in the Spectrum Act and any Public Safety Trust Fund amounts needed in connection with FirstNet” (cost component).⁴⁹³ Below, we reject various requests that we either eliminate or modify the link between the spectrum reserve trigger and the final stage rule.

⁴⁸⁴ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6207, para. 181. We noted that we would revise the short-form application to provide for a certification by an applicant intending to bid on reserved spectrum that it meets the qualification criteria. If any entity plans to file a pre-auction divestiture application to come into compliance with the below-1-GHz holdings threshold, it will have to file in sufficient time to qualify by the short-form application deadline. *Id.* Additional details regarding completing the short-form application will be provided in the *Application Procedures PN*.

⁴⁸⁵ *Auction 1000 Comment PN*, 29 FCC Rcd at 15799, para. 150.

⁴⁸⁶ *Id.* We proposed that the actual number of reserved blocks would be based on demand for Category 1 blocks by reserve-eligible bidders at the time the auction reaches the spectrum reserve trigger. *Id.* As a result, in our implementation, if demand for Category 1 blocks in a PEA by reserve-eligible bidders is less than the maximum reserved spectrum, then fewer reserved blocks would be available in that PEA. *Id.* at 15799, para. 151.

⁴⁸⁷ *Id.* at 15799, para. 151.

⁴⁸⁸ *Id.* at 15800, para. 155. At the time the final stage rule is satisfied, we proposed that we would split the Category 1 licenses into two new categories, a reserved category, on which only reserve-eligible bidders may bid, and an unreserved category, on which any bidder may bid. The *Auction 1000 Comment PN* further set forth a proposal for allocating the demands of bidders that had been bidding for Category 1 blocks into demands for the newly split categories. *Id.* at 15801, para. 156.

⁴⁸⁹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6156, para. 45.

⁴⁹⁰ *Id.* at 6193, para. 146.

⁴⁹¹ *Id.* at 6209, para. 187.

⁴⁹² *Incentive Auction R&O*, 29 FCC Rcd at 6578, para. 26.

⁴⁹³ *Id.*

160. First, we reject T-Mobile's request, in its petition for reconsideration of the *Mobile Spectrum Holdings R&O*,⁴⁹⁴ that the Commission eliminate the link between the spectrum reserve trigger and the average price component of the final stage rule,⁴⁹⁵ as well as more recent requests by commenters to eliminate the link between the spectrum reserve trigger and the cost component of the final stage rule or eliminate the link to the final stage rule altogether.⁴⁹⁶ In particular, we disagree with arguments that linking the spectrum reserve trigger to one or the other component of the final stage rule undermines our goals in establishing the spectrum reserve.⁴⁹⁷ Rather, we affirm that linking the spectrum reserve trigger to the average price component is important to "fairly distribute the responsibility for satisfying the costs of the Incentive Auction among all bidders," particularly in light of our decision to set the average price component at \$1.25.⁴⁹⁸ Moreover, linking the spectrum reserve trigger to the cost component ensures that the existence of the spectrum reserve will not reduce the amount of spectrum being cleared for mobile broadband use. We found in the *Mobile Spectrum Holdings R&O* that satisfaction of both components of the final stage rule would ensure that reserve-eligible bidders pay significant prices for spectrum, that they are paying the same price as other bidders at the time that the final stage rule is met, and that the final stage rule is met before the spectrum reserve is implemented.⁴⁹⁹ In essence, we concluded that linking the spectrum reserve with satisfaction of the final stage rule ensured that reserve-eligible bidders would be

⁴⁹⁴ T-Mobile Petition for Reconsideration at 3, 13. See also Reply Comments of CCA on T-Mobile Petition for Reconsideration at 3; Letter from Steven K. Berry, President & CEO, CCA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-269, GN Docket No. 12-268, White Paper at 9 (filed Sept. 15, 2014) (CCA Sept. 15 White Paper).

⁴⁹⁵ We note that, contrary to AT&T's assertions, T-Mobile's petition was properly filed as a request for reconsideration of the *Mobile Spectrum Holdings R&O*, which linked the spectrum reserve trigger to the final stage rule. See Opposition of AT&T to T-Mobile Petition for Reconsideration, WT Docket No. 12-269, Docket No. 12-268 (filed Sept. 24, 2014), at 16 (arguing that T-Mobile was requesting reconsideration of the *Incentive Auction R&O*) (AT&T Opposition). See also *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, para 187. As discussed above, we address the T-Mobile request herein because it is interrelated with issues raised in the *Auction 1000 Comment PN*.

⁴⁹⁶ See, e.g., T-Mobile Apr. 24, 2015 *Ex Parte* Letter, Appendix A at 6 (arguing that the proposed spectrum-reserve trigger creates opportunities for anti-competitive foreclosure, including locking in prices at foreclosure levels nationwide while staying below the final stage rule threshold and locking in prices at foreclosure levels in critical markets to frustrate competitors' national network deployment plans), Appendix B (filed confidentially); Letter from Rebecca Murphy Thompson, General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252 at 2-3 (filed June 4, 2015) (asserting that the Commission should initiate the reserve at the beginning of the forward auction or eliminate the cost component of the reserve trigger to avoid foreclosure pricing); Letter from Rafi Martina, Legal and Government Affairs, Sprint, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed March 19, 2015) (arguing that the proposed implementation mechanism for the reserve – the triggering of the final stage rule upon satisfaction of two revenue components – was susceptible to foreclosure strategies by non-reserve-eligible bidders); Letter from Lawrence R. Krevor, Vice President, Legal and Government Affairs – Spectrum, Sprint, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 3-4 (filed May 20, 2015) (Sprint May 20, 2015 *Ex Parte* Letter) (claiming that if clearing costs are relatively high, prices across all PEAs would have to rise significantly to meet the final stage rule and that creating reserve blocks after meeting the final stage rule increases foreclosure risk). See also Verizon Comments at 10 (arguing that the Commission could establish a closing price that is below \$1.25 or eliminate the per-unit closing price altogether).

⁴⁹⁷ See T-Mobile Petition for Reconsideration at 16-17; T-Mobile Reply at 4-5; T-Mobile Apr. 24, 2015 *Ex Parte* Letter; CCA Comments at 32-33; CCA Reply at 12-13.

⁴⁹⁸ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, para 186.

⁴⁹⁹ *Id.* at 6209, para. 187, 6211, para. 194.

contributing “a fair share” of the final stage rule requirements, including “a portion” of the value of the spectrum for the public and the costs of clearing the spectrum.⁵⁰⁰

161. We also disagree with T-Mobile, Sprint, and CCA that the link between the spectrum reserve trigger and one or both components of the final stage rule creates a significant risk of undesirable strategic bidding by non-reserve-eligible bidders.⁵⁰¹ We find that the clock auction format of the forward auction, together with the auction procedures we adopt in this Public Notice, place significant limitations on the possibility for such undesirable strategic bidding. First, those procedures will not allow bidders to switch demand away from a product except when there is excess demand for the product and its price is rising, thereby limiting the ability of non-reserve-eligible bidders to drive up prices prior to the spectrum reserve being triggered without incurring significant risk.⁵⁰² Second, the efficacy of a strategy to drive up prices will be limited: for instance, since “jump bidding” cannot occur in a clock auction, bidders will be limited in their ability to strategically bid up particular markets relative to other markets.⁵⁰³

162. In addition, by limiting the use of extended rounds to situations where bidding has come close to meeting the final stage rule during the clock phase, we limit the potential for bidders to successfully implement an undesirable strategic bidding strategy by taking advantage of a higher clock increment in the top 40 markets in an extended round.⁵⁰⁴ Further, in response to Sprint’s contention that uncertainty about when the final stage rule will be met will cause reserve-eligible bidders to inefficiently maintain bidding activity across multiple PEAs and across bidding categories,⁵⁰⁵ we note that we will make publicly available during the auction on a round-by-round basis information showing how close forward auction revenues are to the final stage rule. This will enable reserve-eligible bidders to assess how their current bidding activity will affect the spectrum reserve in each PEA when the final stage rule is met. Accordingly, we deny T-Mobile’s petition for reconsideration insofar as it requests that the spectrum reserve trigger should not be linked to the average price component of the final stage rule, and we reject proposals by commenters to delink the spectrum reserve trigger from the cost component or both components of the final stage rule.

163. We also reject recent arguments that tying the spectrum reserve trigger to the cost component of the final stage rule increases the risk of foreclosure pricing. Commenters contend that, because the cost component must be satisfied before the reserve is triggered, high clearing costs under a high clearing target could allow non-reserve eligible bidders to intentionally increase prices to foreclosure levels in key markets in the early rounds of bidding, forcing reserve-eligible bidders to reduce demand prior to the split and thereby reducing the amount of reserved spectrum.⁵⁰⁶ Moreover, they argue, because

⁵⁰⁰ *Id.*

⁵⁰¹ See T-Mobile Petition for Reconsideration at 2–3; T-Mobile Apr. 2, 2015 *Ex Parte* Letter at 2; T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 2; CCA Sept. 15 White Paper at 9. These parties suggest that tying the spectrum reserve trigger to the average price component creates a risk that AT&T and Verizon would engage in a foreclosure strategy by bidding up prices after the average price component of the final stage rule has been met but before the cost component has been met. See also Sprint Comments at 46; Sprint Mar. 19, 2015 *Ex Parte* Letter at 2–3; Sprint May 20, 2015 *Ex Parte* Letter at 4–5.

⁵⁰² See § VI.A.4 (Reducing Demand, Bid Types, and Bid Processing).

⁵⁰³ See § VI.A.3.b (Clock Increments). In an SMR auction, “jump bidding” occurs when an entity bids more than what is required or necessary to be a currently winning bidder. Jump bidding is not possible in a clock auction. Moreover, in a clock auction, prices increase at a steady rate as long as there is *any* excess demand; in an SMR auction, prices can increase more quickly the greater the extent of excess demand.

⁵⁰⁴ See § VI.A.8 (Extended Round Procedures).

⁵⁰⁵ Sprint Reply at 27–28; see also Sprint Comments at 46.

⁵⁰⁶ See T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 2 (“Tying the spectrum reserve to both elements of the FSR could allow pricing to reach foreclosure levels in some or all markets before the reserve becomes effective, which would cause competitors to drop out of the auction.”).

the auction system does not reset prices if the auction drops to the next lower clearing target, the impact of any such foreclosure bidding would be carried forward to these later stages, even if clearing costs drop.⁵⁰⁷ To address these possibilities, T-Mobile proposes a “safety valve” of retaining the \$1.25 price per MHz-pop trigger in the top 40 PEAs, but amending the other component of the trigger to be either (1) an average of \$2 per MHz-pop in the top 40 PEAs; or (2) the cost component of the final stage rule, whichever is met first.⁵⁰⁸ Other parties propose a single spectrum reserve trigger of \$2 per MHz-pop for the top 40 markets, either generally⁵⁰⁹ or limited to spectrum clearing targets of more than 84 megahertz.⁵¹⁰ Verizon and AT&T oppose T-Mobile’s “safety valve” proposal, arguing that triggering the reserve before the cost component is met will result in lower auction revenue and threaten the success of the auction.⁵¹¹

164. We affirm our decision to tie the spectrum reserve trigger to the cost component of the final stage rule as well as the average price component and decline to adopt T-Mobile’s “safety valve” or another alternative trigger. The foreclosure scenarios that T-Mobile and other competitive carriers fear are extremely unlikely. As discussed above, the clock auction format, as well as the bidding procedures we adopt, including the no-excess supply rule and the limitation on the use of an extended round, will limit the ability of certain bidders to strategically bid up prices in order to disadvantage others, and

⁵⁰⁷ Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252 at 2–3 (filed June 30, 2015) (T-Mobile June 30, 2015 *Ex Parte* Letter) (“The risk of the second trigger is that high clearing costs in the early rounds of bidding under a high clearing target create a ‘hangover effect’ for subsequent stages of the auction. Specifically, if the initial spectrum-clearing target is high, the cost of clearing broadcast stations will be high, too. And if early-round bidding approaches, but does not reach, the reserve-creating trigger, those high bids will still hang over all subsequent stages of the auction even though the amount of spectrum available is less than in the initial stages. Even though broadcast-clearing expenses would be lower per license at the lower clearing target than they were at the initial high-clearing rounds, the prices in the forward auction do not reset and could greatly exceed those expenses and exceed the level at which foreclosure would occur.”); *see also* Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252 at 2 (filed July 10, 2015) (T-Mobile July 10, 2015 *Ex Parte* Letter).

⁵⁰⁸ T-Mobile June 30, 2015 *Ex Parte* Letter at 1, 3; T-Mobile July 10, 2015 *Ex Parte* Letter at 1, 3; *see also* Letter from Lawrence R. Krevor, Vice President, Legal and Government Affairs – Spectrum, Sprint, AU Docket No. 14-252, GN Docket No. 12-268 at 3–4 (filed July 9, 2015) (supporting T-Mobile’s \$2.00 MHz-pop reserve trigger proposal). Sprint additionally mentions an alternative to the proposed safety valve of limiting the number of blocks on which a bidder is permitted to bid in a category in a PEA. *See* Sprint July 9, 2015 *Ex Parte* Letter at 3 n.6. *See also* Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252 at 3 (filed July 16, 2015) (T-Mobile July 16, 2015 *Ex Parte* Letter) (summarizing a meeting of Sprint and T-Mobile with the Incentive Auction Task Force). We decline to adopt this alternative proposal for the same reasons we decline to adopt the other proposals discussed in this section.

⁵⁰⁹ Letter from Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 1 (filed July 9, 2015); Letter from Michael Calabrese, Director, Wireless Future Project, Open Technology Institute at New America, to Marlene H. Dortch, Secretary, FCC, AU Docket 14-252, GN Docket No. 12-268 at 5–6 (filed July 8, 2015).

⁵¹⁰ Waxman July 9, 2015 *Ex Parte* Letter at 2.

⁵¹¹ Letter from John T. Scott, III, VP & Deputy General Counsel, Verizon, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, WT Docket No. 12-269, GN Docket No 12-268 at 1-2 (filed July 30, 2015); Letter from Joan Marsh, Vice President, Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, AU Docket No. 14-252, WT Docket No. 12-269, GN Docket No. 12-268 at 2 (filed July 30, 2015). *See also* Letter from John T. Scott, III, VP & Deputy General Counsel, Verizon, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, WT Docket No. 12-269 at 2 (filed July 8, 2015) (arguing that if T-Mobile can acquire its spectrum at below-market value before the auction raises enough money to pay the broadcasters, the Commission will likely be forced to lower the clearing target in order to close the auction).

impose on any such bidders the risk of being forced to purchase unwanted spectrum at high prices.⁵¹² Further, T-Mobile's "hangover effect" scenario is premised on an assumption—that clearing costs will steeply decline in subsequent auction stages—that is not founded in the record. On the other hand, as discussed above, the Commission previously found that tying the spectrum reserve trigger to *both* components of the final stage rule—the cost component as well as the average price component—is necessary to ensure that the reserve does not cause a reduction in the spectrum clearing target and to ensure that reserve-eligible bidders contribute a fair share of the costs of meeting the auction's revenue requirements. We are not persuaded that the benefits of tying the spectrum reserve trigger to both components of the final stage rule are outweighed by the risk of foreclosure that T-Mobile and others have identified.⁵¹³ Untying the reserve trigger from the cost component also would place the onus on the Commission to accurately predict clearing costs—which is difficult to do, as T-Mobile has argued in its initial advocacy to untie the reserve trigger from the average price component of the final stage rule—rather than allowing the market to determine when the reserve is triggered.⁵¹⁴ Accordingly, we affirm our judgment to tie the spectrum reserve trigger to the cost component of the final stage rule.⁵¹⁵

165. We emphasize, however, that Commission takes very seriously its duty to ensure the integrity of its auctions. To this end, all auctions are monitored carefully, and appropriate actions will be taken if undesirable strategic behavior is discovered. As discussed below, we also adopt additional measures to help us meet this objective. For instance, we adopt a smaller minimum clock price increment than we proposed in the *Comment PN* and authorize clock price increments to be changed on a PEA-by-PEA basis. This allows a smaller increment to be used in specific PEAs should clock prices rise too fast in some markets relative to others.⁵¹⁶ Our auction procedures typically provide for this tool, which has been available in past Commission auctions⁵¹⁷ and implemented to maintain a balance of price increases across geographic license areas.⁵¹⁸

166. We also reject arguments against tying the spectrum reserve trigger to the average price benchmark of \$1.25 in the top 40 PEAs proposed in the *Auction 1000 Comment PN*. T-Mobile contends

⁵¹² On a nationwide basis, we project that executing such a foreclosure strategy would require tens of billions of dollars, representing an exorbitant risk even for the wealthiest bidders. On a market-by-market basis, smaller bidders should be able to defend themselves against a foreclosure strategy by larger bidders.

⁵¹³ In addition, untying the reserve trigger from the final stage rule's cost component would fundamentally alter the rule framework for the auction that we adopted over a year ago, requiring a set of new and modified rules (e.g., for triggering an extended round and for carrying the reserve over to a new stage), increasing the auction's complexity, and inevitably delaying the auction itself.

⁵¹⁴ See T-Mobile Petition for Reconsideration at 15 (“[A]ny price per MHz-POP threshold the Commission ties to the reserve license framework will be arbitrary, thus increasing the opportunity for foreclosure. Spectrum is notoriously hard to value, particularly in situations where, as here, the amount of spectrum coming to market is uncertain.”)

⁵¹⁵ In so affirming, we have considered information that T-Mobile and Sprint filed in support of their arguments along with a request for confidential treatment. See T-Mobile July 16, 2015 *Ex Parte* Letter. In light of our decision, we dismiss as moot Verizon's requests that we strike this information from the record without consideration or, alternatively, reject the request for confidential treatment and make the information public, and we decline to address the merits of Verizon's arguments in support of these requests. Letter from John T. Scott III, Verizon, to Marlene H. Dortch, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed July 24, 2015); see also Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed July 29, 2015) (opposing Verizon's request).

⁵¹⁶ See § VI.A.3.b. (Clock Increments).

⁵¹⁷ See *Auction 97 Procedures PN*, 29 FCC Rcd at 8442–44, paras. 199–205.

⁵¹⁸ See, e.g., the Auction 73 “Bid Amount Changes” announcement that was posted Jan. 31, 2008, at 10:36 a.m. To view Auction 73 announcements, go to <http://auctions.fcc.gov>, select Auction 73 in the drop-down box, click on the “Go” button, and then click on the “Announcements” tab at the top of the next page.

that the benchmark price should be set as low as possible and no more than \$1.25 in the top 25 PEAs,⁵¹⁹ while Sprint proposes that the spectrum reserve be set at the beginning of the clock phase, subject to a condition subsequent of spectrum being de-reserved if reserve-eligible bidders do not, in aggregate, demand quantities equivalent to the supply.⁵²⁰ They argue that tying the spectrum reserve trigger to the average price benchmark of \$1.25 in the top 40 PEAs will allow strategic bidding by the two largest providers to foreclose their major competitors, both on a nationwide and market-specific basis.⁵²¹ CCA states that there should not be a price per MHz-pop reserve trigger; however, if the Commission chooses to move forward with a price per MHz-pop reserve trigger, then it should be set at no more than \$1.25 per MHz-pop in the largest 40 PEAs, based on gross bids, which is what we proposed in the *Auction 1000 Comment PN*.⁵²² By contrast, AT&T and Verizon argue that \$1.25 is too low a trigger, and will result in too much spectrum being allocated to the spectrum reserve and a windfall for reserve-eligible bidders.⁵²³ They contend that \$1.25 is not an appropriate “market price” to ensure that reserve-eligible bidders pay their fair share, noting that this price is only approximately half of prices paid in the AWS-3 auction and significantly less than prices paid in the 700 MHz auction.⁵²⁴

167. We reject the various arguments that the price benchmark should be increased or decreased for purposes of triggering the spectrum reserve. Contrary to arguments by AT&T and Verizon, ensuring that reserve-eligible bidders pay a “fair share” does not require that we determine the “true competitive market value of the 600 MHz spectrum” and set the spectrum reserve trigger price “as close as possible” to that value, or that we determine and set a price that represents the exact point at which foreclosure of reserve-eligible bidders could occur.⁵²⁵ As stated above, we previously concluded that satisfaction of both components of the final stage rule would ensure, among other things, that reserve-eligible bidders pay significant prices for spectrum, and that they are paying the same price as other bidders at the time that the final stage rule is met.⁵²⁶ Consistent with that conclusion, we affirm that tying the spectrum reserve trigger to satisfaction of the cost component of the final stage rule and an average price component of \$1.25 is sufficient to achieve our goal of ensuring that reserve-eligible bidders bear a fair share of the costs of the forward auction.

168. Likewise, we reject arguments that \$1.25 is too high to achieve our pro-competitive goals.⁵²⁷ We are not persuaded that a fair distribution of the costs of the incentive auction would occur if

⁵¹⁹ T-Mobile Comments at 40; T-Mobile Apr. 2, 2015 *Ex Parte* Letter at 2.

⁵²⁰ Sprint Comments at 47; Sprint May 20, 2015 *Ex Parte* Letter at 6–7. Under Sprint’s proposal, bidding for licenses in the forward auction would be subject to separate clocks at the beginning of the clock phase, rather than after the final stage rule is met. We note that Sprint does not demonstrate how its proposal to transfer licenses from the reserve category to the unreserved category if reserve-eligible demand is less than the maximum spectrum reserve could be implemented without unduly complicating our auction design. *See also* T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 1–2.

⁵²¹ Sprint Comments at 46; Sprint May 20, 2015 *Ex Parte* Letter at 3–4; T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 2.

⁵²² CCA Comments at 32–33; Letter from Rebecca Murphy Thompson, General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, ET Docket No. 14-14, GN Docket No. 12-268, WT Docket No. 12-269 at 1–2 (filed Feb. 5, 2015) (CCA Feb. 5, 2015 *Ex Parte* Letter) (arguing that the \$1.25 per MHz-pop is historically high and will adversely impact smaller providers); *see also* CCA Reply at 11–12.

⁵²³ AT&T Comments at 8–9, 30–32; Verizon Comments at 10–14; *see also* Mobile Future Reply at 8–9.

⁵²⁴ AT&T Comments at 8–9, 31–32, Attachment A at 13; Verizon Comments at 12. Verizon further argues that, even assuming that the Commission is correct in setting spectrum reserve policy based on foreclosure value, \$1.25 would not come close to approximating foreclosure value. Verizon Comments at 11–12.

⁵²⁵ AT&T Comments, Attachment A at 12; *see also* Verizon Comments at 11–12.

⁵²⁶ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, 6211, paras. 187, 194.

⁵²⁷ *See* § VI.A.7 (Final Stage Rule).

the price for reserved spectrum is determined solely by competition among reserve-eligible bidders for reserved spectrum instead of being tied to satisfaction of the final stage rule. Moreover, as discussed above, we are not convinced that our approach of tying the spectrum reserve trigger to the final stage rule creates a significant risk of undesirable strategic behavior by non-reserve-eligible bidders, including at the \$1.25 average price component that we determine herein represents a portion of the value of the spectrum. In addition, the maximum amount of spectrum in the reserve is tied to bidders' demands in order to balance the underlying goals of the spectrum reserve. If reserve-eligible bidders' demand is insufficient, then we find that it is appropriate to set aside less than the maximum in order to balance the Commission's objectives. We also reject T-Mobile's alternate proposal to tie the spectrum reserve to a \$1.25 benchmark across only the top 25 PEAs, rather than the top 40 PEAs.⁵²⁸

(iii) Determination of Maximum Spectrum Reserve for a New Stage

169. As we set out in the *Mobile Spectrum Holdings R&O*,⁵²⁹ the maximum amount of reserve established based on the initial spectrum clearing target will not be reduced in any later stages of the incentive auction based on lower clearing targets, although it will be subject to demand by reserve-eligible bidders. We concluded in the *Mobile Spectrum Holdings R&O* that the maximum amount of licensed spectrum that will be reserved in each market will be identified at the initial stage.⁵³⁰ In the *Auction 1000 Comment PN*, we reiterated that the maximum reserve will be set according to the initial clearing target.⁵³¹

170. Accordingly, AT&T's claim is incorrect that our prior decision established that the maximum spectrum reserve amount would be tied to the spectrum clearing target in each stage, not just the initial stage.⁵³² We find that this procedure is consistent with our goals for the spectrum reserve: basing the maximum reserve amount on the initial spectrum clearing target will ensure the efficacy of the reserve and will protect our competitive goals by preventing the reserve from being reduced if the final stage rule is not satisfied in the initial stage and reserve-eligible bidders continue to demand the maximum level.⁵³³ By contrast, reducing the maximum reserve amount based on later clearing targets, regardless of demand by reserve-eligible bidders, would likely create incentives for non-reserve-eligible bidders to suppress demand at the initial stage in order to reduce the amount of the spectrum reserve.⁵³⁴

171. Contrary to AT&T's assertions, this procedure is consistent with our observation that every bidder will have the opportunity to bid for and win at least half of the 600 MHz Band spectrum in each PEA.⁵³⁵ Generally, if non-reserve-eligible bidders bid actively on spectrum in the initial stage, the bidding either will meet the final stage rule, or due to insufficient demand by reserve-eligible bidders, the bidding will not meet the final stage rule (thus reducing the spectrum reserve for the next stage). In either

⁵²⁸ T-Mobile Apr. 2, 2015 *Ex Parte* Letter at 2.

⁵²⁹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6208, para. 184.

⁵³⁰ *Id.* at 6208, para. 184; *see also* T-Mobile Reply at 12; Sprint Reply at 23.

⁵³¹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15760, para. 23 (repeating the relevant discussion and example from the *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6208, para. 184 & n.521). In claiming that the *Auction 1000 Comment PN* proposed this approach for the first time, AT&T ignores the express statement of the rule and accompanying example in the *Mobile Spectrum Holdings R&O*. AT&T Comments at 32–35.

⁵³² AT&T Comments at 7–8, 32–35. AT&T contends that the Commission should “maintain the mechanism that limits the amount of spectrum allocated to the reserve based on the total amount of spectrum available at each stage.” AT&T Comments at 32.

⁵³³ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6196, para. 154, 6209, para. 185, 6211, paras. 192–94.

⁵³⁴ *Id.* at 6211, para. 194.

⁵³⁵ *See* AT&T Comments at 34, citing *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6200, para. 162.

case, the market-based spectrum reserve rule would not have prevented non-reserve-eligible bidders from winning at least half of the 600 MHz Band spectrum in each PEA.⁵³⁶

(iv) Attribution for Purposes of Qualifying to Bid on Reserved Spectrum

172. For purposes of qualifying to bid on reserved spectrum as a non-nationwide provider, we clarify that an entity is subject to the attribution criteria set forth in section 20.22(b) of the Commission's rules.⁵³⁷ An entity can qualify to bid on reserved spectrum by either: (1) holding an attributable interest in less than 45 megahertz, on a population-weighted basis, of below-1-GHz spectrum in a given PEA; or (2) being a non-nationwide provider.⁵³⁸ Attributable holdings include, for example, controlling interests, non-controlling interests of 10 percent or more, and long-term *de facto* transfer leasing arrangements and long-term spectrum manager leasing arrangements that enable commercial use.⁵³⁹

173. The *Mobile Spectrum Holdings R&O* stated that "non-nationwide providers" include any provider other than Verizon Wireless, AT&T, Sprint, and T-Mobile,⁵⁴⁰ but that Order also included attribution rules "for purposes of ... applying a mobile spectrum holding limit" in the auction.⁵⁴¹ Those attribution rules were intended to ensure the integrity of our underlying rule, by permitting eligibility for the reserved spectrum only when appropriate to enhance competitive choices beyond nationwide providers and when eligibility would present a lesser risk of anti-competitive behaviors due to "relative lack of resources."⁵⁴² Accordingly, we clarify that the attribution criteria set forth in section 20.22 of our rules govern the application of all aspects of the mobile spectrum holding limit in the incentive auction, regardless of whether an entity is attempting to qualify to bid on the spectrum reserve as a holder of less than 45 megahertz of low-band spectrum in the relevant market or as a non-nationwide provider.

174. CCA has expressed concern about the potential impact that attribution of long-term leases of spectrum from nationwide providers to otherwise non-nationwide providers may have on the eligibility of those non-nationwide providers to bid on reserve spectrum.⁵⁴³ To address this concern, although we will attribute long-term transfer leasing arrangements set forth in section 20.22(b)(vii) for purposes of qualification based on low-band spectrum holdings, we will not attribute such leasing arrangements to lessees and sublessees for purposes of qualifying as a non-nationwide provider.⁵⁴⁴ Attributing long-term leasing arrangements in individual PEAs for purpose of qualification based on low-band spectrum holdings is consistent with the Commission's intent that entities lacking significant low band spectrum resources in those PEAs should have an opportunity to bid on reserved spectrum, and such attribution is

⁵³⁶ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6211, para. 193.

⁵³⁷ For example, all interests of ten percent or more by a nationwide provider in a non-nationwide provider will eliminate that non-nationwide provider from being considered reserve-eligible as a non-nationwide provider, though that provider still could qualify based on low-band holdings of less than 45 megahertz.

⁵³⁸ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6207, para. 181.

⁵³⁹ 47 C.F.R. § 20.22(b). In the *Mobile Spectrum Holdings R&O*, we adopted criteria to attribute partial ownership and other interests in spectrum holdings for purposes of applying a mobile spectrum holding limit to the licensing of spectrum through competitive bidding (as well as applying the initial spectrum screen to secondary market transactions). *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6245, para. 302.

⁵⁴⁰ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6206, para. 179 n.502.

⁵⁴¹ *Id.* at 6245, para 302; 47 C.F.R. § 20.22(b).

⁵⁴² *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6207, para. 180.

⁵⁴³ CCA July 9, 2015 *Ex Parte* Letter at 3.

⁵⁴⁴ *See* 47 C.F.R. § 20.22(b)(vii).

consistent with the Commission's methodology for competitive review of spectrum acquisition.⁵⁴⁵ However, attributing long-term leasing arrangements to lessees from nationwide providers for purposes of qualifying as a non-nationwide provider—which would have the effect of disqualifying providers “with networks that are limited to regional and local areas”⁵⁴⁶ from bidding on reserved spectrum as a non-nationwide provider—would be inconsistent with our intent to “permit bidding on 600 MHz reserve spectrum by regional and local service providers in all PEAs, including those where such a provider holds more spectrum than our 45 megahertz holding threshold of the available low-band spectrum.”⁵⁴⁷ As we indicated in the *Mobile Spectrum Holdings R&O*,⁵⁴⁸ non-nationwide service providers enhance competitive choices for consumers in the mobile wireless marketplace, and help promote deployment in rural areas.

175. CCA has similarly expressed concern that it would be inconsistent with the intent of the reserve, in certain unique circumstances involving limited equity interests, to apply an attribution rule that would prevent non-nationwide providers from bidding for reserved spectrum or participating in the auction entirely. CCA notes as examples various insignificant passive equity interests that nationwide providers have in certain long-standing rural partnerships and argues that the FCC should consider certain limiting factors so as not to foreclose those partnerships from bidding on reserve spectrum.⁵⁴⁹ We agree. In particular, where the nationwide provider is not the managing partner of the rural partnership, has not and will not provide funding for the purchase of the licenses in spectrum auctions by the rural partnership, including the incentive auction, the rural partnership is of long standing, the nationwide provider's interest in the rural partnership is non-controlling and is less than 33 percent, and the partnership's retail service is not branded under the name of the nationwide provider, non-attribution may enhance competitive choices for consumers by giving the partnerships an opportunity to gain access to low-band spectrum through the spectrum reserve, and without creating an undue risk of anti-competitive behaviors due to the rural partnership's relative lack of resources. We will specify in the *Application Procedures PN* how such rural partnerships can secure status as non-nationwide providers for purposes of qualifying to bid on the spectrum reserve.

(v) Applying the Spectrum Reserve in PEAs with Category 1 and Category 2 Blocks

176. We adopt our proposal that, for a given PEA in which we offer fewer Category 1 blocks than the nationwide clearing target, the maximum number of reserved blocks will be determined by the total number of Category 1 blocks and Category 2 blocks (if any) offered in that PEA. This approach will help facilitate the availability of more reserved spectrum in the limited number of PEAs in which we offer fewer Category 1 blocks than the nationwide clearing target,⁵⁵⁰ relative to an approach based solely on Category 1 blocks.⁵⁵¹ That, in turn, will promote our competitive goals for the reserve by providing an

⁵⁴⁵ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6242–45, paras. 294–302; *Applications of AT&T Inc., E.N.M.R Telephone Cooperative, Plateau Telecommunications, Inc., New Mexico RSA 4 East Limited Partnership, and Texas RSA 3 Limited Partnership for Consent to Assign Licenses and Authorizations*, WT Docket No. 14-144, Memorandum Opinion and Order, 30 FCC Rcd 5107 (2015).

⁵⁴⁶ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6206, para. 179 n.502.

⁵⁴⁷ *Id.* at 6207, para. 180.

⁵⁴⁸ *Id.*

⁵⁴⁹ CCA July 9, 2015 *Ex Parte* Letter at 3–4.

⁵⁵⁰ *See* The Associations Comments at 4.

⁵⁵¹ *See* § VI.A.2.b.i. (Market Based Spectrum Reserve Background). We note that in a limited number of PEAs, we will offer fewer licenses (either Category 1 or Category 2) than the nationwide clearing target because blocks with greater than 50 percent impairment will not be made available for acquisition. In these instances, our balancing of goals to facilitate post-auction competition and to provide opportunities for all bidders to acquire 600 MHz spectrum does not support setting the maximum spectrum reserve based on the nationwide clearing target, rather than based

(continued...)

opportunity for reserve-eligible bidders, who likely will be more reliant than non-reserve eligible bidders in particular PEAs on 600 MHz Band spectrum, to utilize the market-based reserve to expand coverage and enter new geographic areas. As we have noted, this auction will be the last offering of a significant amount of nationwide “greenfield” low-band spectrum for the foreseeable future and access to this spectrum by smaller bidders is particularly important to increasing competition and choice in the wireless marketplace.⁵⁵²

177. In addition, we adopt our proposal that the spectrum reserve will include only Category 1 blocks. That is, in the limited number of PEAs in which there are both Category 1 and Category 2 blocks, Category 1 blocks will be allocated to the spectrum reserve up to the maximum number of reserved spectrum blocks, assuming that reserve-eligible bidders demand up to that maximum.⁵⁵³ This also will help ensure the efficacy of the pro-competitive policies that we adopted in the *Mobile Spectrum Holdings R&O* by ensuring that reserve-eligible bidders, who by definition currently hold little or no low-band spectrum, have access through the spectrum reserve to unimpaired or minimally-impaired spectrum blocks in areas with impairments. As discussed below, limiting the spectrum reserve to Category 1 blocks also will simplify the forward auction for bidders by limiting the number of license categories that must be “split” at the time the spectrum reserve is triggered.

178. We decline to adopt AT&T’s alternative proposal to fill the reserve first with Category 2 blocks in the PEA, followed by any Category 1 blocks necessary to meet the reserve allocation.⁵⁵⁴ AT&T and Verizon assert that the approach we adopt will undermine our incentive auction goals by preventing them from acquiring the spectrum they need to effectively serve their customers, and will result in lower spectrum clearing targets and auction revenues.⁵⁵⁵ We disagree. First, we note that AT&T and Verizon themselves are eligible to acquire reserved 600 MHz spectrum in those PEAs where they have the most need, that is, in those PEAs where they hold less than one-third of currently suitable and available low-band spectrum. Indeed, AT&T and Verizon will be eligible to bid on reserved spectrum in PEAs that cover approximately 40 percent of the total population of the United States. And, of course, they can bid on substantial amounts of non-reserved spectrum nationwide.⁵⁵⁶

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on the total number of Category 1 and Category 2 licenses. Thus, if there are 50 megahertz of Category 1 blocks and 10 megahertz of Category 2 blocks made available in a PEA at the initial stage, the available amount of spectrum offered in that PEA will be 60 megahertz, with a corresponding maximum reserve of 20 megahertz.

⁵⁵² *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6157, para. 48. As discussed above, if a particular stage of the auction is not the final stage, the maximum amount of reserved spectrum in each PEA in subsequent stages will be the smaller of the maximum amount of reserved spectrum in the previous stage or the amount that the reserve-eligible bidders demanded at the end of the previous stage. Similarly, we note here that, in PEAs in which we offer fewer Category 1 blocks than the nationwide clearing target, the maximum amount of reserve established in the initial stage in a PEA will not be reduced in any subsequent stages of the incentive auction so long as there are a sufficient number of Category 1 blocks being offered in that PEA that are demanded by reserve-eligible bidders. For example, if there are 50 megahertz of Category 1 blocks and 10 megahertz of Category 2 blocks made available in a PEA at the initial stage, with a maximum reserve of 20 megahertz, the maximum reserve will remain 20 megahertz at each subsequent stage, provided that 20 megahertz of Category 1 blocks continue to be offered in that stage and reserve-eligible bidders demanded that amount in the prior stage.

⁵⁵³ We note that any remaining Category 1 blocks, as well as all Category 2 blocks, will be unreserved, and both reserve-eligible and non-reserve-eligible bidders will be able to bid on these blocks.

⁵⁵⁴ AT&T Comments at 36. *See also* Verizon Comments at 9.

⁵⁵⁵ Verizon Comments at 2, 8–10; AT&T Comments at 36; AT&T Reply at 27. AT&T argues that the best spectrum would be simply handed to “favored bidders” at prices far below market levels, leading to lower auction revenues, while the relatively low quality spectrum in the unreserved auction would lower auction revenues there as well. *Id.* at 27.

⁵⁵⁶ *See* Letter from Non-Nationwide Competitive Carriers, to Tom Wheeler, Chairman, FCC, GN Docket No. 12-268, WT Docket No. 12-269 at 2 n.3 (filed Apr. 22, 2015).

179. As discussed above, according to the simulations conducted by staff, approximately 84 to 88 percent of PEAs (and 88 to 93 percent of high-demand PEAs) will contain only Category 1 blocks, and even in PEAs with Category 2 blocks the vast majority of blocks offered in the forward auction will fall into Category 1.⁵⁵⁷ And the record reflects that Category 2 blocks are of substantial value and will provide utility to wireless service providers for future advanced broadband deployment.⁵⁵⁸ Accordingly, we are not persuaded that the approach we adopt to implementing the spectrum reserve will have a significant impact on either the amount of spectrum that is repurposed through the auction or on auction revenues. Moreover, as stated above, in the limited number of areas with Category 2 blocks for sale, our approach is critical to realizing the pro-competitive goals of the *Mobile Spectrum Holdings R&O* by ensuring that service providers that lack a sufficient mix of low-band and high-band spectrum to compete robustly have the opportunity to gain access to low-band spectrum.

180. Likewise, we reject Mobile Future's argument that our approach will harm consumers by "skew[ing]" access to 600 MHz Band spectrum.⁵⁵⁹ Rather, our approach will benefit consumers by promoting competition and reducing the potential for competitive harm.⁵⁶⁰ Contrary to Mobile Future's suggestion, our decisions to allocate Category 1 blocks to the reserve up to the maximum number (subject to demand by reserve-eligible bidders), while counting both Category 1 and Category 2 blocks towards the maximum number, are not inconsistent.⁵⁶¹ The two decisions involve separate issues. We first need to decide how much licensed spectrum is in the maximum spectrum reserve. In the *Mobile Spectrum Holdings R&O*, we determined that the maximum spectrum reserve is to be based on the "Licensed Spectrum in the Initial Clearing Target."⁵⁶² Our decision here implements that determination: both Category 1 and Category 2 licenses are going to be auctioned and are included in the initial clearing target. And, as discussed elsewhere, placing only Category 1 blocks in the reserve makes sense to provide reserve-eligible bidders with the best opportunity to increase competition and choice in the wireless marketplace.

181. We also reject AT&T's claim that our approach to implementing the spectrum reserve in PEAs with impairments violates the Spectrum Act as an auction-specific restriction that would dramatically increase the barriers to AT&T's "participation" in this "system of competitive bidding."⁵⁶³ AT&T has not demonstrated that our approach, which as explained above will apply in a limited number of markets and is necessary to carry out our goals in establishing the spectrum reserve, undermines our reasoning in the *Mobile Spectrum Holdings R&O* that the reservation of spectrum in the incentive auction is fully consistent with our authority under Title III and the Spectrum Act.⁵⁶⁴ More specifically, AT&T has not demonstrated that our approach transforms an otherwise permissible application of the spectrum reserve into an approach that is no longer a rule of "general applicability" or a provision that would "prevent" any entity "from participating" in a "system of competitive bidding."⁵⁶⁵

182. We also reject proposals from prospective reserve-eligible bidders to reserve the least impaired Category 2 blocks in any PEAs with fewer Category 1 blocks than the maximum spectrum

⁵⁵⁷ See § VI.A.2.a (Forward Auction – Bidding Categories).

⁵⁵⁸ See §§ VI.A.1.a (Impairment Information for Bidders), VI.A.2.a (Forward Auction – Bidding Categories).

⁵⁵⁹ See Mobile Future Comments at 4.

⁵⁶⁰ See *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6156, para. 45.

⁵⁶¹ See Mobile Future Comments at 3–5.

⁵⁶² See *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6208–09, para. 184.

⁵⁶³ AT&T Comments at 38–39, citing 47 U.S.C. § 309(j)(17).

⁵⁶⁴ See *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6215–19, paras. 206–17.

⁵⁶⁵ See *id.*, referencing 47 U.S.C. §§ 309(j)(17)(A)–(B).

reserve.⁵⁶⁶ As we explained in the *Auction 1000 Comment PN*, to implement separate reserved categories for both Category 1 and Category 2 blocks in individual PEAs where they exist would significantly complicate the design of the auction by necessitating an additional bidding category, potentially extending the length of the auction and requiring additional procedures for dividing bidder demands at the time the spectrum reserve is triggered.⁵⁶⁷ Reserving only Category 1 blocks will simplify the auction design and promote our goal of a successful auction. Indeed, T-Mobile recognizes that dividing both Category 1 and Category 2 blocks into reserved and unreserved categories would create significant complications of managing four simultaneous auction clocks—two in the reserved and two in the non-reserved blocks—across the large number of licenses expected to be offered in the incentive auction.⁵⁶⁸ We also conclude that filling out the reserve with Category 2 blocks would create an imbalance between our pro-competitive goals and ensuring that all bidders, including non-reserve-eligible bidders, have an opportunity to acquire a significant amount of 600 MHz Band spectrum in the incentive auction.⁵⁶⁹

183. Finally, we adopt our proposal that the actual number of reserved blocks will be based on demand for Category 1 blocks by reserve-eligible bidders at the time the forward auction reaches the spectrum reserve trigger, i.e., when the final stage rule is satisfied. We reject arguments that the actual number should be based on reserve-eligible bidders' demand for Category 1 and Category 2 blocks.⁵⁷⁰ Given our decision to limit reserve blocks to Category 1 blocks, the most logical measure for determining demand at the reserve trigger are the Category 1 blocks.

(vi) Other Proposals Related to Bidding by Reserve-Eligible Entities

184. As we indicated in the *Mobile Spectrum Holdings R&O*,⁵⁷¹ and after opportunity for comment in the *Auction 1000 Comment PN*, in order to balance the needs of all bidders and to promote competition within the forward auction, we adopt our proposal to limit the maximum amount of reserved spectrum in a PEA to 20 megahertz if there is only one reserve-eligible bidder demanding Category 1 blocks when the spectrum reserve trigger is reached.⁵⁷² We note that DISH supports this proposal; no commenter has opposed it.⁵⁷³ We do not believe the public interest benefits of a maximum of 30

⁵⁶⁶ C Spire Comments at 4; The Associations Comments at 3–4; Sprint Comments at 48 n.76; Sprint Reply at 26; U.S. Cellular Reply at 39. See also CCA Comments at 21; T-Mobile Comments at 6–8 (proposing that we eliminate categories altogether or define them more flexibly); DISH May 29, 2015 *Ex Parte* Letter at 3 (agreeing that the least impaired license blocks should be set aside for the reserve).

⁵⁶⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15800, para. 154. As discussed below, the spectrum reserve is implemented when the final stage rule is met, so that blocks must be reserved after bidders have already established bidding interests.

⁵⁶⁸ T-Mobile Comments at 6. To avoid the complications of managing four simultaneous auction clocks, T-Mobile proposes that in those markets in which the number of Category 1 licenses is less than the maximum spectrum reserve, the Commission should add to Category 1 the least impaired remaining license. T-Mobile Comments at 6–7. We decline to adopt this method of determining the spectrum reserve because, while it avoids complications of four simultaneous clocks, it would add the complications of implementing a different definition of Category 1 licenses in different markets.

⁵⁶⁹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6148, para. 28.

⁵⁷⁰ T-Mobile Comments at 8; CCA Comments at 23. T-Mobile contends that doing otherwise would penalize rational bidding behavior of reserve-eligible bidders that switch back and forth between Category 1 and Category 2 spectrum depending on price differentials and the degree of impairment of any given license. T-Mobile Comments at 9.

⁵⁷¹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, para. 187.

⁵⁷² *Auction 1000 Comment PN*, 29 FCC Rcd at 15800–01, para. 155.

⁵⁷³ DISH May 29, 2015 *Ex Parte* Letter at 3.

megahertz of reserved spectrum would be realized without more than one reserve-eligible bidder in a PEA.⁵⁷⁴

185. CCA, T-Mobile, and U.S. Cellular argue that, regardless of the number of reserve-eligible bidders in a PEA, no reserve-eligible bidder should be permitted to purchase more than 20 megahertz of reserved spectrum in any PEA in order to protect license diversity among reserve-eligible bidders.⁵⁷⁵ We find that giving more than one reserve-eligible bidder an opportunity to acquire reserve spectrum in smaller, more rural PEAs where 30 megahertz of reserve spectrum is available will further our goal of facilitating post-auction competition in those areas.⁵⁷⁶ Competition in these areas is generally less robust than in larger, more urban areas. As we have observed, “92 percent of non-rural consumers, but only 37 percent of rural consumers are covered by at least four 3G or 4G mobile wireless providers’ networks and more than 1.3 million people in rural areas have no mobile broadband access.”⁵⁷⁷ The Commission has frequently stressed the importance of competition and consumer choice in rural as well as in urban areas.⁵⁷⁸ The policies in the *Mobile Spectrum Holdings R&O* were intended to “ensure that all Americans, regardless of whether they live in an urban, suburban, or rural area, can enjoy the benefits that competition provides.”⁵⁷⁹ We found there that regional and local service providers enhance competitive choices for consumers in the mobile wireless marketplace, and are “important sources of competition in rural areas, where multiple nationwide service providers may have less incentive to offer high quality services.”⁵⁸⁰ Accordingly, we adopt a cap of 20 megahertz for smaller PEAs where 30 megahertz of reserve spectrum is available.⁵⁸¹ By adopting the cap of 20 megahertz on reserve spectrum in the smaller

⁵⁷⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15800–01, para. 155.

⁵⁷⁵ CCA Comments at 27–28; T-Mobile Comments at 4–5; T-Mobile Reply at 9; T-Mobile Apr. 2, 2015 *Ex Parte* Letter at 2; T-Mobile Apr. 24, 2015 *Ex Parte* Letter at 2; U.S. Cellular Reply at 32.

⁵⁷⁶ U.S. Cellular Reply at 32 (contending that a 20 megahertz cap would advance the public interest goals of the spectrum reserve, including facilitating access to low-band spectrum by non-nationwide carriers to enable them to continue offering consumers additional choices in the areas they serve, including rural areas).

⁵⁷⁷ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6206, para. 179 (citing *Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 11-186, Sixteenth Report, 28 FCC Rcd 3700, 3945, para. 392 (*16th Mobile Competition Report*)); see also *Part 1 R&O*, 30 FCC Rcd at 7531–32, para. 91 & n.305.

⁵⁷⁸ See, e.g., *16th Mobile Competition Report*, 28 FCC Rcd at 3937–52, paras. 383–400 (§ X (Urban-Rural Comparisons)); *Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 10-133, Fifteenth Report, 26 FCC Rcd 9664, 9878–85, paras. 378–388 (§ IX (Urban-Rural Comparisons)); *Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 09-66, Fourteenth Report, 25 FCC Rcd 11407, 11611–17, paras. 351–358 (§ IX (Urban-Rural Comparisons)); see also *Part 1 R&O*, 30 FCC Rcd at 7530, para. 88, 7531–32, para. 91, 7533–34, para. 96.

⁵⁷⁹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6134, para. 1.

⁵⁸⁰ *Id.* at 6206, para. 179.

⁵⁸¹ We define smaller PEAs as those with a population of 500,000 or less, which corresponds to PEAs 118–416, excluding PEA 412 (Puerto Rico). The population density of PEAs with population of 500,000 or less correlates more closely with that of rural areas as previously defined by the Commission. The average population density of PEAs with a population greater than 500,000 is 333 pops/square mile, whereas the average population density for the smaller PEAs is 76 pops/square mile. We observe that 76 pops/square mile roughly corresponds with the 100 pops/square mile approach we take in defining rural areas. Geographic area and population data can be found on the Commission’s website. See *FCC Auctions Home*, FCC, <http://www.fcc.gov/auctions> (last updated Oct. 14, 2014). In addition, we note that this threshold provides an objective and easily administrable delineation between larger urban and smaller rural PEAs and one that provides consistency with the definition we already will be applying in this auction for other purposes. See *Part 1 R&O*, 30 FCC Rcd at 7546–7548, paras. 127–30. This threshold also identifies “where rural service providers are most likely to offer service.” *Id.* at 7547–48, para. 130.

PEAs, we promote the dissemination of licenses among a wide variety of applicants, and avoid the excessive concentration of licenses.⁵⁸² In addition, the cap prevents any single reserve-eligible bidder from foreclosing other reserve-eligible bidders from obtaining reserve spectrum in the significant number of smaller PEAs where this is a potential risk. Thus, we find that the cap of 20 megahertz on reserve spectrum will help ensure that multiple service providers have access to low-band spectrum, and promote “the rapid deployment of new wireless broadband technologies to all Americans, including those residing in rural areas.”⁵⁸³

186. In response to concerns raised by AT&T and DISH that adopting a cap could decrease competition in the bidding for reserved spectrum,⁵⁸⁴ we first note that we are adopting a cap of 20 megahertz in the smaller PEAs only, and thus, to the extent those concerns are valid, there will be no decrease in competition in the bidding for reserved spectrum in the larger, more urban PEAs. We find that in smaller PEAs, any such concerns are outweighed by the benefits to post-auction competition of facilitating access by multiple bidders to reserved spectrum. In balancing the competing factors identified in Section 309(j),⁵⁸⁵ we believe it is important to take account of concerns about the degree of competitive mobile voice and broadband service in rural areas, as well as the important contributions that rural service providers can offer in promoting such competitive service and incentives for increased deployment in these more rural areas. In addition, we disagree with DISH’s assertion that restricting reserve-eligible bidders to acquiring a maximum of 20 megahertz of spectrum within a single PEA could unnecessarily limit the network and business strategies of reserve-eligible participants.⁵⁸⁶ While we cap the amount of reserved spectrum that any entity can acquire in order to extend the benefits of the reserve to multiple providers in smaller PEAs, a reserve-eligible bidder has an opportunity to acquire more than 20 megahertz of 600 MHz spectrum by bidding on unreserved licenses.⁵⁸⁷ Accordingly, we adopt a 20 megahertz cap in the smaller PEAs nationwide on the amount of reserved spectrum that an individual bidder can win in the forward auction in those PEAs where the spectrum reserve is set at 30 megahertz when the final stage rule is satisfied.

187. We also decline to adopt U.S. Cellular’s proposal of a special round after the spectrum reserve trigger is met that would provide reserve-eligible bidders prior notice and the opportunity to shift their demand for reserved blocks to compensate for any difference between actual demand on the maximum spectrum reserve.⁵⁸⁸ U.S. Cellular has not demonstrated how this special round could be implemented without undercutting our auction design goals by adding undue complexity and reducing the speed of the auction. In addition, we are making significantly more information available to forward auction bidders, including information indicating how close forward auction revenues are to satisfying the final stage rule.

188. Finally, we reject AT&T’s contention that a change to our bidding procedures is necessary to avoid strategic behavior by reserve-eligible bidders. In particular, AT&T contends that, once

⁵⁸² See 47 U.S.C. § 309(j)(3)(A) and (B).

⁵⁸³ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6206–07, paras. 179–80.

⁵⁸⁴ AT&T Reply at 27, Attachment A at 8 (arguing that a 20 megahertz limit could soften competition among reserve-eligible bidders who might otherwise compete vigorously for multiple licenses); DISH May 29, 2015 *Ex Parte* Letter at 3.

⁵⁸⁵ See, e.g., *Fresno Mobile Radio, Inc. v. FCC*, 165 F.3d 965, 971 (D.C. Cir. 1999).

⁵⁸⁶ DISH May 29, 2015 *Ex Parte* Letter at 3.

⁵⁸⁷ See U.S. Cellular, May 12, 2015 *Ex Parte* Letter at 14.

⁵⁸⁸ U.S. Cellular Reply at 37–38. U.S. Cellular proposes a one-time “special round” which would occur immediately after the spectrum reserve is triggered, in which reserve-eligible bidders could express aggregate demand in markets in which their current demand is less than the maximum spectrum reserve, in order to address potential uncertainty for reserve-eligible bidders as bidding in the clock phase of the forward auction approaches the final stage rule.

the spectrum reserve is triggered, reserve-eligible bidders' demand for spectrum in a given PEA should be assigned to the lowest-price spectrum available between the reserved and unreserved categories.⁵⁸⁹ We disagree with AT&T's assertion that implementation of this proposed change is necessary to avoid an opportunity for manipulative bidding by reserve-eligible bidders because those bidders could bid for unreserved blocks instead of reserved blocks even when the reserved price is lower. As discussed above, in rejecting claims by certain bidders that AT&T could engage in strategic bidding behavior,⁵⁹⁰ we adopt procedures that will not allow bidders to switch demand away from a category in a PEA except when there is excess demand and the price is rising. These procedures limit the ability of reserve-eligible bidders to shift from reserved to unreserved blocks in a given PEA and thereby narrow the circumstances under which the bidding strategies suggested by AT&T would be possible. They also discourage these strategies by limiting the ability of a reserve-eligible bidder to return to reserved blocks without driving up the prices of those blocks. Moreover, AT&T's approach could reduce competition for non-reserved spectrum by reserve-eligible bidders, contrary to our goal of encouraging competitive bidding for non-reserved blocks as well as reserved blocks.⁵⁹¹ We are not persuaded that additional safeguards are necessary to prevent strategic behavior by reserve-eligible bidders once the spectrum reserve is triggered.

3. Acceptable Bid Amounts

a. Opening Bids

189. We will set minimum opening bids at \$5,000 per bidding unit for all spectrum blocks offered in the forward auction, regardless of category.⁵⁹² At the beginning of the clock phase of the forward auction in the initial stage, a bidder will indicate how many blocks in a generic license category in a PEA it demands at the minimum opening bid price. The *Application Procedures PN* will set forth the minimum opening bid amount for the 5+5 megahertz generic blocks for each PEA in the forward auction, calculated according to these procedures.

190. We find there is no need to discount minimum opening bids for blocks in Category 2.⁵⁹³ Because our minimum opening bids serve primarily as a starting point for bidding, not as estimates of final prices, there is no need to base them upon the extent to which a spectrum block may be impaired (i.e., which category a block falls into—Category 1 or 2). Further, winning bidders will receive an impairment-based discount off the final clock phase price for licenses that are subject to impairments, regardless of whether they are Category 1 or Category 2 licenses.⁵⁹⁴

191. A minimum opening bid amount of \$5,000 per bidding unit should, as intended, help to accelerate the competitive bidding process. Basing minimum opening prices on the number of bidding units associated with blocks in a particular PEA serves to incorporate past pricing information into the calculation of minimum opening prices. By setting higher minimum opening prices in markets that have

⁵⁸⁹ AT&T Comments at 37, Attachment A at 15; *see also* AT&T July 1, 2015 *Ex Parte* Letter. In particular, AT&T is concerned that, absent this modification, reserve-eligible bidders could bid on unreserved blocks in order to drive up the prices and then return to bid on reserved blocks, leaving unreserved bidders with significantly higher prices in the unreserved license clock. *See Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6211, para. 192 (determining that, once the spectrum reserve is established, bidders will bid separately for generic reserved and unreserved spectrum licenses, with reserve-eligible bidders able to bid for spectrum in either reserved or unreserved category and other bidders only in the unreserved category).

⁵⁹⁰ *See* § VI.A.2.b.ii (Spectrum Reserve Trigger).

⁵⁹¹ Under AT&T's approach, reserve-eligible bidders would be required to drive the price of reserved blocks up to the price of unreserved blocks before they would be allowed to compete for an unreserved block.

⁵⁹² *See Auction 1000 Comment PN*, 29 FCC Rcd at 15805–06, para. 171.

⁵⁹³ *See id.* at 15806, para. 173 (seeking comment on whether we should discount opening prices for licenses in Category 2). We received no comment on this issue.

⁵⁹⁴ *See* § VI.C (Forward Auction – Final Winning Bid Amounts).

historically commanded relatively higher prices, we expect to reduce the number of rounds it will take for demand to equal supply in those markets. Moreover, incorporating the results from Auction 97 will ensure that minimum opening prices reflect relative value differences that bidders have placed on different geographic areas most recently.⁵⁹⁵ Our experience in past spectrum license auctions indicates that this will be an effective tool for accelerating the competitive bidding process, a particularly important goal for the incentive auction given the interdependency between the reverse and forward auctions.⁵⁹⁶

192. Our approach is consistent with section 309(j) of the Communications Act, as amended, which calls for prescribed methods of establishing minimum opening bid amounts when FCC licenses are subject to auction, unless the Commission determines that a minimum opening bid amount is not in the public interest. This approach is also consistent with the precedent of our AWS-3 auction procedures, where we set the minimum opening bid amount at twice the upfront payment for each license.⁵⁹⁷

b. Clock Increments

193. We adopt our proposal to set clock prices for a subsequent bidding round by adding a fixed percentage to the previous round's price, but modify the range to be broader than the range of five to 15 percent we proposed.⁵⁹⁸ We will use an increment of between one percent and 15 percent to provide additional flexibility to offer appropriate prices to bidders. Further, we set the initial increment at five percent. This initial increment is consistent with AT&T's suggestion to use increments at the bottom of the proposed increment range.⁵⁹⁹ While we anticipate applying the same percentage increment to all categories in all PEAs, increments may be changed during the auction on a PEA-by-PEA or category-by-category basis as stages and rounds continue. This discretion provides a tool to ensure that price increases over a broad range of markets remain relatively balanced.⁶⁰⁰ We find that setting the increment in a round in the range of one to 15 percent, beginning with five percent, will allow the auction system to manage the auction at a reasonable pace, offering appropriate price choices to bidders.

194. After each round, the system will announce a clock price for the next round, which will be the highest price to which a bidder can respond during the round.⁶⁰¹ For each category in each PEA,

⁵⁹⁵ As discussed above, *see* § IV.B.1 (Bidding Units), we are not persuaded by CCA's argument that incorporating the results from Auction 97 into the price index for determining bidding units, and therefore minimum opening bids, will prejudice small entities. *See* CCA RFA Comments at 9. Other than claiming that small businesses did not fare well in Auction 97, CCA has provided no justification to support its objection to incorporating the final Auction 97 results into incentive auction prices. *See id.* at 10.

⁵⁹⁶ *See, e.g., Auction of 800 MHz SMR Upper 10 MHz Band; Minimum Opening Bids or Reserve Prices*, Order, 12 FCC Rcd 16354 (1997); *Auction of the Phase II 220 MHz Service Licenses, Auction Notice and Filing Requirements for 908 Licenses Consisting of Economic Area (EA), Economic Area Grouping (EAG), and Nationwide Licenses, Scheduled for September 15, 1998, Minimum Opening Bids and Other Procedural Issues*, Report No. AUC-98-18-B, Public Notice, 13 FCC Rcd 16445 (1998).

⁵⁹⁷ *Auction 1000 Comment PN*, 29 FCC Rcd at 15805–06, para. 171. CCA warns the Commission that “excessively high opening bids in the forward auction pose . . . basic risks: tepid support, foreclosed opportunity, and ultimately auction failure.” CCA Reply at 33. We are not persuaded, nor does the record suggest, that our adopted procedures for setting opening bids will result in excessively high prices that will discourage participation.

⁵⁹⁸ *See Auction 1000 Comment PN*, 29 FCC Rcd at 15806, para. 175.

⁵⁹⁹ *See* AT&T Comments at 47–48, Attachment A at 20; *see also* Letter from Joan Marsh, Vice President, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 3 (filed June 25, 2015) (arguing that setting the bid increment at a lower level will provide “bidders some flexibility to engage in price discovery and adopt effective bidding strategies”).

⁶⁰⁰ *See* § VI.A.2.b.ii (Spectrum Reserve Trigger).

⁶⁰¹ In this clock auction, a bidder will be required to confirm its demands in every round, although it will not need to bid at a higher price. Unlike in an SMR auction, there are no provisional winners in the forward auction.

the clock price will be higher than the previous round's price by the fixed percentage increment.⁶⁰² As long as total demand for blocks in a category exceeds the supply of blocks, the percentage increment will be added to the clock price from the prior round. If demand drops to equal supply in a round, then the clock price for the next round will be set by adding the percentage increment to the price (potentially an intra-round bid price) at which demand became equal to supply.⁶⁰³

c. Intra-Round Bids

195. We adopt our proposed procedures to permit a bidder to make intra-round bids by indicating a point between the previous round's price and the new clock price at which its demand for blocks in a category changes.⁶⁰⁴ In placing an intra-round bid, a bidder will indicate a specific price, and a quantity of blocks it demands if the price for blocks in the category should increase beyond that price.⁶⁰⁵

196. Intra-round bids will be optional; a bidder may choose to express its demands only at the clock prices. The decision to permit intra-round bidding will allow the auction system to use relatively large clock increments, thereby speeding the forward auction, without running the risk that a jump in the clock price will overshoot the market clearing price—the point at which demand for blocks equals the available supply.⁶⁰⁶

4. Reducing Demand, Bid Types, and Bid Processing

197. A forward auction participant will bid by indicating a quantity of blocks in a PEA it demands at a price, indicating that it is willing to pay that price for the specified quantity.⁶⁰⁷ A bidder can express its demands at the clock price or at an intra-round price, and bid quantities can represent an increase or a decrease over the bidder's previous demands for blocks in a category. Under the procedures we adopt, the auction system will treat bids as requests; the bid processing procedures we adopt, however, will ensure that a bidder will never win a block at a price higher than it indicates it is willing to pay.⁶⁰⁸ If a bid would reduce the quantity of blocks a bidder demands in a category in a PEA, the auction system

⁶⁰² For example, if the price for the first round is \$10, and the price increment is 20 percent, the clock price for second round will be \$12.

⁶⁰³ If demand is equal to or less than supply at the minimum opening price, the increment will be added to the minimum opening price. Further, if at the beginning of a round supply exceeds demand and during the round demand increases to equal supply, then the increment will be added to the beginning of round price, which may be the minimum opening price.

⁶⁰⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15806–07, para. 176; *Incentive Auction R&O*, 29 FCC Rcd at 6776–77, para. 509; see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15879, 15882, App. G; CCA Reply at 33 (noting that “intra-round bidding in the forward-round auction offers some protection”). The previous round's price may be the clock price for the previous round or, if there was not excess demand, the minimum opening bid or the price at which demand equaled supply.

⁶⁰⁵ The auction system will not permit a bidder to place inconsistent bids for blocks in a category in a PEA during a round. For example, a bidder cannot indicate that it wishes to decrease its demand at a low intra-round price and then, in the same round, indicate that it wishes to increase its demand for blocks in the same category in a PEA at a higher intra-round price.

⁶⁰⁶ See CCA Reply at 33. As addressed above in § V.C (Reverse Auction – Bidding Mechanics), the more complicated bid processing in the reverse auction, involving multiple bidding options and feasibility checking, means that allowing intra-round bidding would unduly slow the progress of the reverse auction, as well as making participation more complicated for reverse auction bidders.

⁶⁰⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15806–07, para. 176. A bidder cannot demand more blocks in a category than the supply of available blocks.

⁶⁰⁸ Bids generally must be consistent with rules on bidding eligibility. Accordingly, bids to increase demand will be applied subject to the bidder having sufficient bidding eligibility as measured by the number of bidding units associated with the blocks a bidder demands. See § VI.A.6 (Bidding Eligibility and Activity Rule).

will apply the reduction only if the reduction will not result in aggregate demand falling below the available supply of licenses. This restriction ensures that the final stage rule, once met, will continue to be satisfied. Absent such a restriction, blocks with bids that were counted toward meeting the reserve price could later become unsold, leaving revenue below the necessary minimum. For this reason, and because we agree with T-Mobile that the restriction provides “a meaningful safeguard against anticompetitive or predatory auction behavior,”⁶⁰⁹ we find that the benefits of the restriction outweigh concerns, expressed by AT&T, about a potential exposure risk to bidders.⁶¹⁰ Moreover, we agree with T-Mobile that AT&T overstates the significance of an exposure problem.⁶¹¹ Further in this regard, we decline AT&T’s recommendation to allow bidders a limited number of withdrawals to mitigate an exposure problem.⁶¹²

198. We also adopt our proposal to process bids in order of price point after a round ends, where the price point represents the percentage of the bidding interval for the round.⁶¹³ Considering bids in increasing order of price point allows the auction system to determine an ascending processing order when prices in different PEAs may be at very different absolute levels. Once a round ends, the auction system will process bids in ascending order of price point, considering first intra-round bids in order of price point and then bids at the clock price. The system will consider bids at the lowest price point for all categories in all PEAs, then look at bids at the next price point in all areas, and so on. Importantly, for a given category in a given PEA, the uniform price for all of the blocks in the category will stop increasing when aggregate demand no longer exceeds the available supply. If no further bids are placed, the final clock phase price for the category will be the stopped price.

⁶⁰⁹ Letter from Trey Hanbury, Counsel, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, Attachment at 1 (filed June 19, 2015) (T-Mobile June 19, 2015 *Ex Parte* Letter). T-Mobile explains that without the restriction, “bidders can increase the prices that other bidders pay, while maintaining the option to reduce demand in later rounds. The [No Excess Supply] constraint serves the important purpose of making such predatory behavior more costly. Specifically, to increase others’ prices, a bidder would need to increase the price of its own licenses. But removing the NES constraint would create the option to raise competitor prices with no cost to the predatory bidder. . . . If the NES constraint is not in place to prevent predatory auction behavior, competitive bidders worried about having prices ‘bid up’ may reduce their demand earlier than they otherwise would have, which would lead to inefficient allocations of spectrum and lower revenues in the incentive auction.” *Id.*, Attachment at 4.

⁶¹⁰ See AT&T Comments at 46–47, Attachment A at 3, 17–18; AT&T Reply at 30 (“The proposed prohibition on demand reductions would introduce the ‘risk [of] being forced . . . to buy a single license at a price that exceeds its standalone value,’ which would ‘be a further discouragement to aggressive participation by wireless providers whose valuations are heavily dependent on complementarities.’”). See also Letter from Christopher T. Shenk, Counsel to AT&T, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 1–2, Haile Paper at 3–5 (filed May 15, 2015) (AT&T May 15, 2015 *Ex Parte* Letter).

⁶¹¹ See T-Mobile June 19, 2015 *Ex Parte* Letter, Attachment at 3 (“For ‘coverage spectrum,’ such as the low-band spectrum to be auctioned here, most of the benefits (*i.e.*: greater coverage over long distances and in-building penetration) are recognized with the first block.”). T-Mobile further explains that coverage spectrum is unlike capacity spectrum, such as AWS, for which carriers need more than 10 megahertz, and for which complementary valuations are more common. *Id.* Since “coverage spectrum” will be offered in the forward auction, T-Mobile argues that “[t]he exposure risk of securing only one license rather than two or more are therefore, counterbalanced if not entirely offset by the higher value of securing at least one license by those bidders that have little or no access to alternative licenses with similar characteristics.” *Id.* at 3–4.

⁶¹² See AT&T Comments at 47, Attachment A at 18 (“At a minimum, bidders should be given waivers to allow a limited number of withdrawals of demand when such withdrawal would create (at least temporarily) excess supply.”).

⁶¹³ For example, if the price for the previous round is \$5,000 and the new clock price is \$6,000, a price of \$5,100 will correspond to the 10 percent price point, since it is 10 percent of the bidding interval between \$5,000 and \$6,000. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15807–08, para. 181.

199. In order to give bidders more flexibility in managing their demands in certain situations, we adopt our proposal to allow bidders to make two additional types of bids in addition to the “simple” bids mentioned below: “all-or-nothing” bids and “switch” bids. These additional bid types will enable bidders to indicate that they want a bid to be implemented fully or not at all or that they wish to switch demand from one license category to another at a certain price.⁶¹⁴ Because all-or-nothing and switch bids are optional, a bidder can choose not to submit such bids. We find that the bid types and associated processing procedures we adopt, which are discussed in more detail below, will provide bidders with the flexibility they need to modify their demands as the bidding progresses while ensuring that the reserve price conditions, once satisfied, will continue to be satisfied.⁶¹⁵

a. Simple Bids

200. A simple bid indicates a desired quantity of a product at a price. If it is not possible for the auction system to apply the simple bid in its entirety, a simple bid may be applied partially. A simple bid requesting a reduction in demand will be applied in full if there is sufficient excess demand for blocks in the category. That is, the auction system will apply the reduction provided that there is sufficient aggregate demand at the bid price to allow the reduction to be applied without the total demands of all bidders falling below available supply in the category. If there is some excess demand, but not enough to grant the full requested reduction, the auction system will partially apply the reduction, thereby reducing the bidder’s demand by fewer than the requested number of blocks. A simple bid requesting an increase in demand will be applied in full as long as the bidder has sufficient bidding eligibility, measured by the total number of bidding units associated with the blocks the bidder demands in that round, at the time the bid is processed. If the bidder does not have sufficient eligibility, the auction system will apply the increase to the extent possible given the bidder’s available bidding eligibility.

201. Formally, to the auction system, a simple bid to reduce demand at an intra-round price indicates that a bidder is willing to pay up to the intra-round bid price for a quantity of blocks that is unchanged from its previously demanded quantity. At the intra-round bid price, the bidder is willing to accept the unchanged quantity, the changed quantity, or any quantity in-between. At a price above the intra-round bid up to the clock price for the round, the bidder is willing to accept the changed quantity indicated by the intra-round bid.

202. Because the auction system will process bids in increasing order of price point and the uniform price for blocks in a category stops increasing when demand falls to equal supply, a bidder placing a simple bid for a reduction that is partially applied will not pay a price above its bid price for its unreduced quantity. If a requested reduction cannot be applied at all, it must be the case that demand fell to equal supply at a previous, lower price.⁶¹⁶ In that case, the bidder that placed the simple bid will still demand its unreduced quantity at a price it indicated it would accept. In sum, a simple bid requesting a reduction will either be fully applied, partially applied with the price stopping at the bid price, or not applied but with the stopped price below the bid price.

203. In the event that a bid is not applied, or not fully applied, the auction system will maintain the unapplied demands in a queue, prioritized by price point, should subsequent changes in aggregate demand or a bidder’s eligibility later make it possible to apply the bid. Bids are only held in the queue during the processing of bids for a single round. For example, if a bidder’s reduction request is only partially applied because aggregate demand is insufficient, but another bidder requests an increase in

⁶¹⁴ In a given round, a bidder may place at most one of the three bid types for a given category in a PEA.

⁶¹⁵ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15807, para. 179. The bid types and associated processing procedures we adopt are set forth in detail in Appendix G to the *Auction 1000 Comment PN*. 29 FCC Rcd at 15879–95, App. G.

⁶¹⁶ Alternatively, demand could fall to equal supply at the same price point, in the case of ties, which are broken pseudo-randomly. Further, in the case where fewer blocks are demanded than are available at the minimum opening bid price, the price will remain at the minimum opening bid.

demand at a higher price point, it may then be possible to fully apply the bid reduction request that was only partially applied earlier in the bid processing for the round and held in the queue. And if a bidder's request to increase demand is not applied or not fully applied because the bidder has insufficient bidding eligibility at that price point, and its request to reduce demand in another category is later applied at a higher price point, freeing bidding eligibility, the system may then be able to fully apply the increase.

b. All-or-Nothing Bids

204. An all-or-nothing bid also indicates a desired quantity of blocks at a price but differs from a simple bid in that it will not be applied partially. Hence, an all-or-nothing bid is useful if the bidder wants the bid to be implemented fully or not at all. An all-or-nothing bid requesting a reduction in demand will be applied only if there is sufficient excess demand at that price point to apply the full reduction. If not, the auction system will not apply the bid, and will move on to consider bids at higher price points. The uniform price for the category may continue to increase as long as there is excess demand. The bidder will still demand its unreduced quantity, at a price which may increase up to the round's clock price. This is in contrast to a simple bid that may be partially applied, and which, hence, stops the price from increasing if it cannot be fully applied. Thus, in making an all-or-nothing bid that requests a reduction, the bidder affirmatively indicates that it will accept the round's clock price for its unreduced demand if the bid cannot be fully applied at the bid price.

205. A bidder making an all-or-nothing bid that requests a reduction may add a "backstop" to the bid that would allow the bid to be applied partially at a higher price, as long as the bidder makes only a single all-or-nothing bid for the category in the PEA in the round.⁶¹⁷ The backstop will ensure that the price for the category cannot go higher than the specified higher price if the all-or-nothing bid is not applied. The backstop is essentially a simple bid that may be applied partially, thereby stopping the price from increasing further.

206. An all-or-nothing bid that requests an increase in demand will be applied only if the bidder has sufficient bidding eligibility for the full increase at the price point of the bid. If an all-or-nothing bid requesting an increase or decrease in demand is not applied, it will be held in the processing queue in case it should later become possible to apply it.

c. Switch Bids

207. To place a switch bid, the bidder will indicate a desired quantity of blocks in the category in which it wishes to reduce its demand at a given price point, and will identify another category in the same PEA that it wishes to switch into at the price point. While processing the bid, the auction system will apply as much of the requested reduction as possible considering excess demand, and then will apply an increase in the bidder's demand in the other category by the same number of blocks.⁶¹⁸ The unapplied portion of a switch bid will be held in the processing queue in case it can be applied later in the round's bid processing.

5. No Bidding Aggregation

208. We will not incorporate package bidding procedures into the forward auction because of the additional complexity such procedures would introduce into the auction.⁶¹⁹ Further, consistent with

⁶¹⁷ The auction system will allow a backstop bid only if a bidder submits a single all-or-nothing bid for the category because bid processing could become excessively complex if bidders submit multiple all-or-nothing bids with backstops.

⁶¹⁸ Because all blocks in a PEA, regardless of category, will have the same number of associated bidding units, the eligibility freed up by the reduction portion of a switch bid will always cover the corresponding increase in demand.

⁶¹⁹ See *Incentive Auction R&O*, 29 FCC Rcd at 6777–78, paras. 510–11 (noting intention not to incorporate package bidding procedures into the forward auction); *Auction 1000 Comment PN*, 29 FCC Rcd at 18808–09, para. 184. See also U.S. Cellular Comments at 6 ("USCC strongly supports the Commission's tentative conclusion not to permit any form of package bidding in the forward auction.").

our proposal in the *Comment PN*, we decline to adopt an alternative to package bidding under which the Commission would create an aggregation of the largest PEAs in advance of the auction.⁶²⁰ We are not persuaded that creating a bidding aggregation will serve our goal of encouraging entry by a broad range of potential wireless service providers.⁶²¹ In particular, several commenters share our concern that the alternative aggregation approach we sought comment on would discourage small or regional entities with an interest in only a subset of the PEAs in the aggregation from participating in the forward auction.⁶²² Further, larger carriers may have interests in only some of the largest PEAs, or may wish to acquire a different number of licenses in different large PEAs, thus making an FCC defined bidding aggregation undesirable for them, also. Therefore, we decline to adopt a bidding aggregation and will instead permit bidders to bid for blocks in any or all of the individual PEAs.

6. Bidding Eligibility and Activity Rule

209. In order to ensure that the auction moves quickly and to promote a sound price discovery process, bidders will be required to maintain a minimum, high level of activity in each round of the auction in order to maintain bidding eligibility. As discussed above, the Commission will use upfront payments to determine initial (maximum) eligibility, the maximum number of blocks as measured by their associated bidding units a bidder demands at the start of the auction.⁶²³ Bidding eligibility will be reduced as the auction progresses if a bidder does not meet the activity requirement.

210. Specifically, bidders must be active on at least 95 percent of their bidding eligibility in all regular clock rounds to maintain their bidding eligibility.⁶²⁴ However, the activity requirement may be further altered (by, for example, establishing a 98 or 100 percent threshold) before and/or during the auction as circumstances warrant.⁶²⁵ Any changes to the activity requirement will be announced via the auction system.

211. The activity rule will be satisfied when a bidder has bidding activity on blocks with bidding units that total at least 95 percent of its current eligibility in the round. If the activity rule is met, then the bidder's eligibility will not change in the next round. Failure to maintain the requisite activity level will result in a reduction in the bidder's eligibility, possibly curtailing or eliminating the bidder's ability to place additional bids in the auction. A bidder's activity level will reflect its demands as applied by the auction system during bid processing.⁶²⁶ Thus, if a bidder requests a reduction in the quantity of blocks it demands in a category, but the auction system does not apply the requested reduction because demand for the category would fall below the available supply, the bidder's activity will reflect its unreduced demand.⁶²⁷

⁶²⁰ See *Auction 1000 Comment PN*, 29 FCC Rcd at 18808–09, para. 184.

⁶²¹ See The Associations Comments at 5–6 (“[t]he decision against package bidding will increase participation and competition in the Incentive Auction”).

⁶²² See, e.g., *id.* at 5; U.S. Cellular Comments at 24.

⁶²³ See § IV.B.2 (Upfront Payment Due After Initial 600 MHz Band Plan Determined).

⁶²⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15809, para. 186. An activity rule requires bidders to bid actively throughout the auction to maintain bidding eligibility, rather than wait until late in the auction before participating. In the forward auction, the activity rule will provide an incentive for bidders to participate in each round of the auction. See *id.* at 15809, para. 186 n.315.

⁶²⁵ See, e.g., *Auction 97 Procedures PN*, 29 FCC Rcd at 8432, para. 162.

⁶²⁶ See § VI.A.4 (Reducing Demand, Bid Types, and Bid Processing).

⁶²⁷ See *id.*

212. While the record supports an activity rule that requires significant bidder participation,⁶²⁸ some commenters argue that the proposed 92–98 percent threshold is too aggressive,⁶²⁹ will disadvantage smaller carriers,⁶³⁰ and may limit a bidder’s ability to move its bids between markets.⁶³¹ Commenters propose setting the threshold at 80 percent and only increasing it during later stages of the auction.⁶³² We find that the 95 percent threshold we adopt is appropriate for the clock phase of the forward auction. Although the Commission has sometimes used an 80 percent activity requirement in simultaneous multiple round (“SMR”) auctions, having an activity requirement significantly below 100 percent in the clock phase of the forward auction would create uncertainty with respect to the exact level of bidder demand, interfering with the basic clock price-setting and winner determination mechanism, providing less helpful price-discovery information to bidders, and unduly prolonging the bidding process. As bidders plan their bidding strategies, they need accurate information about relative prices and the level of excess demand in different markets, and if significant bidding eligibility is held back, the available price and demand information will be less reliable. At the same time, we recognize that some flexibility will be helpful for bidders choosing between two categories of generic licenses across as many as 416 PEAs. We find that the 95 percent threshold we adopt will satisfy the requirements of the clock auction format and ensure that accurate price discovery information is available for bidders, while also providing bidders with adequate flexibility.⁶³³ Further, based on our experience with prior spectrum license auctions, we expect that the activity rule we adopt will foster an appropriate bidding pace and ensure that each stage of the forward auction closes within a reasonable period of time.

213. For these same reasons, we do not provide for activity rule waivers to preserve a bidder’s eligibility in the forward auction. In previous FCC SMR auctions, when a bidder’s eligibility in the current round was below a required minimum level, the bidder was able to preserve its current level of eligibility with a limited number of activity rule waivers.⁶³⁴ Several commenters support the use of such waivers in the forward auction.⁶³⁵ Allowing such waivers, however, would cause the same problems that we are concerned about with respect to the activity requirement. Thus, the auction system will require bidders to reconfirm their bids in every round and will not provide bidders with activity rule waivers.⁶³⁶

⁶²⁸ See, e.g., AT&T Comments at 48 (“AT&T supports the Commission’s proposal to adopt an activity rule that requires significant participation.”).

⁶²⁹ See, e.g., CTIA Comments at 23.

⁶³⁰ See, e.g., C Spire Comments at 5; CCA Comments at 15–16; CCA Reply at 32.

⁶³¹ See, e.g., Sprint Comments at 51; see also CCA Reply at 32. Sprint also claims that a high activity requirement will hamper a bidder’s ability to move bids between licenses in a market. Sprint Comments at 51. But as CCA correctly notes, because the same number of bidding units will be assigned to all blocks in a PEA, the activity requirement will not affect a bidder’s ability to move its bids within a market. CCA Comments at 15.

⁶³² See, e.g., AT&T Reply at 30; C Spire Comments at 5; CCA Comments at 16–17; CTIA Comments at 23; Sprint Comments at 50–51; see also AT&T Comments at 48.

⁶³³ As set forth above, we adopt procedures to permit all-or-nothing bids, which will also provide some bidding flexibility. See § VI.A.4 (Reducing Demand, Bid Types, and Bid Processing).

⁶³⁴ See, e.g., *Auction of H Block Licenses in the 1915-1920 MHz and 1995-2000 MHz Bands Scheduled for January 14, 2014; Notice and Filing Requirements, Reserve Price, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 96*, AU Docket No. 13-178, Public Notice, 28 FCC Rcd 13019, 13060, paras. 157–60 (WTB 2013).

⁶³⁵ See, e.g., AT&T Comments at 48 (arguing the Commission should provide each bidder with three activity rule waivers as it did in Auction 97); CTIA Reply at 17; see also Sprint Comments at 53 (supporting limited activity relief after the eligibility ratio falls below 1.5).

⁶³⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15809–10, para. 188.

214. While acknowledging that a clock auction format weighs against activity rule waivers, U.S. Cellular is concerned that, in their absence, bidders will need more time to adjust their bidding strategies in order to maintain their bidding eligibility before the first round following an increase to the activity requirement and after that round if bidding surges ensue.⁶³⁷ CTIA is concerned that bidders may never have time to establish a comfort level with the auction system, and asks the Commission to ensure bidders are comfortable before moving to higher activity levels.⁶³⁸ As is typical in our spectrum license auctions, these concerns will be considered in setting the bidding schedule and determining whether to move to higher activity levels as the clock phase portion of the forward auction progresses.

7. Final Stage Rule

215. We adopt procedures to implement the final stage rule, which establishes reserve price conditions that, when met, will determine that bidding in the incentive auction will end with the current stage and clearing target.⁶³⁹ Specifically, we adopt the proposed \$1.25 average price and 70 megahertz licensed spectrum clearing benchmarks, as well as the proposed method to evaluate whether the final stage rule criteria have been satisfied. We adopt a modified version of the procedures we proposed for triggering an extended round in order to limit the size of the shortfall that an extended round will attempt to close.

a. First Component

216. We adopt a \$1.25 average price and 70 megahertz licensed spectrum benchmark,⁶⁴⁰ as well as our proposed procedures for evaluating whether the first component of the final stage rule has been satisfied. Hence, the first component, which aims to ensure that winning bids for forward auction licenses reflect competitive prices, will be satisfied if, for a given stage of the auction:

- The clearing target is at or below 70 megahertz and the benchmark average price per MHz-pop for Category 1 blocks in high-demand PEAs in the forward auction is at least \$1.25 per MHz-pop; or
- The clearing target is above 70 megahertz and the total proceeds associated with all licenses in the forward auction exceed the product of the price benchmark of \$1.25 per MHz-pop, the forward auction spectrum benchmark of 70 megahertz, and the total number of pops associated with the Category 1 blocks in high-demand PEAs.

217. Based on our review of the record and past auction experience, we find that the proposed \$1.25 average per MHz-pop benchmark price balances the statutory objective of seeking to recover “a portion” of the value of the spectrum for the public with the goal of a successful incentive auction that

⁶³⁷ See U.S. Cellular Comments at 31–34; see also Sprint Comments at 53 (suggesting that as bidding progresses, the Commission should increase the activity waivers or recess allowance, ensuring that additional time is granted only to serious bidders).

⁶³⁸ See CTIA Comments at 23–24; CTIA Reply at 16–17.

⁶³⁹ We recently reaffirmed the adoption of the first component as a part of the final stage rule. *Incentive Auction Second Order on Reconsideration*, 30 FCC Rcd at 6808–09, paras. 137–41. Accordingly, to the extent commenters repeat prior challenges to that component, those arguments have been answered. To the extent they seek reconsideration of the rule’s adoption on other grounds, those arguments should have been made in a petition for reconsideration and need not be addressed in this Public Notice. We address elsewhere challenges to the use of the final stage rule in connection with establishing the spectrum reserve. See § VI.A.2.b (Market-Based Spectrum Reserve).

⁶⁴⁰ The forward auction spectrum benchmark of 70 megahertz of licenses corresponds to a spectrum clearing target of 84 megahertz. This framework for the first component of the final stage rule was established in the *Incentive Auction R&O*, 29 FCC Rcd at 6712, para. 340.

allows market forces to determine the highest and best use of spectrum.⁶⁴¹ A number of commenters supported a benchmark price of \$1.25.⁶⁴² We disagree with commenters who argue that \$1.25 is either too low⁶⁴³ or too high.⁶⁴⁴ While recent auction results may suggest that final forward auction prices ultimately will be higher,⁶⁴⁵ the benchmark price is not a predictor of final auction prices, but rather a reserve price or “floor,” consistent with the Commission’s obligation to protect the public interest in its spectrum resources.⁶⁴⁶

218. The auction system will determine whether the price benchmark is satisfied based on the average prices for Category 1 spectrum blocks in the 40 high-demand markets.⁶⁴⁷ Commenters agree that it is unnecessary to evaluate the final stage rule based on all of the PEAs,⁶⁴⁸ although some commenters propose focusing instead on the top 25 largest markets.⁶⁴⁹ While reducing the number of markets evaluated for purposes of the final stage rule might “promote an even faster auction,” we are not persuaded that the clock prices for the top 25 largest markets would “serve as a ‘good leading indicator of

⁶⁴¹ See 47 U.S.C. § 309(j)(3)(C). Comments concerning the benchmark price for purposes of triggering the spectrum reserve and whether the spectrum reserve trigger should be decoupled from the final stage rule are discussed below. See § VI.A.2.b.ii (Spectrum Reserve Trigger).

⁶⁴² See, e.g., U.S. Cellular Comments at 6, 28; see also T-Mobile Comments at 40 (arguing that the Commission should cap the threshold at “no more than \$1.25 per MHz-POP”); CCA Comments at 33 (noting that if the Commission uses a price per MHz-pop reserve trigger, it should use the \$1.25 average price per MHz-pop benchmark).

⁶⁴³ See, e.g., Joint Media Parties Reply at 13; Local Media Comments at 6; see also Joint Media Parties Reply at 13–14 (“[T]he Commission should consider placing a premium on the ‘beachfront spectrum below 1 GHz’ which is of much greater value in the forward auction than the proposed \$1.25 per MHz-pop.”).

⁶⁴⁴ See, e.g., Verizon Comments at 10, 17 (“[I]f the Commission perceives a need to retain a per-unit closing price, it should be set below \$1.25 per MHz pop.”). As noted above, we decline to address here arguments that we should eliminate the price benchmark altogether. See, e.g., CCA Comments at 32; T-Mobile Comments at 39; Verizon Comments at 10, 17.

⁶⁴⁵ Although final prices from Auction 97 (AWS-3) were not yet available at the time the *Comment PN* was released, the general price level in that auction was already apparent and we considered it in proposing the \$1.25 benchmark. See note 209 (explaining that we took the Auction 97 general price level into account when we proposed a \$900 opening base clock price).

⁶⁴⁶ See U.S. Cellular Comments at 30 (“[T]he Commission’s expressed intent to adopt a reserve price for the forward auction which ‘reflect[s] a ‘floor’ and not a ‘ceiling’ of the ‘competitive values’ of these licenses’ weighs against increasing the proposed \$1.25 price benchmark.”); see also J.H. Snider Comments at 3–4 (generally supporting measures to ensure an “adequate public return on public airwaves”).

⁶⁴⁷ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15770, para. 51. The high-demand markets include PEAs 1–40. PEAs are numbered in decreasing order of population, except that PEAs in the states are ranked before those in the territories and protectorates. Accordingly, PEAs 1–40 are the 40 most populous PEAs within the 50 states. Had territories not been ranked after the states, Puerto Rico would have been included in the most populous group. See generally *PEAs PN*, 29 FCC Rcd 6491.

⁶⁴⁸ See, e.g., CCA Comments at 33 (supporting the use of the 40 high-demand markets); U.S. Cellular Comments at 29 (“Given that the second, rather than the first, component of the final stage rule ensures that the revenue from the forward auction is sufficient to cover all of the mandatory costs and expenses set forth in the Spectrum Act, there is no need to require that the average price across all of the PEAs satisfies the price benchmark.”). But see AT&T Comments at 8, 30 (arguing that the focus on high-demand markets exacerbates the fact that the \$1.25 benchmark is too low, as values in such markets are likely to be even higher). Since the purpose of the average price benchmark is to establish a reserve price that appropriately balances the Commission’s goals, not to predict ultimate spectrum values, we decline to broaden our focus to all markets because that would fail to promote a faster auction.

⁶⁴⁹ See, e.g., T-Mobile Comments at 40; U.S. Cellular Reply at 28.

final auction revenues' to the same extent as the prices in the top 40 PEAs.⁶⁵⁰ In addition, limiting consideration of bids to Category 1 blocks will be more consistent with the price benchmark derived from past auctions, which did not include licenses impaired in a manner comparable to Category 2 licenses.⁶⁵¹ Moreover, in evaluating whether the price benchmark is satisfied, the auction system will rely on gross bids, rather than bids net of individual bidders' bidding credits or any adjustments for impairments.⁶⁵²

219. The 70 megahertz licensed spectrum benchmark we adopt corresponds with the spectrum recovery scenario in which an 84 megahertz clearing target is selected and licenses for 70 megahertz of spectrum are offered in the forward auction.⁶⁵³ Incorporating a spectrum benchmark into the final stage rule's first component "recognizes that if the incentive auction repurposes a relatively large amount of spectrum for flexible uses, per-unit market prices may be expected to decline consistent with the increase in available supply."⁶⁵⁴ In proposing this threshold for the spectrum benchmark, we explained that a 70 megahertz spectrum benchmark would repurpose the UHF spectrum between television channel 37 and the 700 MHz Band and would enable multiple bidders to obtain low-band spectrum, thereby promoting our competitive goals for the incentive auction.⁶⁵⁵ No commenters disagreed with our proposal.

220. For clearing targets higher than 84 megahertz, the auction system will consider current auction proceeds for all licenses in evaluating whether the first component of the final stage rule is satisfied.⁶⁵⁶ Accordingly, for forward auction stages in which more than 70 megahertz of licensed spectrum is available in the forward auction, the first component will be satisfied if current auction proceeds for all blocks—Category 1 and Category 2, in all PEAs—exceed the proceeds generated by the Category 1 blocks in the 40 high-demand PEAs at the benchmark price of \$1.25 per MHz-pop and benchmark clearing target of 70 megahertz. On balance, when the clearing target is relatively high, we find that the simplicity of comparing total auction proceeds for all blocks to the benchmark proceeds, which is based only on the high-demand PEAs, outweighs any concern for consistency in including only some markets in both sides of this metric. Total auction proceeds information will be available to the public after each round, and the proceeds benchmark is a fixed number for each clearing target, making it very easy to evaluate whether this component of the final stage rule is satisfied. Moreover, in stages with higher clearing targets, the \$1.25 benchmark price is relaxed as long as overall revenues are sufficient; hence the tie to the high-demand PEAs is less important in this context.

⁶⁵⁰ See, e.g., U.S. Cellular Reply at 28.

⁶⁵¹ See T-Mobile Comments at 41; see also U.S. Cellular Comments at 29–30 (arguing that it would be inappropriate to include the clock prices for Category 2 licenses in the determination of whether the average clock price satisfies the proposed benchmark as it is based on Auction 73 results and the Category 2 licenses will have far greater impairments than the majority of licenses offered in Auction 73).

⁶⁵² See CCA Comments at 33 (supporting the use of gross bids in evaluating the price per MHz-pop trigger); T-Mobile Comments at 41 (arguing that the Commission should ensure that designated entity discounts on a bid in subsequent phases of the auction are not factored into the price per MHz-pop trigger); U.S. Cellular Comments at 30 (arguing that there is no need to take a conservative approach based on net bids for the first component, as compared to the second component, since the first component is not tied to the statutory requirements).

⁶⁵³ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15770, para. 50; see also T-Mobile Comments at 41 (stating that the 70 megahertz clearing target is consistent with the Commission's goal of enabling multiple bidders to obtain low-band spectrum).

⁶⁵⁴ *Incentive Auction R&O*, 29 FCC Rcd at 6713, para. 342.

⁶⁵⁵ We are adopting the 70 MHz benchmark for the specific purpose of establishing the final stage rule. It should not be construed as a target or projection for the amount of spectrum we anticipate clearing in the incentive auction.

⁶⁵⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15771, para. 53.

b. Second Component – Cost Elements

221. We adopt our proposed procedures for implementing the second component of the final stage rule.⁶⁵⁷ Bidding in the reverse auction will determine the first cost element—winning bidder payments required for broadcasters. With respect to the second element, the Commission’s relevant administrative costs, we estimate these costs at \$226 million. We intend to update these costs no later than the commencement of bidding in the clock phase of the forward auction. For the third element, we proposed that broadcaster relocation costs be estimated at \$1.75 billion, the maximum amount that the Spectrum Act permits the Commission to deposit in the TV Broadcaster Relocation Fund. To be prudent, we will use that estimate when calculating expenses for the purposes of evaluating the costs component of the final stage rule.⁶⁵⁸ While we concluded in the *Incentive Auction R&O* that the forward auction proceeds also must cover any Public Safety Trust Fund amounts still needed to provide the funds for FirstNet specified in the Spectrum Act,⁶⁵⁹ proceeds from the recent H Block and AWS-3 spectrum auctions are sufficient to fully fund the \$7 billion provided to FirstNet.⁶⁶⁰ Therefore, the procedures we adopt need not include any amounts to cover FirstNet expenses.⁶⁶¹

222. We adopt our proposed approach to bidding credits and other discounts from clock phase prices for purposes of applying the second component of the final stage rule. The auction system will consider current total proceeds (for all PEAs and both categories of blocks), net of any discounts based on impairments and small business bidding credits claimed by particular bidders on their short-form applications for Auction 1002.⁶⁶² The auction system will presume that the bidder with the largest bidding credit will win the quantity of blocks on which it is bidding and then proceed to the bidder with the next largest bidding credit and so on, until there are no more blocks left. Moreover, since bidders will be bidding on generic blocks rather than specific licenses at the time the final stage rule is evaluated, the auction system will presume that bidders with larger bidding credits will win blocks that are less impaired and thus, subject to less adjustment based on the extent of impairment. If the supply of blocks in a category exceeds the aggregate demand in that category, the system will presume that any unsold blocks will be those that are least impaired. While this approach will likely underestimate net proceeds, it will not be possible to know more exact amounts at the time of the evaluation, and we find that it is appropriate to adopt a conservative approach when ensuring that statutory requirements are met.

⁶⁵⁷ *Id.* at 15771–74, paras. 55–63.

⁶⁵⁸ The actual amount that will be needed to reimburse broadcasters from the TV Broadcaster Relocation Fund will not be known until sometime after the auction. The Spectrum Act provides that the forward auction must generate proceeds sufficient to meet the Commission’s *estimate* of the total expenses, as opposed to the actual amount. *See* 47 U.S.C. § 1452(c)(2).

⁶⁵⁹ *Incentive Auction R&O*, 29 FCC Rcd at 6714, para. 345.

⁶⁶⁰ Detailed auction results for Auctions 96 (H Block) and 97 (Advanced Wireless Services (AWS-3)), respectively, are available on the FCC’s Auctions website. *FCC Auctions: Summary: Auction 96*, FCC, http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=96 (last updated Feb. 28, 2014); *FCC Auctions: Summary: Auction 97*, FCC, http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=97 (last updated Oct. 1, 2014).

⁶⁶¹ *See* Letter from Keith Hall, Director, Cong. Budget Office, to Sen. Dean Heller, U.S. Senate at 3 (dated April 21, 2015), *available at* <http://www.cbo.gov/sites/default/files/cbofiles/attachments/HellerLtrProceedsFromAuctions.pdf> (“Because the amounts deposited into the PSTF from auctions completed in 2015 or earlier are expected to equal \$28 billion, CBO anticipates that the proceeds from the incentive auction that are not deposited into the TVBRF or used for auction expenses will be deposited into the general fund and will have the effect of reducing the deficit.”).

⁶⁶² *See* § VI.C (Forward Auction – Final Winning Bid Amounts).

223. We will not make adjustments for any Tribal lands bidding credits in evaluating the second component of the final stage rule. Instead, consistent with previous spectrum auctions, any subsequent Tribal lands awards will be limited to available funds that exceed the relevant reserve price.⁶⁶³

c. Evaluation Each Round

224. As long as the final stage rule has not yet been met, the auction system will evaluate after each round of forward auction bidding whether forward auction proceeds are sufficient to satisfy the two components of the final stage rule.⁶⁶⁴ The auction system will make the needed calculations as part of the round results processing in order to establish as soon as possible whether the incentive auction will conclude after forward auction bidding ends at the current clearing target. As discussed above, data indicating the progress of the auction in meeting the various components of the final stage rule will be made public after each round of the forward auction.⁶⁶⁵

d. Allocating Demand for Purposes of the Spectrum Reserve

225. We adopt our proposed procedure to allocate demand in order to initiate bidding for the spectrum reserve. At the time the final stage rule is met, Category 1 blocks in each PEA will be split into separate reserved and unreserved categories, with a separate price clock for each new category.⁶⁶⁶ In the first round following the round in which the final stage rule is met, the clock price will be the same for reserved and unreserved Category 1 blocks, but prices for the two categories may diverge in later rounds depending upon the extent of excess demand in the separate categories going forward. To allocate the pre-“split” demands of bidders for Category 1 blocks into the reserved and unreserved categories, the auction system first will assign all demand by non-reserve-eligible bidders to the unreserved category, and then will assign demand by reserve-eligible bidders to the reserved category up to the point where demand for reserved blocks is equal to supply.

226. Specifically, the auction system will first allocate demand for one block to the reserved category for each reserve-eligible bidder in turn, then demand for a second block, and so on until the total demands allocated to the reserved category equal the supply of reserved blocks.⁶⁶⁷ Thus, any excess demand will be for unreserved Category 1 blocks. The auction system will apply the remaining demand of reserve-eligible bidders to unreserved Category 1. We adopt this approach because allocating demands in this way—as opposed to assigning all demand by reserve-eligible bidders to the reserved category—avoids the possibility of excess supply of unreserved Category 1 blocks after the split, which could result in unsold licenses and lower revenues than when the final stage rule was deemed to have been met.⁶⁶⁸ As

⁶⁶³ See 47 C.F.R. § 1.2110(f)(3)(v). This rule is applicable in, among others, “any auction with reserve price(s) in which the Commission specifies that the provision shall apply.” *Id.*; see also, e.g., *Auction of Advanced Wireless Licenses Scheduled for June 29, 2006; Notice and Filing Requirements, Minimum Opening Bids, Upfront Payments and Other Procedures for Auction No. 66*, AU Docket No. 06-30, Public Notice, 21 FCC Rcd 4562, 4625–27, paras. 251–56 (2006).

⁶⁶⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15774–75, para 67. No commenters address our proposed procedures. As addressed in § VII.C.1 (Transition, If Necessary, To Any Subsequent Stage), in a new stage, the final stage rule will be evaluated after bidding in the first clock round of the forward auction is complete.

⁶⁶⁵ See § VI.A.1.b (Forward Auction – Bidding Information).

⁶⁶⁶ See § VI.A.2.b (Market-Based Spectrum Reserve).

⁶⁶⁷ The order of reserve-eligible bidders will be chosen pseudo-randomly.

⁶⁶⁸ As noted in the *Auction 1000 Comment PN*, this could occur if the demands for Category 1 prior to the split came disproportionately from reserve-eligible bidders. If all those demands were transferred to the reserved category after the split, demand for unreserved Category 1 blocks could be less than the supply, even if demand exceeds supply in the pre-split Category 1. Excess supply cannot occur in the reserved category because the actual number of blocks that will be reserved in a PEA will not be greater than the number of Category 1 licenses demanded by reserve-eligible bidders at the time the auction reaches the spectrum reserve trigger. See *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, para. 187; see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15799–801, paras. 150–55.

discussed elsewhere, avoiding such an outcome is an important principle in designing the forward auction.⁶⁶⁹ In the bidding rounds that follow the implementation of the spectrum reserve, bidders will be able to switch their bids between the separate categories of reserved Category 1, unreserved Category 1, and Category 2 blocks, consistent with our adopted bidding procedures.⁶⁷⁰

227. We clarify that no bidder's demand for blocks in a category will be allowed to exceed the total available supply in the category in the PEA after the split.⁶⁷¹ Thus, if the pre-split demand of a non-reserve-eligible bidder exceeds the supply of blocks in the unreserved category, the bidder's demand for the unreserved blocks will be reduced to the available supply. If, after the system allocates the reserve-eligible bidders' demands to the reserved category as described above, a reserve-eligible bidder's remaining pre-split demand exceeds the total number of blocks available in the unreserved category, the bidder's demand for the unreserved blocks will be reduced to the available supply. Non-reserve-eligible and reserve-eligible bidders will maintain the bidding eligibility associated with any demand that cannot be assigned to a category, and will be able to use such bidding eligibility in other PEAs or in other categories in the next round.⁶⁷² A reserve-eligible bidder that has its demands reduced can use the eligibility to bid in the reserved category, if it wishes.

8. Extended Round Procedures

a. Triggering an Extended Round

228. We adopt the procedures we proposed for triggering an extended round, with one modification. An extended round will be implemented if the final stage rule is not satisfied but bidding activity has stopped—that is, if demand does not exceed the available supply—for Category 1 blocks in the 40 high-demand markets.⁶⁷³ Since bidding in these markets generally serves as a leading indicator of final auction proceeds, we find that basing the trigger on bidding for Category 1 blocks in the high-demand markets will be a reliable predictor of whether the final stage rule can be satisfied in the current stage.⁶⁷⁴ The auction system will not implement an extended round, however, if bidding activity has

⁶⁶⁹ See, e.g., § VI.A.4 (Reducing Demand, Bid Types, and Bid Processing).

⁶⁷⁰ In this regard, contrary to AT&T's suggestion, the procedure we adopt for allocating demand at the time of the split will not prevent reserved spectrum prices from rising. See Letter from Joan Marsh, Vice President-Regulatory Affairs, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 at 1 (filed July 1, 2015) ("We understand that . . . when the final stage rule is met, if total demand by reserve eligible bidders exceeds supply of reserve spectrum, the excess demand will be allocated exclusively to the unreserved auction. Thus, by design, the clock price in the reserve auction will stop (because demand will equal supply), but the clock price in the unreserved auction will continue to rise as long as demand in that auction exceeds supply."). In rounds after the split, reserve-eligible bidders may switch to bidding for reserved blocks if the price for unreserved blocks is rising more quickly than the price of reserved blocks. As explained above, the bidding procedures we adopt for the forward auction will mitigate the risk that reserve-eligible bidders can engage in strategic bidding for non-reserved blocks. See § VI.A.2.b.vi (Other Proposals Related to Bidding by Reserve-Eligible Entities).

⁶⁷¹ This is consistent with the general rule that no bidder's demand for blocks in a category may exceed the total available supply in a category. See § VI.A.4 (Reducing Demand, Bid Types, and Bid Processing).

⁶⁷² For example, assume the supply of Category 1 blocks in a PEA is seven. Prior to the split, reserve-eligible bidder 1 ("RE1") and non-reserve-eligible bidder 1 ("NRE1") each demand seven blocks, and two other reserve-eligible bidders each demand one Category 1 block. At the split, three Category 1 blocks are reserved, leaving four unreserved blocks. NRE1's demand for Category 1 blocks in the PEA will be reduced to four, and NRE1 will have three blocks' worth of excess eligibility to use in another PEA. Pursuant to the allocation method we adopt, one block worth of RE1's demand will be assigned to one reserved block, and the other two reserve-eligible bidders' demand will be assigned to the other two reserved blocks, so that demand in the reserved category equals supply. Four blocks' worth of RE1's remaining six blocks of demand will be assigned to the unreserved category, and RE1 will have two blocks' worth of excess eligibility to use in another PEA.

⁶⁷³ High-demand markets are PEAs 1–40, as described in § VI.A.7.a (Final Stage Rule – First Component).

⁶⁷⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15769–71, paras. 47–54.

stopped for Category 1 blocks in the high-demand markets but the gap between current forward auction proceeds (from all blocks in all PEAs) and the amount needed to meet the final stage rule exceeds 20 percent of current auction proceeds.⁶⁷⁵ Instead, the auction will move to a new stage without an extended round. This modification of our proposed procedures addresses concerns that bidding dynamics and price discovery may be distorted if the auction system attempts to raise a large portion of auction proceeds in a single round on only a subset of the available blocks.⁶⁷⁶

229. We decline to accept AT&T's suggestion that an extended round not be triggered until bidding has ended in all or almost all of the PEAs.⁶⁷⁷ AT&T's suggested approach would undercut the purpose of the extended round, which is to avoid running what may be a very large number of bidding rounds before ascertaining that the final stage rule cannot be met in the current stage.

b. Extended Round Bidding Procedures

230. We adopt our proposed extended round bidding and bid processing procedures, which are described in detail in Appendix G of the *Auction 1000 Comment PN*.⁶⁷⁸ Under these procedures, extended round bidding will be conducted only for Category 1 blocks in high-demand markets, the same set of licenses considered in triggering the extended round and applying the first component of the final stage rule. Because bidding will have stopped on these blocks, the currently winning bidders are very likely to become the winning bidders when the clock phase ends and, hence, they will have a strong incentive to try to ensure that the final stage rule can be met.⁶⁷⁹ Moreover, asking participants that are bidding for the most valuable licenses to accept an extended round increment will not pose an unreasonable burden, since proceeds for comparable licenses typically account for a very large fraction of revenues in other spectrum auctions.⁶⁸⁰ Therefore, we decline to adopt AT&T's suggestion to include all available licenses in the extended round bidding.⁶⁸¹

231. Under the procedures we adopt, the auction system will set an extended round clock price increment for Category 1 blocks in each high-demand PEA that is 33 percent larger than the increment required to satisfy the final stage rule.⁶⁸² This required amount will be the amount needed to meet the first

⁶⁷⁵ Information on progress toward meeting the final stage rule, including the shortfall, will be made public during the auction. See § VI.A.1.b (Forward Auction – Bidding Information).

⁶⁷⁶ See AT&T Comments at 45–46, Attachment A at 3, 15–16. T-Mobile also expressed concern that if there is a large shortfall in proceeds, some bidders may not be able to accept the full extended round increment, which could result in a reduction in the number of reserved blocks available in a subsequent stage. Letter from Trey Hanbury, Counsel, T-Mobile, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269 at 2 (filed Jan. 22, 2015).

⁶⁷⁷ See AT&T Comments at 46 (“[P]ermitting the clock phase to continue until demand equalizes with supply in non-high-demand PEAs could very well result in the final stage rule being met.”).

⁶⁷⁸ Other than AT&T's disagreement with our proposal to limit extended round bidding to high-demand PEAs, which is addressed below, commenters did not address these proposals.

⁶⁷⁹ Bidders in less settled markets may be less inclined to accept their allocated share of an extended round increment, which may in turn reduce the chances that the extended round will meet the final stage rule.

⁶⁸⁰ This is especially so given our decision to limit the circumstances in which the extended round will be implemented to ensure that the shortfall in proceeds is not too large. See *Auction of Advanced Wireless Services Licenses Closes; Winning Bidders Announced for Auction No. 66*, Report No. AUC-06-66-F, Public Notice, 21 FCC Rcd 10521, 10529–84, Attachment A (WTB 2006); *Auction of 700 MHz Band Licenses Closes*, Report No. AUC-08-73-I, Public Notice, 23 FCC Rcd 4572, 4583–656, Attachment A (WTB 2008).

⁶⁸¹ AT&T Comments at 45–46, Attachment A at 3. AT&T argues that including all licenses would increase the chances that the final stage rule can be satisfied.

⁶⁸² The same percentage increment will be applied to Category 1 blocks in each high-demand PEA, such that the additional proceeds over all the areas would equal 133 percent of the amount needed to meet the shortfall. See

(continued....)

or second components of the rule, whichever is greater.⁶⁸³ Setting the clock price 33 percent higher than the minimum amount necessary to meet the reserve price will enable the extended round to satisfy the rule even if a market clearing price in some PEAs is less than proportional to the full gap in proceeds, by permitting bidders in markets with higher market clearing prices to make up for the difference in needed proceeds.

232. A bidder in the extended round will be permitted to accept the clock price for the blocks it demands or to submit an intra-round bid that requests a reduction of one block at a price lower than the clock price.⁶⁸⁴ The auction system will consider bids in all PEAs for which there is extended round bidding in increasing order of price point (and random number in the case of ties).⁶⁸⁵ At the lowest price point at which the auction system encounters an intra-round bid in a given PEA, the uniform price applying to Category 1 blocks in that PEA will stop increasing. The auction system will stop processing bids if it reaches a point where the total additional proceeds associated with the extended round prices in the high-demand PEAs together are sufficient to meet the final stage rule.⁶⁸⁶ Hence, prices in high-demand PEAs where there is an intra-round bid will stop increasing when bid processing reaches the price point of the first requested reduction if the final stage rule has not yet been met. In high-demand PEAs without a reduction request, prices will stop at the price point at which the final stage rule is met.

233. If the final stage rule is met in the extended round, the uniform price applying to all Category 1 blocks in each high-demand market will increase only as much as needed to meet the final stage rule. Regular clock rounds will resume with the spectrum reserve in place, and clock rounds will continue as long as there is excess demand in any category in any PEA. In PEAs where there was extended round bidding, clock prices for Category 1 blocks in the first new clock round will be based on the extended round stopped price. Where there was no extended round bidding—that is, for Category 2 blocks and Category 1 blocks in non-high-demand PEAs—clock prices in the next clock round will be based on prices from the last regular clock round. However, even if in the extended round the price stopped in a PEA at an intra-round price point at which a bidder requested a reduction, the reduction will not be applied to the bidder's demands, since applying the reduction would result in excess supply. The bidder will still demand the quantity it demanded going into the extended round, but at the stopped price.

234. If the final stage rule cannot be met in the extended round, the current stage of the auction will end and a new stage will begin. In PEAs where there was extended round bidding, clock prices for the first round of the forward auction in a new stage will be based on the extended round stopped price in PEAs where a reduction was requested, and on the extended round clock price if no reduction was requested.⁶⁸⁷ In contrast to the case where the final stage rule is met, if a bidder requested a reduction that stopped the price in the extended round, the auction system will apply that reduction to the bidder's demands going into the next stage. Since a bidder can request a reduction of at most one block in the extended round, and the stage transition procedures we adopt generally will reduce the supply of blocks in

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Auction 1000 Comment PN, 29 FCC Rcd at 15893–95, App. G. High-demand PEAs where there is excess supply will not be included in extended round bidding.

⁶⁸³ See § VI.A.7 (Final Stage Rule).

⁶⁸⁴ Only bidders that demanded blocks in the previous round in the category may bid in the extended round. A bidder will not be able to request an increase in demand in the extended round.

⁶⁸⁵ A quasi-random number will be associated with each bid as it is submitted.

⁶⁸⁶ This point may not necessarily correspond to a price-point at which an intra-round bid is submitted.

⁶⁸⁷ If there was no extended round bidding, i.e., for Category 2 blocks and Category 1 blocks in non-high-demand PEAs, clock prices in the new stage will be based on the last regular clock round. See § VII.C.1.b (Transition – Clock Price).

a PEA by one block,⁶⁸⁸ we find that allowing a single extended round reduction to be applied will not unduly risk creating unsold licenses.

9. Stopping Procedures

235. The auction system will employ a simultaneous stopping rule for the clock phase of the forward auction in the final stage.⁶⁸⁹ Specifically, if the final stage rule has been met (with or without an extended round), the clock phase of bidding will end for all categories of licenses following the first round in which there is no excess demand in any category in any PEA. Forward auction bidders that are still expressing demand for a category of a PEA at the time the stopping rule is met will become the winning bidders, and will be assigned specific frequencies in the assignment phase.

B. Assignment Phase

236. The assignment phase will determine which frequency-specific licenses will be won by the winning bidders of generic blocks during the clock phase. In the assignment phase, winning bidders will have the opportunity to bid for preferred combinations of frequency-specific licenses. A bidder can assign a price using a sealed bid to one or more possible frequency assignments for which it wishes to express a preference, consistent with its winning bids for generic blocks in the clock phase.⁶⁹⁰ The bid prices will represent a maximum payment that the bidder is willing to pay for the frequency-specific license assignment, in addition to the final price established in the clock phase for the generic blocks, which may be subject to an impairment discount.⁶⁹¹ The procedures we establish will determine the optimal assignment of licenses within each PEA by first considering a series of spectral contiguity objectives and then, if there are multiple arrangements that meet the contiguity objectives, determine assignments based on bid amount in the assignment phase.⁶⁹²

237. We generally adopt the assignment round procedures proposed in the *Auction 1000 Comment PN*, except that in response to concerns expressed by commenters we will not group PEAs when any of the licenses are at all impaired.⁶⁹³ This modified approach to grouping PEAs will ensure that bidders can express divergent frequency preferences for impaired licenses across geographic areas.

1. Availability of Auction-Related Information to Bidders

238. Prior to commencement of bidding in the assignment phase, the auction system will inform all winning bidders from the clock phase of the extent to which contiguous blocks feasibly may be assigned in every PEA.⁶⁹⁴ More specifically, the auction system will provide information with respect to each PEA on whether, consistent with the contiguity objectives discussed below: (1) it is possible to

⁶⁸⁸ See § VII.C.1 (Transition – License Inventory by Category and PEA).

⁶⁸⁹ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15812, para. 195. We received no comment on this proposal.

⁶⁹⁰ For instance, if a bidder won two Category 1 blocks and one Category 2 block in the clock phase, then it will only be offered the option of bidding for frequency assignments with exactly two Category 1 licenses and one Category 2 license. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15896–906, App. H.

⁶⁹¹ See § VI.A.2.a (Forward Auction – Bidding Categories).

⁶⁹² As a simple example, assume four identical blocks are available in a PEA, and two bidders won two blocks each in the clock phase, and each was presented with bidding options for contiguous blocks AB and CD. One bidder bid 10 for AB and 0 for CD, the other bidder bid 12 for AB and 0 for CD in the assignment phase. The auction system will assign AB to the second bidder, and CD to the first bidder.

⁶⁹³ See § VI.B.2.a (Grouping of PEAs). Further details on the assignment phase procedures we adopt, subject to the modifications discussed below, are provided in Appendix H to the *Auction 1000 Comment PN*. 29 FCC Rcd at 15896–906, App. H.

⁶⁹⁴ This applies to all blocks in the PEA irrespective of whether they are in Category 1 or Category 2, reserved or unreserved, or are impaired to varying extents.

assign contiguous blocks to all winning bidders in the clock phase, or, if not, (2a) that it is possible to assign at least two contiguous blocks to all winning bidders of two or more blocks in the clock phase, or (2b) that it is not possible to assign at least two contiguous blocks to all winning bidders of two or more blocks in the clock phase.⁶⁹⁵ This information will enable a bidder to assess the likelihood of being assigned contiguous blocks, and the extent to which contiguity may be possible across PEAs. Providing such information about all PEAs to all winning bidders, rather than only to winners in each specific PEA, averts the risk that winning bidders in a large number of PEAs will gain an undue advantage over others.

239. In addition to the foregoing information, the auction system will provide to each assignment phase bidder a menu of bidding options consisting of possible configurations of frequency-specific licenses on which it can bid in each PEA in which it holds winning clock phase bids, as U.S. Cellular proposed.⁶⁹⁶ These bidding options will be consistent with the bidder's clock phase winnings and the information described above.⁶⁹⁷ Providing such information will facilitate participation in the assignment phase, particularly for smaller bidders with fewer resources to expend on analysis, by limiting the number of frequency configurations on which they need to consider for the assignment phase.⁶⁹⁸

240. The auction system will provide clock phase winning bidders with the above-stated information as soon as possible and announce a schedule of assignment phase rounds that will commence beginning no less than five business days later.⁶⁹⁹ While CTIA advocates at least 10 days between the provision of detailed information and the commencement of the assignment phase,⁷⁰⁰ we find that five days will be sufficient for bidders to prepare given the information that will be made available to facilitate bidding in the assignment phase.⁷⁰¹

241. When an assignment round concludes, the auction system also will advise the bidders in each PEA of their own payments and assignments.

2. Structure of the Assignment Phase

a. Grouping of PEAs

242. We adopt our proposed requirements for grouping PEAs for assignment phase bidding purposes, with an additional requirement in response to concerns expressed by commenters regarding bidding for licenses with impairments. Specifically, the auction system will group together PEAs in a single assignment round only if all of the following three conditions are met:

⁶⁹⁵ The auction system will determine the potential for contiguous frequency assignments, as well as the assignment phase bidding options provided to each bidder, based on the availability of frequency-specific licenses corresponding to Category 1 and Category 2 blocks in the PEA (or group of PEAs), and the contiguity objectives that are possible given the particular mix of bidders and the categories of their clock phase winnings.

⁶⁹⁶ See U.S. Cellular Comments at 15–16.

⁶⁹⁷ The auction system may, in some cases, offer a bidder assignment bidding options that include combinations that are not possible for the bidder to win, given the winnings of other bidders, in order to avoid disclosing too much information about the winning bids of other bidders. In other cases, if there is only one possible assignment in a PEA given a bidder's winnings (for example, if a bidder won the only available Category 2 block and no Category 1 blocks), the bidder may not be offered a bidding option but will be assigned to that option by the auction system.

⁶⁹⁸ See, e.g., U.S. Cellular Comments at 15–16 (proposing that if more than one assignment plan satisfies all of the objectives, the Commission should disclose to each bidder, but not publicly, the different blocks, or combinations of blocks, that could be assigned to that bidder).

⁶⁹⁹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 70.

⁷⁰⁰ CTIA Comments at 15.

⁷⁰¹ See T-Mobile Comments at 39 (supporting an interval of at least five business days between the close of the clock phase and the start of the assignment phase).

- 1) The PEAs are one of the following:
 - a) All high-demand, regardless of Regional Economic Area Grouping (“REAG”);⁷⁰²
 - b) All in the same REAG and not subject to the small market bidding credit cap;⁷⁰³ or
 - c) All in the same REAG and are subject to the small market bidding credit cap;
- 2) Each PEA in the group has the exact same number of blocks, all of which are Category 1 blocks and are zero percent impaired; and
- 3) Each PEA in the group has the same mix of clock phase winners and winnings.⁷⁰⁴

243. These requirements will assure that in any grouping, assignment round bidders will be presented with a set of PEAs with blocks with the same characteristics, which should reduce uncertainty and simplify bidding for all bidders. No PEAs will be grouped in the assignment phase if any of the blocks are considered impaired.⁷⁰⁵ Our modified approach addresses concerns raised by commenters, including Sprint, U.S. Cellular, and others,⁷⁰⁶ that the approach we proposed might not give bidders sufficient flexibility to express preferences for assignments in cases where PEAs with licenses in the same category are impaired differently but are grouped together for bidding.⁷⁰⁷

b. Intra-PEA Contiguity Objectives

244. The auction system will use an optimization process to determine for each PEA or PEA group various possible configurations of frequency-specific licenses consistent with the pattern of winning bidders and block categories from the clock phase. More specifically, the auction system will apply the following contiguity objectives, taking into account both Category 1 and Category 2 blocks:⁷⁰⁸ (1) for bidders that win multiple blocks, maximize the number of bidders that are assigned at least two contiguous blocks; (2) for bidders that win multiple blocks, minimize the number of blocks that are non-contiguous to any of the bidder’s other blocks; (3) maximize the number of bidders that are assigned only contiguous blocks; and (4) maximize the number of pairs of unsold blocks that are contiguous as long as

⁷⁰² High-demand markets are PEAs 1–40, as described in § VI.A.7.a (Final Stage Rule – First Component).

⁷⁰³ Markets that are subject to the small market bidding credit cap are those PEAs with a population of 500,000 or less, which corresponds to PEAs 118–416, excluding PEA 412. *Part 1 R&O*, 30 FCC Rcd at 7546, para. 127 (“[N]o winning DE bidder will be able to obtain more than \$10 million in bidding credits for licenses won in PEAs 118–416, with the exception of PEA 412 (Puerto Rico), which exceeds the 500,000 pop threshold.”).

⁷⁰⁴ For example, in all PEAs in the group there are five Category 1 blocks with zero percent impairment. Bidder A won one block in each of the PEAs in the group. Bidder B won one block in each of the PEAs, and Bidder C won three blocks in each of the PEAs.

⁷⁰⁵ That is, all blocks will be considered 0 percent impaired.

⁷⁰⁶ See Sprint Comments at 32–33; U.S. Cellular Comments at 24. Sprint additionally argues that if bidders have the opportunity to express and respond to preferences at earlier stages in the auction, efficient outcomes would be more likely. Sprint Comments at 32–33.

⁷⁰⁷ Sprint Comments at 32–33 (arguing that the proposed grouping procedures make it so that carriers would have to apply their preference for specific frequencies evenly across all grouped PEAs despite varying toleration for such impairment between markets); U.S. Cellular Reply at 27 (urging the Commission to reject its grouping proposal because it would limit bidders’ ability to express their preferences and proposing that if the Commission uses grouping, it should only group together PEAs that do not contain licenses with greater than 5 percent impairment); U.S. Cellular Comments at 24 (“[I]f a bidder desires a particular block in one PEA because it lacks impairments, the bidder would have no choice but to also acquire that same block in one or more additional PEAs even if the block is significantly more impaired in some or all of those PEAs. Moreover, even if a certain block has the same level of impairment in all of the grouped PEAs, the impaired portions in one PEA could be concentrated in the areas most valued by a particular bidder, while the opposite is true in another PEA.”).

⁷⁰⁸ To clarify, the optimization will attempt to assign contiguous Category 1 and Category 2 licenses, consistent with these objectives, to a bidder that wins blocks in both categories.

the impairment of blocks to winning bidders does not increase. These objectives are consistent with comments indicating that carriers place significant value on spectrally contiguous spectrum,⁷⁰⁹ as well as some commenters' arguments that prioritizing inter-PEA contiguity, as opposed to contiguity within PEAs, could disadvantage certain carriers and create opportunities for discriminatory conduct.⁷¹⁰

245. The contiguity objectives will be applied in the order specified, so that the second objective will only be applied to possible assignments that fully satisfy the first objective, the third objective will only apply to assignments that fully satisfy the first two objectives, and so on. As a result, the fourth objective regarding unsold blocks will not adversely affect the assignment of contiguous blocks as determined by the first three objectives. We adopt the fourth objective, in addition to the three objectives we proposed in the *Auction 1000 Comment PN*, in order to ensure that, if the auction system must choose between an assignment in which any unsold blocks are contiguous or separated, the system will choose the contiguous assignment, thus maximizing the value of blocks retained by the FCC.⁷¹¹

246. We decline to adopt CCA's proposal for the auction system to assign the winning bidder of a single license in a PEA the least impaired license block before assigning any others.⁷¹² We disagree with the premise of CCA's proposal that the first three objectives uniformly favor multi-license or multi-market winning bidders and harm carriers that purchase only one license in a PEA. The contiguity objectives will be applied without regard to the level of impairment and therefore will not favor any bidder or type of bidder. We also decline to adopt U.S. Cellular's proposal for an additional objective which minimizes the difference in the average level of impairment of the same-category license(s) assigned to any two bidders.⁷¹³ Since bidders may value impairments differently, we prefer to allow bidders to indicate their own frequency preferences through their bidding in the assignment phase.

c. Sequencing of Assignment Phase Bidding

247. We adopt our proposal to sequence bidding on PEAs or PEA groups in the assignment phase based on total weighted-pops, beginning with the high-demand PEAs and then moving to non-high-demand PEAs by REAG.⁷¹⁴ Under this approach, clock phase winning bidders of blocks in the high-demand PEAs will first bid on the PEA or PEA group with the greatest number of weighted-pops.

⁷⁰⁹ See, e.g., U.S. Cellular Comments at 11 (stating that bidders' frequency preferences primarily relate to the synergies associated with contiguous spectrum blocks); T-Mobile Comments at 46–47 (arguing the auction system should prioritize the assignment of contiguous blocks of spectrum within a PEA); see also Letter from John T. Scott, III, VP & Deputy General Counsel, Verizon, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252 at 2 (filed July 6, 2015). AT&T, however, stated that mobile providers place significant value on geographically contiguous spectrum. AT&T Reply at 12–13.

⁷¹⁰ See CCA Comments at 2–3, 40–41; U.S. Cellular Reply at 22–23; T-Mobile Comments at 47–49 (arguing that any common channels awarded during the assignment round should not be any larger than 20 contiguous PEAs or three adjacent Major Economic Areas ("MEAs")). But see AT&T Reply at 31–33 (arguing against T-Mobile's proposal that common channels awarded during the assignment round should not be any larger than 20 contiguous PEAs or three adjacent MEAs).

⁷¹¹ Unsold blocks are also addressed in § VI.A.2.a. (Forward Auction – Bidding Categories).

⁷¹² CCA Comments at 34.

⁷¹³ U.S. Cellular proposes a fourth objective: "first, minimizing the difference in the average level of impairment of the Category 1 licenses held by any two bidders; and then, minimizing the difference in the average level of impairment of the Category 2 licenses held by any two bidders." U.S. Cellular Reply at 18; see also CCA Reply at 15–16 (supporting U.S. Cellular's proposal to add an objective that minimizes the difference in average impairment across geographic licenses held by each bidder).

⁷¹⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15814, para. 203; see also § III.B.1.a. (Calculation of Weighted-Pops) (discussing how we will calculate weighted-pops). For assignment phase bidding, assignment rounds for the PEAs in the six smaller REAGs will be sequenced with one of the six continental REAGs. See *Auction 1000 Comment PN*, 29 FCC Rcd at 15897, App. H n.1.

Bidding will continue in descending order of weighted-pops until specific frequencies have been assigned in all the high-demand PEAs. Once frequencies have been assigned for the high-demand PEAs, the auction system will conduct a series of assignment rounds for the non-high-demand PEAs within each of the six REAGs, again in descending order of weighted-pops. We expect that the auction system will run the assignment rounds for non-high-demand PEAs associated with different REAGs in parallel. However, an alternative schedule for the REAG rounds, of which bidders will be given ample notice, may be necessary in the event that running multiple rounds in parallel is deemed too complicated for bidders, the auction managers, or the auction system.⁷¹⁵

248. We are not persuaded by arguments that larger bidders would derive a significant advantage from being able to participate in assignment rounds that are sequenced earlier in the assignment phase process, and hence, we decline to adopt the commenters' proposal to randomly sequence the assignment rounds to avoid any timing advantage.⁷¹⁶ We find that the information we will provide—on bidders' own bidding options and on the potential for contiguous assignments in each PEA—will minimize any “early mover” informational advantage. In addition, the second-pricing procedures discussed below will simplify bidding strategy for bidders, mitigating any potential advantage from bidding “experience” in the assignment phase.

249. We also reject the assumption that earlier bidding for frequency assignments in the high-demand markets will enable winners of blocks in those markets to establish consistent frequency “footprints” that they will later pay a premium to extend, thereby disadvantaging bidders with fewer resources to spend in the assignment phase.⁷¹⁷ The intra-area contiguity objectives will limit bidders' abilities to establish consistent frequency footprints across PEAs. Because the auction system will only allow bids for license combinations that satisfy those contiguity objectives, it is unlikely that a single bidder will have the opportunity to bid for and win a consistent footprint in all areas in which it won blocks. Consequently, we are not persuaded that the sequencing procedures we adopt will lead to a lack of interoperability as a result of larger carriers establishing consistent footprints in one section of the 600 MHz Band, leading equipment manufacturers to tailor equipment only to those frequencies, and note moreover that our rules require interoperability throughout the 600 MHz Band.⁷¹⁸

d. Bidding and Bid Processing

250. Once bids have been submitted, the auction system will perform an optimization to select as the winning license assignment that configuration, consistent with the continuity objectives set forth above and the options provided to bidders in advance, for which bidders indicate the greatest willingness

⁷¹⁵ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15814, para. 204. Within each REAG, the assignment rounds would be conducted one PEA or PEA group at a time, sequentially. *Id.* at 15899, App. H.

⁷¹⁶ U.S. Cellular and others are concerned that sequencing the assignment rounds in descending order based on weighted-pops will provide larger carriers with an informational advantage because many smaller carriers may not win generic blocks in the high-demand markets and therefore may not have an opportunity to bid for many rounds. U.S. Cellular Comments at 19, 22–23; CCA Reply at 17–19. As a result, these commenters argue that by the time smaller bidders are preparing their first assignment round bids, the largest bidders will have considerable bidding experience and be better informed about potential prices. Moreover, according to these commenters, smaller bidders will be forced to bid against companies that will already have deeply entrenched preferences from the early rounds and may be willing to bid very aggressively to extend their footprints. U.S. Cellular Comments at 20, 21–22; CCA Reply at 17–19.

⁷¹⁷ Some commenters argue that allowing larger carriers to establish a “footprint” may create interoperability issues. U.S. Cellular Comments at 19, 21; CCA Reply at 17–19.

⁷¹⁸ The *Incentive Auction R&O* adopted a strong interoperability rule that requires that any user equipment certified to operate in any portion of the 600 MHz Band must be capable of operating, using the same technology that the licensee has elected to use, throughout the entire 600 MHz Band. See *Incentive Auction R&O*, 29 FCC Rcd at 6866–67, para. 732.

to pay.⁷¹⁹ Bidding in an assignment round is voluntary. If a bidder chooses not to bid in an assignment round, the auction system will assign a zero bid to each of the bidder's available options, or to any option for which the bidder does not submit a bid. Bidders that choose not to bid in an assignment round will be assigned licenses consistent with their winnings in the clock phase of the auction and the contiguity objectives. We decline to implement the suggestion that the auction system process assignment round bids by looking separately at the high bids on various licenses, since bids will be used to select a single configuration of license assignments and the licenses with the highest bids may not be in the same configuration.⁷²⁰

251. Under the assignment phase bidding procedures we adopt, winners of either reserved or unreserved Category 1 blocks will be able to bid for the available frequencies in Category 1, and the auction system will assign specific frequencies without regard to the reserve-eligible status of the bidder.⁷²¹ In other words, the auction system will not differentiate in the assignment rounds between reserved and unreserved spectrum blocks.⁷²² Consistent with the record, the procedures we adopt will prioritize the assignment of contiguous blocks within PEAs in order to promote efficient utilization of the 600 MHz Band.⁷²³ Differentiating between reserved and unreserved blocks would undermine this objective by making it more difficult to assign frequency-contiguous spectrum blocks to winners of blocks in an area, particularly if a bidder wins both reserved and unreserved blocks. Further, we are not persuaded that differentiating is necessary to ensure fulfillment of our competitive goals for the auction, especially since all reserved blocks will be Category 1, and therefore relatively substitutable. Accordingly, we decline to assign reserved and non-reserved licenses separately during the assignment rounds.⁷²⁴

252. We decline to adopt an assignment approach that would rely on random or quasi-random distribution of licenses, or other non-monetary bidding for frequency preferences, as some commenters suggest.⁷²⁵ We determined in the *Incentive Auction R&O* that the use of competitive bidding procedures

⁷¹⁹ Ties, if any, will be broken by including pseudo-random numbers in the optimization. *See Auction 1000 Comment PN*, 29 FCC Rcd at 15904, App. H.

⁷²⁰ *See, e.g.*, U.S. Cellular Comments at 16, 18–19; U.S. Cellular Reply at 24–25 (proposing processing assignment round bids on a per-license basis, under which the single bid submitted by each bidder would be divided by the total number of generic licenses held by the bidder for the PEA or group involved in that assignment round); CCA Comments at 3 (suggesting that “assignment phase bids should be evaluated on a per-license basis to avoid creating an unfair advantage for the largest carriers”).

⁷²¹ *Auction 1000 Comment PN*, 29 FCC Rcd at 15814–15, paras. 205–08.

⁷²² Subsequent to making frequency assignments in the assignment phase, in order to determine final license prices, the auction system will determine which license or licenses are deemed as reserved, if a bidder wins both reserved and unreserved Category 1 blocks in a single PEA or PEA group. *See* § VI.C (Forward Auction – Final Winning Bid Amounts).

⁷²³ *See, e.g.*, AT&T Reply at 12–13 (stating that mobile providers place significant value on geographically contiguous spectrum); U.S. Cellular Comments at 11 (stating that bidders' frequency preferences primarily relate to the synergies associated with contiguous spectrum blocks); T-Mobile Comments at 46–47 (arguing the auction system should prioritize the assignment of contiguous blocks of spectrum within a PEA and should also prioritize the assignment of the same channel blocks across geographically adjacent markets, to a point).

⁷²⁴ CCA suggests that the Commission separately assign reserved and non-reserved licenses during the assignment round bidding. CCA Reply at 19–20.

⁷²⁵ *See, e.g.*, C Spire Comments at 6 (advocating for random assignment as a way to ensure that regional carriers have an opportunity to compete for the least impaired spectrum); The Associations Reply at 4–5; CCA Reply at 15–16; U.S. Cellular Comments at 12; U.S. Cellular Reply at 16–17 (supporting a quasi-random assignment whereby the Commission would include impairment-based constraints in the optimization mechanism, and in the case of ties, randomly select an assignment plan or supporting a plan under which the Commission would honor non-conflicting bidder preferences, but assign licenses pseudo-randomly where there are conflicts); T-Mobile Reply at 31–32

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would promote the efficiency of the assignment process, and allow more confident bidding for generic licenses in the clock phase of the forward auction, by facilitating the assignment of specific frequencies to the highest-valuing users.⁷²⁶ Accordingly, we rejected an administrative, random or quasi-random process.⁷²⁷ Nevertheless, these commenters assert that using competitive bidding will give an advantage to nationwide carriers in obtaining the least impaired blocks in a category, leaving less desirable blocks for the smaller and regional carriers.⁷²⁸ They argue further that bidding in the assignment phase is likely to depress revenue in the clock phase.⁷²⁹ We reaffirm that giving bidders the opportunity to bid monetary amounts for specific frequency preferences in the assignment phase, which they will not be able to express in the bidding for generic blocks in the clock phase, will allow the auction system to take bidder interests into account in assigning frequency-specific licenses.⁷³⁰ This will lead to potentially more effective use of the spectrum than would a random assignment mechanism.

253. In addition, we find that competitive bidding will provide a greater incentive for sincere bidding—since real resources will be at stake—than would a system of “draft pick” preferences or points based bidding, as also suggested by commenters.⁷³¹ We further reject arguments that the competitive

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(supporting U.S. Cellular’s proposal to use quasi-random assignment when bidders’ preferences for a license conflict). For the reasons stated above, we also decline to adopt the alternative approach advocated by U.S. Cellular and others, under which the auction system would take into account preferences for contiguous blocks within an area and then randomly determine the remaining frequency assignment. U.S. Cellular Comments at 5, 11. *Cf.* Mobile Future Reply at 10 (“The Commission must maintain a mechanism for bidders in the forward auction to select specific frequency assignments Allowing bidders to select specific frequency assignments will ensure the repurposed spectrum is put to its highest and best use.”); AT&T May 15, 2015 *Ex Parte* Letter, Haile Paper at 1–2 (“A quasi-random system, however, would destroy a great deal of spectrum value by denying bidders any opportunity to convey information about the value created by different assignments.”).

⁷²⁶ See *Incentive Auction R&O*, 29 FCC Rcd at 6779–80, paras. 515–18.

⁷²⁷ *Id.* at 6780, para. 518.

⁷²⁸ U.S. Cellular Comments at 7; see also Letter from Rebecca Murphy Thompson, General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed June 25, 2016) (CCA June 25, 2015 *Ex Parte* Letter).

⁷²⁹ See, e.g., U.S. Cellular Comments at 11; U.S. Cellular Reply at 16; see also CCA June 25, 2015 *Ex Parte* Letter at 2; Letter from Trey Hanbury, Counsel, T-Mobile, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 at 2 (filed June 11, 2015). AT&T agrees about the potential for revenue suppression in the proposed FCC approach, but notes that “[a] poorly designed points-based system [such as the U.S. Cellular proposal] would suppress clock phase bidding, potentially more so than the current Commission proposal.” AT&T May 15, 2015 *Ex Parte* Letter, Haile Paper at 2.

⁷³⁰ Moreover, we agree that a monetary bidding-based assignment round will allow bidders to express the intensity of preferences for particular licenses, which the points-based approaches generally do not. See AT&T May 15, 2015 *Ex Parte* Letter at 2, Haile Paper at 5 (noting the advantages of monetary bidding for sincere bidding and expressing intensity of preferences).

⁷³¹ CCA Reply at 15–16 (advocates instating a draft mechanism that would guarantee all bidders a baseline level of access to their preferred frequencies); U.S. Cellular Reply at 21–22 (supporting CCA’s proposal to provide 10 assignment auction preferences, but stating that this objective should be secondary to its proposed “impairment averaging” objective); see also Letter from Trey Hanbury, Counsel, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, Rosston, Skrzypacz, and Weber Paper at 2 (filed June 16, 2015) (T-Mobile & U.S. Cellular June 16, 2015 *Ex Parte* Letter). The parties propose a “serial priority-assessment algorithm” which would randomly rank-order the clock phase winning bidders, then allowing them to select, in order, their preferred assignment in a PEA, cycling through the order of bidders until all assignments are made. Compare Letter from Leighton T. Brown, Counsel, U.S. Cellular, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (filed April 22, 2015) (proposing a “point system” for the assignment phase), and Letter from Leighton T. Brown, Counsel, U.S. Cellular, to Marlene H. Dortch, Secretary, FCC, GN

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bidding-based approach we adopt to the assignment phase will depress revenues in the clock phase, potentially causing the auction to move to a lower clearing target because the final stage rule cannot be met.⁷³² On the contrary, bidders may bid more aggressively in the clock phase because they know that they will later have an opportunity to bid for a strongly-held frequency preference in the assignment phase.⁷³³ In addition, given our projections that the initial clearing target procedure will result in a very high proportion of Category 1 blocks with minimal or no impairment, and our decision to make detailed impairment information available to bidders prior to the commencement of bidding in the clock phase of the forward auction, bidders generally are unlikely to hold back their clock phase bids in order to be able to secure the least impaired licenses in the assignment phase.⁷³⁴ In most PEAs, we expect that there will be insufficient impairment or variety in the degree to which licenses are impaired to warrant such action. The discount on clock phase prices for any license impairments also will help account for variation in value due to impairment, minimizing the incentive to limit clock phase bids to the value of the most impaired generic block in a category. Accordingly, we are not persuaded that clock phase revenues will be significantly suppressed by the use of competitive bidding procedures in the assignment phase.

254. We also disagree with arguments that a competitive bidding-based approach to the assignment phase will disadvantage smaller carriers. First, the assignment phase structure will level the competitive playing field: the auction system will prioritize assigning contiguous frequency blocks within each PEA before taking bids, without regard to whether potential bidders (the winning bidders in the clock phase) are nationwide carriers or regional entities, reserve-eligible or not, and without taking into account the extent of impairment within a bidding category. By prioritizing intra-area contiguity of licenses, the assignment phase structure will protect all bidders equally from discontinuous frequency assignments, even if a bidder does not submit an assignment round bid. Second, smaller carriers are as likely as larger ones to be able to benefit from expressing assignment phase preferences. Indeed, because the networks of smaller carriers may be less flexible than those of the nationwide carriers, the ability to bid for frequency-specific preferences may be all the more important for smaller carriers. Moreover, because the contiguity objectives will seek to assign two contiguous blocks to each winner *before* trying to assign any winner three or more contiguous blocks, they are likely to benefit carriers that win fewer than three blocks within a PEA over carriers that win more. Third, designated entity bidding credits will apply to assignment phase payments, giving smaller carriers that qualify as designated entities a price advantage over larger carriers in assignment phase bidding.

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Docket No. 12-268 (filed July 1, 2015) (U.S. Cellular July 1, 2015 *Ex Parte* Letter), with AT&T May 15, 2015 *Ex Parte* Letter (identifying flaws in the U.S. Cellular points proposal, and proposing adjustments).

⁷³² In other spectrum auctions around the world in which similar assignment phase designs have been used, the revenues in the assignment phase have averaged less than 0.5 percent of the total auction revenues. For example, assignment phase revenues were 1.15 percent of total auction revenues in the 2013 UK 4G Auction. See *Auction Data*, Ofcom, <http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/awards-archive/completed-awards/800mhz-2.6ghz/auction-data/> (last updated Mar. 13, 2013). In the 2013 Australian Digital Dividend Auction, while the auction data was not released in full, an upper bound of 0.19 percent can be calculated using available public data for assignment phase revenues as a percentage of total auction revenues. See *Digital dividend auction—results*, Australia Comm. & Media Authority, <http://www.acma.gov.au/Industry/Spectrum/Digital-Dividend-700MHz-and-25Gz-Auction/Reallocation/digital-dividend-auction-results> (last updated Mar. 25, 2014). Assignment phase revenues were less than 0.01 percent of total auction revenues in the Canadian 700 MHz Auction. *Download Bid Data – 700 MHz – Spectrum Auctions Results and Analysis*, Industry Canada, http://agora.ic.gc.ca/download_eng.cfm?p_auction_id=8.0 (last modified Sept. 30, 2013).

⁷³³ See *Incentive Auction R&O*, 29 FCC Rcd at 6779, para. 515 (“Knowing that the assignment mechanism will enable them to express preferences for frequency-specific licenses, bidders will be able to bid more confidently for generic licenses in the clock rounds.”).

⁷³⁴ See §§ III.C (Standard to Limit Market Variation), VI.A.1.a (Impairment Information for Bidders).

255. Moreover, under the competitive bidding-based procedure we adopt, bidding strategies will be easier than more complex and unfamiliar procedures advocated by some commenters. For example, the “serial priority-assessment algorithm” approach advocated by T-Mobile and U.S. Cellular would require a bidder to understand a new bidding mechanism in which the optimal bidding strategy is not clear and depends on what strategy it expects others to play.⁷³⁵ Choosing selection order randomly and enforcing rotations among bidders, as advocated by T-Mobile and U.S. Cellular, would result in a less efficient assignment than if bidders can express preferences using monetary bids, which also allow for varying intensity of preferences. In combination with the “second-pricing” approach discussed below, the procedures we adopt will allow bidders to follow a clear and familiar strategy: bid the incremental value of a specific assignment option, knowing that the payment will be equal to or less than that bid amount.⁷³⁶

e. Assignment Phase Payment Calculations

256. We adopt the procedures we proposed to calculate the assignment phase payment (above the discounted final clock phase price) a bidder will pay for a frequency-specific license using a generalized “second price” approach.⁷³⁷ Under this approach, the auction system will calculate a payment amount that, if the winning bidder had bid that amount, would have been just sufficient to result in the bidder receiving the same winning frequency-specific license assignment.⁷³⁸ This payment will be less than or equal to the amount the bidder indicates in its bid that it is willing to pay for the assignment. We find that this approach will simplify bidding strategies for bidders by giving them an incentive to bid what they consider to be full value for the assignment: if the assignment is selected, they will pay no more than would have been necessary to ensure that the assignment won. While U.S. Cellular indicates that inexperience with a second-pricing approach may still lead bidders to “overbid,” we are confident that as bidders consider seriously their bidding strategies, this incentive will become apparent to them.⁷³⁹ Appendix H from the *Auction 1000 Comment PN* includes a detailed explanation of the procedures we will use to determine the assignment round payment.

C. Final Winning Bid Amounts

257. We adopt the procedures proposed in the *Auction 1000 Comment PN* for determining final forward auction prices, on which we received no feedback from commenters. The final price that a winning bidder must pay for a license it wins in the assignment phase will be the final clock phase price for the category of license it won within a given PEA, adjusted by the percentage of any impairment to the frequency block, plus any assignment phase payment, all reduced by any designated entity bidding credit.

258. We clarify that, in the event a bidder wins both Category 1 reserved and unreserved blocks in the same PEA in the clock phase, in determining final payments, the auction system will deem

⁷³⁵ See U.S. Cellular July 1, 2015 *Ex Parte* Letter; T-Mobile & U.S. Cellular June 16, 2015 *Ex Parte* Letter.

⁷³⁶ For example, assume a bidder’s three possible assignments are AB, BC, and CD. All that the bidder needs to do is determine a valuation for AB, BC, and CD. Assume these valuations are \$120 million, \$110 million, and \$100 million, respectively, and the final clock phase price for A, B, and C was \$100 million. The bidder would assign a value of \$0 to its lowest priority assignment, CD, and submit a bid of \$10 million for BC and \$20 million for AB. The bidder’s valuation would not depend on guesses about others’ bids.

⁷³⁷ The final clock phase price of an impaired license will be discounted by an amount proportional to the extent of impairment, as set forth in § VI.A.2.a (Forward Auction – Bidding Categories).

⁷³⁸ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15815, para. 208. This pricing approach is a version of a Vickrey-Clarke-Groves mechanism. See *id.* at 15905, App. H.

⁷³⁹ U.S. Cellular Comments at 22 (stating that the “second-price” approach will not eliminate the risk of the “winner’s curse” because bidders may overbid due to their inexperience with this type of bidding); see also T-Mobile & U.S. Cellular June 16, 2015 *Ex Parte* Letter.

as reserved that block or blocks that will yield the bidder the lowest price, taking into account the final clock phase price for the category and the impairment discount.⁷⁴⁰ This approach will maximize the impairment discount. For example, assume that in the clock phase a bidder won one unreserved Category 1 block and one reserved Category 1 block in a PEA. The assignment phase procedures determined that the bidder would be assigned blocks E and F, where block E is two percent impaired and block F is zero percent impaired. The assignment phase payment is determined to be \$100. If the final clock phase prices were \$1,000 for reserved blocks and \$1,200 for unreserved blocks, then the E block would be deemed unreserved and the F block would be deemed reserved. Conversely, if the final clock phase prices were \$1,200 for reserved blocks and \$1,000 for unreserved blocks, then the E block would be deemed reserved and the F block would be deemed unreserved. In either event, the bidder's final payment amount for blocks EF, assuming it has no designated entity bidding credit, will be calculated as follows:⁷⁴¹

$$\{1,000 + 1,200 * 0.98\} + \{100\} = \$2,276$$

VII. TRANSITION, IF NECESSARY, TO ANY SUBSEQUENT STAGE

259. If a stage of the auction ends without satisfying the final stage rule, the auction system will begin a new stage of the auction using a lower clearing target.⁷⁴² The reverse auction will be conducted for the applicable clearing target followed by the forward auction.⁷⁴³ A new stage of the reverse auction will begin not sooner than five business days after the conclusion of the prior stage of the forward auction.⁷⁴⁴ Reverse and forward auction bidding in subsequent stages will carry-over from the prior stage—the prices will continue to descend in the reverse auction and continue to rise in the forward.

⁷⁴⁰ The blocks that are deemed reserved will carry the restrictions on transferability, consistent with the conditions on reserved spectrum established in the *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6212–13, paras. 196–200.

⁷⁴¹ If, for example, the bidder is eligible for a designated entity bidding credit, its total payment will be reduced by the amount of the bidding credit, subject to any cap. See *Part 1 R&O*, 30 FCC Rcd at 7544–48, paras. 122–30. In the event that the reserved and unreserved blocks have the same final clock phase prices or the blocks are equally impaired, blocks will be designated as reserved in descending order of frequency. While ties in FCC auctions are traditionally broken pseudo-randomly, we find that this rule is clear and simple to implement, and will result in assigning contiguous reserved licenses in cases where a bidder wins multiple reserved blocks as well as unreserved blocks, which a random assignment mechanism will not necessarily do.

⁷⁴² See *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 69; see also *Incentive Auction R&O*, 29 FCC Rcd at 6708–09, para. 326.

⁷⁴³ *Auction 1000 Comment PN*, 29 FCC Rcd 15774, para. 65. The auction system will announce the new clearing target to bidders, as well as a bidding schedule for the reverse auction. *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 69.

⁷⁴⁴ CTIA requests that the Commission allow at least two weeks between auction stages. CTIA Reply at 13–14. We conclude that five business days will provide the auction system with adequate time to conduct a clearing target optimization and provide forward auction bidders with impairment information for the new stage of the auction. See § VI.A.1.a (Forward Auction – Impairment Information for Bidders) (describing the impairment data that will be made available to forward auction bidders). While forward auction bidders need time to analyze new impairment data, we note that such bidders will have that information for the entirety of the stage of the reverse auction. Additionally, at a lower clearing target, there generally will be fewer impairing stations for forward auction bidders to consider. We conclude that bidders will have sufficient time to process new impairment information and commenters have not provided us with a compelling reason to delay the start of a subsequent stage of the reverse auction by an additional week.

A. Selecting a New Clearing Target

260. The clearing target for any subsequent stage of the auction generally will be the next lowest clearing target in the 600 MHz Band Plan.⁷⁴⁵ In the *Auction 1000 Comment PN*, we also sought comment on the alternative of skipping clearing targets when moving to a new stage.⁷⁴⁶ CTIA and EOBC both argue against skipping any clearing targets as the auction advances to subsequent stages.⁷⁴⁷ CTIA is concerned that if the Commission skips a clearing target it could unknowingly bypass an opportunity to clear additional spectrum.⁷⁴⁸ We generally agree. Therefore, in any subsequent stage, the clearing target determination procedure will be applied for the next lowest clearing target.⁷⁴⁹ Under this procedure, the current assignment of participating stations to relinquishment options from the reverse auction will not change. The optimization tool will determine a new provisional television assignment plan for the UHF band using the same objectives as in the initial clearing target optimization, taking into account the additional channel in the TV band and any participating stations that have dropped out of the auction in the previous stage. As part of this process, the optimization procedure may modify the provisional assignment of stations to the 600 MHz Band from the prior stage in order to minimize impaired weighted-pops and carry out the other objectives we adopt.⁷⁵⁰ Based on the new provisional television channel assignment plan, the nationwide impaired weighted-pops will be calculated on a 2x2 cell level. The one-block-equivalent nationwide standard for impairments will then be applied.⁷⁵¹ In the event that the new plan does not meet the standard, the process will be repeated at the next lowest clearing target until a plan is identified that meets the one-block-equivalent impairment standard. We anticipate that only in rare situations would the process result in moving down more than one clearing target.

261. In Attachment A to this Public Notice, we provide a description of how our computer model will apply the between-stages clearing target determination procedure we adopt on a step-by-step basis. An updated version of Appendix C to the *Comment PN* setting forth the technical details and formulas associated with this procedure will be included with the appendices to the *Application Procedures PN*.⁷⁵²

⁷⁴⁵ *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 69. Each clearing target is associated with a 600 MHz Band Plan. See § II (Background of Proceeding). As with the initial clearing target, prior to bidding in a new stage, the auction system will make public the new clearing target.

⁷⁴⁶ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 69

⁷⁴⁷ CTIA Comments at 16; see also EOBC Comments at 48–49 (“[The Commission] should adopt the proposal in the *Comment PN* to move sequentially to the next lowest clearing target if . . . the final stage rule cannot be satisfied at any stage of the auction.”); Local Media Comments at 8 (“[The Commission should] promulgate auction rules that allow it to clear the highest band plan possible.”). But see T-Mobile Reply at 31 (agreeing that the Commission should maximize the amount of spectrum that can be cleared, but advocating that the Commission retain the flexibility to skip clearing targets when it determines that targets, such as those incorporating considerable guard band spectrum, are unlikely to be met).

⁷⁴⁸ CTIA Comments at 16.

⁷⁴⁹ As noted above, it may be necessary to skip the 108 MHz clearing target to better harmonize our band plan with Canada or Mexico. See § III.A (Overview of the Initial Clearing Target Optimization Procedure).

⁷⁵⁰ See § III (Initial Clearing Target Optimization Procedure). Prior to the start of the reverse auction in a new stage, the auction system will provide forward auction bidders with the same impairment and other information as will be provided to bidders in the initial stage. See § VI.A.1.a (Forward Auction – Impairment Information for Bidders).

⁷⁵¹ See § III (Initial Clearing Target Determination Procedure) (adopting a one-block-equivalent standard with a cap for limiting impairments).

⁷⁵² See § I (Introduction and Executive Summary); see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15841–51, App C.

B. Reverse Auction Bidding

262. We adopt our proposals for resuming bidding and setting clock prices in the reverse auction in any subsequent stages.⁷⁵³ In the beginning of a new stage, the auction system will re-evaluate the bidding status of each station that was “frozen – provisionally winning” in the prior stage of the reverse auction in light of the reduced clearing target, notifying every such station of its new status,⁷⁵⁴ and resetting the base clock price.

263. The auction system will reset the base clock price to the highest “catch up point” of all newly-active stations.⁷⁵⁵ For each newly-active station, its catch up point will be the base clock price at the time that the station became provisionally winning in a previous stage. In the first round of the new stage, the newly-active station(s) with the highest catch up point will become either “bidding in the current round” (applicable to UHF or VHF stations) or “frozen – currently infeasible” (applicable only to VHF stations), while all newly-active stations with lower catch up points will become “frozen – pending catch up.”⁷⁵⁶ Bidders that have a station that is “frozen – pending catch up” or “frozen – currently infeasible” may place proxy bid instructions, if they so choose, in accordance with the reverse auction bidding procedures described above.⁷⁵⁷

264. The base clock price will descend from the reset price (i.e., the highest catch up point of newly-active stations).⁷⁵⁸ Bidders with a newly-active station that is “frozen – pending catch up” will not resume bidding in the current round until the base clock price falls below the station’s catch up point and its status changes.⁷⁵⁹ Once the base clock price descends to that point, such bidders will see their station’s bidding status change to “bidding in the current round” if the station has a feasible channel assignment, or “frozen – currently infeasible” if the station is a VHF station and does not currently have a feasible

⁷⁵³ *Auction 1000 Comment PN*, 29 FCC Rcd at 15792, para. 126. Commenters did not comment directly on these proposals. Joint Media Parties asserts that “if the final stage rule is not satisfied for the initial clearing target, the Commission should allow broadcasters to make a subsequent election of whether to continue to participate in the auction.” See Joint Media Parties Reply at 15. We reject this proposal as it is at odds with the basic design of the clock auction. Once a bidder has exited the auction, it may not re-enter the auction. In a new stage, any bidder that becomes “frozen – pending catch up,” and then becomes “frozen – provisionally winning” without bidding to accept a lower price offer will continue to be provisionally winning at the price they already accepted. A bidder that resumes the status “bidding in the current round” may evaluate its options in accordance with the reverse auction bidding procedures, including whether to drop out of the auction.

⁷⁵⁴ See § V.D.3 (Reverse Auction – Bidding Status) (describing the different bidding statuses that bidders may see throughout the auction).

⁷⁵⁵ Active stations are all participating stations that have not exited or become provisional winners. At the start of the new stage, each provisional winner from the prior stage will have its status reevaluated to take account of the new clearing target. In a subsequent stage, the auction system will inform newly-active stations that they will be returned to the active status of “bidding in current round,” “frozen – currently infeasible,” or “frozen – pending catch up,” whichever the case may be, at the beginning of the reverse auction in the new stage.

⁷⁵⁶ *Auction 1000 Comment PN*, 29 FCC Rcd at 15792, para. 126. As detailed above, the auction system will inform reverse auction bidders of their bidding status after each round of the auction and at the start of a new stage. See § V.A (Reverse Auction – Availability of Auction-Related Information).

⁷⁵⁷ See § V.C (Reverse Auction – Bidding Mechanics).

⁷⁵⁸ The auction system will calculate new price offers for bidding stations using the descending clock pricing procedures set forth above. See § V.B (Determining Price Offer in Clock Rounds).

⁷⁵⁹ In order to avoid rounds in which no bidders are able to submit bids, if in any round there would be no stations that have the status “bidding in the current round” but there are stations that remain “frozen – pending catch up,” the auction system will temporarily adjust the price decrement. Specifically, the auction system will increase the price decrement only for the next round so as to meet the highest catch up point of a station that is pending catch up. This change will be announced to bidders immediately prior to adjusting the decrement.

channel assignment.⁷⁶⁰ Bidders who are asked to bid in a new stage will be able to bid using the bidding procedures described above, including requesting to switch to another bid option if their station is eligible to do so.⁷⁶¹ Any stations that exited in a prior stage will retain that status and will not resume bidding.

C. Forward Auction Bidding

1. License Inventory by Category and PEA

265. In the forward auction in a subsequent stage, the number of spectrum blocks available in each PEA will generally be reduced by one.⁷⁶² The number of Category 1 and Category 2 licenses available in a given PEA may increase or decrease, however, because the clearing target determination procedure between stages may change the assignment of television stations to the 600 MHz Band, altering the extent and location of impairments in the available blocks. As discussed above, prior to the start of the forward auction in a new stage, the auction system will inform forward auction bidders of the new band plan, including the number of blocks that will be available in each category in each PEA, and the same types of impairment information provided prior to the initial stage of the auction.⁷⁶³ The auction system will not evaluate whether the final stage rule has been satisfied until after bidding in the first clock round of the forward auction in a subsequent stage is complete.

a. Bidder Demands and Bidding Eligibility

266. The auction system will initiate bidding in the forward auction in any subsequent stage based on bidder demands and bidder eligibility from the end of the previous stage.⁷⁶⁴ If a new stage does not follow an extended round because the shortfall to meet the final stage rule was too large, bidder

⁷⁶⁰ For example, consider three stations, each of which is a UHF station bidding to go off-air with a volume of one. (With a volume of one, the clock price for going off-air is equal to the base clock price.) Assume in the previous stage Station A became provisionally winning at the base clock level (the “catch up point”) of \$100, Station B at \$90, and Station C at \$63, and that the base clock price in that stage fell to \$54 when the stage ended. In the new stage with a reduced clearing target and one additional channel in the remaining television bands, three newly-active stations (i.e., each station can now be feasibly repacked in the UHF band) would be competing for the additional channel and their status would be changed to “frozen – pending catch up.” In the new stage, Station A’s catch up point is the highest among the other newly-active stations, therefore the base clock price will be reset to \$100 and will descend from that point. Suppose Station A accepts each corresponding lower price as the base clock price continues to descend. When the base clock in the new stage passes Station B’s catch up point (\$90), Station B begins bidding, accepting each lower price offer. Station B drops out of the auction when the base clock price reaches \$77, being provisionally assigned to the additional available channel and therefore ending the stage. Station A becomes “frozen – provisionally winning” at \$77 and its catch up point becomes \$77 should it become feasible again in future stages. The base clock price never descends below Station C’s catch up point, so Station C’s status never becomes “bidding in the current round” in that stage. Station C becomes “frozen – provisionally winning,” keeping its previously accepted price of \$63. Its catch up point remains at \$63 should it become feasible again in future stages.

⁷⁶¹ See § V.D.1 (Reverse Auction – Bidding Mechanics). As described above, because some VHF bidders can become frozen but not provisionally winning, these VHF stations may be given the bidding status “frozen – currently infeasible.” They will retain this status until either the auction system determines that at any point that a feasible channel assignment will always be available for the station in its pre-auction band, at which point its status will change to “exited – not needed,” the system determines a feasible channel exists for the station, at which point its status will change to “bidding in the current round,” or the system determines that a feasible channel assignment will not be available for the station in its pre-auction band for the remainder of the stage, at which point the station will be “frozen – provisionally winning.” See § V.D.3 (Reverse Auction – Bidding Status).

⁷⁶² See *Auction 1000 Comment PN*, 29 FCC Rcd at 15775, para. 69.

⁷⁶³ See § IV.A.1 (Forward Auction – Availability of Auction-Related Information). Prior to bidding in the reverse auction in a new stage, we will make public the new clearing target.

⁷⁶⁴ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15812, paras. 196, 198.

demands and eligibility at the start of the first round of the forward auction in the new stage will be equal to those accepted by the auction system at the end of the last regular clock round in the previous stage.

267. If the forward auction in a new stage follows an extended round in which the final stage rule was not met, bidder demands will be based on bidding in the extended round for license categories in PEAs that participated in the extended round, and on demands from the last regular clock round for license categories and PEAs that did not participate. More specifically, for categories of blocks for which all bidders indicate that they are willing to accept the full extended round price increment, bidder demands will carry over from the extended round.⁷⁶⁵ For categories for which a reduction was accepted, bidder demands from the start of the extended round will carry over to the new stage for all but the bidder whose requested reduction was accepted.⁷⁶⁶ That bidder's demand will reflect the reduction, consistent with our extended round bid processing procedures.⁷⁶⁷ For blocks that are not included in bidding in the extended round, bidder demands that were accepted at the end of the last regular clock round of the previous stage will carry over to the beginning of the next stage.⁷⁶⁸

268. In recognition that bidder demand for Category 2 blocks in a PEA may be reduced based on changes to the extent of impairments, the auction system will accept requests to reduce demand for Category 2 blocks in the first round of the forward auction in a subsequent stage, even if the reduction will result in demand falling below supply for that category.⁷⁶⁹ Bidder eligibility in a subsequent stage will be based on the bidder's bidding activity at the end of the previous stage. A bidder will begin the first round of the forward auction in the new stage with its eligibility reset based on bidding in the extended round for licenses for which there was bidding in the extended round, and for other licenses on bidding in the last regular clock round.⁷⁷⁰

b. Clock Price

269. The auction system will initiate forward auction bidding in any subsequent stage based on prices from the end of the previous stage.⁷⁷¹ The price increment in the first round of the forward auction in the next stage will be added to the last clock price from the previous stage, or to the intra-round price at which a reduction that brought demand down to equal supply was processed. If an extended round was held, for blocks not subject to extended round bidding (i.e., Category 2 blocks and blocks in non-high-demand PEAs) clock prices for the first round in the new stage will be based on prices from the round preceding the extended round. For categories subject to extended round bidding, the increment will be added to the extended round clock price if no reduction was requested in the category, or the lowest price at which a reduction was requested. If the new stage is triggered without an extended round because

⁷⁶⁵ See *id.* at 15812, para. 197.

⁷⁶⁶ Under the procedures we adopt for processing extended round bids when the final stage rule is not met, the auction system will process a demand reduction of up to one block per "high-demand" PEA. See *id.* at 15810–11, para. 192. As stated above, in some cases the supply of Category 1 blocks in a PEA may not decrease in a subsequent stage in spite of the lower clearing target because the clearing target selection procedure could reduce impairments to licenses in a PEA sufficiently that one or more blocks previously considered Category 2 will be considered Category 1 in the new stage, so that even with a lower total number of blocks, the number of Category 1 blocks will not decrease. We anticipate that, in such cases, bidders previously demanding a Category 2 block, the supply of which will be reduced disproportionately, are likely to shift to bid on the Category 1 blocks, so that demand for the Category 1 blocks will at least equal supply.

⁷⁶⁷ See § VI.A.8 (Extended Round Procedures).

⁷⁶⁸ See *Auction 1000 Comment PN*, 29 FCC Rcd at 15812, para. 197.

⁷⁶⁹ See *id.* at 15812, para. 198.

⁷⁷⁰ See *id.* at 15879–95, App. G.

⁷⁷¹ See *id.* at 15812, para. 196.

the shortfall in proceeds was sufficiently large, these procedures are equivalent to setting clock prices for the first round of the new stage as if it were a new round in the previous stage.⁷⁷²

270. We disagree with T-Mobile's assertion that forward auction clock prices in a subsequent stage should reflect the reduction in payments to provisionally winning reverse auction bidders and relocation expenses resulting from a lower clearing target.⁷⁷³ Nor are we persuaded to set clock prices in a new stage that are just sufficient to satisfy the final stage rule for the reduced spectrum clearing target.⁷⁷⁴ We agree with AT&T that rolling back prices between stages may provide an incentive for undesirable bidding behavior because bidders may hold back on bidding, knowing "that prices could be lower in the next round if they allow the auction to fail at the current clearing targets," which would reduce the amount of spectrum cleared in the incentive auction.⁷⁷⁵ Moreover, the procedures we adopt to prevent an extended round if the needed shortfall to satisfy the final stage rule is too large will limit the extent to which clock prices can increase from stage to stage,⁷⁷⁶ mitigating T-Mobile's concern that a failed extended round will set "an artificially inflated price floor for subsequent stages" of the auction, potentially leading to reduced bidder demands and fewer blocks in the spectrum reserve.⁷⁷⁷ The pricing procedures we adopt will provide a smooth transition between stages and sound incentives for straightforward bidding in the forward auction in any subsequent stages.

VIII. FINAL TELEVISION CHANNEL ASSIGNMENT PLAN SELECTION PROCEDURE

271. Once the forward auction satisfies the final stage rule, no additional stages will be required: at that time it will be possible to finalize the provisional television channel assignment plan for the remaining television bands using the optimization procedures described below.⁷⁷⁸ The mathematical formulas for implementing the final television channel assignment selection procedure will be set forth in an appendix to the *Application Procedures PN*.⁷⁷⁹ The results of the final television channel assignment plan selection procedure will be announced by the Media and Wireless Telecommunications Bureaus in the *Channel Reassignment PN* after the completion of the reverse and forward auctions.⁷⁸⁰

272. The final television channel assignment plan will include a channel assignment for each eligible full power and Class A television station that will remain on the air post-auction; i.e., those that did not participate in the reverse auction, those that participated but exited the bidding, and those that successfully bid to voluntarily relocate to a different TV band. With the exception of any stations that were assigned to channels in the 600 MHz Band in the final stage of the auction, all provisional television

⁷⁷² If supply exceeds demand in a category because a bidder on a Category 2 block chose to reduce its demand, taking advantage of the exception to the rule that reductions will not be applied if aggregate demand will fall below supply, the clock price for the second round of the new stage will be also based on the price from the last round in the previous stage (when supply did not exceed demand).

⁷⁷³ See T-Mobile Comments at 44.

⁷⁷⁴ See T-Mobile Comments at 45 (arguing that the Commission should ensure that the amount needed to trigger the final stage rule does not frustrate the establishment of the spectrum reserve at the next spectrum clearing target).

⁷⁷⁵ See AT&T Reply at 32, Attachment A at 3-4.

⁷⁷⁶ See § VI.A.8 (Extended Round Procedures).

⁷⁷⁷ See T-Mobile Comments at 43; see also CCA Comments at 34.

⁷⁷⁸ The satisfaction of the final stage rule will be publicly announced. See § VI.A.7.c (Evaluation Each Round). Reverse auction bidders that were "frozen – provisionally winning" in that stage will become winning bidders; however, their bidding status will not change in the bidding system. The final television channel assignment plan will not be released until after the close of the forward auction.

⁷⁷⁹ See § I (Introduction and Executive Summary).

⁷⁸⁰ See *Incentive Auction R&O*, 29 FCC Rcd at 6782, para. 525.

channel assignments will be subject to change in the final television channel assignment plan.⁷⁸¹ Every final channel assignment will be required to satisfy the constraints adopted in the *Incentive Auction R&O* to fulfill the statutory mandate that the Commission make all reasonable efforts to preserve each station's coverage area and population served.⁷⁸²

273. The auction system will use optimization techniques to determine a final television channel assignment plan.⁷⁸³ In addition to satisfying the constraints adopted in the *Incentive Auction R&O*, the final television channel assignment plan selection procedure will take into account the following objectives, listed in order of priority: (1) maximizing the number of channel "stays," or stations assigned to their pre-auction channels instead of being assigned to new channels; (2) minimizing the maximum aggregate new interference experienced by any station; (3) avoiding reassignment of stations with high anticipated relocation costs; and (4) prioritizing assignments to channel 5 in the Low-VHF band and off of channel 14 in the UHF band.⁷⁸⁴ The procedure will first optimize for the first objective. It will then optimize for the second objective, which will be constrained by the results of the optimization for the first objective. The procedure will then optimize for the third objective, which will be constrained by the results for the first and second objectives. Finally, the procedure will optimize for the fourth objective, which will be constrained by the results for the first three objectives.⁷⁸⁵ The procedure will select a final television channel assignment plan that satisfies the constraints adopted in the *Incentive Auction R&O* and best fulfills the above-stated objectives.⁷⁸⁶

274. The first objective of maximizing the number of stations assigned to their pre-auction channels will promote a number of important goals. First, it will help to reduce the total cost of reimbursing broadcasters and others for the reasonable costs associated with repacking. Several commenters have expressed concerns regarding the sufficiency of the \$1.75 billion in the TV Broadcaster Relocation Fund that Congress made available for reimbursing the reasonable relocation expenses of broadcasters and MVPDs.⁷⁸⁷ By minimizing the number of stations that will be required to move off their pre-auction channels and, therefore, minimizing the number of stations that incur relocation expenses eligible for reimbursement from the Fund, the first objective will help to ensure the Fund's sufficiency. Additionally, by reducing the number of stations that must change channels, the first objective will speed

⁷⁸¹ The channel assignments of stations provisionally assigned to the 600 MHz Band in the final stage of the auction will not change in the final television channel assignment plan. This approach provides needed certainty for the auction outcome by ensuring that impairments to forward auction licenses will not change as a result of the final television channel assignment optimization procedure. See § VI.A.1.a (Forward Auction – Impairment Information for Bidders); see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15869, App. E.

⁷⁸² See *Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 119; see also *Auction 1000 Comment PN*, 29 FCC Rcd at 15792–93, para. 129 n.230 (describing a feasible assignment). Several commenters raised concerns regarding the Commission's adopted repacking methodology generally. See, e.g., Media General Comments at 3, 5; PTV Comments at 5–8; Sinclair Comments at 10. The methodology was adopted in the *Incentive Auction R&O* and *ISIX Order*, and was recently affirmed by the D.C. Circuit, and is not open for comment in this proceeding. See *Nat'l Ass'n of Broadcasters, v. FCC*, 2015 WL 3634693 (D.C. Cir. June 12, 2015).

⁷⁸³ See § III.D (Assigning TV Stations to the 600 MHz Band to Accommodate Market Variation) (describing the clearing target optimization procedures and for a discussion of when stations will be assigned to the 600 MHz Band). See also *Auction 1000 Comment PN*, 29 FCC Rcd at 15792–95, paras. 129–34, 15869, App. E.

⁷⁸⁴ *Auction 1000 Comment PN*, 29 FCC Rcd at 15793, para. 130, 15869, App. E.

⁷⁸⁵ Commenters generally did not comment on these objectives or the order in which we will prioritize them, with the exceptions mentioned specifically below.

⁷⁸⁶ Consistent with the Spectrum Act, the final television channel assignment plan will be subject to international coordination with Canada and Mexico. See 47 U.S.C. § 1452(b)(1)(B).

⁷⁸⁷ See, e.g., CTIA Comments at 22 (noting that keeping relocation costs within \$1.75 billion dollars will be challenging).

the post-auction transition process for other stations and minimize disruption for stations and viewers alike.⁷⁸⁸ Finally, the first objective will avoid terrain losses (and potentially viewer losses) that could result from channel changes due to signal propagation differences on different frequencies,⁷⁸⁹ consistent with our statutory mandate to make all reasonable efforts to preserve the coverage area and population served of eligible broadcast television licensees.⁷⁹⁰

275. The first objective will constrain the additional objectives; however, we adopt our proposal to allow the optimization procedure to choose a final television channel assignment plan in which the number of stations that are assigned to their pre-auction channels is within 95 percent of the number found in the first objective. We adopt this percentage in order to allow some flexibility to achieve greater benefit in the second and third objectives while still capturing the benefits of the first objective by mostly restricting the assignments to maintain the maximum number of stays.⁷⁹¹ However, the fourth objective will constrain the number of stations that are assigned to their pre-auction channel to be at least as many as found in the third optimization.

276. The second objective of minimizing the maximum aggregate new interference that any station will incur furthers our statutory obligation to make all reasonable efforts to preserve eligible stations' population served, and fulfills our commitment in the *ISIX Order* to take aggregate new interference into account when establishing the final channel assignments.⁷⁹² In the *Incentive Auction R&O*, we determined that we would permit channel assignments that would not increase pairwise interference—interference from any one station to another station—by more than 0.5 percent.⁷⁹³ In response to concerns that this approach could result in stations experiencing new interference of more than 0.5 percent on an aggregate basis, in the *ISIX Order* we explained that, based on staff analysis, few stations were likely to experience new interference above one percent⁷⁹⁴ and that any such interference

⁷⁸⁸ *Auction 1000 Comment PN*, 29 FCC Rcd at 15793–94, para. 131, 15869 App. E; *see also Incentive Auction R&O*, 29 FCC Rcd at 6573, para. 11 (seeking to ensure “that stations transition as quickly as their circumstances will allow, and allow coordination of deadlines where, for example, one station must vacate a channel before another can begin operating on its new channel”); *id.* at 6798, para. 566 (discussing coordination issues such as “daisy chains” and availability of qualified tower crews).

⁷⁸⁹ *See Incentive Auction R&O*, 29 FCC Rcd at 6645, para. 170 (“Because radio signals propagate differently on different frequencies, the signal of a station reassigned to a different channel will generally not be receivable in precisely the same locations within a station’s contour as it was in its original channel.”).

⁷⁹⁰ *Auction 1000 Comment PN*, 29 FCC Rcd at 15793–94, para. 131, 15869, App. E; *see also ISIX Order*, 29 FCC Rcd at 13082–83, para. 22 (determining that we would optimize the final television channel assignment plan to seek to avoid final channel assignments that would result in significant viewer losses due to terrain losses, as well as to avoid aggregate new interference over one percent, while deferring a decision as to exactly how to do so).

⁷⁹¹ We received no comments on this proposal from the *Auction 1000 PN*.

⁷⁹² In the *ISIX Order* we committed to seek a final channel assignment plan that minimizes aggregate new interference above one percent in order to address exceptional cases and respond to broadcasters’ concerns. *See ISIX Order*, 29 FCC Rcd at 13079, para. 14.

⁷⁹³ *Incentive Auction R&O*, 29 FCC Rcd at 6621, para. 119.

⁷⁹⁴ Commenters to that proceeding asked the Commission to cap the amount of total new interference that a station may receive at one percent. *See, e.g.,* Comments of the National Association of Broadcasters, GN Docket No. 12-268 at 20–21 (filed Jan. 25, 2013). In the *ISIX Order*, we declined to adopt a cap on aggregate new interference and instead committed to optimizing the final television channel assignment plan to minimize aggregate new interference over one percent. *See ISIX Order*, 29 FCC Rcd at 13075, 13079–80, paras. 6, 14–15. There is a petition for reconsideration regarding this issue which argues that the Commission’s decision is arbitrary and capricious and offers different approaches for incorporating an aggregate cap on new interference. *See* Petition for Reconsideration of the National Association of Broadcasters, GN Docket No. 12-268, ET Docket Nos. 13-26, 14-14 at 1–6 (filed Jan. 22, 2015). The Commission will address this issue in an upcoming decision.

was unlikely to exceed two percent.⁷⁹⁵ In order to address the exceptional cases, we stated that we would include an optimization objective in the final television channel assignment plan optimization that would seek to minimize this issue.⁷⁹⁶

277. In order to implement the second objective, the final television channel assignment plan selection procedure will minimize the maximum amount of aggregate new interference that *any single station* could receive.⁷⁹⁷ In order to do so, the procedure will determine each station's predicted aggregate new interference.⁷⁹⁸ It will then determine an assignment plan that minimizes the maximum aggregate new interference that any station will receive.⁷⁹⁹ This approach to minimizing aggregate new interference will help to ensure that no station will receive a disproportionately high amount of new interference.⁸⁰⁰ We received only one comment directly addressing this objective, and we conclude that the approach we adopt to implementing it will best meet our commitment to minimize aggregate new interference while being the most fair to stations overall.⁸⁰¹

⁷⁹⁵ *ISIX Order*, 29 FCC Rcd at 13075, para. 6.

⁷⁹⁶ *Id.* at 13079, para. 14.

⁷⁹⁷ In the *Auction 1000 Comment PN* we proposed the alternative of minimizing the number of stations that receive aggregate new interference above one percent; however, using that procedure could possibly result in significantly higher interference levels for some stations with minimal benefit—i.e., hypothetically, three stations could end up going from 1.5 percent interference to 2.5 percent interference just to get one station to .9 percent interference—meanwhile, the procedure we adopt will not disproportionately affect any one station but ensure that the overall worst case is lowest. *See Auction 1000 Comment PN*, 29 FCC Rcd at 15794, para. 132.

⁷⁹⁸ The optimization procedure will use pairwise constraints to calculate aggregate new interference, which will result in some double counting of interference. This provides a conservative approach to calculating aggregate new interference, making it possible that the amount of interference will be less than predicted. *See Auction 1000 Comment PN*, 29 FCC Rcd at 15794, para. 132 n.241.

⁷⁹⁹ For example, for a given assignment, after maximizing the number of stations assigned to their pre-auction channel, one or more stations will end up with the highest amount of predicted aggregate new interference. The optimization software will try to adjust the channel assignments to decrease the interference that the station with the highest aggregate new interference is predicted to experience. As the assignments are adjusted and the highest predicted aggregate new interference decreases, the station (or stations) experiencing the highest predicted aggregate new interference may change.

⁸⁰⁰ To the extent that any stations are predicted to receive new interference greater than one percent in the final TV channel assignment plan despite the application of the secondary objective, we noted in the *ISIX Order* that stations may seek a remedy through the post-auction facilities modification processes. *ISIX Order*, 29 FCC Rcd at 13079–80, para. 15. PTV expresses some concern that this remedy will be illusory if there are no extra channels available in the station's post-auction band, and asks the Commission to address this potential problem. PTV Comments at 7–8. We decline to address this request here because post-auction transition issues are outside the scope of this proceeding. We note, however, that generally there will be vacant channels in the post-auction TV bands due to the need to prevent interference between television stations, and that we established a priority to any channels that are available for any stations that experience more than one percent aggregate new interference. *ISIX Order*, 29 FCC Rcd at 13079–80, para. 15; *see also Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band for Use By White Space Devices and Wireless Microphones*, MB Docket No. 15-146, Notice of Proposed Rulemaking, 30 FCC Rcd 6711 (2015) (*Vacant Channels NPRM*).

⁸⁰¹ Media General states that, “the FCC's proposal to minimize the number of stations that will suffer in excess of 1 percent new interference is preferable to repacking all stations irrespective of this factor.” Media General is concerned that the Commission has underestimated the likelihood of interference and failed to adopt a reasonable cap on new interference. Media General Comments at 6. We decline to address these concerns in this Public Notice as they were addressed in the *ISIX Order* proceeding. *See generally ISIX Order*, 29 FCC Rcd 13071; *see also* note 788.

278. The third objective of avoiding reassignment of stations with high anticipated relocation costs will further our efforts to minimize total relocation costs. This objective is consistent with our goals of ensuring the sufficiency of the \$1.75 billion TV Broadcaster Relocation Fund and disbursing the Fund as fairly and efficiently as possible.⁸⁰²

279. In determining how to estimate relocation costs for purposes of applying the third objective, we adopt a categorical approach, rather than a station-by-station approach. Such an approach better serves the public interest by simplifying the determination and minimizing administration burdens.⁸⁰³ More specifically, we adopt an approach under which each station will be assigned a weight based on a number of characteristics that generally make a station more costly to relocate to a different channel. A higher number will indicate that a station's channel change is more difficult to implement, and therefore, generally more costly.⁸⁰⁴ The optimization software will use the categorical weights to choose a final television channel assignment plan that minimizes relocation costs by avoiding highly-weighted reassignments.

280. A channel change for a full power station will generally be more costly than for a Class A station, and channel changes for stations in the top 30 DMAs will generally be more costly than stations in the remaining DMAs. Accordingly, we will use the following categorical or "base" weights: a weight of five for full power stations in the top 30 DMAs; a weight of three for full power stations in all other DMAs; and a weight of one for Class A stations.⁸⁰⁵ In order to take account of considerations that will likely add significant costs to relocation, we will also add one to a station's base weight for each of the following factors: (1) an antenna on a tower taller than 1000 feet, because work on such a tower requires a specialized crew; (2) a tower in areas with significant ice and wind threat, because such towers may need improvements to satisfy "Rev. G" structural standards; (3) collocation on a tower with four or more other television or radio entities;⁸⁰⁶ and (4) a station will encounter known extraordinary circumstances if they need to change channels. Examples of some of the more complicated station sites are described in the Widelity report.⁸⁰⁷ These weights are meant to reflect relative difficulty when comparing two stations and are not intended to capture all of the unique circumstances potentially encountered by each station; however, they provide a simple and non-burdensome means of estimating relocation costs accurately enough to avoid the most costly and difficult relocations. Should Commission staff determine based on additional information that consideration of additional factors could result in cost savings in keeping with our overall goals of minimizing the expense and disruption to broadcasters during the repacking process,

⁸⁰² See *Incentive Auction R&O*, 29 FCC Rcd at 6832, para. 650.

⁸⁰³ In the *Auction 1000 Comment PN*, we proposed to determine costs for purposes of applying this objective by using publicly available data, such as the data compiled for the Media Bureau by Widelity, Inc. or the data provided by broadcasters in the Form 381 Pre-Auction Technical Certification. *Auction 1000 Comment PN*, 29 FCC Rcd at 15794, para. 133 & n.243; see also *Media Bureau Announces Incentive Auction Eligible Facilities and July 9, 2015 Deadline for Filing Pre-Auction Technical Certification Form*, Public Notice, DA 15-679 (rel. June 9, 2015). Although CTIA suggests polling broadcasters, obtaining and using such station-by-station estimated costs prior to the final channel assignment plan optimization may be difficult and could increase the complexity of the final channel assignment optimization procedure. See CTIA Comments at 21–22.

⁸⁰⁴ Also, generally, these more difficult and costly moves will take the greatest amount of time. Minimizing them will help speed the post-auction transition process, thus further minimizing the potential for service disruptions.

⁸⁰⁵ We used the Widelity Report Case Studies as a basis for these relative values. We used Case Study 1 for Full Power Top 30 DMAs: cost is approximately \$2.5 million, Case Study 2 for Full Power not Top 30: cost is approximately \$1.5 million, Case Study 3 for Class A stations: cost is approximately \$0.5 million. See *Media Bureau Seeks Comment on Widelity Report and Catalog of Potential Expenses and Estimated Costs*, Public Notice, 29 FCC Rcd 2989, 3037–43 (MB 2014) (Widelity Report).

⁸⁰⁶ This factor would help to address PTV's concern that the repacking process does not account for the effect that reassigning one station's channel may have on co-located facilities. PTV Comments at 5–6.

⁸⁰⁷ 29 FCC Rcd at 3047–58.

we delegate authority to the Media Bureau to modify the approach we adopt to take into account such factors and direct the Media Bureau to publicly announce the final approach that will be used by the final television channel assignment optimization procedure to minimize relocation expenses.

281. Finally, the fourth objective will seek to assign as many stations as possible that voluntarily move to the Low-VHF band—or that must be reassigned to new channels in that band to accommodate such moves—to channel 5. We adopt this objective in response to the suggestions of several commenters that interest in bidding to move to the Low-VHF band would be increased if winning bidders could be assigned to as high a channel in that band as possible.⁸⁰⁸ We conclude that their suggestion has merit. Additionally, the fourth objective will seek to assign stations in the UHF band to a channel other than channel 14 in order to avoid coordination challenges with private land mobile radio systems (“PLMRS”). Because we conclude that this objective should not be applied at the expense of the objectives set forth above, the fourth objective will be constrained by the second and third objectives and fully constrain the number of stations assigned to their pre-auction band to be at least as many as found after the third objective.

IX. VACANT CHANNEL NPRM (MB DOCKET NO. 15-146)—PROCEDURAL MATTERS

A. Supplemental Initial Regulatory Flexibility Analysis

282. As required by section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission prepared this Supplemental Initial Regulatory Flexibility Analysis (Supplemental IRFA) of the possible significant economic impact on small entities of the proposal in paragraph 32 of this Public Notice. Written public comments are requested on this Supplemental IRFA. Comments must be identified as responses to the Supplemental IRFA and must be filed by the deadlines for comments indicated in paragraph 32 of this Public Notice. The Commission will send a copy of the *Public Notice*, including this Supplemental IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (“SBA”).⁸⁰⁹ In addition, this Public Notice and Supplemental IRFA (or summaries thereof) will be published in the Federal Register.⁸¹⁰

283. In the *Vacant Channel NPRM*, the Commission tentatively concluded that preserving a vacant channel in the remaining television band in each area of the United States for shared use by white space devices and wireless microphones will help to ensure that the public continues to have access to the benefits they provide across the nation.⁸¹¹ As required by section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission included as Appendix B of the *Vacant Channel NPRM* an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the proposals suggested in the *Vacant Channel NPRM*.⁸¹²

284. In this Public Notice, the Commission decides that a limited number of broadcast television stations may be reassigned during the incentive auction and repacking process to channels within the “duplex gap” established as part of the 600 MHz Band Plan. The Commission notes that white space devices and wireless microphone advocates maintain that lack of access to the duplex gap in areas where it is subject to impairment will limit the public’s access to the benefits these services provide. To address this concern, the Commission tentatively concludes that it will preserve a second available television channel in the remaining television band in such areas for shared use by white space devices and wireless microphones, in addition to the one such channel it has tentatively concluded will be made

⁸⁰⁸ See, e.g., SWM Law Comments at 2. These commenters assert that the technical characteristics of higher VHF channels are generally better than those of lower VHF channels.

⁸⁰⁹ See 5 U.S.C. § 603(a).

⁸¹⁰ *Id.*

⁸¹¹ See generally *Vacant Channel NPRM* at 6711.

⁸¹² See *id.* at 6735–6741, App. B.

available in each area of the United States for shared use by these devices in the *Vacant Channels NPRM*. Under this proposal, demonstration of the availability of a second television channel would be required in accordance with the procedures proposed in the *Vacant Channel NPRM* in geographic areas where the duplex gap is subject to impairment.

285. We hereby incorporate by reference the IRFA from the *Vacant Channel NPRM*. This Supplemental IRFA supplements paragraphs 4 and 19 of the IRFA as follows to reflect the second vacant channel preservation proposal. Consistent with the vacant channel proposal in the *Vacant Channel NPRM*, we believe the second vacant channel proposal in paragraph 32 of this Public Notice will not significantly burden small entities in terms of either the continued availability of channels in all areas or the administrative burdens of compliance. After the final channel assignments are made following the incentive auction, multiple vacant channels will exist in most areas as a result of the co- and adjacent channel separation requirements necessary to protect primary broadcast stations from interference from each other. While the effect of the second vacant channel preservation proposal would be to reduce by two the total number of vacant channels that would otherwise be available in an area, it applies only in those areas where the duplex gap is subject to impairment. Our analysis indicates the duplex gap will not be subject to any impairment in most markets even if the optimization procedure tool is not restricted in assigning impairing stations.⁸¹³ Thus, the duplex gap will remain free from impairment across most of the country, except in a relatively small number of markets. Consequently, the impact on small entities, in terms of the availability of channels for future use, will be limited. Consistent with the IRFA, although small entities may experience an increased burden, the Commission believes that adoption of the second vacant channel preservation requirement will greatly benefit white space and wireless microphone users as well as the manufacturer of white space and wireless microphone equipment that are also small businesses by creating new uses and opportunity for this spectrum. The Commission also believes that this prioritization and protection of white space is critical if it is to realize the benefits that this spectrum will provide to small businesses and developers that will usher forth new and unthought-of uses.

286. This Supplemental IRFA also supplements paragraph 17 of the IRFA discussing procedures to reflect that a broadcast applicant would determine if its contour overlaps the service contour of a television station assigned to a channel within the duplex gap.

B. Paperwork Reduction Act Analysis

287. The proposal in paragraph 32 of this Public Notice contains proposed new or modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. § 3506(c)(4), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

C. Further Information

288. For further information about the matters raised in paragraph 32 of this Public Notice, please contact Shaun Maher (Media Bureau) at (202) 418-2324, Shaun.Maher@fcc.gov and Paul Murray (Office of Engineering and Technology) at (202) 418-0688, Paul.Murray@fcc.gov.

⁸¹³ Letter from Gary M. Epstein, Chair, Incentive Auction Task Force, FCC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252, App. at 3-5 (filed July 10, 2015) (IATF July 10, 2015 *Ex Parte* Letter). *See also* *CTS PN*, 30 FCC Rcd at 4858, App. § I (Overview).

X. CONTACT INFORMATION

289. For further information concerning this proceeding, contact the offices listed below:

Broadband Division, Wireless Telecommunications Bureau

For 600 MHz Band service rule questions: Madelaine Maior at (202) 418-1466

Auctions and Spectrum Access Division, Wireless Telecommunications Bureau

For general auction questions: Linda Sanderson at (717) 338-2868

For reverse auction legal questions: Erin Griffith at (202) 418-0660

For forward auction legal questions: Kathryn Hinton at (202) 418-0660

Competition and Infrastructure Policy Division, Wireless Telecommunications Bureau

For mobile spectrum holding questions: Karen Sprung at (202) 418-2762

Video Division, Media Bureau

For broadcaster questions: Dorann Bunkin at (202) 418-1636

Office of Engineering and Technology

For legal repacking and inter-service interference questions: Aspasia Paroutsas at (202) 418-7285

For technical repacking and inter-service interference questions: Martin Doczkat at (202) 418-2435

Press Information

For press questions: Charles Meisch at (202) 418-2943

Office of Communications Business Opportunities

For questions concerning small business inquiries: (202) 418-0990

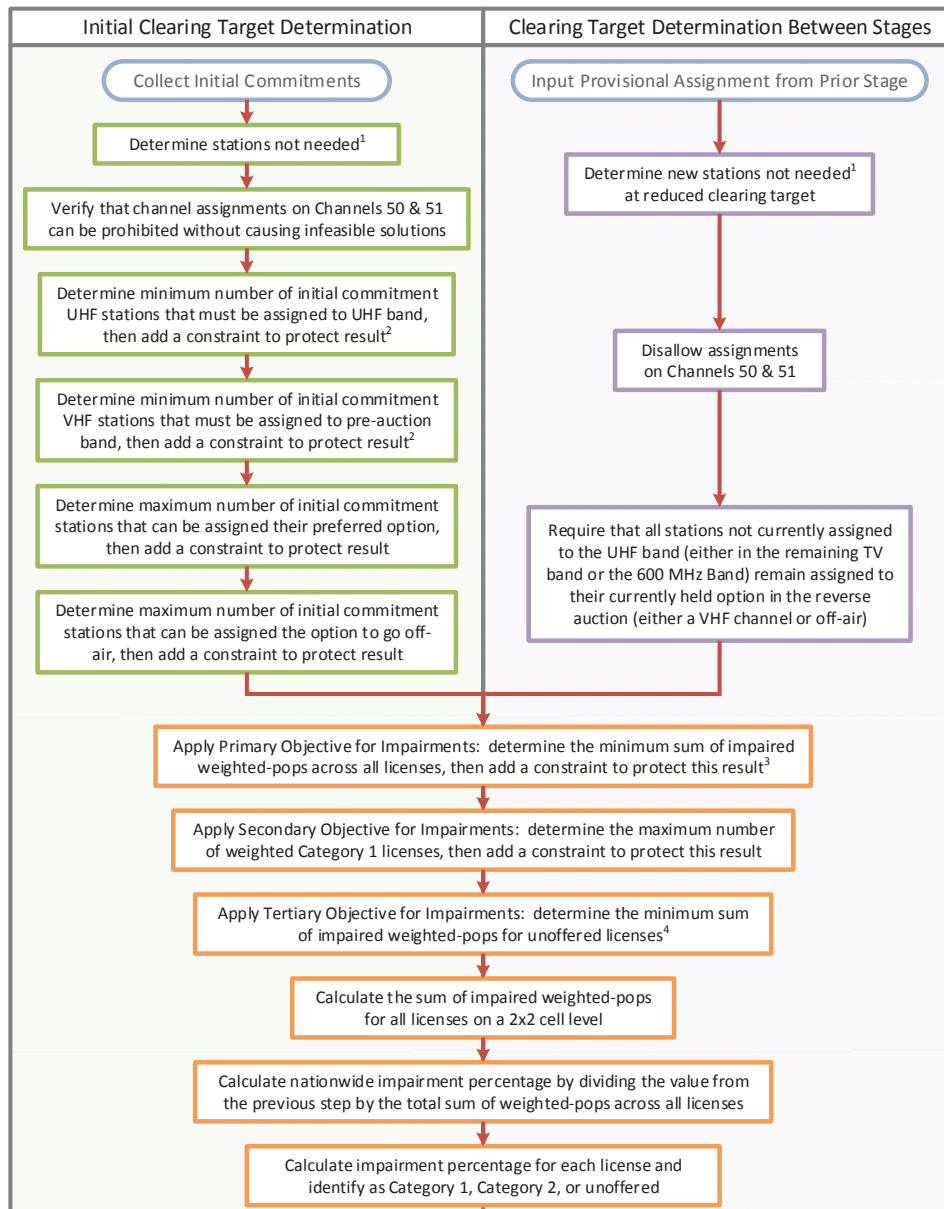
Action by the Commission on August 6, 2015: Chairman Wheeler and Commissioners Clyburn and Rosenworcel issuing separate statements; Commissioners Pai and O’Rielly dissenting and issuing separate statements.

APPENDIX A**Clearing Target Determination Procedures: Summary of Software Steps**

The flow chart on the following page summarizes the software steps in the clearing target determination procedures for the initial and any subsequent stages of the incentive auction. The object of both procedures is to determine a feasible TV channel assignment plan for each clearing target that best satisfies the impairment objectives established by the Commission. In addition, when it is not possible for all stations that made initial commitments to be assigned the preferred options indicated by the stations, the initial clearing target optimization procedure seeks to assign stations to fallback options or if necessary to a provisional channel in its pre-auction band.

For a given clearing target, a TV channel assignment plan must meet the following restrictions i.e. these are the base constraints that define a feasible TV channel assignment plan:

- All eligible stations are assigned either to a channel or to go off-air
- A station can only be assigned to one of its allowable channels as defined in the domain.csv file
- Stations' channel assignments must not violate adjacent and co-channel pairwise interference restrictions as defined in the interference_paired.csv file
- All non-participating stations are assigned a channel in their pre-auction band
- All stations that have made an initial commitment(s) are assigned to one of the following:
 - Go off-air (if they initially committed to go off-air)
 - A channel in Low-VHF (if they initially committed to a move to Low-VHF)
 - A channel in High-VHF (if they initially committed to a move to High-VHF)
 - A channel in their pre-auction band



¹ For each initial commitment station, run one or more optimizations to determine if a feasible channel assignment plan in which the station does *not* have a channel available in its pre-auction band exists (for UHF stations, this is restricted to the UHF band designated for broadcasting). If no such assignment plan exists, the study station will always have a channel available at the given clearing target and any lower clearing target, therefore it is not needed.

² Initial commitments to go off-air can always be accommodated.

³ This is calculated using county level ISIX constraints. The minimum sum of impaired weighted-pops is rounded up to the nearest integer before being added as a constraint.

⁴ The weighted number of Category 2 licenses is also protected. Unoffered (i.e. licenses with more than 50 percent of the population impaired) license will not be considered 100 percent impaired in this optimization.

APPENDIX B
Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends

47 CFR part 20 as follows:

PART 20 – COMMERCIAL MOBILE SERVICES

1. The authority citation for Part 20 continues to read as follows:
Authority: 47 U.S.C. 154, 160, 201, 251-254, 301, 303, 316, and 332 unless otherwise noted.
Section 20.12 is also issued under 47 U.S.C. 1302.
2. Part 20 – COMMERCIAL MOBILE SERVICES is amended by revising section 20.22 to delete paragraph (b)(3)(vii) and to add paragraph (b)(4) to read as follows:

§ 20.22 Rules Governing Mobile Spectrum Holdings

* * * * *

(b) * * *

- (4) The following interests shall be attributable to holders, except to lessees and sublessees for the purpose of qualifying to bid on reserved licenses offered in the Incentive Auction, discussed in subsection (c) below, on the basis of status as a non-nationwide provider:

Long-term *de facto* transfer leasing arrangements as defined in § 1.9003 of Subpart X of Part 1 of these rules and long-term spectrum manager leasing arrangements as identified in § 1.9020(e)(1)(ii) that enable commercial use shall be attributable to lessees, lessors, sublessees, and sublessors for purposes of this section.

* * * * *

APPENDIX C

Supplemental Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (“RFA”),¹ the Commission has prepared this Supplemental Final Regulatory Flexibility Analysis (“SFRFA”) of the possible significant economic impact on small entities by the procedures and policies contained in the *Auction 1000 Bidding Procedures Public Notice* and the SFRFA.

A. Need for, and Objectives of, Public Notice

1. The *Auction 1000 Bidding Procedures Public Notice* determines procedures necessary to carry out the broadcast television spectrum incentive auction and resolves issues raised in the *Auction 1000 Comment Public Notice* released December 17, 2014.² In the *Auction 1000 Comment PN*, the Commission sought comment on the proposals for conducting the broadcast television incentive auction, including proposed procedures for the forward auction, the reverse auction, and integration of the reverse and forward auctions, that would implement rules previously proposed in the *Incentive Auction NPRM* and adopted in the *Incentive Auction R&O*.³ In part, the *Auction 1000 Bidding Procedures Public Notice* also resolves pending petitions for reconsideration of the *Mobile Spectrum Holdings R&O*.⁴

2. Previously, as required by the RFA, the Commission prepared an Initial Regulatory Flexibility Analysis (“IRFA”) in connection with the *Incentive Auction NPRM* and a Final Regulatory Flexibility Analysis (“FRFA”) in connection with the *Incentive Auction R&O*. Likewise, the Commission’s *Mobile Spectrum Holdings NPRM* included an Initial Regulatory Flexibility Analysis (“MSH IRFA”) and its *Mobile Spectrum Holdings R&O* included a Final Regulatory Flexibility Analysis (“MSH FRFA”).

3. Following the release of the *Auction 1000 Comment PN*, a *Supplemental Public Notice* sought comment on how the proposals in the *Auction 1000 Comment PN* could affect either the IRFA or the FRFA.⁵ This SFRFA,⁶ addresses the effect, to the extent there is any, of the *Auction 1000 Bidding Procedures Public Notice* determinations have on the IRFA and FRFA.

4. As noted in the *Supplemental Public Notice*, the proposals in the *Auction 1000 Comment PN* did not change any of the matters described in the IRFA or FRFA.⁷ More specifically, the IRFA and

¹ See 5 U.S.C. § 603. The RFA, see 5 U.S.C. §§ 601 et. seq., has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (“SBREFA”), Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996).

² See *Comment Sought on Competitive Bidding Procedures for Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002*, GN Docket No. 12-268, AU Docket No. 14-252, Public Notice, 29 FCC Rcd 15750 (2014) (*Auction 1000 Comment PN*).

³ See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357 (2012) (*Incentive Auction NPRM*); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567 (2014) (*Incentive Auction R&O*).

⁴ See § VI.A.2.b (Market-Based Spectrum Reserve) (denying T-Mobile Petition for Reconsideration). See *Policies Regarding Mobile Spectrum Holdings*, WT Docket. No. 12-269, Notice of Proposed Rulemaking, 27 FCC Rcd 11710 (2012) (*Mobile Spectrum Holdings NPRM*); *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, Report and Order, 29 FCC 6133 (2014) (*Mobile Spectrum Holdings R&O*).

⁵ *Comment Sought with Respect to Regulatory Flexibility Act and Paperwork Reduction Act in Connection with Competitive Bidding Procedures for Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002*, AU Docket No. 14-252, GN Docket No. 12-268, Public Notice, 30 FCC Rcd 192 (2015) (*Supplemental Public Notice*).

⁶ See 5 U.S.C. § 604.

⁷ *Supplemental Public Notice*, 30 FCC Rcd at 193.

FRFA set forth the need for and objective of the Commission's rules for the broadcast spectrum incentive auction; the legal basis for those rules; a description and estimate of the number of small entities to which the rules apply; a description of the projected reporting, recordkeeping, and other compliance requirements with small entities and significant alternative considered; and a statement that there are no federal rules that may duplicate, overlap, or conflict with the rules. As further noted in the *Supplemental Public Notice*, the request for comment focused on how the proposals in the *Auction 1000 Comment PN* might affect either the IRFA or the FRFA.⁸

5. As discussed below, one comment responded specifically to the *Supplemental Public Notice*, filed by the Competitive Carriers Association ("CCA"). CCA does not assert that any of the matters already described in the IRFA or the FRFA need to be changed in light of the proposals in the *Auction 1000 Comment PN*. Accordingly, the descriptions provided in the IRFA and the FRFA are incorporated herein without change.⁹

6. CCA contends, however, that three of our proposals require a "more fulsome factual, policy, and legal analysis [than was provided in the FRFA] for these proposals for the agency to meet its requirements under the Regulatory Flexibility Act."¹⁰ The three proposals to which CCA refers are "(1) the price per MHz-pop benchmark for determining whether the final stage rule has been satisfied; (2) the upfront payment amounts for the [forward] auction; and (3) the minimum opening bid amounts for the [forward] auction."¹¹

7. As a preliminary matter, the factual, policy and legal analyses supporting these proposals, as well as our related decisions, have been the subject of discussion in the *Incentive Auction NPRM* and the *Incentive Auction R&O*. These topics also have been discussed in the *Auction 1000 Comment PN*. Finally, after CCA filed its comment in response to the *Supplemental Public Notice*, the Commission also addressed the reasons for the final stage rule proposal and decision in the *Second Order on Reconsideration* and for all three subjects in the *Auction 1000 Bidding Procedures Public Notice*. More than once, these discussions have addressed comments by CCA, often making the same substantive points that CCA makes in response to the *Supplemental Public Notice*.

8. The prior discussions cited above amply explain the reasons supporting our decisions. Nonetheless, in response to CCA's submission of its arguments in response to the *Supplemental Public Notice*, this SFRFA summarizes those reasons to assure that the Commission has accounted properly for any particular impact on small businesses of those decisions.

B. Summary of Significant Issues Raised by Public Comments in Response to the Supplemental Notice

9. The Average Price Component of the Final Stage Rule. CCA contends that the average price component of the final stage rule is "unnecessary, contrary to the Commission's stated purpose of the spectrum reserve, and will negatively affect smaller auction participants."¹² CCA argues that this component is unnecessary because the cost component of the final stage rule is sufficient to assure that

⁸ *Id.*

⁹ To the extent there is any variance and it is necessary due to the use of the average price component of the final stage rule as part of the trigger for the spectrum reserve, the MSH IRFA and MSH FRFA likewise are incorporated herein without change.

¹⁰ CCA RFA Comments at 2-3.

¹¹ *Id.* at 2.

¹² *Id.* at 5-6. Reversing the order in which the two components are presented and discussed by the Commission, CCA refers to the component of the final stage rule that is based on license prices in the forward auction as the second component of the final stage rule. We maintain consistency with our prior discussions and refer to this instead as the first component.

forward auction bidders will pay competitive prices, that it is contrary to the Commission's purpose because it creates a risk that the auction will not close, that it is contrary to the purpose of the spectrum reserve because it may result in a lower spectrum amount of reserve spectrum, and that it harms small businesses because they are unable to influence whether it is met.

10. Bidding Units Based on Price Weighted Population to Determine Forward Auction Upfront Payment Amounts and Minimum Opening Bids. Although CCA describes the Commission's proposal to use population of license areas weighted by past auction prices as "an elegant means of accounting for the historical differences in prices between markets," CCA "remains concerned, however, by certain outliers . . . resulting from the Commission's methodology."¹³ CCA asks for additional information regarding the creation of the price index, specifically "how results from past auctions for spectrum licensed in Economic Areas and Cellular Market Areas were adapted for use with licenses to be offered based on PEAs."¹⁴ Finally, "CCA objects to the Commission's proposal to incorporate the final results from Auction 97 into the price index for determining bidding units (and, therefore, upfront payments and minimum opening bids), because this exercise could prejudice smaller bidders."¹⁵ As addressed below, we find the arguments raised by CCA to be without merit.

C. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

11. The Average Price Component of the Final Stage Rule. The Commission adopted the average price component of the final stage rule in order to assure that forward auction bidders pay competitive prices for licenses, in compliance with the Commission's statutory mandate to recover for the public a portion of the value of the public spectrum resource.¹⁶ The cost component of the final stage rule does not fulfill this mandate because the costs covered are not set in relation to the value of the public spectrum resource.¹⁷ Rather, the cost of paying existing licensees to relinquish spectrum usage rights based on existing broadcasting licenses to make spectrum available for new flexible use licenses, is determined by other factors, such as the value of the existing usage rights.¹⁸ Moreover, there is not a one-to-one relationship between the spectrum subject to the relinquished rights and the spectrum covered by new licenses, either on an individual license basis or collectively.¹⁹ Accordingly, despite CCA's contrary contention, the average price component serves a significant purpose not satisfied by the cost component. The effects of the average price component accordingly must be assessed against the public interest in achieving that purpose.

12. The average price component furthers the public interest in recovering a portion of the value of the public spectrum resource.²⁰ The attendant risk that the average price component might preclude achieving a given spectrum clearing target is consistent with serving the public interest. All participants in the forward auction, regardless of size, bear that risk. Alternatives that would grant new licenses without recovering the value pursuant to the Commission's decision would be contrary to this purpose.

¹³ *Id.* at 9.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ See § VI.A.7.a (First Component).

¹⁷ See § VI.A.7.b (Second Component – Cost Elements).

¹⁸ See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Second Order on Reconsideration, 30 FCC Rcd 6746, 6808, para. 138 (2015) (*Incentive Auction Second Order on Reconsideration*).

¹⁹ See *id.*

²⁰ See § VI.A.7.a (First Component).

13. The link between the average price component of the final stage rule and the establishment of the spectrum reserve is similar. Satisfying the final stage rule before establishing the reserve ensures that reserve-eligible bidders pay significant prices for spectrum, that they are paying the same price as other bidders at the time that the final stage rule is met, and that the final stage rule is met before the spectrum reserve is implemented.²¹ Fundamentally, linking the reserve with satisfaction of the final stage rule ensures that reserve-eligible bidders contribute “a fair share” of the final stage rule requirements, including “a portion” of the value of the spectrum for the public, given the average price component.²² Any alternative to using the final stage rule as a trigger for the reserve would conflict with these goals.

14. The Commission’s use of the average price in the top 40 by population Partial Economic Areas (“PEAs”) is supported by the stated purpose of the procedure, specifically to facilitate a speedy auction by focusing on PEAs more likely to sooner reach their final prices.²³ An alternative that would consider the average price in more areas would risk slowing down the auction and would require assessing an average price over areas for which past price data may not be as reliable as data in the top 40 PEAs. CCA contends that smaller bidders may be less likely to bid in the top 40 PEAs, and therefore less likely to directly influence whether the average price component is met.²⁴ Presuming, for the sake of argument, that this is true, that also means that such bidders may win licenses despite lower average prices in other PEAs. Smaller bidders that may have relatively less influence over whether the average price component is met therefore benefit from the use of the top 40 PEAs to the extent it enables them to win licenses with lower average prices.

15. At clearing targets that license more than 70 megahertz in the 600 MHz, the gross bids of all licenses will be considered in determining whether the average price component is met, rather than the average price in the top 40 PEAs.²⁵ In that case, bidders for areas other than the top 40 PEAs will influence whether the average price component is satisfied. Moreover, the effective average price of licenses in such circumstances will be lower than that set for the top 40 PEAs, thereby retaining the benefit of meeting lower average prices in areas outside the top 40 PEAs.

16. Bidding Units Based on Price Weighted Population to Determine Forward Auction Upfront Payment Amounts and Minimum Opening Bids. The Commission uses bidding units to determine forward auction upfront payment amounts and minimum opening bids for each PEA.²⁶ More specifically, the upfront payments and the minimum opening bids are set on a dollar per bidding unit basis.²⁷ The bidding units reflect the population of the respective PEA, weighted by a price index set based on data from prior spectrum license auctions.²⁸ The procedure for determining the bidding units, i.e., for weighting the relevant population based on price data from past auctions, is detailed in the *Auction 1000 Bidding Procedures Public Notice*.²⁹

²¹ *Mobile Spectrum Holdings R&O*, 29 FCC Rcd at 6209, para. 187, 6211, para. 194.

²² *Id.*

²³ *Auction 1000 Comment PN*, 29 FCC Rcd at 15770, para. 51; § VI.A.7.a (First Component).

²⁴ CCA RFA Comments at 6.

²⁵ See § VI.A.7.a (First Component).

²⁶ See §§ IV.B.1 (Bidding Units), IV.B.2 (Upfront Payment Due After Initial 600 MHz Band Plan Determined); VI.A.3.a (Forward Auction – Opening Bids).

²⁷ See §§ IV.B.2 (Upfront Payment Due After Initial 600 MHz Band Plan Determined), VI.A.3.a (Forward Auction – Opening Bids).

²⁸ See § IV.B.1 (Bidding Units).

²⁹ See § IV.B.1 (Bidding Units).

17. The price index attempts to capture the information about relative demand and value reflected in those prices. Any change in the relative index for particular PEAs is the intended effect. Using price data from recently completed Auction 97 furthers the Commission's purpose of weighting population based on the demand from bidders for licenses in past auctions. There is no basis for an alternative that would be consistent with this purpose. "Outliers" in the data or differences in relative prices in different auctions, whether Auction 97 or any other auction, are reasons to incorporate the data, not reasons to selectively reject some of it.

18. Using population weighted by a price index to set upfront payments and minimum opening bids establishes the relative amounts involved without determining the final amounts. CCA does not offer any support for its contention that the amounts set by the Commission's decision are too high. Furthermore, contrary to CCA's suggestion that upfront payments must be made without knowledge of the amount of spectrum to be offered in the forward auction, the Commission's decision provides that forward auction bidders will make upfront payments only after the determination of the initial clearing target.³⁰

D. Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration

19. Pursuant to the Small Business Jobs Act of 2010, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration ("SBA"), and to provide a detailed statement of any change made to the proposed rules as a result of those comments. The Chief Counsel did not file any comments in response to the *Auction 1000 Comment PN* released December 17, 2014.

E. Report to Congress

20. The Commission will send a copy of the *Auction 1000 Bidding Procedures Public Notice*, including this SFRFA, in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act. A copy of the *Auction 1000 Bidding Procedures Public Notice* and SFRFA (or summaries thereof) will also be published in the Federal Register.

F. Report to Small Business Administration

21. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, will send a copy of the *Auction 1000 Bidding Procedures Public Notice*, including this SFRFA, to the Chief Counsel for Advocacy of the SBA.

³⁰ See § IV.B.2 (Upfront Payment Due After Initial 600 MHz Band Plan Determined).

APPENDIX D

List of Commenters and Short Names

Advanced Television Broadcasting Alliance
Anonymous Broadcaster
Association of Public Television Stations (APTS) (with CPB and PBS, collectively, PTV)
AT&T Services, Inc. (AT&T)
Broadcasters for VHF Pricing Parity/Broadcasters for Fair Auction Pricing (Joint Broadcasters)
Cellular South, Inc. (d/b/a C Spire)
Charter Communications, Inc.
Cheyenne and Arapaho Tribes
Cohen, Dippell and Everist, P.C.
Communications Technologies, Inc.
Competitive Carriers Association (CCA)
Connecticut Public Broadcasting, Inc.
Corporation for Public Broadcasting (CPB)
Council Tree Investors, Inc. (CTI)
CTIA-The Wireless Association (CTIA)
DISH Network Corporation (DISH)
Doyon, Limited and Chugach Alaska Corporation
Engine
Expanding Opportunities for Broadcasters Coalition (EOBC)
Fox Television Stations, Inc., ION Media Networks, Inc., Tribune Media Company and Univision
Communications Inc. (collectively, Broadcaster Representatives)
Iowa Utilities Board
J.H. Snider
Local Media Holdings, LLC; Venture Technologies Group, LLC; Coachella Communications, LLC
(collectively, Joint Media Parties)
Local Media TV Holdings, LLC (Local Media)
LocusPoint Networks, LLC (LPN)
Marquee Broadcasting, Inc. (Marquee)
Media General, Inc. (Medial General)
Milachi Media (Milachi)
Mobile Future
M. Wick
National Association of Broadcasters (NAB)
NGEN Wireless LLC (NGEN)
Non-nationwide Competitive Carriers
New America's Open Technology Institute, Common Cause, Public Knowledge (collectively, Public
Interest Advocates)
PBS: Public Broadcasting Service (PBS)
Public Interest Spectrum Coalition (PISC)
Public Knowledge
Radio Television Digital News Association (RTDNA)
Rural Wireless Association, Inc. (RWA) and NTCA – the Rural Broadband Association (NTCA)
(collectively, The Associations)
S.Jones
SaveWirelessChoice¹

¹ In addition, approximately 6,000 Save Wireless Choice campaign form letters were submitted. We do not list those letters separately.

Schwartz, Woods & Miller (SWMLaw)
Sennheiser Electronic Corporation (Sennheiser)
Shure Incorporated (Shure)
Sinclair Broadcast Group, Inc. (Sinclair)
Sprint Corporation (Sprint)
Telecommunications Industry Association (TIA)
T-Mobile USA, Inc. (T-Mobile)
T. zumMallen (Qcommunications, LLC)
Trinity Broadcasting Network (Trinity)
Tuomas Sandholm (Sandholm)
United States Cellular Corporation (U.S. Cellular)
Univision Communications Inc. (Univision)
Verizon Wireless and Verizon Communications Inc. (Verizon)
WatchTV, Inc.
Waxman Strategies
World Television of Washington, LLC (WTVW)
Writers Guild of America, West
WRNN-TV Associates, LP (WRNN)

**STATEMENT OF
CHAIRMAN TOM WHEELER**

Re: Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Procedures for Competitive Bidding in Auction 1000, Including Initial Clearing Target Determination, Qualifying to Bid, and Bidding in Auctions 1001 (Reverse) and 1002 (Forward), AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269, MB Docket No. 15-146.

In the early 1990s, leaders at the FCC, Congress and the Clinton Administration had a big idea: rather than license spectrum—a scarce, valuable resource—through competitive hearings and lotteries, market forces should drive spectrum to its most valuable uses. This big idea led to the world's first competitive spectrum auctions—a breakthrough policy innovation that has raised tens of billions in revenue for the U.S. Treasury and enabled hundreds of billions of dollars in private investment and economic activity.

Since 1994, the FCC has conducted more than 80 spectrum auctions, but none more complex than the upcoming Incentive Auction. It is challenging enough trying to design an unprecedented two-sided auction with more moving parts than a Swiss watch. But the Commission must also balance a range of goals that Congress established, goals that are sometimes competing. These objectives include helping wireless carriers acquire licensed spectrum to meet growing consumer demand; making sure broadcasters are fairly compensated for the spectrum they relinquish; recovering a portion of the value of this spectrum for the public; preserving test beds for mobile innovation by maintaining spectrum for unlicensed use; and promoting competition by providing competitive wireless carriers and new entrants a realistic opportunity to acquire valuable low-band spectrum.

Adding to the complexity is that almost all of these goals and design elements are interrelated and interdependent. If you change one piece here, that impacts another piece there, so the balancing and give-and-take required is constant and immense.

For nearly two years, all the interested parties have been jockeying for auction rules that benefit their position. Aside from a universal acknowledgment of the complexity of this challenge, the biggest area of agreement among all stakeholders was the call for simplicity. The final rules must be as simple as possible.

Now is the time to end the back-and-forth, make some hard decisions, and finalize our auction rules.

The Public Notice establishes final rules for the auction that balance our statutory obligations, heeds commenters' calls for simplicity and transparency in the flow of the auction, and keep us on track to hold the auction in the first quarter of 2016. Most importantly, the rules would serve the public's interest in an effective, efficient, and timely auction.

Our goal remains to clear the highest possible amount of spectrum for broadband consistent with broadcasters' voluntary decisions to relinquish some or all of their spectrum usage rights.

We eliminated from an earlier proposal bidding procedures that many commenters believed were burdensome and could limit broadcaster participation in favor of a formula for opening bid prices that creates value for both broadcasters and American taxpayers. Our action today also ensures that competitive wireless carriers and new entrants have a clear shot at adding sufficient low-band spectrum to their portfolios so that they can compete more effectively in both rural and urban areas.

This Public Notice reflects an incredible amount of modeling and the careful consideration and analysis of all parties' comments and concerns in a robust public record. Today's package of rules is designed to best serve the broad public interest— and that's the true test of good public policy.

Hard choices on difficult questions mean that no stakeholder will get exactly what it wants. Taken as a whole, however, today we strike a fair balance that serves the greater public interest. The net result is that we are one step closer to making history next year with the world's first Incentive Auction. Like the initial spectrum auction more than two decades ago, this big idea will be a big win for the American people, unleashing new waves of innovation, economic growth and consumer choice.

**STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN**

Re: *Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Procedures for Competitive Bidding in Auction 1000, Including Initial Clearing Target Determination, Qualifying to Bid, and Bidding in Auctions 1001 (Reverse) and 1002 (Forward)*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269, MB Docket No. 15-146.

In most spectrum auctions, Comment and Procedures PNs are essentially “afterthoughts.” The real policy action occurs prior to the adoption of the orders that set the license and service rules for the spectrum being allocated. That will not be said about the Procedures PN for the world’s first ever incentive auction and the relevant stakeholders are to be commended for their excellent and thorough advocacy on the issues raised in the Comment PN last December.

It could go without saying, but I will do so anyway, that the staff of the Incentive Auction Task Force, Media and Wireless Bureaus have worked hard to balance all the respective interests at stake in the reverse and forward auctions. That is clearly reflected in the number of excellent decisions in this Procedures PN. First, we are adopting techniques to determine a final TV channel assignment plan that strives to maximize the number of stations that stay on their pre-auction channels, minimizes aggregate new interference, and avoids channel reassignments for stations with high anticipated relocation costs. All of this will help ensure that total reimbursement costs will remain within the \$1.75 billion in the TV Broadcaster Relocation Fund, speed the post-auction transition process and minimize disruption for stations and viewers. Second, thanks to the advocacy of broadcast TV stations that want to participate in the reverse auction, we reject the Comment PN’s proposal to use a Dynamic Reserve Price, or “DRP,” mechanism. This will encourage voluntary participation in the reverse auction by removing uncertainty among broadcasters. Third, we are adopting optimization procedures that will result in significantly fewer impaired wireless license blocks in the forward auction. This should increase the incentives for both wireless carriers and broadcast TV stations to participate.

As most industry insiders know, over the past couple of months, the most contentious issues about this particular item involved whether or not to place TV stations in the duplex gap, when to begin bidding for reserve spectrum, and how to design optimal procedures for the assignment round. I want to thank my colleagues for their cooperation on changes to this item that properly address my concerns in these areas.

Since 2010, I have been a strong advocate for TV White Space technology, because it offers a low-cost way to provide broadband to unserved and underserved areas. When we began this proceeding, in 2012, we made a commitment to adopt policies that allow TV White Space technology to be used for mobile broadband services. Placing TV stations in the duplex gap could harm the development of TV White Space technology for mobile broadband use. So, I thank Commissioner Rosenworcel for her approach to address this concern.

I also carefully considered the proposals of consumer advocates and competitive carriers, to address the fear, that larger nationwide carriers have incentives to strategically bid up prices to foreclose competitors from acquiring spectrum. My focus here was on whether the various proposals address those risks, while adequately balancing other incentive auction goals, such as proper auction design and a wide dissemination of licenses. I thank Chairman Wheeler and Commissioner Rosenworcel for supporting my recommendations to address these serious concerns.

By adopting a 20 MHz cap on the amount of reserve spectrum that any reserve-eligible entity could acquire in PEAs with populations of 500,000 or fewer people, we are achieving three important public policy goals. First, we are creating an additional incentive for smaller wireless carriers to bid more

aggressively in the forward auction. This should encourage more broadcast TV stations to participate in the reverse auction. Second, we are promoting more competition by ensuring there is sufficient reserve spectrum, not just for nationwide carriers, but for smaller regional carriers as well. Competition in less populated PEAs is generally less robust than in larger areas and we are addressing this head-on. Third, the cap helps to minimize the risk of foreclosure bidding in over 280 PEAs. In addition, the Order now directs the staff to carefully monitor bidding activity for foreclosure bidding. If the staff suspects improper bidding activity, the Order now authorizes them to lower the bidding increments to one percent in all PEAs. This policy, together with the characteristics of a clock auction and the bidding activity rule, should reduce the risk of foreclosure bidding in all PEAs.

I must admit that I remain concerned about monetary bidding in the assignment round. This is the first time the Commission has used this procedure and depending on the level of demand for Category 2 licenses in a particular market, monetary bidding in the assignment phase, could cause bidders, especially smaller carriers, to withhold more money in the clock phase than they would if we did not have monetary bidding in the assignment phase. But this item contains a number of policies to address those concerns. Most notably: Bidding in the assignment round is voluntary. All winners in the clock round (including those who do not bid in the assignment round), will be assigned contiguous frequency blocks in the assignment round to the maximum extent feasible. The auction system will seek to maximize the number of bidders that are assigned at least two contiguous blocks. By preventing bidders from splitting up their competitors' contiguous blocks, these policies help deter mischief, and ensure the assignment round will not adversely impact competition.

I again commend Gary Epstein and the staff of the Incentive Auction Task Force for their hard work throughout this proceeding and for presenting us with a terrific item. I am also grateful for the time they took to brief my staff and me on the Public Notice.

**STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL**

Re: *Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Procedures for Competitive Bidding in Auction 1000, Including Initial Clearing Target Determination, Qualifying to Bid, and Bidding in Auctions 1001 (Reverse) and 1002 (Forward)*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269.

This Commission has been charged by Congress with holding the world's first spectrum incentive auction. This is not an effort for the timid and fainthearted. The complexities of reclaiming old airwaves and repurposing them for new wireless use are big—and the small details matter.

It's the details we deal with today in this Public Notice. We announce the date the auction will begin. We delve into the configuration of the 600 MHz band, covering everything from the placement of stations to the dynamics of the duplex gap to the assignment of impaired spectrum. Each issue is novel, packed with consequences, and the product of hard-fought compromise. There are issues and assumptions here every one of us might choose to tweak, but I believe this package of decisions has the benefit of moving us forward. I am especially pleased that today's effort seeks additional comment on vacant channels, which can help provide the unlicensed community with the spectrum necessary to develop innovative and cutting-edge devices and technologies.

This is not your typical Public Notice. But then again, this is not your average spectrum auction. We cannot forget we are making history. There are hard choices to make, complicated decisions to reach, and if we get them right—exciting new possibilities for spectrum in the 600 MHz band.

**DISSENTING STATEMENT OF
COMMISSIONER AJIT PAI**

Re: *Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Procedures for Competitive Bidding in Auction 1000, Including Initial Clearing Target Determination, Qualifying to Bid, and Bidding in Auctions 1001 (Reverse) and 1002 (Forward)*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269.

This proceeding is the direct result of bipartisan legislation that tasked the Commission with the responsibility of conducting an incentive auction. But today's item is yet another example of how the proceeding has been conducted in a partisan and insular manner. Approximately one month ago, I offered ten specific proposals for improving these incentive auction procedures. But each and every one of them was rejected. To scrounge up the votes to pass today's item, the members of the majority made a deal among themselves, leaving Commissioner O'Rielly and I, as well as the bipartisan leadership of the House Energy and Commerce Committee, out in the cold. There was no willingness to negotiate. No willingness to compromise. No openness to considering our ideas.

My concerns about the process leading to today's vote are not unique. Over the past few weeks, I have heard compelling criticisms from numerous stakeholders. Some have told me that the FCC did not give them enough (if any) data to independently analyze the Commission's proposals, nor even enough to verify the FCC's proffered analysis. Others told me that the Commission was breaking promises that had been made earlier in this proceeding. And then, of course, there was the last-minute data dump that was part of the ill-fated attempt to muscle this item through at the July meeting.

What has this process produced? In my view, it has left us with a mess, and with Congress, wireless carriers, broadcasters, unlicensed interests, and others dissatisfied to varying degrees. I don't know whether the incentive auction will be successful. But I do know that the FCC is making it substantially more difficult than it needs to be to have a successful auction. And I believe that we are poised to dump serious post-auction difficulties into the laps of future Commissions. As a result, I have no choice but to respectfully dissent.

* * *

My most serious concern involves the 600 MHz band plan. Put simply, this item permits too many broadcasters to be placed in the wireless portion of the 600 MHz band. That matters for a couple of reasons. First, placing broadcasters in the wireless portion of the 600 MHz band will impair spectrum slated to be sold in the forward auction, thus decreasing revenues and the amount of spectrum cleared. It will also cause future interference between wireless and broadcast services.

The 700 MHz auction in 2008 offers a cautionary tale regarding the problem of inter-service interference. Following that auction, the Commission and industry were forced to deal for years with the difficulties created by having channel 51 television broadcast stations abutting A-block spectrum that had been sold to the wireless industry (not to mention the fact that the auction raised significantly less revenues as a result). George Santayana famously said that "those who do not remember the past are condemned to repeat it." And unfortunately, that appears to be what's happening here in terms of interference.

Under the procedures adopted today, broadcast stations will be sprinkled throughout the wireless portion of the 600 MHz band. This will lead to permanent adjacent channel *and* co-channel interference. All in all, the Commission will allow impairments equal to one paired block nationwide up to a cap of 20% weighted-pops. This is an extraordinary amount of impairment. For example, one wireless carrier calculated that the 84 MHz clearing target simulation released by the Commission would lead, in its view,

to only 8 unimpaired spectrum blocks out of 21 total blocks in our nation's three largest markets.¹ Just think about that: Only 38% of spectrum blocks in New York City, Los Angeles, and Chicago would be clean. And that's just under the cherry-picked simulation that the Commission chose to release. When I asked the staff to run additional simulations using a variety of different assumptions, I never received a response. One can only imagine what those results would have shown.

In my view, our priority should be to auction clean spectrum. That's why I proposed limiting impairments on a nationwide basis to border impairments plus 3% weighted-pops. This proposal, which recognized that there are both border impairments outside of our control and other impairments that we are creating ourselves, was supported by both wireless carriers and broadcasters. But it was rejected.

Then, in the spirit of compromise, I was willing to support a flat cap of 10% impaired weighted-pops. To be clear, such a cap would have permitted far more impairment than I would have preferred. But I was prepared to support it in order to make at least a modest improvement to the band plan. But even this compromise, which had bipartisan support in Congress, was cast aside at the eleventh hour.

And the band plan gets worse. Not only does the Commission permit far too much impairment, it concentrates those impairments in the wrong part of the wireless band. Specifically, the Commission decides to place broadcasters primarily in the downlink wireless portion of the 600 MHz band, with some inserted into the duplex gap and a smattering in the uplink.

This outcome flies in the face of the record we have compiled. Most wireless carriers have told the Commission that it is better to place broadcast stations in uplink spectrum than in downlink spectrum. Why? To begin with, as Cellular South told us, "mobile broadband providers currently require significantly more downlink than uplink spectrum to meet consumer demand."² That's why, as T-Mobile explained, placing broadcasters in the "uplink will impair the less useful—and less valuable—segment of the band pair, which will increase the utility of remaining spectrum as well as the revenue generated by the forward auction, which will increase the total amount of spectrum cleared."³

Moreover, when broadcasters are placed in the uplink rather than the downlink, carriers can more easily minimize interference through the use of filters. When TV stations are repacked into the uplink portion, Verizon informed the Commission that "wireless operators can design market-specific base station receiver filters to protect against broadcaster interference."⁴ And T-Mobile pointed out that these commercially available base station filters are "cost effective because the LTE base stations are fixed in location and limited in number."⁵ By contrast, when broadcast stations cause interference in downlink spectrum, Verizon explained that "it is not possible to use market-specific filtering methodologies in handsets that must be able to roam all areas."⁶

For all of these reasons, the Commission's decision to place broadcasters in the downlink spectrum rather than the uplink will make the spectrum sold in the forward auction less valuable. This will mean less revenue generated in the forward auction, which, in turn, will reduce the amount of

¹ See Letter from Joan Marsh, AT&T to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-168, AU Docket No. 14-252 (July 27, 2015) (Table entitled "Summary Including Full Device Impacts").

² C Spire Comments at 4.

³ T-Mobile Comments at 14.

⁴ Verizon Comments at 18.

⁵ T-Mobile Comments at 12.

⁶ Verizon Comments at 18.

spectrum the Commission is able to clear, and ultimately, the chances of holding a successful incentive auction.

The decision to place broadcasters in the duplex gap will also cause downlink spectrum to be impaired and has engendered widespread opposition. I have been amazed by the diverse coalition that opposes putting television stations in the duplex gap. Broadcasters, wireless carriers, and unlicensed advocates have all criticized the idea.⁷ And while the Commission's vote today will be party-line, this isn't a partisan issue. For example, Democratic Senators Blumenthal, Booker, Leahy, Schumer, and Wyden,⁸ not to mention New York City Mayor Bill de Blasio,⁹ have expressed serious concern to the Commission about placing television stations in the duplex gap. But the Commission ignores this chorus and barrels ahead anyway.

I also object to the Commission's tentative conclusion to reserve two vacant channels in the repacked UHF broadcast television band for unlicensed white-space devices in those markets where broadcast television stations are placed in the duplex gap. As set forth in my statement dissenting from the *Vacant Channel NPRM*,¹⁰ it is bad enough that the Commission is proposing to set aside one vacant channel in the broadcast television band for unlicensed white-space devices. Reserving *two* vacant channels in a downsized broadcast television band is even worse.

That's because many low-power TV stations and TV translators who provide valuable service across the country will need a home after the auction. Making yet another vacant channel off-limits to broadcasters will mean that more LPTV stations and TV translators will go off the air. As one might say, you can't say that you're for LPTV stations and TV translators but then deliberately deny them spectrum within the broadcast television band.

Stepping back, it is remarkable that we have come to the point where the following statement no longer has the support of the majority of the Federal Communications Commission: "When it comes to the broadcast television band, broadcasters should have priority." Nonetheless, that remains my position. It's also the position of a large and bipartisan group of elected officials and, I daresay, the millions of Americans who rely on broadcasters each and every day.

I also disagree with the arbitrary and inconsistent manner in which the Commission will determine the size and makeup of the spectrum reserve. From the start of this proceeding, I have opposed

⁷ See, e.g., CTIA Comments at 5; Verizon Comments at 19; NAB Reply Comments at 5–6; Letter from Broadcast Networks and Their Affiliate Associations to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, WT Docket No. 12-269 (July 15, 2015); Letter from Michael Calabrese, Open Technology Institute at New American Foundation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, WT Docket No. 12-269 (July 7, 2015); Letter from Harold Feld, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252, WT Docket No. 12-269 (July 9, 2015).

⁸ See Letter from Hon. Richard Blumenthal *et al.* to Hon. Tom Wheeler, Chairman, FCC, GN Docket No. 12-268, GN Docket No. 12-269, AU Docket No. 14-252, MB Docket No. 15-146 (August 4, 2015).

⁹ See Letter from Maya Wiley, Counsel to the Mayor, New York City to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 (July 30, 2015).

¹⁰ See *Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band for Use by White Space Devices and Wireless Microphones; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, MB Docket No. 15-146; GN Docket No. 12-268, Notice of Proposed Rulemaking, 30 FCC Rcd 6711, 6742–43 (2015) (Dissenting Statement of Commissioner Ajit Pai), available at <http://go.usa.gov/3sDq5>.

establishing any spectrum set-asides.¹¹ In my view, the Commission should not pick winners and losers. Rather, we should give all participants an equal opportunity to bid on whatever spectrum they want. Experience demonstrates that this is the best way to ensure that spectrum flows to its highest valued use, that auction revenues are maximized, and that we have the best chance of holding a successful incentive auction.

But at this point, that fight is water under the bridge. The Commission decided last year to establish a spectrum reserve and the only question on the table right now is how to implement it. And unfortunately, the internally contradictory approach set forth in this item only serves to heighten the unfairness of this misguided policy.

In particular, the Commission will determine the size of the reserve by aggregating the number of (less-impaired) Category 1 and (more-impaired) Category 2 licenses to be sold in a particular market. So in deciding how big the reserve will be, both types of licenses will contribute to expanding the size of the reserve. But at the same time, the Commission decides that only Category 1 licenses will be placed in the spectrum reserve while Category 2 licenses will be placed in the unreserved spectrum. But if Category 2 licenses cannot be placed into the reserve, then why should they factor into calculating the reserve's size? My position is simple: Spectrum that isn't of sufficient quality to go in the reserve should not serve to inflate the size of the reserve.

I suggested different approaches to fixing this problem. One proposal was to determine the size of reserve by counting only Category 1 licenses. Another was to permit Category 2 licenses to be placed in the reserve. Again, each idea was rejected.

To be sure, I do not disagree with every decision made in this item. For example, I have long opposed the use of dynamic reserve pricing,¹² and the Commission at long last abandons it today. I also support the Commission's refusal to decouple the trigger for creating reserved spectrum from the amount of money necessary to close the incentive auction. Reducing competition at any point in an auction is a mistake, but it would be a particularly colossal error to do so before we have ensured that the auction can close. It would be like a football player beginning his touchdown celebration while still on the one-yard line.¹³ We must keep focused on reaching our overriding objective, which is to have a successful auction, and we must not allow side issues to reduce our chances of achieving that goal. But at the end of the day, the positive aspects of this item are few and far between, and I cannot support it.

* * *

¹¹ See *Policies Regarding Mobile Spectrum Holdings; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, WT Docket No. 12-269, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6133, 6268 (2014) (Dissenting Statement of Commissioner Ajit Pai), available at <http://go.usa.gov/3fvgd>.

¹² See *Comment Sought On Competitive Bidding Procedures For Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002*, AU Docket No. 14-252, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 15750, 15912 (2014) (Dissenting Statement of Commissioner Ajit Pai), available at <http://go.usa.gov/3sDpB>.

¹³ National Football League, Can't-Miss Plays: Trevathan's Drop Six, <http://bit.ly/1KTbaAm>.

Throughout this proceeding, the Commission has been plagued by the same problem. It has been absolutely convinced that it has all the right answers. As a result, there has been a stunning unwillingness to listen to what anyone else, from Republican Commissioners to Democratic Congressmen, has to say. It doesn't matter what the engineering shows, what stakeholders tell us, or what common sense suggests. The answer is always the same: "We are right, and you are wrong." That's no way for the Commission to make decisions that will impact not only the wireless and broadcast industries, but all Americans, for years to come.

I respectfully dissent.

**DISSENTING STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY**

Re: *Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Procedures for Competitive Bidding in Auction 1000, Including Initial Clearing Target Determination, Qualifying to Bid, and Bidding in Auctions 1001 (Reverse) and 1002 (Forward)*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269.

As I have repeatedly stated, the success of the auction depends on the Commission's ability to bring certainty and a fair process to all interested parties. Broadcasters must be sufficiently incentivized to participate, and the rules and processes must entice the wireless industry to freely bid the necessary sums to cover the costs to buy the broadcast stations. Simplicity and transparency are key to ensuring that stakeholders can make the necessary business plans to enable and promote participation allowing for the efficient allocation of spectrum. Unfortunately, this proceeding continues to proceed down a path – both substantively and procedurally – that I fear places the success of the auction at risk.

My foremost concern is the item's handling of market variation. I acknowledge that some market variation is unavoidable to protect Canadian and Mexican stations. But, we must always keep in mind that with market variation comes impaired wireless licenses. The flawed and incredibly complex dynamic reserve price model and ridiculously high 20 percent impairment (by weighted pops) benchmark, both of which I advocated against from the very beginning, have been abandoned. Although this is good news, the not-so-good news is that the 20 percent impairment rate has been replaced by graduated percentages specific to the particular clearing target, a concept first introduced in the Simulations Public Notice.¹ These permitted impairment levels, although lower than 20 percent in most instances, are still too high, especially for the most likely clearing thresholds.

For instance, at the 84 megahertz clearing target, the Commission will permit a 14 percent impairment rate. In light of the agreement that was reached with Mexico and the indications of a promising deal with Canada, a 14 percent impairment rate provides too much variation that could lead to unnecessary impairments, including in the largest and most desired markets. To ensure that the wireless industry has the opportunity and willingness to participate fully, the Commission should ensure that impairments are as minimal as possible. Accordingly, I would have preferred that the only impairments permitted were those caused by border stations, but the industry proposal to permit border impairments along with an additional three percent for flexibility was a good compromise. Unfortunately, this was rejected.

The permitted impairment rate is particularly important because it provides the flexibility to place additional broadcasters in the 600 MHz Band, which is likely to cause significant impairment to the spectrum allocated for wireless downlinks. If broadcasters are placed into the new 600 MHz Band, the stations will be placed in the duplex gap first, downlink next and then the uplink. Placing stations in the downlink and even the duplex gap will cause significant impairments to the downlink spectrum. This is very worrisome because the downlink spectrum is more valuable to wireless providers, and therefore this decision could have a disproportionate effect on the amount that forward auction bidders are willing to bid at auction. Therefore, I cannot support any plan that would unnecessarily increase impairments to the downlink, including the placement of broadcasters in the downlink and duplex gap. Placing stations in the duplex gap is equally troubling as it unnecessarily harms broadcaster wireless microphones used to do live and breaking news reports to the American people.

¹ *Incentive Auction Task Force Releases Initial Clearing Target Optimization Simulations*, AU Docket No. 14-252, GN Docket No. 12-268, Public Notice, DA 15-606 (May 20, 2015).

I am also concerned that the decision to favor the placement of broadcasters in the downlink, instead of the uplink, was influenced by outside factors that were not revealed to the Commissioners until very late in the game. It appears that, as part of negotiations with the Canadian government, a deal may have been struck to keep broadcast stations out of the uplink at any expense.² This decision, which was clearly on an issue of importance to the industry and can affect the overall success of the auction, should have been made by the Commissioners. And the Commissioners should not have been in a position to decide such an important issue with a threat being held over their heads that protecting the downlink could tank border negotiations with Canada.

I also have serious concerns about the compromise that is in the works to provide a second vacant channel to the unlicensed community in those markets where a broadcast station is placed in the duplex gap. I am a fervent supporter of the innovation and opportunities provided by unlicensed technologies, but, as I have said before, I cannot support any action that would have the effect of making secondary users primary to full-power stations in the TV Band. This is not consistent with the Spectrum Act, and I am unlikely to support any efforts to provide unlicensed users priority access to broadcast spectrum at the expense of full-power broadcasters.

Procedurally, the trend of failing to provide sufficient information to industry, and in many cases to Commissioners, in a timely manner continues. The focus on placing broadcasters in the duplex gap and downlink – and the effect of a potential deal with Canada – came to light after staff released a letter with supplemental information on July 10th.³ This untimely release of additional information, which industry had been requesting since the release of the Simulations Public Notice, was a process violation of the highest order. And since then, little additional information has been forthcoming.

For this reason, I cannot agree to the language in the order that states that it is unnecessary to release additional simulations, along with any data and assumptions underlying these simulations. The Commission should share all of the information it has and specify the assumptions it is making so that interested parties who have the ability and want to run simulations can do so. Although it is outrageous that this data and stakeholder analyses were not available to inform our decision today, it would still be useful for potential auction participants to have this data to assist in their preparation of business plans and bidding strategies for the auction.

I also have concerns about how the Commission is administering the reverse auction. Although I am supportive of eliminating intra-round bidding to simplify the auction process, a five percent decrement in price per round equates to a substantial differential in price. For instance, a license that starts at \$900 million will have a \$45 million dollar drop in one round. This could cause broadcasters to drop out of the auction prematurely. We need to incentivize broadcasters to remain in the auction for as long as possible, instead of potentially swaying their decision to drop out and be repacked as they see the value of their stations drop by millions of dollars per round. The idea that the reverse auction may take a little bit longer and that participating broadcasters would be inconvenienced rings hollow. Considering the importance of this auction, what is a little more time? For those unwilling to sit before a computer all day, the Commission has implemented a proxy bid system where they can indicate the lowest amount at

² Letter from Tom Wheeler, Chairman, Federal Communications Commission, to the Honorable Fred Upton, Chairman, Committee on Energy and Commerce, U.S. House of Representatives, and the Honorable Greg Walden, Chairman, Subcommittee on Communications and Technology, Committee on Energy and Commerce, U.S. House of Representatives (July 15, 2015) (“If we are unable to use the duplex gap in a handful of instances, however, the positive impact of agreements we reach could be significantly reduced.”).

³ Letter from Gary M. Epstein, Chair, Incentive Auction Task Force, Federal Communications Commission, to Marlene H. Dortch, Secretary, Federal Communications Commission (July 10, 2015).

which they are willing to relinquish their spectrum. For this reason, I suggested that the decrement should be reduced from five percent to one percent.

Additionally, I continue to object to the spectrum reserve. The Commission should not favor certain auction participants, facilitate their acquisition of spectrum at a reduced price at the expense of the American taxpayer, and compensate for the past business decisions of existing large wireless providers. And the existence of the reserve spectrum does not stop there, it exacerbates the problem that the spectrum is being offered in non-generic generic blocks. The licenses with the most impairments will be offered as unreserved licenses, while the licenses with the fewest impairments will be reserved licenses. This means that the nation's largest wireless providers will be bidding on impaired licenses, reducing the overall auction revenues.

Finally, the Commission should be able to vote on the technical formulas regarding the initial clearing target determination procedure, the final television assignment plan, and the assignment of licenses to forward auction winning bidders, along with algorithms for bid processing. I also cannot support the delegation to the Media Bureau to modify the optimization procedure for determining final channel assignments. Any changes, including the consideration of additional factors that could result in minimizing expenses and the disruption to broadcasters, should be voted on by the Commission.

In the end, the Commission majority has made clear that no suggestions to their auction design were acceptable or welcome. They dismissed every effort for compromise and are now left hoping the auction is a success based on an artificial deadline and a deeply flawed process. And while I came to the Commission willing to do the hard work to make the auction workable, I am left on the outside praying it is not a failure. At this point, I can see only one way for success: if the insatiable need for licensed spectrum far exceeds the roadblocks imposed by wrong-headed decisions.

For all of these reasons, I must dissent to today's item.