PUBLIC NOTICE

Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

News Media Information: 202-418-0500
Internet: http://www.fcc.gov
TTY: 888-835-5322

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INCENTIVE AUCTION TASK FORCE AND MEDIA BUREAU ADOPT A POST-INCENTIVE AUCTION TRANSITION SCHEDULING PLAN

MB Docket No. 16-306
GN Docket No. 12-268

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I. INTRODUCTION

1. The Media Bureau (Bureau) in this Public Notice adopts a methodology to establish construction deadlines for full power and Class A television stations that are transitioning to new channels following the incentive auction (Auction 1000). The Federal Communications Commission (Commission or FCC) delegated authority to the Bureau to establish transition deadlines within the 39-month post-auction transition period.[1] In consultation with the Incentive Auction Task Force (IATF), the Wireless Telecommunications Bureau (WTB), and the Office of Engineering and Technology (OET), the Bureau proposed a methodology for establishing deadlines within a "phased" transition schedule in the *Transition Scheduling Proposal Public Notice*.[2] Commenters generally expressed support for the proposal, with some suggested modifications and additional measures to facilitate the transition.[3] We now adopt the proposed methodology, with modifications that are discussed below. The methodology we adopt is detailed in Appendix A. This methodology will be used after final channel reassignments are known in order to establish an orderly schedule that will allow stations, manufacturers, and other vendors and consultants, to coordinate broadcasters' post-auction channel changes.

2. This Public Notice also addresses other matters related to the transition scheduling plan that commenters raised in response to the *Transition Scheduling Proposal Public Notice.* In particular, we explain how the Bureau will evaluate requests for relief from transition obligations and address commenters' requests for greater flexibility and coordination during the transition period.[4] We also address comments regarding the prohibited communications rule[5] and decline to address several matters raised by commenters as outside the scope of this proceeding or already addressed in other proceedings.[6] In a separate public notice being released today, we address the Commission's process for the post-auction transition of full power and Class A television stations, including detailed information, instructions, and projected deadlines for filing applications related to the transition.[7]

II. BACKGROUND

3. The Commission established a 39-month period for all reassigned stations to transition to their post-auction channel assignments following conclusion of the auction.[8] In delegating authority to

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[1] 47 CFR § 73.3700(b)(1)(vi); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6797, para. 563 (2014) (*Incentive Auction R&O*), *aff'd, Nat'l Assoc. of Broadcasters, et al. v. FCC*, 789 F.3d 165 (D.C. Cir. 2015) (*NAB v. FCC*) (subsequent citation omitted). All comments, reply comments, letters, and *ex parte* submissions referenced in citations below can be found in GN Docket No. 12-268 and MB Docket No. 16-306. The Bureau also hosted a webinar regarding the proposed post-auction transition scheduling plan on October 17, 2016. *See* https://www.fcc.gov/news-events/events/2016/10/post-incentive-auction-scheduling-plan-webinar.

[2] *Incentive Auction Task Force and Media Bureau Seek Comment on Post-Incentive Auction Transition Scheduling Plan*, MB Docket No. 16-306 and GN Docket No. 12-268, Public Notice, 31 FCC Rcd 10802 (MB 2016) (*Transition Scheduling Proposal Public Notice*).

[3] *See, e.g.*, CCA Comments at 2-3; CTIA Comments at 5-6; ERI Comments at 1; NAB Comments at 7.

[4] *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan).

[5] *See infra* § III.C (Confidential Letters and Prohibited Communications).

[6] *See infra* § III.D (Matters Outside of the Scope of the Proceeding or Previously Addressed in Other Proceedings).

[7] *See Incentive Auction Task Force and Media Bureau Announces Procedures for the Post-Incentive Auction Broadcast Transition*, Public Notice, GN Docket No. 12-268 and MB Docket No. 16-306, DA 17-106 (rel. Jan. 27, 2017) (*Broadcast Transition Procedures Public Notice*).

[8] *Incentive Auction R&O*, 29 FCC Rcd at 6796, para. 559 (In order to balance "the need for a post-incentive auction transition timetable that is flexible for broadcasters and that minimizes disruption to viewers" with the need for a

(continued….)

the Bureau to establish construction deadlines within the transition period, the FCC directed the Bureau to tailor the deadlines to stations' individual circumstances.[9] Recognizing that resources needed for the transition process are limited, the Commission determined that a phased construction schedule would facilitate efficient use of these resources, eliminate the need for all stations to obtain their equipment or schedule tower crews at the same time, and could account for the complexities that stations may face.[10]

4. To carry out the Commission's directive, the Bureau proposed to use two computer-based tools to assign construction deadlines within a phased transition schedule.[11] The first of the proposed tools, the Phase Assignment Tool, uses optimization techniques to assign those television stations reassigned to new post-auction channels to one of 10 transition phases.[12] The Bureau proposed to use the Phase Assignment Tool to group stations together in transition phases in a way that will support an orderly, managed transition process. As part of this grouping, the tool identifies which stations are part of "linked-station sets," that is, a set of two or more stations assigned to the same phase with interference relationships, or "dependencies."[13]

5. The second tool, the Phase Scheduling Tool, simulates the time required for stations in each phase to complete their transition-related tasks in light of resource availability. By modeling the tasks required to complete the transition, and accounting for limited resources, this tool estimates the total time necessary for stations within a phase to complete the transition process. The Phase Scheduling Tool accounts for limited resources by constraining the amount of such resources available to stations within a phase at any given time. To simulate how long stations may have to wait if a required resource is unavailable, the stations within a phase will obtain access to the required resource according to a "simulation order,"[14] and the tool will estimate the time required for all stations to complete the transition phase based on that particular simulation order.[15] The Bureau proposed to run the Phase Scheduling Tool

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schedule that "provide[s] certainty to wireless providers and [is] completed as expeditiously as possible" the Commission established a 39-month period for reassigned stations to transition to their post-auction channel assignments). The 39-month transition period commences upon release of the *Auction 1000 Closing and Channel Reassignment Public Notice* (*Closing and Reassignment Public Notice*) and consists of a three-month window for stations to file their initial construction permit and 36-month period for reassigned stations to transition to their post-auction channel. *Incentive Auction R&O*, 29 FCC Rcd at 6796, para. 559; 47 CFR § 73.3700(b)(1)(i).

[9] *See Incentive Auction R&O*, 29 FCC Rcd at 6580, para. 34 ("Stations will be assigned deadlines within that period tailored to their individual circumstances"); *id*. at 6800, para. 569 ("We recognize that some stations will face significant challenges in completing the post-auction transition to their new facilities. The Media Bureau will take such challenges into account when assigning individual construction deadlines.").

[10] *See id*. at 6801, para. 571 ("We recognize that resources needed for the transition process are limited. By structuring a phased transition, our goal is to mitigate the impact of these limitations by eliminating the need for all stations to obtain their equipment or schedule a tower crew at the same time."); *id.* at 6797, para. 563 (concluding that a phased construction schedule is most likely to ensure a successful transition for all broadcasters).

[11] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10808-10, paras. 11-16.

[12] Once the final stage rule is satisfied in the forward auction, the final television channel assignment plan will be determined. *See Broadcast Incentive Auction Scheduled to Begin 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)*, GN Docket No. 12-268, Public Notice, 30 FCC Rcd 8975, 9100, para. 272 (2015) (*Auction 1000 Bidding Procedures Public Notice*).

[13] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10807, para. 10. Because linked-station sets may include both U.S. and Canadian stations, the FCC and the Department of Innovation, Science and Economic Development of Canada (ISED Canada) continue to coordinate closely as part of the joint repacking process.

[14] *See infra* n. 98 (describing the simulation order).

[15] *See Transition Scheduling Proposal Public Notice,* 31 FCC Rcd at 10834-35 (Appx. A), at paras. 31-36. The Phase Scheduling Tool divides the various processes involved in a station transitioning to its post-auction channel
(continued….)

with different simulation orders to produce a range of estimated times for each transition phase, and the Bureau proposed to use these estimates to assist it in establishing phase completion dates for each phase.[16]

6. Using the two tools, the Bureau proposed to create a phased transition schedule, under which stations will be assigned to one of 10 transition phases with sequential testing periods and phase completion dates.[17] The testing period will have a designated start and end date, with the end date corresponding to the phase completion date.[18] The phase completion date will be the date listed in that station's construction permit as its construction deadline. That date will be the last day that a station may operate on its pre-auction channel.[19] While stations may engage in planning and construction activities at any time prior to their phase completion date, equipment testing on post-auction channels will be confined to the specified testing periods assigned to their transition phase in order to minimize interference and facilitate coordination.[20]

7. In the *Transition Scheduling Proposal Public Notice*, the Bureau noted that once the forward auction (Auction 1002) concludes, it will release the *Auction Closing and Channel Reassignment Public Notice (Closing and Reassignment Public Notice)*, which will announce that the reverse and forward auctions have ended and specify the effective date of the post-auction repacking.[21] That public notice will also announce the transition phase, phase completion date, and testing period for each transitioning station. Recognizing the importance of providing broadcasters with as much time as possible to prepare for the transition, in the *Transition Scheduling Proposal Public Notice*, the Bureau announced its intention, to send, after the final stage rule is satisfied,[22] each eligible full power or Class A television station[23] that was not a provisionally winning bidder to go off-air at the end of Stage 4 of the reverse auction (Auction 1001) a confidential letter that identifies the station's post-auction channel assignment, technical parameters, and assigned transition phase.[24]

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into two sequential stages: the "Pre-Construction Stage" and the "Construction Stage." *See id.* at 10835-36 (Appx. A), paras. 38-39. The Tool assumes that a station assigned to an earlier transition phase will begin its Pre-Construction Stage processes involving a constrained resource (e.g., ordering an antenna or tower crew) before a station assigned to a later phase.

[16] *See id.* at 10809, para. 15 and 10834-35 (Appx. A), para. 35.

[17] *See id.* at 10805, para. 4.

[18] *See id*. at 10807, para. 9.

[19] *See id*. at 10806-07, para. 8.

[20] *See id.* at 10807, para. 9. The concept of a "testing period" is discussed in greater detail below. *See infra* para. 44.

[21] The *Closing and Reassignment Public Notice* is the same public notice referred to as the Channel Reassignment Public Notice in prior public notices and orders released in this proceeding. *See, e.g., Incentive Auction R&O*, 29 FCC Rcd at 6782, para. 525; *Application Procedures for Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Technical Formulas for Competitive Bidding*, Public Notice, 30 FCC Rcd 11034, 11088, para. 167 (WTB 2015); 47 CFR § 73.3700(a)(2). As stated in the *Incentive Auction R&O*, we may release the auction closing public notice and the *Channel Reassignment Public Notice* simultaneously. *See Incentive Auction R&O,* 29 FCC Rcd at 6784, para. 529. Our intention is to combine those into one public notice as described above.

[22] The final stage rule was satisfied on Jan. 18, 2017. *See* Incentive Auction Public Reporting System, Forward Auction – Announcements, https://auctiondata.fcc.gov/public/projects/1000/reports/forward_announcements (last visited Jan. 26, 2017).

[23] "Eligible stations" are those that were eligible to participate in the reverse auction and that are being protected in the repacking process. *See Incentive Auction R&O*, 29 FCC Rcd at 6715, para. 350.

[24] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10806, para. 7. If a station is not assigned to a new post-auction channel, its confidential letter will indicate that the station has not been reassigned and therefore, the letter will not provide technical parameters or a transition phase. We anticipate releasing a public notice announcing
(continued….)

8. The Bureau also sought comment on other issues related to the phased transition plan and how best to facilitate the transition, including whether to mandate the use of temporary channels[25] or permit temporary increased pairwise interference during the transition.[26] It also sought comment on how the Bureau should evaluate requests received during the transition and account for the impact of such filings on the transition plan.[27]

III. DISCUSSION

9. Based on the record in this proceeding, we adopt, with modifications, the phased transition plan proposed in the *Transition Scheduling Proposal Public Notice*, including use of the Phase Assignment Tool and the Phase Scheduling Tool. Most commenters support efforts to establish a phased transition process and the use of the tools developed to plan and create an orderly schedule.[28] In the sections that follow,[29] we discuss the modifications made and the rationale for those changes, as well as comments regarding other aspects of the two tools. We then discuss comments concerning other issues raised in response to the *Transition Scheduling Proposal Public Notice* relating to how we will evaluate transition-related requests by stations in light of their potential impact on the schedule, challenges to individual construction permit deadlines, and the flexibility of the transition schedule.[30] We also address comments on the use of information regarding post-auction channel assignments in light of the prohibition on certain communications of bids and bidding strategies in the incentive auction.[31] Finally, we decline in this Public Notice commenter requests to reconsider the 39-month transition period as beyond the staff's delegated authority. We also briefly address certain comments regarding reimbursement eligibility and the impact of the plan on low power television and TV translator stations, which are either outside the scope of this proceeding or have already been addressed in other proceedings.[32]

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the issuance of the confidential letters. *See Broadcast Transition Procedures Public Notice* at 4, para. 10.

[25] *See Transition Scheduling Proposal Public Notice*, 30 FCC Rcd at 10811-14, paras. 20-25.

[26] *See id.* at 10810-11, paras. 17-19.

[27] *See id.* at 10814-15, paras. 26-27.

[28] *See, e.g.*, CCA Comments at 2-3 (supporting the Transition Plan laid out by the Bureau, but also recommending additional actions the Bureau can take to ensure that the 600 MHz Band is cleared in an expeditious manner); CTIA Comments at 5-6 (supporting the use of the two optimization tools, the Phase Assignment and Scheduling Tools, to best determine the timing for a particular broadcast station to relocate as well as the length of time it will take for that station to complete its transition); ERI Comments at 1 ("[t]hese tools promise to identify not only the constraints created by the assignment relationships between stations but also recognize the variety of unique factors that apply to each facility's transition to a new operating channel and the resources available to the industry to accomplish the channel repacking plan"); NAB Comments at 7 (supporting the transition scheduling plan, but in practice noting that the success of the plan will depend on its agility during the transition).

[29] *See infra* §§ III.A.1 (Phase Assignment Tool) and III.A.2 (Phase Scheduling Tool).

[30] *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan).

[31] *See infra* § III.C (Confidential Letters and Prohibited Communications).

[32] *See infra* § III.D (Matters Outside of the Scope of the Proceeding or Previously Addressed in Other Proceedings). The *Transition Scheduling Proposal Public Notice* did not seek comment on nor was it intended to address the impact of the transition and phase completion dates on other licensed services such as fixed Broadcast Auxiliary Stations, Low Power Auxiliary Stations (including wireless microphones), or unlicensed operations (including white space devices and unlicensed wireless microphone operations) that access the broadcast television spectrum and that may be affected by the transition of full power and Class A television stations. *See generally Incentive Auction R&O*, 29 FCC at 6834-47, paras. 656-88 (addressing the impact of the repack on other services and unlicensed operations).

A. Creating the Phased Transition Schedule

1. Phase Assignment Tool

10. As soon as possible after the forward auction satisfies the final stage rule and the final channel assignments are determined, the Bureau will use the Phase Assignment Tool to assign a transition phase to each eligible full power and Class A television station that receives a new post-auction channel as a result of the final channel assignment determination procedure. As noted above, the Bureau has announced that it intends to send each eligible station that will remain on the air after the auction a confidential letter after the final stage rule is met that identifies the station's post-auction channel assignment, technical parameters, and assigned transition phase.[33] We find that developing the final channel assignments and providing the information to affected stations as early as possible after the final stage rule is reached will facilitate early planning and provide additional time for stations to prepare construction permit applications.

11. We decline to adopt NAB's suggestion that we not assign stations to phases until "stations have completed necessary structural and engineering studies"[34] or its alternative suggestion that initial phase assignments be "preliminary" and be re-evaluated after stations have filed their construction permit applications and cost estimates.[35] We find that NAB's suggested approach could negatively affect the incentive for broadcasters to begin preparing for the transition in earnest.[36] Furthermore, the information used to create the transition schedule is sufficiently detailed and reliable to establish phased transition deadlines once the final channel reassignments have been established. Launching an organized, phased schedule at the earliest opportunity will provide broadcasters, equipment manufacturers and other vendors and consultants, wireless providers, and television viewers with certainty and stability. This is particularly important as broadcasters prepare their construction permit applications, coordinate with other broadcasters, and begin construction planning.[37] We understand that unforeseen circumstances may arise, and the Bureau will work closely with individual broadcasters, as well as broadcaster associations, during the transition process. However, we conclude that assigning stations to transition phases as soon as possible is necessary to carry out the transition in a timely manner.

12. We also decline suggestions to collect additional or different information about stations that face difficult approval processes or procurement issues prior to assigning stations to phases.[38] As described more fully in Appendix A, the Phase Assignment Tool already includes a constraint identifying

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[33] *See also Media Bureau and Incentive Auction Task Force Urge Television Licensees to Update Contact Information and Identify a Street Address*, Public Notice, GN Docket No. 12-268 and MB Docket No. 16-306, DA 17-10 (MB Jan. 5, 2017) ("We will send [information about channel reassignments] approximately three to four weeks after the final stage rule is met in the forward auction and the Commission's systems have identified new post-auction channel assignments for all stations that will remain broadcasting.").

[34] NAB Comments at 7-8.

[35] *Id*.

[36] *See* CTIA Reply at 13-14 (stating that NAB's proposal "would lead to a guaranteed delay for all broadcast television stations rather than just some of the stations that may need changes to their phase or schedule").

[37] Likewise, it is important for manufacturers and other vendors and consultants to know the phase transition priorities as early as possible so that they can manage the supply chain and plan how to best allocate resources in a way that will assist with the transition as a whole.

[38] *See* Block Comments at 3-4 (proposing that the Commission seek real-world information from broadcasters following the auction and prior to assigning stations to phases); Sinclair Reply at 7 (arguing that the Bureau should obtain information about the need for local approvals, tower loading conditions, and other tenants on towers, the need for FAA approvals, and other knowable information before making phase assignments); PTV Comments at 7 n.4 (proposing that the Bureau provide governmental licensees an opportunity to inform the Commission of their expected procurement processes and potential delays, and factor this information into the Commission's assignment of stations to particular transition phases).

certain stations as "complicated" based on data collected by the Bureau.[39] Commenters who advocated additional data collection did not identify a source of additional or different data, or explain how the Phase Assignment Tool should take such information into account. Furthermore, we emphasize that the obstacles faced by individual stations are not the only factor that the Phase Assignment Tool must consider. Regardless of the difficulty of any one station's move, certain stations must move together in the same phase or certain stations must move in one phase before additional stations can move in a subsequent phase because of station dependencies created by interference constraints.[40] The Phase Assignment Tool is designed to organize the transition of all transitioning broadcast stations in an orderly fashion that respects station dependencies and interference constraints in addition to accounting for individual stations complexities, while simultaneously protecting television viewers. The Phase Assignment Tool as proposed strikes the appropriate balance with respect to these elements.

13. We adopt the constraints and objectives as set forward in Appendix A.[41] These constraints and objectives will minimize dependencies created by interference issues, ensure that the 600 MHz Band is cleared as expeditiously as possible, cluster groups of stations into the same phase to help manage scarce transition resources, and minimize the impact of the transition on television viewers. As discussed in more detail in the Appendix, solutions identified by the Phase Assignment Tool—that is, assignments of stations to phases—must satisfy all constraints. Of the many possible solutions that meet all the constraints, the tool will use optimization techniques to then select the one that best meets the defined objectives. Each objective is implemented in order of priority. Thus, the higher the objective's priority, the greater its potential impact on the solution.[42]

a. Constraints

14. The Bureau adopts eight of the constraints proposed in the *Transition Scheduling Proposal Public Notice*.[43] Every solution produced by the tool will satisfy all eight constraints. Specifically, (1) a station cannot cause more than two percent new pairwise interference to another station during the transition; (2) no stations in Canada will be assigned to transition before the third transition phase; (3) there will be no more than 10 transition phases; (4) all stations within a DMA will be assigned to no more than two different transition phases; (5) the difference in the number of stations in the largest transition phase and the smallest transition phase will be no more than 30 stations; (6) every transitioning station will be assigned to one transition phase; (7) no phase can have more than 125 linked stations; and (8) no station falling into the "complicated" category for purposes of the Phase Scheduling Tool can be assigned to Phase 1.[44] Commenters generally support these constraints, as well as the constraints indicating that the tool would not assign stations to temporary channels, and we discuss each one below.

15. In addition to the eight constraints adopted below, the *Transition Scheduling Proposal Public Notice* proposed as constraints that no Canadian or U.S. station would be assigned to a temporary channel.[45] Although temporary channels could be useful for breaking dependencies, the overwhelming

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[39] *See infra* paras. 24-25 and n.82 (defining complicated stations).

[40] *See Transition Scheduling Proposal Public Notice,* 31 FCC Rcd at 10820-21, paras. 6-11.

[41] *See infra* Appx. A at para. 20.

[42] We note that a few commenters specifically requested to be assigned to later phases or in the same phase. *See, e.g.*, DTV Utah Reply at 2-3. We deny such requests. The Phase Assignment Tool uses a holistic approach to assigning stations to phases that balances competing priorities and it is not practical to factor such requests into the optimization. *See infra* para. 50 n.166.

[43] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10824-27 (Appx. A), para 20.

[44] *Infra* Appx. A at para. 20.

[45] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10811, para. 20; *id.* at 10824-25 (Appx. A), para. 20.

number of commenters agreed with the Bureau's tentative conclusion not to use temporary channels and argued that the use of temporary channels should be permitted, but not required.[46] Therefore, we will not assign any station to a temporary channel as part of the Phase Assignment Tool. While the restriction on temporary channels was included as a constraint in the proposal,[47] it is unnecessary to include this restriction as a constraint in the final tool as the tool will not assign stations to temporary channels even absent such a constraint. As discussed below we will allow stations to voluntarily seek the use of a temporary channel.[48]

16. *Constraint 1.* During the post-incentive auction transition, we will allow temporary increased pairwise (station-to-station) interference of up to two percent.[49] As we previously stated, temporary pairwise interference increases of up to two percent could occur at any time during the transition on a station's pre-auction and/or post-auction channels. This constraint is likely to significantly reduce dependencies between stations.[50] Commenters generally support this approach; for example, NAB notes that "a two percent limit on a temporary basis will allow the Commission to reduce repacking interdependencies and make the transition more manageable."[51] The Commission has in the past allowed temporary increases in interference to broadcasters in order to facilitate transitions to new service,[52] and we agree with CTIA that allowing temporary increased interference in this context will "[provide] substantial public interest benefits that greatly exceed the minimal effect of temporarily changing the interference threshold."[53]

17. We disagree with the Joint Broadcast Commenters that the two percent temporary interference proposal is at odds with the Spectrum Act's directive to make "all reasonable efforts" to preserve television stations' coverage areas and population served.[54] Nothing in the Spectrum Act limits the Bureau's authority to permit temporary pairwise interference of up to two percent in order to facilitate the transition to post-auction channels.

18. NAB and the Joint Broadcast Commenters proposed that we cap the aggregate amount of interference any station may have to accept.[55] We decline to adopt NAB's proposal to cap aggregate interference. We find that doing so would provide little benefit while imposing significant costs by dramatically increasing the computational difficulty of the Phase Assignment Tool. In the *Transition Scheduling Proposal Public Notice*, we explained that limited increases in pairwise interference were unlikely to result in significant aggregate interference increases based on staff analysis, which reflects that

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[46] *See, e.g.*, CCA Comments at 9; Cordillera, et al. Comments at 8 n.11; FAB Reply at 1; Joint Broadcast Commenters Comments at 16; NAB Comments at 15, Reply at 5; Sinclair Reply at 6; WatchTV Comments at 1.

[47] *See Transition Scheduling Proposal Public Notice*, 31 FCC at 10825-26 (Appx. A) at para. 20.

[48] *See infra* § III.B.2 (Temporary Joint Use of Channels and Temporary Individual Channel Assignments).

[49] *Infra* Appx. A para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10811, para. 19; *id.* at 10824 (Appx. A), para. 20.

[50] *Id.* at 10811, para. 19.

[51] NAB Comments at 14; s*ee also* CTIA Comments at 7-8, Reply at 15; CCA Comments at 8 (implicitly acknowledging the Bureau's proposal to allow up to two percent new interference during the transition).

[52] *See, e.g., Qualcomm Incorporated Petition for Declaratory Ruling*, WT Docket No. 05-7, Order, 21 FCC Rcd 11683 (2006) (*Qualcomm Order*) (permitting new wireless licensees in the 700 MHz Band to cause temporary increases of up to 1.5 percent interference to broadcasters).

[53] CTIA Comments at 8.

[54] Joint Broadcast Commenters Comments at 13-15. *See also* Spectrum Act, 47 U.S.C. §1452(b)(2).

[55] Joint Broadcast Commenters Comments at 15 (asking the Commission to cap aggregate interference during the transition to no more than three percent); NAB Comments at 14 (asking the Commission to adopt an aggregate limit of five percent).

aggregate interference levels are unlikely to exceed the pairwise limits except for a few cases.[56] Recognizing the potential problems with a cap, NAB suggests as an alternative that, after stations are assigned to phases, the Bureau determine whether any station has greater than five percent aggregate interference, and, if so, make appropriate adjustments.[57] Consistent with this suggestion, the Bureau will attempt to find an alternative phase assignment for any station predicted to receive more than five percent temporary aggregate interference, consistent with the constraints and objectives of the Phase Assignment Tool as set forth in Appendix A.

19. *Constraints 2 and 3*. No Canadian station will be assigned to a transition phase before the third phase.[58] This constraint was developed in consultation with Canada.[59] Additionally we will limit the number of transition phases to 10.[60] Commenters support limiting the number of transition phases to 10.[61]

20. *Constraint 4*. To minimize consumer disruption during the 39-month transition period, and to promote the efficient use of tower crews, all stations within a DMA will be assigned to no more than two transition phases.[62] This constraint alleviates concerns that viewers will need to complete frequent rescans during the transition. Broadcast commenters put forward a variety of proposals to modify this constraint,[63] but none describe how their respective proposals would affect the overall phase assignments.[64] For example, NAB proposes that the Commission modify this constraint to a single

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[56] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10823 (Appx. A), para. 16 and 10831 (Appx. A), para. 28.

[57] NAB Comments at 14 (noting that if computational limit restricts the ability to incorporate such an aggregate cap in the Commission's software tool, the Commission should conduct an analysis after running its phase assignment tool to confirm that no station is subject to more than five percent aggregate interference and make appropriate adjustments in the event any station is subject to such excessive interference).

[58] *Infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10825 (Appx. A), para. 20. *See also infra* Appx. A at 1, para. 3 n.5 and 10, para. 23 n.25 (describing how the tool takes Canadian and Mexican television stations into account)

[59] The FCC and ISED Canada are coordinating closely on transition timing, consistent with the agencies' intent to jointly repack TV stations in both countries. *See Statement of Intent Between the Federal Communications Commission of the United States of America and the Department of Industry Canada Related to the Reconfiguration of Spectrum Use in the UHF Band for Over-the-Air Television Broadcasting and Mobile Broadband Services, U.S.–Can.*, Aug. 11, 2015, available at https://transition.fcc.gov/ib/sand/agree/files/PASIIC.pdf (Canadian Coordination). *See* NAB Comments at 15 (supporting the constraints relating to Canadian stations).

[60] *Infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rc at 10825-26 (Appx. A), para. 20.

[61] *See, e.g.*, ERI Comments at 1 (recognizing the value of assigning each relocating station to one of 10 transition phases); CTIA Reply at 4 ("Dividing the relocation process into ten distinct phases will help eliminate inefficiencies in resource utilization that would otherwise occur."); NAB Comments at 16 (supporting the constraint that there be no more than 10 phases).

[62] *Infra* Appx. A at 8, para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10826 (Appx. A), para. 20.

[63] American Tower Comments at 4; Joint Broadcast Commenters Comments at 11.

[64] In particular, Joint Broadcast Commenters do not suggest how the Bureau could determine which broadcast groups should qualify for their proposal or how many stations an owner can handle in a given transition phase. A number of transitioning stations that may overwhelm one broadcast group owner may be manageable for another. The Bureau is not in a position to draw those lines; however, if a group owner determines that it will likely be unable to complete the transition for all of its stations assigned to the same transition phase, the broadcaster should evaluate whether any option, such as the use of auxiliary facilities or a temporary channel, would help facilitate its transition. S*ee infra* §§ III.B.2 (Temporary Joint Use of Channels and Temporary Individual Channel Assignments);

(continued….)

transition phase in each market.[65] At the same time, NAB acknowledges that a constraint assigning stations in a DMA to a single phase "is unlikely to be achievable in practice."[66] CCA supports the two-phase constraint, but urges the Bureau to require that the two phases occur "back-to-back."[67] Analogously, American Tower proposes that all stations located on the same tower should be assigned to the same transition phase, and Joint Broadcast Commenters propose that the Commission should limit the number of stations that any one broadcast group has in a given phase.[68] We reject these proposals. Staff analysis reflects that assigning stations within a DMA to two, potentially nonconsecutive phases, is crucial in providing the optimization with the flexibility to satisfy other constraints, such as limiting the number of linked stations per phase and keeping a relatively consistent number of stations assigned to each phase. The commenters' proposals would threaten the Phase Assignment Tool's ability to balance such competing goals.

21. At the same time, we agree with broadcasters that minimizing viewer disruption[69] and efficiently clearing DMAs[70] are important public interest goals. Accordingly, we adopt below the second objective of "minimiz[ing] the sum, over all DMAs, of the number of times a DMA must rescan."[71] If it is possible to satisfy the optimization's constraints and its first objective, and still assign stations to only one DMA, the optimization will attempt to do so using the second objective.[72] We find that this approach gives the optimization the flexibility to balance competing priorities, including prioritizing television viewers and regional clusters.

22. *Constraints 5 and 6*. To balance the number of stations across transition phases, the difference in the number of stations in the largest transition phase and the smallest transition phase will be no more than 30 stations.[73] NAB suggests that the Bureau treat this constraint as an objective;[74] however, objectives have less effect on the solution than constraints and we find that the benefits of this constraint

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III.B.4 (Interim and Auxiliary Facilities).). *See also* § III.B.1 (Consideration of the Transition Plan and Requests for Alternate Facilities, Expanded Facilities, Alternate Channels, STAs, and Waivers of Transition Deadlines).

[65] NAB Comments at 17. We noted in the *Transition Scheduling Proposal Public Notice* that "[r]equiring that all stations within a DMA be assigned to the same transition phase resulted in approximately two thirds of all stations being assigned to the same phase." *See Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10832 (Appx. A), para. 29. Assigning two thirds of transitioning stations to a single transition phase negates the benefits of using a phased transition approach by increasing the amount of necessary coordination between stations and placing an untenable strain on limited resources.

[66] NAB Comments at 17.

[67] CCA Comments at 7.

[68] American Tower Comments at 4; Joint Broadcast Commenters Comments at 11.

[69] NAB Comments at 17.

[70] CCA Comments at 7.

[71] *See infra* para. 26 and Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10827 (Appx. A), para. 20.

[72] We note that the staff's analysis demonstrates that typically fewer than 50 percent of the DMA's require two rescans, but the ones that do provide the tool with the flexibility to achieve the other objectives. *Infra* Appx. A at para. 24 Table 1.

[73] *Infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10826 (Appx. A), para. 20.

[74] NAB Comments at 17 (stating that "strictly using the number of stations as a means of accomplishing this goal is unlikely to be effective"). While it is true that the actual makeup of stations within each phase may require varying draws on resources, we conclude that this constraint is the correct approach to ensuring the number of stations will be spread evenly throughout the transition phases.

cannot be achieved by making it an objective.[75] Every transitioning station will also only be assigned to one transition phase.[76] We received no comment objecting to this constraint.

23. *Constraint 7.* No transition phase will have more than 125 linked stations as a result of the Phase Assignment Tool.[77] NAB proposes that the Bureau should treat this constraint as an objective.[78] However, NAB does not explain what priority such an objective should be given nor how its proposal would affect the overall balancing of the optimization's priorities. We find that this constraint is the cornerstone of managing the breadth of coordination required of any station to complete its transition. As previously noted, "the dependencies created by the interference constraints can affect a large number of stations across large geographic areas," and no commenter put forward an alternative to limit the amount of coordination that would be necessary between dependent stations.[79] Accordingly, we decline to adopt NAB's proposal to treat this constraint as an objective.[80]

24. *Constraint 8.* No station falling into the "complicated" category will be assigned to Phase 1 under the Phase Assignment Tool.[81] For the purposes of the Phase Assignment Tool and the Phase Scheduling Tool, "complicated" stations are those at locations previously determined as likely to face extraordinary hurdles.[82] CCA asks the Bureau to clarify that the least complicated stations will be assigned to earlier transition phases.[83] However, phase assignments hinge on several factors, and in

[75] Furthermore, as proposed and adopted below, the Bureau has an objective that will attempt to further reduce the difference in the number of stations in the largest transition phase and the smallest transition phase if it can be accomplished while still satisfying all of the constraints and the objectives that come first in priority to that one. *See infra* para. 26 and Appx. A, para. 20.

[76] *See also infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10826 (Appx. A), para. 20.

[77] *Infra* Appx. A, at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10827 (Appx. A), para. 20. *See also infra* para. 26 and Appx. A at para. 20 (adopting objective to minimize the total number of linked stations). S*ee* NAB Comments at 18 (supporting limiting dependencies created by interference constraints to 125 linked stations).

[78] NAB Comments at 18.

[79] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10827 (Appx. A), para. 20. *See also infra* para. 26 and Appx. A at para. 20 (adopting objective to minimize the sum, over all DMAs, of the number of times a DMA must rescan).

[80] NAB further proposes that if the constraint were treated as an objective, the Bureau could "[adjust] the completion date for each phase, if necessary" if there are more than 125 linked stations per phase. NAB Comments at 18. We reject this proposal for the reasons stated above and note that NAB does not propose an alternative metric for determining how much additional time should be added to a phase with more than 125 linked stations.

[81] *Infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice,* 30 FCC Rcd at 10827 (Appx. A) para. 20. *See* NAB Comments at 16 (supporting this constraint).

[82] *See Auction 1000 Bidding Procedures Public Notice*, 30 FCC Rcd at 9104, paras. 279-80; *Application Procedures for Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Technical Formulas for Competitive Bidding*, 30 FCC Rcd 11034, 11176 n.9 (WTB 2015) (*Auction 1000 Application Procedures Public Notice*) ("Certain towers will require extraordinary means to move a station to a new channel . . . [S]tations at the following locations in the U.S. will be considered extraordinary: Mt. Sutro, Willis Tower, Hancock Building, Empire State Building, Times Square, Mount Mansfield, Lookout Mountain."); *Transition Scheduling Proposal Public Notice,* 30 FCC Rcd at 10827 (Appx. A), para. 20; *id.* at 10837 n.29 (Appx A). These tower locations are based on the *Widelity Report* Case Study IV. *Media Bureau Seeks Comment on Widelity Report and Catalog Costs of Potential Expenses and Estimated Costs*, GN Docket No.12-268, Public Notice, 29 FCC Rcd 2989, 3043 (Case Study IV) (*Widelity Report*). *See also Widelity Report*, 29 FCC Rcd at 2993 and 3037-46 (seeking comment on the Widelity Report, which provides case studies that explore scenarios and provide estimates time estimates required to implement channel reassignment).

[83] CCA Comments at 6.

particular must take into account station dependencies. For example, a complicated station may be positioned first in a daisy chain of interdependent stations, requiring that it move before all the other stations in that chain. Additionally, while a less complicated station with no dependencies may be able to move quickly, competing goals such as ensuring that DMAs transition in a limited number of phases and balancing resources across the transition may dictate later phase assignments for a specific station. We therefore decline to adopt CCA's suggestion.

25. American Tower asks the Bureau to identify as complicated those structures that have the additional characteristics discussed in the *Auction 1000 Bidding Procedures Public Notice*.[84] American Tower states that the Commission should afford parties a process by which to confirm that structures that they consider to be complicated will be treated as such in assigning them to a phase.[85] However, for purposes of the post-auction transition scheduling plan, we identified certain locations where stations are likely to encounter unusually difficult circumstances when completing their transitions.[86] Only stations at locations on this discrete list, which have been identified as facing extraordinary hurdles, will be treated as complicated.[87] As discussed below, however, we note that the transition schedule is based on reasonable assumptions about how long stations—whether they are within the complicated category or not—will need to complete their transitions.[88] The amount of time used to estimate how long stations will need to transition is based on feedback from the industry and the *Widelity Report*.[89] While the time estimates provided for complicated stations are consistent with the *Widelity Report* Case Study IV, to be even more conservative, constraint number eight guarantees that stations identified as complicated for the purpose of the Phase Scheduling Tool will have a minimum of two phases to complete their transitions since such stations will not be assigned to the first transition phase.

b. Objectives

26. We adopt the four objectives and respective priorities proposed in the *Transition Scheduling Proposal Public Notice*.[90] Specifically, the first objective will be to assign U.S. stations whose pre-auction channels are in the 600 MHz Band to earlier phases, while simultaneously assigning all Canadian stations and U.S. stations with pre-auction channels in the remaining television bands to later phases, where possible. The second objective is to minimize the sum, over all DMAs, of the number of times a DMA must rescan. The third objective is to minimize the total number of linked stations. The fourth objective is to minimize the difference between the number of stations in the largest transition phase and the smallest transition phase.

27. Commenters generally support these objectives;[91] however, broadcast commenters disagree that prioritizing clearing the 600 MHz Band should be the first objective.[92] We emphasize that

[84] American Tower Comments at 5 (citing *Auction 1000 Bidding Procedures Public Notice*, 30 FCC Rcd at 9104, paras. 279-80; *Widelity Report*, 29 FCC Rcd 2989).

[85] American Tower Comments at 5.

[86] *See supra* n.82.

[87] *Id.*

[88] *See infra* § III.A.2 (Phase Scheduling Tool).

[89] *Infra* Appx. A at para. 35 n.33.

[90] *Infra* Appx. A at para. 20; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10809, para. 13 and 10827-28 (Appx. A), para. 20.

[91] CCA Comments at 5 ("CCA generally supports the four stated objectives prioritized by the Phase Assignment Tool."); NAB Comments at 16 (supporting the proposed objectives of minimizing, over all DMAs, the number of rescans in a DMA, minimizing the total number of linked stations, and minimizing the differences between the smallest and largest phases).

[92] *See, e.g.*, CCA Comments at 5 ("CCA is particularly encouraged that the Bureau has affirmed clearing the 600

(continued….)

all phase assignments must satisfy each of the eight constraints adopted above, most of which are designed to protect the interests that the broadcast commenters appear to believe should be of primary consideration. As noted, those constraints will protect broadcast services and television viewers from undue pairwise interference, limit the number of required rescans, minimize the impact of dependencies and thus the need for inter-station coordination, and create an organized phased approach that spreads the transition across 10 phases. The Commission also tasked the Bureau with developing a transition schedule that "provide[s] certainty to wireless providers and [is] completed as expeditiously as possible."[93] We find that the proposed prioritization of the four objectives strikes the appropriate balance and will encourage the expeditious clearing of the 600 MHz Band.[94]

28. Cordillera, et al. proposes that "the two primary objectives be to maximize the health and safety of tower crews and the homes and businesses that are in close proximity to towers and to minimize service disruptions to viewers and users of other services that share broadcast towers."[95] Cordillera, et al. has not explained how we could incorporate such goals into the mathematical optimization model and we are unaware of any mechanism to accomplish the task. However, we note that the Phase Scheduling Tool estimates time periods for construction tasks based on industry information, and we believe that relying on such information is reasonable and will help to promote health and safety.

2. Phase Scheduling Tool

29. After the Phase Assignment Tool assigns stations to phases, the Bureau will use the Phase Scheduling Tool to produce an estimate of the average amount of time, in weeks, it will take all stations in a phase to complete their transition.[96] In order to obtain this estimate, the Phase Scheduling Tool uses the time and resource estimates set forth in Appendix A to simulate how long it will take all the stations in each phase to obtain access to limited resources and complete their transitions.[97] In the simulation, a station must complete the activities in the pre-construction and construction stages. If a required resource such as a tower crew is constrained, stations that require the resource will obtain access

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MHz Band as its top priority"); CTIA Reply at 11-13 (strongly opposing reordering the objectives as proposed by broadcast commenters); T-Mobile Reply at 2 (arguing that the plan appropriately prioritizes clearance of the new 600 MHz Band and that the Commission should reject any de-prioritization in transitioning the band). *But see* Cordillera, et al. Comments at ii (proposing that clearing the 600 MHz Band be the last objective); NAB Comments at 18 (supporting the expeditious clearing of the 600 MHz Band, but noting it should be the final priority among the objectives); Sinclair Reply at 7 (agreeing with commenters who take exception to the Commission's decision to make clearing stations from the 600 MHz Band at the earliest possible date "the highest priority of repacking"). We note that the optimization attempts to clear the 600 MHz Band by phase eight. One benefit to this approach is that in the event there are delays during the transition, this objective decreases the impact to forward auction bidders in obtaining access to the spectrum within 39 months.

[93] *Incentive Auction R&O*, 29 FCC Rcd at 6796, para. 559.

[94] The Commission's adopted approach to the transition seeks to strike a balance between the needs of the broadcasters and the wireless providers. *See, e.g., Incentive Auction R&O,* 29 FCC Rcd at 6801, para. 572 ("[A]n unduly long transition period also could delay the launch of innovative services and cause uncertainty both for providers and television viewers. Our tailored approach will help to ensure that each station reassigned to a new channel transitions to its new channel as soon as possible, and that forward auction winners have access to their newly acquired spectrum as quickly as possible, thus ensuring a successful incentive auction.").

[95] Cordillera, et al. Comments at ii, 9. NAB has also noted that the Commission should make protecting television viewers its top priority wherever possible. NAB Comments at i.

[96] The total number of estimated weeks for phase 10 is the total time estimate for the post-auction transition, based on the Phase Scheduling Tool's simulation.

[97] *See infra* Appx. A at paras. 32-44.

to it according to a randomly assigned simulation order.[98] The output of the tool is the number of weeks it will take all stations in a phase to obtain necessary resources and complete their transition. Because the number of weeks needed may vary depending on the simulation order of the stations in each phase, the Bureau will run the Phase Scheduling Tool 100 times to generate the average time in weeks it takes to complete a phase.[99] As described below, the Bureau will use the resulting average of the estimated time required per phase to guide its determination of the completion dates for each transition phase.[100] In this section, we address comments related to the inputs used in the Phase Scheduling Tool, including suggestions for slight modifications to the tool as originally proposed. Appendix A to this public notice describes the Phase Scheduling Tool and its inputs in detail.[101]

30. Many commenters agree that the Phase Scheduling Tool is an appropriate mechanism to guide the Bureau in setting deadlines for phases,[102] and no commenter provided an alternative to the simulation tool. A few commenters contend that the tool is unrealistic because broadcasters often use specific vendors, and the vendors have preferred-customer relationships and may manufacture only on a first-come-first serve basis. These commenters argue that stations will not line up in a queue, especially if they risk going dark if they fail to meet their phase deadlines.[103] However, the Phase Scheduling Tool does not mandate that broadcasters use particular vendors or access resources in a particular order in the real world. It is a simulation tool created to assist the Commission in setting reasonable deadlines for phases. Our plan provides flexibility for stations to make their preferred arrangements by starting all 10 transition phases at the same time, so that each station may start planning for its transition as soon as possible. Nevertheless, station and vendor cooperation will be an essential element of the transition plan and we urge all industry participants to be respectful of the overall demands of the transition on limited resources.[104]

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[98] In other words, the Phase Scheduling Tool creates a random order within each phase to simulate the sequence in which stations within each phase will have access to limited resources. As explained in the Appendix, the tool simulates this order randomly because it is impossible to predict exactly when each station will obtain access to limited resources under real-world conditions. Accordingly, the tool uses randomly varied simulation orders to create a range of time estimates that the Bureau can use to schedule the transition. *See infra* Appx. A at para. 29.

[99] Cordillera, et al. argues that the Bureau should use the longest timing estimates for all stations in a phase. Cordillera, et al. Comments at 7. We disagree that the Bureau should always use the longest timing estimate for all stations in a phase to set the phase transition deadline. By generating results for multiple simulation orders, the Phase Scheduling Tool produces a range of estimated completion times for each phase. Using those ranges as a guide will provide the staff with the flexibility it needs to create a reasonable transition schedule within the 39-month timeframe.

[100] *See infra* § III.A.3.

[101] *See infra* Appx. A at paras. 25-44.

[102] *See, e.g.*, CTIA Comments at 6 (supporting the use of the two optimization tools, the Phase Assignment and Scheduling Tools, to best determine the timing for a particular broadcast station to relocate as well as the length of time it will take for that station to complete its transitioning); ERI Comments at 1 ("[t]hese tools promise to identify not only the constraints created by the assignment relationships between stations but also recognize the variety of unique factors that apply to each facility's transition to a new operating channel and the resources available to the industry to accomplish the channel repacking plan").

[103] *See, e.g.*, Cordillera, et al Comments at 4 (noting that resources are not fungible and that manufacturing constraints may make it difficult for vendors to fill orders in any manner other than first-come, first-served); NAB Comments at 5 (arguing it is not a reasonable assumption that broadcast groups will form a "neat, orderly queue" for constrained resources); Stainless Comments at 1 (asking how the Bureau will manage potential contracts, commitments, alliances, or existing allegiances between broadcasters and select vendors).

[104] We strongly encourage stations to be mindful of the overall transition plan when working with their vendors, and we note that we will closely monitor the progress of the transition.

31. Examination of the record reflects that vendors are keenly aware of the need to prioritize projects by phase assignment where possible and would like stations to place orders for equipment as early as possible.[105] For example, ERI states that having orders early will "allow equipment suppliers and installation crews to prioritize projects based on transition phase assignments and construction permit deadlines instead of basing production priorities on a first come/first served basis. If all the stations in a market or region have timely orders in process, even with different vendors, those equipment orders can be coordinated to optimize the efficiency of installation activities."[106]

a. Pre-Construction Stage

32. The Pre-Construction Stage will include (1) the time required for antenna equipment to be ordered, manufactured, and delivered and (2) the time required for all other planning and administration activities necessary to prepare for construction. These categories reflect the type of work that stations will need to do before they begin construction on their towers.[107]

33. *Antenna equipment manufacturing and delivery.* As described in Appendix A, in order to account for limits on antenna manufacturing and delivery, the Phase Scheduling Tool uses time estimates to simulate how long it will take manufacturers to manufacture and deliver an antenna to each station.[108] The tool assumes that auxiliary antenna manufacturing and delivery will not be a constrained resource during the transition and that 75 percent of all stations will need to install an auxiliary antenna. A few commenters are concerned that manufacturers will not be able to meet the demand for antennas, and particularly auxiliary antennas, during the transition.[109] Although several commenters point out auxiliary antennas will be a significant means of helping stations complete timely transitions,[110] the majority of commenters contend that the manufacturing and availability of auxiliary antennas will not be constrained

[105] *See, e.g.*, Rohde & Schwarz Reply at 1-2 (noting that it does not anticipate problems with manufacturing for the repack if broadcast stations order equipment as early as possible); RIO Comments at 1 (" [B]roadcasters should be engaging now with companies like RIO to do initial tower mapping and structural analysis to identify any baseline maintenance issues or upgrades that will be needed.").

[106] ERI Comments at 2.

[107] *Infra* Appx. A at paras. 34-39.

[108] *Id.* at paras. 37-38.

[109] *See* Cordillera, et al. Comments at 12 (arguing that the limited capacity of antenna manufacturers, coupled with constraints on material inputs like copper for transmission lines and steel for towers, should be considered and addressed by the model, and that the same companies that manufacture main antennas provide broadcasters with auxiliary antennas as well); American Tower Comments at 6 ("[I]t is possible that the additional time required to manufacture the temporary antennas may create a backlog for antenna manufacturers."); E.W. Scripps Comments at 3-4 ("[s]tation antennas are not 'one-size-fits-all' merchandise that can be easily mass produced. The need for adjustments and customization naturally leads to delay under normal circumstances; delays will almost certainly occur as antenna manufacturers are required to ramp up production to unprecedented levels during the transition.").

[110] CCA Reply at 3 (stating that the Bureau should create a transition environment that permits use of auxiliary facilities and equipment when feasible); T-Mobile Comments at 6 (proposing that the Commission "should encourage the use of combined auxiliary antennas, where feasible").

during the transition.[111] We find that the model properly reflects the availability of antennas, including auxiliary antennas.

34. Some commenters argue further that manufacturers will not be able to maintain or increase manufacturing capacity throughout the transition.[112] However, the vendor industry is ramping up to prepare for the transition. CCA notes, "two antenna equipment manufacturers, Dielectric, Inc., and Electronics Research Inc. . . . wisely are preparing for the post-auction transition by acquiring capital investments, testing equipment, building additional facilities, and revamping product lines to meet expected demands necessary to complete the repack."[113] Additionally, the phased transition approach is designed to create a steady stream of work over the course of the transition, which should allow manufacturers to keep pace with demand.[114] On balance, we conclude that the model accurately reflects the manufacturing and delivery capabilities of the vendors throughout the transition.

35. *Administration/Planning.* We adopt the estimates proposed in the *Transition Scheduling Proposal Public Notice* for the Administration/Planning component of the Pre-Construction Stage. The Administration/Planning component includes zoning, administration, legal work, and pre-construction alterations to tower and transmitter equipment.[115] Commenters express two primary concerns with this component, first the amount of time it may take some stations to get through zoning and permitting,[116] and second, the possible procurement issues facing public broadcast stations.[117]

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[111] T-Mobile notes that manufacturers can "start production immediately" and that "there would be no negative impact on manufacturing or the relocation reimbursement fund if individual stations were to obtain their auxiliary antennas early." T-Mobile Reply at 3-4; T-Mobile Comments at 5-6. Rohde & Schwarz agrees that transmitter manufacturing will not affect the time required for a station to complete its transition. Rohde & Schwarz Reply at 1-2. ERI is in the process of "more than doubling" the manufacturing and tuning space for television antenna fabrication and testing. ERI notes that it has invested substantially in the expansion of its capacity to produce the antennas, transmission line products, and filter systems, and also that it has invested in two complete sets of high capacity winches and gin poles. ERI Comments at 1.

[112] Cordillera, et al. Comments at 7 (arguing the model should "assume that manufacturing slow-downs, tower-crew delays, and other resource shortages will occur"); WOGF Reply at 2 ("Many manufacturers insist that they will be able to meet the demand . . . however [the plan] does not take into consideration if the manufacturing industry related to broadcast can truly keep up with demand[.]"); Block Comments at 7-8 ("The FCC should pursue direct and comprehensive discussions with the suppliers of these essential materials to determine their realistic capacity for delivering the necessary antennas and other facilities during the repack.").

[113] Letter from Rebecca Murphy Thompson, EVP & General Counsel to CCA to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-306, at 2 (filed Dec. 8, 2016); T-Mobile Reply at 3 ("Tower companies and manufacturers also provided evidence, and continue to update the record, regarding their own capabilities and the feasibility of the timeline from their unique position as the vendors who will be undertaking the work.").

[114] T-Mobile agrees, stating, "[b]ecause the plan proposes to allocate fairly evenly the number of stations in each phase, there should be ample structural resources to meet demand at any given time." T-Mobile Reply at 3-4.

[115] *Infra* Appx. A at paras. 35-36; *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10836-37, paras 41-42. Stainless argues that structural tower improvements should not be considered in the Pre-Construction Stage. Stainless Comments at 2. We disagree. Stations may start making structural tower improvements well before the transition begins in preparation for the transition and tower crews will engage tower work during both the Pre-Construction and Construction Phase.

[116] Joint Broadcast Commenters Comments at 11 (noting that the tool "should account for local zoning restrictions that necessarily will delay tower access in some areas"); Everist Reply at 2; NAB Comments at 11 (arguing that the proposed repacking schedule fails to consider regulatory hurdles outside the Commission's control).

[117] PTV Comments at 2-6. American Tower notes that structural engineers may become a constrained resource during the process and that the transition plan should consider the availability of structural engineers when setting time estimates. American Tower Comments at 7-8. While structural engineers will be needed throughout the transition, we expect that the heaviest strain on structural engineers will be in conjunction with the construction

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36. We acknowledge that local zoning authorities and entities such as the FAA, tribal or historic preservation offices, and municipal authorities will likely receive requests for approval during the transition and that these entities have important roles to play within their various jurisdictions.[118] However, we are not persuaded that these procedural requirements necessitate increased time estimates. We conclude that the Widelity case studies will be sufficient for the majority of stations, and we are unconvinced that the time estimates for the transition schedule should be driven by the worst-case scenarios. The Phase Scheduling Tool provides conservative estimates for stations in three categories: Complicated, DTV, and Class A stations.[119] This differentiation captures the varying timelines that the majority of stations in each group may face during Administration/Planning activities.[120] We also note that because all phases will commence at the same time, stations in later phases will actually have significantly more time to complete their Administration/Planning activities than the time estimates provided in the simulation.[121]

37. Public television entities are concerned that the adopted timelines do not adequately take into account the needs of public broadcast stations, which PTV says face significant hurdles with financing and procurement.[122] We conclude that the time estimates for the Administration/Planning component of the Phase Scheduling Tool for all stations are sufficiently conservative and we do not find that the arguments raised by PTV require that all public broadcast stations receive increased transition time. Furthermore, PTV does not indicate how much additional time should be allocated to public stations. Because of the large number and variety of public stations and the case-by-case nature of each station's transition, we conclude that it is not reasonable to provide additional time to all public stations for the purposes of the Phase Scheduling Tool. Stations that anticipate these specific challenges should

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permit application process, and that structural engineers will not be a constrained resource during most of the transition. The 90-day construction permit process was established in the *Incentive Auction R&O*, 29 FCC Rcd at 5797, para. 563. Everist notes for many stations, the filings will be more complex and take more time. Everist Comments at 4. The Bureau intends to provide stations with their final channel assignments as soon as possible after the final stage rule is satisfied in order to give stations as much time as possible to complete the necessary filings.

[118] Cordillera, et al. and NAB suggest that the Phase Scheduling Tool should "give more time to stations whose towers are located in states and jurisdictions that are known to delay tower permits and zoning variations." Cordillera, et al. Comments at 13; NAB Reply at 12. NAB and Cordillera, et al. also note that the model must account for FAA application processing delays. NAB Reply at 12; Cordillera, et al. Comments at 13. Additionally, several commenters suggest that the plan needs to take into account the resource constraints of local zoning authorities and state and tribal historic preservation offices. NAB Reply at 12; American Tower Comments at 8; Cordillera, et al. Comments at 13. Cordillera, et al. also argues that the model should allow more time for stations on towers owned by small business owners or municipalities. Cordillera, et al. Comments at 13.

[119] *See infra* Appx. A at paras. 35-36 (discussing the time estimates for the Administration/Planning component of the Pre-Construction Stage). The *Widelity Report* estimates that Administration/Planning could take up to 72 weeks for "Complicated" stations (primarily due to zoning), up to 20 weeks for the average DTV station and up to 12 weeks for the average Class A or other lower powered station. *See Widelity Report*, 29 FCC Rcd at 3037-46 (Widelity Case Studies). To be conservative, we add another 12 weeks to the Administration/Planning estimates for the non-complicated stations since these timelines were more aggressive.

[120] We note that stations may explore a variety of options to assist with their post-auction transitions, including the use of temporary channels and interim or auxiliary facilities. *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan).

[121] For example, the Phase Scheduling Tool estimates that a DTV station would need 32 weeks to complete its administrative and planning activities. A station assigned to a later phase will have far more than 32 weeks to complete these tasks. The time estimates in the tool are intended to give each station the minimum time necessary to complete these tasks, but the majority of stations will have more than the minimum amount of time provided by the Tool. *See infra* Appx. A at para. 35.

[122] *See* PTV Comments at 2, 3, 6.

begin their transition process as early as possible. We note that while each station must work diligently to meet its phase completion date, stations can explore a variety of possible solutions should unforeseen circumstances arise.[123]

b. Construction Stage

38. The Construction Phase will include (1) the time to complete all general facets of construction (called "Construction Related Work") and (2) the time required by tower crews to install equipment on towers.[124] Commenters generally support the factors included in the Construction Phase and with the minimum estimated time for Construction Related Work.[125] However, some commenters express concern regarding the time saving estimates for work done on the same tower, the number and qualifications of tower crews,[126] and the impact of weather on construction.[127] We adopt proposals for the Construction Phase component as described in the *Transition Scheduling Proposal Public Notice* with slight modifications based on the comments.[128] Specifically, we adjust the time required to complete the work on towers having antennas for multiple stations. In addition, although the proposed time estimates are conservative and should provide enough to time for stations to complete their transitions without separately considering the issue of weather, in response to comments the Bureau will specifically consider the possibility of major weather-related delays when it assigns completion dates to each phase.

39. *Tower work.* Several commenters argue that the model overestimates the amount of time-savings that can be achieved by performing multiple installations on the same tower in a single, multi-station job.[129] We find these arguments have merit. Accordingly, we modify our proposed approach to assume that construction on a tower will commence when the first station on that tower is ready to begin its construction work and the total time to complete all construction for all stations on that tower is equal to (a) the time required for the most difficult station (we assign this time to the first station) plus (b) the sum of the time estimates for all stations other than this first station, multiplied by 50 percent.[130] This revised approach addresses the concerns identified by the commenters.

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[123] *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan) (describing options such as temporary channels, temporary joint use of channels, and interim or auxiliary facilities).

[124] Stainless requests clarity on the definition of "tower work." Stainless asks whether "tower work" includes structural modification or is specific to RF equipment changes on the tower alone. Stainless argues that tower structural modifications and RF equipment changes should not be separate as both of these activities will need to take place sequentially without any time separation to increase efficiencies and reduce crew movements (rigging and de-rigging). Stainless Comments at 2. Stainless also states that there are long-lead items for modifications too, such as guy wires, which can take from weeks to months for delivery. *Id.* We note that the model does not break tasks down as discretely as Stainless suggests. However, the minimum time estimates for Administration/Planning and Construction Related Work provides enough time to complete the consecutive tasks and time to acquire the long lead-time equipment.

[125] *See, e.g.*, American Tower at 2; CTIA Comments at 6; T-Mobile Reply at 6; TEP Comments at 2.

[126] *See, e.g.*, Cordillera, et al. Comments at 10.

[127] *See, e.g.*, NAB Comments at 9.

[128] *See infra* Appx. A at paras. 40-44; *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10838-40, paras. 46-50.

[129] Cordillera, et al. Comments at 10. *See also* Stainless Comments at 2-3 ("Time saving occurs when the tower crew is able to remain on the tower and limit the amount times required to rig and de-rig the tower. Eliminating the time to rig and de-rig would reduce each successive broadcasters required tower time by approximately 20 [percent].").

[130] *See infra* Appx. A at para. 44.

40. Cordillera, et al. provides a laundry list of additional factual scenarios it believes warrant additional time in the Phase Scheduling Tool.[131] We disagree with its suggestions. We find that the tool already provides estimates intended to account for the ordinary time necessary to complete various tasks. It does not attempt to assess the specific time for each and every individual hypothetical scenario available, and it would not be possible for any scheduling tool to do so accurately. However, in response to the comments from Cordillera, et al. concerning potential coordination with other services (e.g., FM radio or cellular providers) operating on the same tower as the reassigned station, as noted, we have modified the tool to substantially reduce the 'same tower discount' in order to account for the additional coordination that will be required.[132] This reduced discount will more conservatively estimate the total tower work times to account for not only other television broadcasters but also other broadcast and non-broadcast facilities on the tower.[133]

41. *Crew availability and training.* Commenters disagree about whether the Construction Phase tower crew estimates are reasonable.[134] The Commission received varying estimates for the

[131] For example, Cordillera, et al. states that allowing only one week for a tower crew to install an auxiliary antenna is likely to be insufficient. Cordillera, et al. Comments at 11. On the other hand, T-Mobile identified that only three to four 3-5 additional days for this task. *See* Letter from T-Mobile USA, Inc., Attach., *On Time and On Budget: A Response to Digital Tech Consulting, Inc.'s March 2016 Presentation on the State of Broadcaster Relocation Resources* at 39-40 (filed May 11, 2016) (T-Mobile Responsive Study). Based on the record we find that Cordillera, et al. has failed to demonstrate that, as a general rule, one week is insufficient. Cordillera, et al. proposes that the model should take into account special problems and timing needs of broadcasters that operate from "fully-loaded towers." Cordillera, et al. Comments at 11. While we agree that fully-loaded (or close to fully-loaded) towers present some unique challenges, most such towers can be identified now and we expect stations on such towers can take mitigating steps now to work around this issue. A fully-loaded tower is one that does not have the capacity to add an additional antenna.

[132] Cordillera, et al. argues that television broadcasters will need to coordinate with all licensees on a tower when changing channels and must be provided the time (and the compensation) necessary to reimburse other licensees for the necessary disruption to their operations. Cordillera, et al. Comments at 8-9. Cordillera, et al. contends that "the model . . . should account for the time needed to coordinate transition efforts at tower farms." Cordillera, et al. Comments at 11. The tool does not provide any penalties or discounts for tower farms so each tower with a station transitioning will be given the full time associated with each tower. This provides a conservative estimate as some of those resources can be shared. Additionally, grouping stations by DMA in the phase assignment should allow many stations at a tower farm to transition together encouraging coordination in their transition. We agree that numerous broadcast facilities on the same tower can add time to the construction process; however, as reflected in our discount, there are also time efficiencies that can be achieved in such situations because tower rigging is typically only done once. We note with regards to reimbursement that the Commission has acknowledged that the tower used by a reassigned station may have occupants that are not eligible for reimbursement, but may sustain expenses as a result of the repacking process. This issue is addressed in the *Incentive Auction R&O*, 29 FCC Rcd at 6814, para 602 and n.1699.

[133] Joint Broadcast Commenters express concern that temporary antennas may not be able to solve the problem of fully-loaded towers. They note that if a broadcaster elects to use a temporary antenna for its post-auction channel, a tower crew may not be able to come back to make the permanent switch until after the entire repack is complete. Joint Broadcast Commenters Comments at 8 n.12. We note that while a tower may be fully-loaded today, it is possible that after the incentive auction, a tower may have additional capacity as the result of a station going off-air in the auction. Additionally, stations may have options beyond auxiliary facilities to help facilitate their transitions, and the Bureau is open to assisting stations with creative solutions that do not compromise the overall transition plan. *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan).

[134] For example, American Tower argues that the Phase Scheduling Tool should not assume that Canadian crews will be available or properly vetted and that U.S. crews that would otherwise be eligible to work on non-difficult sites will be occupied with work on wireless sites. American Tower Comments at 9-10. *See also* Joint Broadcast Commenters Comments at 12-13 (arguing that there will be far fewer qualified tower crews available for repack work than allotted in the plan and that the assumption that crews can merely be added fails to account for the highly skilled and hazardous nature of tower work); Everist Comments at 6 (noting that routine maintenance with their new

(continued….)

number of tower crews that will be available during the transition.[135] Based on the totality of information received, we conclude that the estimated number of tower crews included in the tool for complex stations, DTV stations, and Canadian stations set forth in the *Transition Scheduling Proposal Public Notice* is reasonable.[136] Many commenters have noted that companies are gearing up for the transition and training crews to perform tower work.[137] Further, we disagree with American Tower that Canadian tower crews will be unavailable or untrained to work on U.S. towers and that companies will be working on wireless towers. We note that GIT's comments offer a different assessment of crew availability.[138] Nevertheless, the Phase Scheduling Tool includes conservative assumptions and the tool assumes that no Canadian tower crews will work on U.S. towers, and vice versa.

42. *Weather*. Although the Phase Scheduling Tool uses conservative estimates that will give most stations ample time to plan their transitions around any anticipated or unanticipated weather conditions, nearly all commenters suggest that the schedule should be more flexible in taking seasonal considerations into account.[139] Commenters are primarily concerned with the impact of winter weather and potential hurricanes. It is not possible to adopt a scheduling plan that prevents the phase completion date of every phases from falling during winter months or hurricane season, even if we limit the restrictions to specific markets. We find that imposing such a restriction would be unnecessarily restrictive and would undermine the transition process, especially because adverse weather conditions may not materialize in all cases. However, in response to commenters, the Bureau intends to examine the output of the Phase Scheduling Tool and adjust the deadlines for early transition phases to accommodate weather.[140] Later transition phases will be less sensitive to the impact of weather because the full

(Continued from previous page)
tower crews is taking longer than anticipated). *But see* Grundy Comments at 1 (stating that it is "equipped and ready for the television repack in the United States").

[135] *See also Widelity Report*, 29 FCC Rcd at 3011-12 (estimating no more than 14 qualified tower crews to work on complex sites and 30 to 40 other crews that can handle simpler jobs, but that it may be possible to supplement with crews from Canada and members of international tower crews); Letter from Digital Tech Consulting, Attach., *Response to T-Mobile and CCA Reports on the Broadcast Spectrum Repacking Timeline, Resource and Cost Study,* at 17-21 (filed Mar. 17, 2016) (DTC Responsive Study) (estimating 21 qualified tower crews for complex sites and four additional regional crews for simpler projects); Letter from T-Mobile USA, Inc., Attach., *On Time and On Budget: Completing the 600 MHz Incentive Auction Repacking Process within the FCC's 39-Month Relocation Deadline and the Budget Established by Congress*, at 37-40 (filed Feb. 17, 2016) (T-Mobile Study) (estimating 41 tower crews and an additional 27 crews that firms expect to hire in the future); T-Mobile Responsive Study at 36 (identifying 51 qualified tower crews).

[136] *See infra* Appx. A at para. 43; *see Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10839-40, para. 49.

[137] Specifically, Grundy notes that it has recently added two large tower hoists and three gin poles and all the associated rigging components in order to be equipped when the process begins. It also plans to scale its field crews from three to six within the next 24 months. Grundy Comments at 1. Likewise, RIO has "four crews and the equipment to successfully relocate broadcast stations nationwide. [RIO is] ready to ramp up tower climbing capacity and manufacturing (of equipment such as gin poles) for the transition." RIO Comments at 1. ERI notes that it has increased the number of installation crews on its staff from two to three, and is in the process of adding a fourth crew. ERI Comments at 1.

[138] Grundy Comments at 1.

[139] Cordillera, et al. proposes that the Commission allow the model to self-adjust based on when "Month 0" actually is during the calendar year.[139] *See generally* Joint Broadcast Commenters Comments at 11; Cordillera, et al. Comments at ii-iii, 5; E.W. Scripps Comments at 3; NAB Comments at 9; American Tower Comments at 7. *But see* Grundy Comments at 2 (noting that weather conditions do not preclude tower work; in most instances, severe cold weather, wind, and lightning provide, at worst, manageable challenges to experienced skilled tower contractors, and that on the occasion that a site is extensively delayed due to weather conditions, the regionality of the plan should allow flexibility for a service provider stopped from working on one job to perform ground work at another).

[140] *See infra* para. 43 and Appx. A at paras. 4, 29, and 46.

transition period will be longer and industry participants will have longer periods to plan for particular weather concerns. As such, we encourage industry participants to anticipate weather-related considerations that might affect their transitions and to plan tower work accordingly in order to utilize the full transition phase. A station facing weather-related challenges may also consider implementing intermediate plans to ensure that it can be off its pre-auction channel while continuing to broadcast during the inclement weather.[141]

3. Determining the Phase Completion Dates to Create the Post-Auction Transition Schedule

43. The Bureau will use the simulations of the Phase Scheduling Tool to produce an estimate of the average amount of time, in weeks, it will take all stations in a phase to complete their transition. While all transition phases will begin at the same time,[142] the Bureau will assign each transition phase a completion date based on the average number of weeks determined by the Phase Scheduling Tool. Although the tool produces reasonable time estimates based on the detailed inputs set forth in the Appendix, it does not account specifically for certain factors that may warrant deadline adjustments, such as the relative length of the testing periods for each phase or seasonal considerations. For example, the phase completion date may be moved later if an early phase consisting primarily of stations in northern regions of the United States is projected to end in the middle of winter.[143] Thus, the Bureau may adjust the phase completion dates from the average durations calculated by the tool to take such factors into account, consistent with the overall 39-month transition deadline imposed by the Commission's rules.[144]

44. Additionally, consistent with the Bureau's proposal each phase will have sequential specified testing periods—defined by a start and end date, with the end date corresponding to the phase completion date.[145] While stations may engage in planning and construction activities at any time prior to their phase completion date, equipment testing on post-auction channels will be confined to the specified

[141] *See* Cordillera, et al. Comments at 5. For instance, stations can prepare to broadcast from an auxiliary antenna prior to their phase completion date, and can apply for an extension of their construction permit deadline if they will need to finish their construction of their permanent facility after the inclement weather subsides. *See infra* § III.B (Other Matters Related to the Transition Scheduling Plan) (describing options such as temporary channels, temporary joint use of channels, and interim or auxiliary facilities).

[142] WatchTV supports the Bureau's proposal to begin all of the phases on the same date. WatchTV Comments at 1.

[143] Many commenters asked the Bureau to make the plan flexible enough to accommodate unforeseeable events. *See, e.g.,* NAB Comments at ii (stating that the Commission's final plan should be flexible and capable of rapid adjustment in response to changing facts), Comments at 9 (noting the plan does not take into account ratings periods and asking the Commission to make reasonable accommodations in adjusting deadlines to avoid unnecessary economic harm to individual stations); CCA Comments at 7 ("[T]he Bureau should adopt parameters to facilitate prompt but flexible transition plans."); Sinclair Comments at 2 (noting that the Bureau should acknowledge that "failures will occur and provide a mechanism for adjustments to the schedule for all impacted stations"); T-Mobile Comments at 3 (noting that the transition plan must allow for flexibility in order to avoid delays"). *See infra* para. 51 (discussing how stations may request modifications to their transition plan).

[144] *See Incentive Auction R&O*, 29 FCC Rcd at 6797, para. 563 (delegating authority to the Bureau to establish deadlines that "may vary by region, by the complexity of construction tasks, or by other factors that the Media Bureau finds appropriate").

[145] Stainless questions whether, "consideration [has] been made to the need for qualified tower personnel during the testing period," and states that adjustments and manipulation of tower-mounted equipment may be necessary during the testing period. Stainless Comments at 1. While the Phase Simulation Tool does not explicitly consider tower crew availability during the testing periods, the phased approach provides timing guidance to the tower crews and station owners that will help them plan accordingly to satisfy the different needs of station owners with regard to testing.

testing periods.[146] The wireless industry proposes that stations should be able to begin testing or operating on their post-auction channels outside of their assigned phase testing period.[147] As a general matter, we will not allow stations to test or operate on their post-auction channels until their designated phase testing period. This restriction encourages stations to plan their transition around their particular phase deadline, which will minimize interference, incentivize the distribution of resources across the phases, and encourage stations within a phase to switch to their post-auction channels at roughly the same time, which will minimize confusion to television viewers.[148] While the *Transition Scheduling Proposal Public Notice* contemplated that no stage would have a testing period shorter than four weeks,[149] the Bureau may need to adjust the amount of time given to the testing periods of some phases to accommodate the overall transition schedule, particularly in the early transition phases.[150]

45. While the majority of phase assignments and deadlines will not change once the initial transition schedule is released, in the unlikely event, for instance, that a station is "unable to construct"[151] the facility specified in the *Closing and Reassignment Public Notice*, the Bureau may need to modify the transition schedule in order to grant an application filed during the first priority window for an alternate facility or channel.[152] If changes to the transition schedule are necessary, stations impacted by the grant will only be moved to a later phase, not to an earlier phase. A station will not be moved to an earlier phase without its consent.[153]

B. Other Matters Related to the Transition Scheduling Plan

46. Below in subsection (1) we discuss the importance of the overall transition scheduling plan in evaluating various broadcaster requests that may impact the transition. In subsection (2) we

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[146] The need for a station to coordinate with other stations during the testing period will depend on whether it is part of a linked-station set. Stations that are not part of a linked-station set may test on their post-auction channels during the testing period without the need for coordination. Stations that are part of a linked-station set must coordinate testing with stations in the set so as not avoid undue interference. Such stations must transition to their post-auction channels simultaneously.

[147] *See, e.g.*, T-Mobile Comments at 5; CCA Comments at 8.

[148] Stations may seek the Bureau's approval to deviate from the transition plan consistent with the guidance below. *See infra* § III.B.1 (Consideration of the Transition Plan and Requests for Alternate Facilities, Expanded Facilities, Alternate Channels, STAs, and Waivers of Transition Deadlines).

[149] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10840, para. 50.

[150] The Bureau retains the discretion to modify phase assignments, phase completion dates, and testing period dates as necessary throughout the 39-month transition. This discretion responds to commenters' requests that the Bureau have flexibility to accommodate real-world events. *See, e.g., supra* n.143. We note that as the transition progresses, the later phases should be better able to accommodate shorter testing periods because they have more time than stations in the early phases to prepare for their transition and complete their work. *See* NAB Reply at i ("[T]he Commission will need to retain flexibility to adjust phase assignments and deadlines as broadcasters and the Commission itself learn more about the work required and available resources.").

[151] *See Incentive Auction R&O*, 29 FCC Rcd at 6794, paras. 554-555; 47 CFR § 73.3700(b)(iv)(A) (first priority window for stations deemed "unable to construct."); *see also Broadcast Transition Procedures Public Notice* at para. 31.

[152] Modifications to the transition schedule may include the length of the testing periods and/or phase assignments.

[153] Below we discuss in greater detail how we will evaluate direct requests to modify a station's phase assignment or other requests made after the initial transition schedule is announced in the *Closing and Reassignment Public Notice* that would necessitate a modification to the transition schedule in order to grant. *Infra* § III.B.1 (Consideration of the Transition Plan Schedule When Evaluating and Requests for Alternate Facilities, Expanded Facilities, Alternate Channels, STAs, and Waivers of Transition Deadlines).

discuss temporary individual and joint use of channels. In subsection (3) we address proposals for project management and progress reporting. Finally, in subsection (4) we discuss interim and auxiliary facilities.

1. Consideration of the Transition Schedule When Evaluating Requests for Alternate Facilities, Expanded Facilities, Alternate Channels, STAs, and Waivers of Transition Deadlines

47. As recognized in the *Transition Scheduling Proposal Public Notice*, there are various scenarios in which a station may seek to construct an expanded facility or use an alternate channel that differs from the technical parameters assigned to it in the *Closing and Reassignment Public Notice*.[154] Some stations may also request extensions of their construction deadline and seek authority to continue operating on their pre-auction channel after their phase completion date, including a waiver of their phase completion deadline.[155] In evaluating such requests, the Bureau proposed in the *Transition Scheduling Proposal Public Notice* to examine the impact that granting such requests would have on the phased transition schedule.[156]

48. Commenters representing wireless interests agree that any requests for relief from the requirements of the transition plan that could result in a station's transition taking longer than its assigned phase completion date, should be required to meet a high burden of proof[157] and consider the impact on 600 MHz Band licensees.[158] On the other hand, broadcast commenters assert that a heavy burden of proof runs counter to efforts to encourage a successful post-auction transition.[159]

49. In order to facilitate a timely and orderly transition, we find that we must evaluate on a case-by-case basis requests for modification of any station's facility[160] or transition deadline[161] as set forth in the *Closing and Reassignment Public Notice,* to assess the impact of such requests on the transition

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[154] 47 CFR § 73.7300(b)(2); *see Incentive Auction R&O,* 29 FCC Rcd at 6794 n.1572 (requests for alternate channels or expanded facilities must "meet all existing technical and interference requirements and . . . serve the public interest").

[155] While a station may request an extension of its construction permit deadline as set forth in 47 CFR § 73.3700(b)(5), grant of such a request only permits the station additional time to complete its construction on its final channel and does not permit a station to continue operating on its pre-auction channel. *See Incentive Auction R&O*, 29 FCC Rcd at 6806, para. 584. In order to do so a licensee must request special temporary authority (STA). *Id. See Broadcast Transition Procedures Public Notice* at 16, para. 47 (reminding stations that a STA is necessary to continue operating on a station's pre-auction channel beyond its phase completion date). We also remind stations that the license of any station that remains silent for any consecutive 12-month period expires automatically at the end of that period, by operation of law, except that the Commission can extend or reinstate such a license "to promote equity and fairness." 47 U.S.C. §312(g). *See Broadcasting Transition Procedures Public Notice* at 16, paras. 48-49 (reminding stations of rules and process pertaining to suspension of operations and requesting reinstatement under Section 312(g)). *See also Incentive Auction R&O,* 29 FCC Rcd at 6806-07, para. 585 ("In considering such requests, we will take into account the extent to which a station has been involuntarily forced to remain dark as a result of the repacking process and whether, in light of the facts presented, equity and fairness dictate a license extension or reinstatement and a waiver.").

[156] Depending on the requesting station's proximity to Mexico or Canada, coordination may also be required from that particular country.

[157] *See* CTIA Comments at 13; AT&T Comments at 4-5; CCA Comments at 10.

[158] CTIA Comments at 3, Reply at 11-12; T-Mobile Reply at 5; CCA Comments at 9; AT&T Comments at 4-5.

[159] *See* Sinclair Comments at 1; NAB Comments at 5.

[160] Such modifications would include requests for alternate facilities, expanded facilities, alternate channels, STAs, and waivers of transition deadlines.

[161] An example would be waiver of a station's phase completion date or testing period.

schedule.[162] Accordingly, we adopt the method for evaluating such requests proposed in the *Transition Scheduling Proposal Public Notice*.[163] We find that the proposed approach balances the important goal of clearing the 600 MHz Band within the 39-month transition period, as well as the additional goals of facilitating a smooth transition, limiting viewer impact, and providing broadcasters the flexibility to make requests that are necessary to construct their post-auction facility and address unforeseen circumstances to prevent stations from going dark.[164] Commenters agree that flexibility is vital to facilitating a successful transition.[165]

50. While the Bureau does not intend to grant requests that would disrupt the transition, our aim is not to discourage stations from proposing alternative transition solutions that could create efficiencies or resolve unforeseen circumstances that could otherwise force a station to go dark. Indeed, such proposals may reduce reimbursement costs or implement a market-wide transition plan that could allow stations to more efficiently utilize limited resources, facilitate coordination, or reduce the impact of the transition on television viewers.[166] Nonetheless, such proposals should specifically demonstrate that implementation would not interfere with other stations' transition efforts and address how implementation of the proposal may affect the transition schedule. If the Bureau grants such a request after considering such effects, it may choose to modify transition phase assignments and construction deadlines of the requesting station or, if necessary, other stations; however, no other station would be assigned to an earlier transition phase than it was originally assigned without its consent.[167]

51. In the *Transition Scheduling Proposal Public Notice* we also recognized that individual stations may request changes to their phase assignment, phase completion date, and/or testing period as set forth in the *Closing and Reassignment Public Notice*. We tentatively concluded that we would rely on existing rules and procedures to address such requests, and also sought comment on whether an alternative process should be established and, if changes to the transition plan are permitted, what rules or

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[162] *See Incentive Auction R&O*, 29 FCC Rcd at 6797, para. 559 (adopting a 39-month transition period for broadcasters that are assigned new channels in the repacking process and winning UHF-to-VHF and high-VHF-to-low-VHF bidders, and requiring all such stations to cease operating on their pre-auction channels regardless of whether they have completed construction of the facilities for their post-auction channel).

[163] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10814-15, para. 27 ("The Bureau will view favorably requests that are otherwise compliant with our rules and have little or no impact on the phase assignments or transition schedule. However, any request that the staff determines would be likely to delay or disrupt the transition, such as by causing pairwise interference above two percent to another station, creating additional linked-station sets, necessitating another station move to a different transition phase, or that is likely to cause a drain on limited transition resources required by other stations, will be viewed unfavorably. The Bureau will view requests that have such adverse effects on the transition schedule more favorably if the requesting station demonstrates that it has the approval of all the stations that would be affected if the request were granted, or it agrees to take steps during the transition period to mitigate the impact of the proposed request[.]").

[164] As discussed in this Section, stations may explore a variety of options to assist with their post-auction transitions, including the use of temporary channels and interim or auxiliary facilities.

[165] *See* Sinclair Reply at 4; T-Mobile Comments at 2-3; NAB Comments at ii.

[166] *See, e.g.*, Letter from Christine M. Crowe, Counsel to American Tower Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, at 10-16 (filed Aug. 31, 2016) (proposing broadband antenna solutions for large markets). In its Reply, DTV Utah requested to have all eight of its stations placed into the same transition phase. DTV Utah Reply at 2-3. Should the member stations of DTV Utah not be assigned to the same transition phase, once phase assignments are issued in the *Closing and Reassignment Public Notice,* DTV Utah may re-file its request with the Bureau and seek to demonstrate that its request does not adversely affect the transition plan in the manner discussed in this section. *See supra* para. 49 n.163.

[167] Should the Bureau deny a request for a station to continue operating on its pre-auction channel past its phase completion date, stations can explore a variety of options to assist with their post-auction transitions, including the use of temporary channels and interim or auxiliary facilities. *See infra* paras.5454-59 and 62-63.

procedures would need to be waived.[168] AT&T supports using existing Commission processes for addressing such requests.[169] On the other hand, NAB and E.W. Scripps support the establishment of a process by which a station can request a different transition phase, although neither propose a specific process[170] or explain why the Commission's existing rules would be insufficient. We find existing Commission processes are sufficient to address such requests.[171]

52. Commenters also suggested that stations should have the flexibility to move to either an earlier or later transition phase.[172] While our decision today does not prohibit stations from making either request, any request to modify a station's phase assignment will be subject to a high burden of proof and reviewed in the manner adopted above for determining the impact of a request on the overall transition schedule.[173] When resolving a requested phase change we also will consider the impact such a request may have on viewers. As evidenced through our objectives and constraints, we believe viewers will benefit from stations in a given DMA transitioning together. Not only does this limit the total number of channel rescans for viewers, but multiple stations' communications with the public about the timing of a rescan supports education efforts.

53. We find that the record does not support the creation of any special sanction system related to transitioning stations, despite the call of some commenters to do so.[174] A station that does not comply with the requirements of any Commission order may be subject to action as contemplated by the Commission's rules.[175]

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[168] *Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10814-15, paras. 26-27.

[169] *See* CTIA Comments at 13.

[170] NAB Comments at 8; E.W. Scripps Comments at 4.

[171] *See* 47 CFR § 1.106 (petitions for reconsideration in non-rulemaking proceedings); 47 CFR § 1.3 (waiver for good cause shown). The Commission may exercise its discretion to waive a rule where the particular facts make strict compliance inconsistent with the public interest. *See Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) (*Northeast Cellular*). In addition, the Commission may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis. *See WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969); *Northeast Cellular*, 897 F.2d at 1166. Waiver of the Commission's rules is appropriate only if both (i) special circumstances warrant a deviation from the general rule, and (ii) such deviation will serve the public interest. *See id.*

[172] NAB Comments at 9; T-Mobile Comments at 4.

[173] Because earlier phases of the transition are likely to have greater resource constraints while equipment manufacturers and suppliers continue to ramp up capacity, we are less likely to be able to accommodate requests for stations to move into the first or second phase.

[174] *See* AT&T Comments at 4 (asking the Commission to establish specific consequences for parties that fail to meet established transition milestones). *But see* NAB Reply at 13 (arguing that broadcasters should not be subject to sanctions for delays that are outside of their control).

[175] A station that is found to have failed to comply with the requirements of any Commission order may be subject to action as contemplated by the rules. *See* 47 CFR § 1.80 (forfeiture); 47 CFR § 73.3598(e) (automatic forfeiture of an expired construction permit). *See also Transition Scheduling Proposal Public Notice,* 31 FCC Rcd at 10807 n.30. As discussed below the Bureau released a public notice regarding a progress report to monitor the progress of stations throughout the transition and allow the Commission to identify problem areas and as needed develop solutions before a station misses a deadline. *Infra* § III.B.3 (Transition Project Management and Progress Reporting).

2. Temporary Joint Use of Channels and Temporary Individual Channel Assignments

54. The transition scheduling plan we adopt today does not mandate the use of temporary channels.[176] However, some commenters have suggested that use of temporary channels may be appropriate on a voluntary basis, especially to prevent stations that are unable to meet their transition deadline from going dark or delaying the transition.[177] Commenters have also suggested that the Commission could permit broadcasters to implement temporary channel sharing arrangements (hereinafter referred to as "temporary joint use of channels") to aide in their transition efforts.[178] To the extent that the Commission permits the use of individual temporary channels, low power television interests such as FAB request that the Commission provide transparency about when and for how long temporary channels will be used and whether a displaced LPTV station can apply for a channel that is slated to be used on a temporary basis.[179] WatchTV requests that the Commission limit the assignment of temporary channels to "truly rare, exceptional and extreme situations," due to the hardship such assignments are likely to place on Class A and LPTV stations, as well as viewers.[180]

55. Although we have concluded that the burdens of assigning temporary channels on a mandatory basis outweigh the benefits, we agree there may be situations in which the voluntary use of either an individual temporary channel or temporary joint use of a channel may aid the transition. We will therefore permit reassigned Class A and full power stations to make a request to operate on a temporary channel either on an individual or joint basis. When seeking authorization to operate on an individual temporary channel or engage in temporary joint use of a channel, a broadcaster must file with the Commission a request for STA proposing the channel it wishes to operate on and including the specific technical parameters.[181] Such requests may be made at any time during the transition period and

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[176] *See supra* para. 15.

[177] DTV America believes that the Commission should not place any restrictions on stations that wish to obtain an individual temporary channel. DTV America Comments at 4. T-Mobile supports only the "judicious use of temporary channels below the new wireless band, provided they will not delay the overall clearing process," and Sinclair supports "limited tactical use of temporary channels when the proponent is able to make reasonable showing that use of a temporary channel will speed up the transition overall." T-Mobile Comments at 8; Sinclair Reply at 6.

[178] *See* CTIA Comments at 11-12; NAB Comments at 10-11, Reply at 5; OTA Comments at 5; T-Mobile Comments at 9. OTA requests that we "automatically extend the construction deadline beyond 39-months for any station that implements a voluntary temporary channel sharing agreement before its phase completion date." It argues that doing so will allow industry to focus its resources on other more critical stations and permit stations to delay their transition so they can implement ATSC 3.0. We decline to adopt OTA's proposal as the need for such preemptive relief has not been sufficiently justified in the record. Furthermore, OTA's support for its proposal is based on a desire by an unspecified number of broadcasters to delay their transition in order to launch ATSC 3.0 is outside the scope of this proceeding. To the extent a station requires additional time to construct its post-auction facility, it is already permitted to seek a single extension of up to 180 days and may subsequently seek tolling. *See* 47 CFR § 73.3700(b)(5); *Incentive Auction R&O,* 29 FCC Rcd at 6804-6, paras. 581-83. *See also Broadcast Transition Procedures Public Notice* at 15-16, paras. 40-43 (describing rules and procedures pertaining to requesting extensions of time to construct a post-auction channel facility and tolling); *Incentive Auction R&O*, 29 FCC Rcd at 6793-94 n.1570 ("[W]e will consider granting longer construction periods for alternate channels or expanded facilities in situations where extenuating circumstances justify such an extension.").

[179] *See* FAB Reply at 5-6.

[180] Watch TV Comments at 3.

[181] *See Broadcast Transition Procedures Public Notice* at 14-15, paras. 46-47 (describing procedures for requesting special temporary authority during the transition). Because STAs are granted for a period of six months, a station may need to file for an extension of its initial STA authorization. Failure to do so while continuing to operate pursuant to the initial authorization would amount to operation without a valid authorization, which is a violation of Section 301 of the Communications Act. 47 U.S.C. § 301. Consistent with the requirements of Section

(continued….)

must demonstrate that the proposal both complies with the Commission's technical rules and will not otherwise interfere with the transition.[182] Use of an individual temporary channel or engaging in temporary joint use of a channel must be for purposes of facilitating the transition. To ensure continuity of service to viewers throughout the transition, a station availing itself of one of these voluntary options must maintain signal coverage of its community of license as required by Section 73.625 of the Rules.[183]

56. *Individual Use of a Temporary Channel.* A request for use of an individual temporary channel will be restricted to replicating a station's pre-auction coverage area and population served. Because we will evaluate applications requesting use of an individual temporary channel under the standard of review we have adopted for considering all requests during the transition,[184] broadcasters should, at a minimum, evaluate whether their operation would require coordination with neighboring stations that are not already in the same linked-station set, thereby resulting in new linked-station sets, or whether additional construction that may be required could divert resources from other stations. Temporary channels will also be subject to all applicable interference rules,[185] unless otherwise waived by the Bureau. Furthermore, depending on the station's proximity to Mexico or Canada, coordination approval to operate on a temporary channel may be required from that particular country.

57. In order to provide maximum flexibility, we will permit a full power or Class A licensee to request authority to operate on an individual temporary channel in the new wireless band during the post-auction transition. Although T-Mobile supports broadcasters voluntarily using temporary channels, it requests that use of individual temporary channels be restricted to channels "below the new wireless band."[186] We believe foreclosing temporary operation in the new wireless band during the transition period would be too conservative an approach and could undercut the benefits of allowing broadcasters to request temporary channels because there may be limited available temporary channels in the television band. However, to balance the interests of wireless operators in starting construction and commencing operations in cleared spectrum, when evaluating requests for individual use of a temporary channel in the new wireless band we will require broadcasters to demonstrate that there is no reasonable alternative to operating in the new wireless band and provide written consent from the wireless licensee(s) of the channel that the broadcaster wishes to temporarily operate on, as well as written consent from any wireless licensee(s) that would otherwise be required to protect the broadcaster's operations under the Commission's inter-service interference (ISIX) rules.[187] Consistent with the policies outlined in the *Broadcast Transition Procedures Public Notice*, no STA may cause impermissible interference to

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73.1635(a)(4) of the Rules, as part of any extension request an applicant must demonstrate the necessity of such extension and describe the steps that are being taken to resume operation on its post-auction channel assignment. 47 CFR § 73.1635(a)(4)("The permittee or licensee must demonstrate that any further extensions requested are necessary and that all steps to resume normal operation are being undertaken in an expeditious and timely fashion.").

[182] *See supra* para. 49 and n.163.

[183] Under the Commission's rules, a full power television station must locate its transmitter at a site from which it can place a principal community contour over its entire community of license. *See* 47 CFR § 73.625. Class A television stations do not have a contour coverage requirement.

[184] *See supra* paras. 47-51.

[185] *See, e.g.*, 47 CFR § 73.616 (post-transition DTV station interference protections); 47 CFR § 73.1635 (making requests for STA).

[186] T-Mobile Comments at 8.

[187] *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* Third Report and Order and First Order on Reconsideration, 30 FCC Rcd 12049 at 12073-74, paras. 53-55 (requiring 600 MHz licensees that want to commence operation prior to the end of the Post-Auction Transition period "to protect television stations that are operating co-channel or adjacent channel at that time and television stations that will be operating co-channel or adjacent channel by the end of the Post-Auction Transition Period.").

wireless licensees.[188] Additionally, the Bureau will view unfavorably any application or request that the staff determines would be likely to delay or disrupt the transition, including by delaying or disrupting the deployment of new wireless services in the 600 MHz Band.[189]

58. *Temporary joint use of a channel*. In the case of a request for temporary joint use of a channel, the applicant (joint user) must include with its request a written authorization from the licensee of the host station. A joint user will continue to be a Commission licensee, and will temporarily operate at variance from its authorized parameters pursuant to an STA. As such, joint users must continue to comply with all requirements under the rules and the Communications Act that would otherwise be required operating on their own channel.[190]

59. Commercial and noncommercial educational (NCE) stations may request to engage in temporary joint use of a channel. A reserved channel NCE licensee that is granted authority to operate temporarily on a non-reserved channel must continue to operate on an NCE basis. We will evaluate requests by commercial stations for temporary joint use of a channel licensed to an NCE station on a case-by-case basis.[191] We will also consider requests to allow a Class A station to operate under the Part 73 rules governing power levels and interference to jointly use a full power television station's channel on a temporary basis for the purpose of facilitating the Class A station's transition. A full power station requesting to temporarily jointly use a Class A station's channel for the purpose of facilitating the transition will be required to operate under the Part 74 power level and interference rules.

3. Transition Project Management and Progress Reporting

60. Commenters offered a number of suggestions on how the Commission should manage its staff and resources to facilitate the transition process. For instance, several commenters recommend that as part of the post-auction transition process, the Commission should consider hiring a third party contractor or a full-time internal project manager to manage the transition.[192] TEP suggests that the Commission should begin building relationships and working with other federal, state, and local government entities that will likely be involved in the transition.[193] PTV suggests that the Commission should designate particular FCC staff who would be familiar with the specific difficulties faced by state and institutional licensees and could be made available for purposes of supporting public broadcasters' efforts.[194] Both AT&T and NAB recommend the establishment of a "web portal" to disseminate

[188] *Broadcast Transition Procedures Public Notice* at 16, para. 47. *See Incentive Auction R&O*, 29 FCC Rcd. at 6806, para. 584.

[189] *Broadcast Transition Procedures Public Notice* at 24-5, para. 73.

[190] For example, stations must continue to maintain their own local public inspection files, 47 CFR §§ 73.3526 and 73.3527, and comply with all applicable children's programming requirements, 47 CFR §§ 73.670 and 73.671.

[191] *See Request for Special Temporary Authority and Channel Sharing Experimental Authorizations KLCS & KJLA*, Letter Decision, 29 FCC Rd 1071 (Vid. Div. 2014) (permitting the temporary operation of a commercial station on a reserved channel pursuant to an STA). We may require the parties to such arrangements agree to specific conditions. *See id.*, 29 FCC Rcd at 1073 (requiring any advertisement broadcast on a portion of the shared channel to be limited to the commercial station's portion of the shared channel). *See* 47 U.S.C. § 399B(b)(2) (restricting an NCE licensee from making its facility available to any person for the broadcasting of any advertisement).

[192] *See* AT&T Comments at 2; T-Mobile Comments at 4; NAB Comments at 10; CTIA Comments at 9 (proposing a project manager be "responsible for monitoring both physical (towers, transmitters, and antennas) and human resources (consulting engineers, tower crews, attorneys)"); TEP Comments at 2.

[193] TEP Comments at 2.

[194] PTV Comments at 7 n.4.

transition information to all affected parties.[195] While at this time we are declining to adopt any of the commenter's specific suggestions, we intend to dedicate sufficient resources to monitor the progress of the transition and keep affected parties informed.

61. Commenters have also recommended that the Commission require reassigned stations to file progress reports so that the Commission and interested parties can monitor the transition progress of reassigned stations, identify problem areas, develop solutions, and, if needed, adjust transition deadlines.[196] In the *Incentive Auction R&O*, the Commission determined that entities receiving reimbursement will be required, on a regular basis, to provide information to the Commission showing how the disbursed funds had been spent and what portion of their construction is complete. The Bureau has developed and set filing deadlines for a progress report (FCC Form 2100 –Schedule 387) that broadcast television stations that are eligible to receive payment of relocation expenses from the Reimbursement Fund will file to track how disbursements have been spent and identify the progress and status of their construction efforts. The Bureau also proposed to require broadcast television stations that are not eligible to receive reimbursement but must transition to new channels as part of the Commission's channel reassignment plan to file the same form on the same schedule during the transition period.[197] As suggested by commenters, the form will allow the Commission to monitor the progress of the transition in real time, identify problem areas, and as needed develop solutions.

4. Interim and Auxiliary Facilities

62. We agree with commenters that interim and auxiliary facilities will be an important part of the transition for broadcasters and we will take action as appropriate to facilitate the use of such facilities and equipment.[198] In order for a station to continue operating on its pre-auction channel while its current primary antenna is removed and a new channel antenna installed, we expect many stations will need to utilize auxiliary facilities and equipment.[199] In some cases, stations may wish to share auxiliary equipment and facilities, such as broadband antennas, with other stations. T-Mobile encourages the

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[195] *See* AT&T Comments at 3; NAB Reply at 7. TEP also recommends that the Commission also establish "an online resource center" where service providers and suppliers can list themselves as available to work on the transition. TEP Comments at 2.

[196] AT&T Comments at 2 ("the Commission should require stations to submit detailed progress reports on a regular basis, showing their progress against both their transition due date and the interim milestones in their transition plans. The Commission should ensure that qualified resources are allocated to reviewing these reports, spotting potential problem areas, and developing solutions to address them. Tracking overall progress and analyzing the causes of delays will be critical to the Commission's ability to keep the transition on schedule."); NAB Reply at 7 ("broadcasters should be required to provide the Commission with an estimate as to when a reassigned station will be able to complete their transition, and update those estimates periodically, based on major project milestones or when problems arise.").

[197] *The Incentive Auction Task Force and Media Bureau Release Transition Progress Report Form and Filing Requirements for Stations Eligible for Reimbursement From the TV Broadcast Relocation Fund and Seek Comment on the Filing of the Report by Non-Reimbursable Stations*, MB Docket No. 16-306 and GN Docket No. 12-268, Public Notice, DA 17-34 (rel. Jan. 10, 2017); *Incentive Auction R&O,* 29 FCC Rcd at 6825, para. 634 and n.1768; *see also* 47 CFR § 73.3700(e)(5) ("Broadcast television station licensees and MVPDs that receive payment from the TV Broadcaster Relocation Fund are required to submit progress reports at a date and frequency to be determined by the Media Bureau.").

[198] CCA Comments at 8 ("[T]he Bureau should encourage use of auxiliary facilities and equipment when feasible[.] . . . While recognizing that a station cannot cause more than two percent interference to another station during the transition, CCA recommends the Bureau allow stakeholders to share equipment and facilities, when reasonable, to expeditiously clear the spectrum band.").

[199] In order to operate an interim or auxiliary facility a station will need to file a request for an STA. *See Broadcast Transition Procedures Public Notice* at 15-16, paras. 46-47 (describing the process for filing for an STA to operate an interim or auxiliary facility).

Bureau to support broadcaster efforts to utilize auxiliary equipment by permitting stations to utilize auxiliary equipment not only for maintaining operations on their pre-auction channel, but also to operate on their post-transition channel in advance of a station's phase completion date.[200] T-Mobile also requests that the Bureau put in place processes to expedite the processing of requests for STA to operate auxiliary facilities.[201]

63. Nothing that we adopt today restricts a station from filing a request for STA to operate on its post-auction channel using an auxiliary facility prior to its phase completion date. While we understand wireless providers' desire that the 600 MHz Band be cleared expeditiously, we also must maintain an orderly process and respect the interference constraints that the transition presents and that transition scheduling plan is meant to address. We will therefore evaluate such requests in the same manner and subject to the same standard of review that we would a station that seeks to continue operating on its pre-auction channel after its phase completion date.[202] We also commit to process all applications in an expeditious manner and will continue to work with interested parties to efficiently process applications.[203]

C. Confidential Letters and Prohibited Communications

64. Nearly every commenter in this proceeding asked that the Commission restate, clarify, or, if necessary, waive, the auction rules prohibiting certain communications to enable stations to make productive use of channel reassignment information as soon as possible after receiving their channel assignment in the confidential letters that will be sent approximately three to four weeks from the date that the final stage rule was met.[204] The prohibited communications rule prohibits broadcasters and

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[200] T-Mobile Comments 6-7.

[201] *Id.*

[202] *See supra* para. 49. Additionally, as with requests for temporary joint use of a channel, the Media Bureau will view unfavorably any application or request that the staff determines would be likely to delay or disrupt the transition, including by delaying or disrupting the deployment of new wireless services in the 600 MHz Band. *See supra* para. 57.

[203] According to T-Mobile, broadcast industry experts believe that many broadcasters will seek expanded facilities in the second filing window and stations will have little incentive to begin constructing the facility filed for in their initial construction permit application. In order to ensure the transition process is not delayed, T-Mobile recommends that the Bureau adopt processing prioritizations for applications that propose combined facilities where the combination will result in more efficient use of spectrum, lower relocation costs, and/or expedite the overall transition, and deprioritize applications for stations operating on pre-auction facilities. T-Mobile Comments at 7, 10. We find that the record does not support adopting such a prioritization process at this time. Broadcasters retain the necessary incentives to not sit idly by while an application remains pending, including the prospect of sanction should they fail to meet their phase completion date due to their own inaction. Furthermore, our commitment to expeditiously process applications will limit the amount of time that broadcasters will have to wait for action on an application.

[204] *See, e.g.,* American Tower Comments at 3 (seeking a blanket waiver of the prohibited communications rules—to become effective upon receipt of confidential letters—so that the information in such letters may be shared with other stations operating on the same tower); CCA Comments at 11-12 (asking that the prohibited communications rules regarding post-auction relocation matters be relaxed); Cordillera, et al. Comments at 17 ("Once all bidding is over for broadcasters, no public interest purpose will be served by maintaining the prohibited communications rule on the broadcast industry side."); CTIA Reply at 9 (encouraging a limited blanket waiver of the restriction on communications between covered television licensees, to take effect upon the Commission's announcement that the final stage rule has been satisfied in the forward auction); DTV Utah Reply at 4; ERI Comments at 2; Grundy Comments at 2 (asking that the Commission clarify its prohibited communications rules to allow broadcasters to reach out to industry professionals immediately); Joint Broadcast Commenters Comments at 4; NAB Reply at 2; Sinclair Reply at 4-5; TEP Comments at 2 (asking the Commission to clarify its rule to allow broadcasters to reach out to professionals in advance of the start of the phasing); T-Mobile Comments at 12-18 (proposing that the Wireless Bureau modify the prohibited communications rules such that restricted-party forward-auction applicants

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forward auction applicants from communicating any incentive auction applicant's bids or bidding strategies to other parties covered by the relevant rules.[205] Commenters' concern is that the rule prohibits broadcasters from engaging in communications that would be helpful in preparing for the post-auction transition, or that it discourages broadcasters from making such communications to avoid the risk of violating the prohibition. In light of these comments, we now provide guidance on the rule as it pertains to broadcasters and the post-auction transition—particularly their ability to hold discussions with vendors not covered by the rule. The Wireless Telecommunications Bureau intends to address any appropriate waiver of the rule when letters regarding post-auction channel assignments are sent.

65. As an initial matter, a great many preparations that broadcasters may undertake with respect to the transition to post-auction channel assignments will not involve prohibited communications. For example, broadcasters may communicate with third parties not covered by the prohibition, such as consulting engineers, equipment vendors, and counsel, without violating the prohibition, even if the communication discloses bids and bidding strategies.[206] A broadcaster or other covered party still should take care, however, that the third party to which such communications are made does not convey the information to another covered party, which would violate the prohibition.[207]

66. In addition, broadcasters may communicate with other covered parties regarding many issues in the post-auction transition without disclosing bids and bidding strategies. For example, broadcasters that did not apply to participate in the auction do not have bids and bidding strategies of their own to disclose and so may communicate regarding their own post-auction transition without violating the prohibition. Such broadcasters must bear in mind, however, that they still are prohibited from communicating any other incentive auction applicant's bids and bidding strategies of which they may have learned, such as a channel sharing partner's bids or bidding strategies.[208] Finally, broadcasters that

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may communicate about post-auction transition matters with three categories of restricted-party television broadcast stations: (a) those that received "zero-dollar" opening bids in the reverse auction and could not participate in the bidding process; (b) those that did not participate in the reverse auction; and (c) those that exited the auction during reverse-auction bidding).

[205] Specifically, "all full power and Class A broadcast television licensees are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any other full power or Class A broadcast television licensee or to any forward auction applicant." 47 CFR § 1.2205(b)(1). In addition, "all forward auction applicants are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any full power or Class A broadcast television licensee," 47 CFR § 1.2105(c)(6)(ii), and "from cooperating or collaborating with respect to, communicating with or disclosing, to each other or any nationwide provider that is not an applicant, or, if the applicant is a nationwide provider, any non-nationwide provider that is not an applicant, in any manner the substance of their own, or each other's, or any other applicants' bids or bidding strategies (including post-auction market structure)." 47 CFR § 1.2205(c)(1).

[206] This includes completing tower surveys and structural analysis. TEP "believe[s] it is crucial for broadcasters to obtain structural analysis, tower mapping and other pre-transition services months in advance of the first Phase." TEP Comments at 3.

[207] Moreover, precautions taken will not protect a party against liability in the event a prohibited communication nevertheless takes place. *See Guidance Regarding the Prohibition of Certain Communications During the Incentive Auction, Auction 1000*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269, Public Notice, 30 FCC Rcd 10794, 10799, para. 14 (WTB 2015) (*Auction 1000 Guidance on Prohibited Communications*).

[208] The prohibition does not apply to communications between parties to a pre-auction channel sharing agreement filed with an auction application. *See* 47 CFR § 1.2205(b)(2)(iii). Thus, a non-participant sharer station may have knowledge of an auction participant sharee's bids and bidding strategies without having violated the prohibition. Such a sharer must take care that it does not communicate the sharee's bids or bidding strategies to other broadcasters that are not parties to the channel sharing agreement. *See Auction 1000 Guidance on Prohibited Communications*, 30 FCC Rcd at 10801-02, paras. 19-20.

did apply but kept that fact confidential also may be able to communicate regarding post-auction channel assignments without disclosing bids and bidding strategies.

67. We recognize that certain broadcasters cannot communicate with other broadcasters regarding post-auction channel assignments without disclosing bids and bidding strategies (though they may communicate with non-covered third parties, as indicated above). For example, a UHF broadcaster with a winning bid to move to a VHF channel cannot communicate its post-auction channel assignment without communicating its bidding strategy. Likewise, a broadcaster that publicly disclosed that it had applied to participate in the auction could implicitly disclose the results of its bidding when it discloses a post-auction channel assignment. Moreover, any communications that disclose a post-auction channel sharing arrangement effectively would disclose the sharee station's bids and bidding strategies in the auction.

68. Since the final stage rule has been met, bidding in the reverse auction is complete, although forward auction is still ongoing. Accordingly, some relief from the prohibition for communications among broadcasters may be appropriate, particularly where doing so would assist the public interest in a smooth post-auction transition. We are sensitive to the concerns raised by commenters and will address them specifically at the time post-auction channel assignment information is provided to broadcasters.

D. Matters Outside of the Scope of the Proceeding or Previously Addressed in Other Proceedings

1. 39-Month Transition Deadline

69. A number of commenters raised concerns regarding the sufficiency of the 39-month transition period.[209] Modification of the length of the 39-month transition period is beyond the Bureau's delegated authority and outside the scope of this proceeding. We note that the 39-month transition period is the subject of a petition for reconsideration that remains pending before the Commission in GN Docket

[209] *See, e.g.,* Sinclair Comments at 4 ("The record is replete with studies and reports that lay out quite methodically why a 39-month transition of most television stations in the country is unrealistic."); Stainless Comments at 4 (arguing that 39 months is not a realistic timeframe for the repack); NAB Reply at 10 ("[T]he consensus among broadcasters who submitted comments in this proceeding is that the FCC's 39-month schedule for the transition reflects unduly optimistic assumptions, oversimplifies challenges, may compromise safety and is unlikely to be achievable in practice."); Everist Reply at 3 ("The goal of achieving a complete buildout within 39 months or earlier even for the majority of repacked stations operating with complete replication is not only unclear, but not certain."); Block Comments at 2 ("[t]he new repack plan adheres to the 39-month post auction construction timeline despite a mountain of evidence that the repack cannot reasonably be completed in that time."); AT&T Comments at 2 (even if the transition is overseen by experienced project management professionals, it is unlikely the Commission will be able to complete the process in thirty-nine months). Conversely, other commenters, including suppliers of broadcast equipment, acknowledge that 39-months is an achievable time period. *See* ERI Comments at 1 (investments being made by ERI and the existing capacity provided by other suppliers should make it possible to complete the process within the 39 months allotted); Rio Comments at 1 (highlighting that the transition can be completed on time); TEP Comments at 2 ("Based on our experience in industry, TEP/TEPDB is confident that the transition can be completed on time[.]"); *Widelity Report*, 29 FCC Rcd at 3046 ("The process will be complex, but we feel that it can be achieved."); OTA Comments at 7 (despite the aggressive nature of the FCC's 39-month post-auction transition schedule, the Commission can and must complete the transition in this timeframe); Sinclair Comments at 1 ("[i]n order to perpetuate the fiction that all stations can be repacked within 39 months according to the repacking plan, the PN does not provide a mechanism to address the impact of inevitable failures to meet the prescribed timelines."); NAB Comments at ii (the 39-month deadline has led to the development of a scheduling plan that will involve assigning stations to construction phases before the Commission or the stations themselves even know the scope of work involved with their transition, which will create inefficiencies and conflicts from the outset); WOGF Reply at 1-2 (contending that the proposed plan as currently outlined and intended to be accomplished within a 39 month deadline is inflexible and fails to account for the necessary considerations).

No. 12-268.[210] The purpose of this notice is to carry out the Commission's directive to assign construction deadlines within the 39-month period prescribed by the Commission.[211]

2. Requests for Clarification of Reimbursement Eligibility

70. Several parties seek clarification as to the eligibility of certain costs for reimbursement from the TV Broadcaster Relocation Fund (Reimbursement Fund). NAB states that the Commission should assure broadcasters that any costs associated with voluntary transition plans will be eligible for reimbursement from the Reimbursement Fund.[212] The Commission anticipated the possibility of using temporary channels, as well as interim and auxiliary facilities to facilitate the transition and stated that the reasonably incurred costs of such equipment would be eligible for reimbursement.[213] However, as already made clear by the Commission, reassigned stations constructing alternate or expanded facilities applied for outside of the "non-priority window" will only be eligible for reimbursement for the eligible costs of relocating to the channel and facilities specified in the *Closing and Channel Reassignment Public Notice*.[214] NCTA expressed concern that the cost of carriage of temporary channels should not be borne by MVPDs.[215] As stated in the *Transition Scheduling Proposal Public Notice*, MVPDs are eligible for reimbursement when they reasonably incur costs in order to maintain carriage of a broadcast station.[216]

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[210] *See* Affiliates Associations, Petition For Reconsideration, GN Docket No. 12-268, filed Sept. 15, 2014 at 8 and 10; Advance Television Broadcasting Alliance, Petition For Reconsideration, GN Docket No. 12-268, filed Sept. 15, 2014 at 7; Gannett Co., Inc., Graham Media Group, and ICA Broadcasting Petition For Reconsideration and Clarification, GN Docket No. 12-268, filed Sept. 15, 2014 at 5.

[211] *See Incentive Auction R&O*, 29 FCC Rcd at 6796, para. 563 (delegating authority to the Media Bureau to set construction deadlines within the transition period for all stations that are reassigned to a new channel in the repacking process and all winning UHF-to-VHF and high-VHF to low-VHF bidders).

[212] NAB Comments at 10. CTIA voices its support for reimbursement of costs for implementing temporary channels and auxiliary/interim facilities so long as such expenditures are reasonable and necessary to expedite the clearing of the 600 MHz Band. CTIA Reply at 5. NAB also requests clarification that in the event the increased temporary interference to which a station is subject prevents a station from delivering a good-quality signal to an MVPD, temporary alternative delivery systems, such as a fiber feed or a microwave link, are eligible for reimbursement. NAB Comments at 14-15. This matter was also raised by NAB in response to the *Catalog of Costs Public Notice* and is being addressed in that proceeding. *See Media Bureau Seeks Comment on Updates to Catalog of Reimbursement Expenses*, MB Docket No. 16-306, GN Docket No. 12-268, Public Notice, 31 FCC Rcd 11467 (MB 2016) (*Catalog Update Public Notice*).

[213] *See Incentive Auction R&O,* 29 FCC Rcd at 6823-24, para. 627 ("We will treat interim facilities as a relocation expense eligible for reimbursement and will reimburse costs for such facilities that are reasonably incurred in order for a station to meet its construction deadline or to avoid prolonged periods off the air while repacking changes are made."); *id.* at n.1756 (explaining that one appropriate use of an interim facility is when "a station may need to operate on a different channel with different facilities than its final channel or facilities").

[214] *See id.* at 6823, para. 626 ("In the case of nonpriority stations, costs related to alternate channels or expanded facilities are not "reasonably incurred…in order for the licensee to relocate its television service" to another channel. Such stations will be able to continue to serve their coverage area and population served on the channel and pursuant to the technical parameters assigned in the repacking process without having to rely on an alternate channel or expanded facilities.").

[215] NCTA Comments at 2-3.

[216] *See Incentive Auction R&O,* 29 FCC Rcd at 6823-24, paras. 628-29; 47 U.S.C. § 1452(b)(4)(A)(i)(ii)). Such costs may include the reasonable costs to set up delivery of a signal that the MVPD is required to carry under the Commission's must-carry rules or under retransmission consent contracts, regardless of whether the station is a winning bidder or is involuntarily reassigned to a new channel in the repacking process. *See Incentive Auction R&O,* 29 FCC Rcd. at 6824, para. 629. Stations that are not reassigned to new channels, including winning bidders that sustain expenses due to the repacking process, may be reimbursed indirectly. In such a circumstance, whether an MVPD is eligible for reimbursement for such costs will depend on whether the MVPD is required to carry the

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Finally, WOGF seeks clarification as to who will be financially responsible when other services, such as FM, LMR, wireless, or LPTV, are impacted by the transition.[217] With respect to costs incurred by non-reimbursement-eligible entities, the Commission explained in the *Incentive Auction R&O*,[218] that reimbursement claims from reassigned stations for costs incurred by non-eligible entities would be limited to instances in which "the reassigned broadcaster has a contractual obligation to pay these expenses through a contract" that was entered into on, or before, the release date of the *Incentive Auction R&O*, which was June 2, 2014.[219] Thus, reimbursement-eligible entities with such contractual obligations may submit for consideration reimbursement claims only for expenses incurred by non-eligible entities that they are obligated to pay under such timely-entered contracts. To the extent these requests seek an affirmative declaration that certain costs will be reimbursed, we decline to pre-judge the eligibility of particular reimbursement expenses, and we remind parties that whether or not a cost is "reasonably incurred" and eligible for reimbursement will be evaluated on a case-by-case basis.[220]

3. LPTV Issues

71. Commenters representing the interests of LPTV and TV translator stations filed comments arguing that the Bureau failed to fully address the impact of the transition scheduling plan on LPTV and translator licensees and that the Bureau should take certain actions to address the impact of the post-incentive auction transition on their stations and interests.[221] Commenters provided several actions the Commission could take to ease the impact of the transition on LPTV and translator stations, including: forbearing from enforcement of Section 312(g) of the Act; extending the minimum distance rule for displaced LPTV and translator stations from 30 miles to 250 miles; specifying in the transition plan when the LPTV displacement window will open; and flexibly waiving rules to minimize the impact of the transition on displaced LPTV and translator stations. We find these proposed actions have already been addressed in other Commission proceedings.[222] We therefore decline to adopt any of these proposals. We

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station under the Commission's must-carry rules or pay for facility modifications pursuant to a retransmission consent contract.

[217] WOGF Reply at 2.

[218] *See Incentive Auction R&O,* 29 FCC Rcd at 6814, para. 602.

[219] *Id*. The Commission further explained that, "[p]arties may receive such reimbursement with respect to contracts entered into after that date if they can show good cause for such reimbursement." *Id.* at para. 602 n.1700. The Commission also noted the possibility of non-reassigned stations indirectly benefiting from reimbursement to an eligible station if, for example, a reassigned station were reimbursed for new equipment that was to be shared with non-reassigned stations. *Id*. at para. 602 n.1701 (internal citations omitted).

[220] Whether or not a specific cost meets the "reasonably incurred" standard for reimbursement must be evaluated on a case-by-case basis. *See id.* at 6821, para. 622 ("The appropriate scope of 'costs reasonably incurred' necessarily will have to be decided on a case-by-case basis.").

[221] *See*, *e.g.*, Cordillera, et al. Comments at 8, n.13; DTV America Comments at 5; FAB Reply at 3-7; LPTV Comments at 3-7 and Reply at 2-3; NAB Comments at 18; PTV Comments at 3, 8-10; Spectrum Rights Comments at 1-2; Watch TV Comments at 2.

[222] Issues with respect to the scheduling of the special post-auction displacement window (PTV Comments at 3, 9-10; Cordillera, et al. Comments at 8, n.13) and the consideration of measures to reduce the impact of the post-auction transition on LPTV and TV translator stations (NAB Comments at 18; Spectrum Rights Comments at 2) were previously addressed in the incentive auction proceeding and the separate proceeding to address the transition impact. *See Incentive Auction R&O*, 29 FCC Rcd at 6835-36, paras. 659-60 (announcing the creation and timing for a special post-auction displacement window); *Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television and Television Translator Stations*, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* MB Docket No. 03-185, Third Report and Order and Fourth Notice of Proposed Rulemaking, 30 FCC Rcd 14927 (2015) (*LPTV DTV Third Report and Order*). The proposal to grant a blanket waiver of Section 312(g) of the Communications Act to allow displaced LPTV and TV translator stations to remain off the air for more than twelve months (LPTV Comments at 6 and Reply Comments at

(continued….)

remain sensitive, however, to the concerns of the LPTV and TV translator community and will continue to explore measures, as we have already committed to doing, to alleviate the impact of repacking on displaced LPTV and TV translator stations.[223] The Commission also adopted rules to permit channel sharing between LPTV and TV translator stations as an additional means to help displaced stations that have difficulty finding available channels to team with other such stations in the same predicament.[224]

72. Several commenters also raise issues that are already addressed by our existing rules. As an initial matter, we note that LPTV and TV translator stations that are displaced by full power or Class A stations reassigned a new channel in the repacking process may continue to operate on their current channel until the displacing television station is operational, at which time the LPTV or TV translator must cease operations.[225] We note that a change in frequency, other than for a station that is displaced, is a "major change" and that applications for new stations or major changes by LPTV and TV translator stations are currently frozen.[226] Spectrum Rights sought clarification as to when displaced LPTV and TV translators may begin operating on their new displacement channel.[227] Because displacement facilities may not cause interference to full power or Class A television stations (either pre-auction, those set forth in the *Closing and Reassignment Public Notice*, or alternative channels and expanded facilities proposed during the applicable filing window),[228] operation will not be contingent on the post-auction transition

(Continued from previous page)
2-3; FAB Reply at 7; DTV America Comments at 5) was also previously considered in the proceeding to address the transition impact. *See LPTV DTV Third Report and Order*, 30 FCC Rcd at 14954-5, para. 60 (rejecting a blanket waiver of Section 312(g)). Allowing stations to relocate their transmitter site location greater than 30 miles (LPTV Comments at 6-7 and Reply at 2-3; FAB Reply at 7) was previously considered in the LPTV digital television rulemaking. *See Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television and Television Translator Stations, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, MB Docket No. 03-185, Second Report and Order, 26 FCC Rcd 10732, 10760, para. 58 (2011). As for FAB's proposal (FAB Reply at 5) to permit "nomadic" LPTV and TV translator stations to use 600 MHz Band channels temporarily, the Commission previously addressed the continued use of 600 MHz Band channels by television stations in the incentive auction rulemaking. *See Incentive Auction R&O*, 29 FCC Rcd at 6706-7, paras. 319-21. Similarly, FAB's comments with respect to the Commission's reserving "vacant channels" for future unlicensed use (FAB Reply at 3-4) are the subject of an ongoing rulemaking proceeding. *See In the Matter of 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, GN Docket No. 12-268, Notice of Proposed Rulemaking, 30 FCC Rcd 6711 (2015). Finally, questions about the reimbursement of expenses incurred by MPVDs in conjunction with the post-auction transition (LPTV Reply at 3) were fully addressed in the incentive auction proceeding. *See Incentive Auction R&O*, 29 FCC Rcd at 6812-33, paras. 598-654.

[223] See *LPTV DTV Third Report and Order*, 30 FCC Rcd at 14946, para. 40.

[224] *Id.* at 14938, para. 21.

[225] *See Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Order, 12 FCC Rcd 14588, 14654, para. 142 (1997) (*DTV Sixth Report and Order*) ("LPTV and TV translator stations will be able to continue to operate until a displacing DTV station . . . is operational and would receive interference from the low power TV or TV translator station"); 47 CFR § 74.703(b). Because full power and LPTV stations follow informal notification procedures with respect to interference and displacement, the Commission has declined to adopt notification requirements for these situations. *Incentive Auction R&O*, 29 FCC Rcd at 6840 n.1866.

[226] *See* 47 CFR § 74.787(b)(1); *See Freeze on the Filing of Applications for New Digital Low Power Television and TV Translator Stations*, Public Notice, 25 FCC Rcd 15120 (MB 2010); *see also Initiation of Nationwide First-Come, First-Served Digital Licensing for Low Power Television and TV Translators Postponed Until Further Notice*, Public Notice, 25 FCC Rcd 8179 (MB 2010).

[227] Spectrum Rights Comments at 1.

[228] *Incentive Auction R&O*, 29 FCC Rcd at 6836 n.1836 ("Displaced stations may apply only for a channel that remains allocated to broadcast television service and is not repurposed for new, flexible uses or reserved as guard
(continued….)

schedule and stations may begin operating at any time following the grant of the construction permit for their displacement facilities. Finally, several commenters sought clarity concerning the operation of temporary facilities by displaced LPTV and TV translator stations.[229] LPTV and TV translator stations are permitted to apply for special temporary authority to operate the facilities proposed in a pending displacement application so long as the application is acceptable for filing and has appeared on a proposed grant list.[230]

IV. ADMINISTRATIVE MATTERS

A. Final Regulatory Flexibility Act Analysis

73. Pursuant to the Regulatory Flexibility Act of 1980, as amended,[231] a Final Regulatory Flexibility Analysis (FRFA) relating to this Public Notice is attached as Appendix B.

B. Paperwork Reduction Act Analysis

74. This document does not contain proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, it does not contain any new or modified information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4).

C. Congressional Review Act

75. The Commission will send a copy of this Public Notice to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

D. Additional Information

76. For additional information on this proceeding, contact Sasha Javid, Sasha.Javid@fcc.gov; Erin Griffith, Erin.Griffith@fcc.gov, (202) 418-0660, Shaun Maher, Shaun.Maher@fcc.gov, (202) 418-2324, or Evan Morris, Evan.Morris@fcc.gov, (202) 418-1656. Press contact: Charles Meisch, Charles.Meisch@fcc.gov, (202) 418-2943.

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bands. When requesting a new channel in a displacement application, LPTV and TV translator stations will be required to demonstrate that they would not cause interference to the predicted service of full power or Class A stations on: (1) existing channels assigned to full power and Class A stations; (2) new channels assigned to full power and Class A stations pursuant to the Channel Reassignment PN; and (3) alternative channels and expanded facilities proposed by such stations during the applicable filing window.”).

[229] DTV America Comments at 3-5; LPTV Comments at 3-5 and Reply at 2-3; NAB Comments at 18; PTV Comments at 9.

[230] *See* 47 CFR § 73.1635; *DTV Sixth Report and Order*, 12 FCC Rcd at 14654-5, para. 144.

[231] *See* 5 U.S.C. § 604.

APPENDIX A

Phase Assignment and Scheduling Tools

I. INTRODUCTION

1. This appendix sets forth the methodology for assigning construction deadlines to stations to transition to new channel assignments following the broadcast television spectrum incentive auction.[1] This is necessary because potential "dependencies," or interference relationships, exist between certain television stations on pre-auction and post-auction channels which will impact the transition process. Stations with dependencies must coordinate in order to test equipment or begin operating on their new channels without causing interference to other stations.[2] In many cases such coordination may only involve stations agreeing to operate at lower power or accept increased interference for short periods of time while the stations are performing tests, but dependencies can often involve numerous and/or distant stations, which makes successful coordination more complicated. The methodology adopted by this Public Notice provides a means of breaking dependencies in order to reduce the need for coordination and to make coordination more manageable.

2. Under this methodology, stations will be assigned to 10 transition phases. The phases will all begin at the same time when channel reassignments are announced in the *Closing and Reassignment Public Notice*, but each phase will have sequential end dates. Equipment testing on post-auction channels will be confined to set "testing periods." With the exception of the first phase, the testing period for subsequent phases will begin on the day after the end of the preceding phase.[3] Every station must cease operating on its pre-auction channel at the end of its assigned phase, also known as the "phase completion date."

3. The methodology will utilize two computer-based tools to assign stations to phases and then to establish phase completion dates for each phase. First, stations will be assigned to phases using the "Phase Assignment Tool," which applies mathematical optimization techniques to identify, among possible solutions that satisfy a set of defined rules or constraints, a solution that best meets a separate set of defined objectives. Section III below discusses the Phase Assignment Tool.

4. After stations are assigned to phases, the "Phase Scheduling Tool" will be used to determine the phase completion date for each phase.[4] The Phase Scheduling Tool estimates the total time necessary for stations assigned to a phase to perform the tasks required to complete the transition process. In addition to accounting for factors such as transmission power and tower height that are likely to impact the time required for individual stations to complete the transition to a new channel, the Phase Scheduling Tool also accounts for potential delays created by resource limitations that may affect when a station can

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[1] This Appendix updates the methodology to create a transition scheduling plan proposed in Appendix A of the *Transition Scheduling Proposal Public Notice* that was released in September of 2016. See *Incentive Auction Task Force and Media Bureau Seek Comment on Post-Incentive Auction Transition Scheduling Plan*, MB Docket No. 16-306 and GN Docket No. 12-268, Public Notice, 31 FCC Rcd 10802, 10819, Appendix A (MB 2016) (*Transition Scheduling Proposal Public Notice*).

[2] 47 CFR § 73.3700(b)(1)(vi); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6797, para. 563 (2014) (*Incentive Auction R&O*), *aff'd, Nat'l Assoc. of Broadcasters, et al. v. FCC*, 789 F.3d 165 (D.C. Cir. 2015) (*NAB v. FCC*) (subsequent citation omitted). . All
comments, reply comments, letters, and ex parte submissions referenced in citations below can be found in GN Docket No. 12-268 and MB Docket No. 16-306.

[3] *See infra* § IV.E (Sample Output) (Figures 7 and 8).

[4] *See infra* § IV (The Phase Scheduling Tool).

obtain resources such as new antennas or tower crews. The Phase Scheduling Tool simulates stations completing the transition and outputs the time needed to complete each phase given a random order (called "simulation order") in which stations have access to scarce resources. The tool runs 100 simulations, each with a different simulation order to generate the average time in weeks it takes to complete a phase. Based on those results, the Bureau may then exercise limited discretion to modify the phase completion dates from the average durations calculated by the tool to account specifically for certain factors that may warrant deadline adjustments, such as the relative length of the testing periods for each phase or seasonal considerations. For example, the phase completion date may be moved later if an early phase consisting primarily of stations in northern regions of the United States is projected to end in the middle of winter.[5] In Section IV below, we discuss the Phase Scheduling Tool and its inputs, including the specific tasks required for stations to transition and the estimated time required to complete each task.

5. The methodology set forth herein differs from that proposed in the September 30 *Transition Scheduling Proposal Public Notice* in several respects.[6] First , in the unlikely event that a station is predicted to incur temporary aggregate interference greater than five percent, the Phase Assignment Tool will be re-run in an attempt to reduce the temporary aggregate interference of all stations below five percent while simultaneously adhering to all constraints and objectives. The second change concerns the Phase Scheduling Tool. The amount of time allocated to tower construction on towers with multiple stations has been increased substantially. These changes were adopted in response to comments regarding the *Transition Scheduling Proposal Public Notice*, and are discussed below and in this Public Notice adopting the post-incentive auction transition scheduling plan.

6. This Appendix provides interested parties with sufficient information to replicate the methodology for determining the overall transition schedule. The Phase Assignment Tool implements the objectives and constraints described in this Appendix using commercially-available optimization software. The Phase Scheduling Tool leverages an open source discrete event simulation software package using inputs described in detail in this Appendix. The data presented in this Appendix is the output of applying this methodology to representative final television channel assignment plans for two 84 MHz spectrum clearing scenarios,[7] and also making certain assumptions regarding Canada and Mexico based on ongoing coordination with those countries.[8]

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[5] This exercise of discretion will be done in consultation with Innovation, Science and Economic Development Canada (ISED Canada) as it impacts Canadian stations. FCC and ISED Canada are coordinating closely on transition timing, consistent with the agencies' intent to jointly repack TV stations in both countries. *See Decision on Repurposing the 600 MHz Band*, August 14, 2015, available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11049.html. *See Statement of Intent Between the Federal Communications Commission of the United States of America and the Department of Industry Canada Related to the Reconfiguration of Spectrum Use in the UHF Band for Over-the-Air Television Broadcasting and Mobile Broadband Services*, U.S.–Can., Aug. 11, 2015, available at https://transition.fcc.gov/ib/sand/agree/files/PASIIC.pdf (*Canadian Coordination*).

[6] *See, Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10819 (Appx. A).

[7] The representative examples presented herein are for illustrative purposes only and are based on channel assignments that do not rely on or predict any auction results. The scenarios are "representative" in the sense that they are consistent with the plans generated by the Commission's Final Television Channel Assignment Plan determination procedure based on numerous auction simulations conducted by the staff. . With the Final Stage Rule now met during Stage 4, the auction will clear 84 MHz. This Appendix therefore uses two 84 MHz scenarios as representative examples. We are not publicly releasing the underlying simulations, which makes assumptions regarding reverse auction participation and outcomes. Interested parties can create their own television channel assignment plans for any spectrum clearing scenario by applying the Assignment Plan determination procedure to auction simulations based on their own assumptions of likely outcomes.

[8] *See supra* n.5 and accompanying text (regarding Canada); s*ee infra* n.25 and accompanying text (regarding Mexico).

II. DEPENDENCIES AND MEANS OF BREAKING THEM

7. Before beginning to operate on their post-auction channels, stations ideally should be able to test equipment on their new channels. During the transition, however, there is a potential for undue interference[9] between stations that are still operating on their pre-auction channels and stations testing or operating on their post-auction channels. In adopting a methodology for assigning construction deadlines to transitioning stations, the staff has sought to avoid undue interference while providing as much flexibility as possible for stations to test equipment prior to commencing operations on their new channels. The "Precedence Daisy-Chain Graph" (Graph) described in the examples below explicitly captures any interference that may occur between stations operating on their pre-auction and post-auction channels.

8. The Graph is constructed as follows: nodes are stations and a directed arc connects two nodes (*s* and *s'*) when station *s* cannot transition until station *s'* has transitioned to its post-auction channel because the current channel of station *s'* interferes with the future channel of station *s*. This relationship is called a *dependency*.

Example 1: Dependency

9. In Example 1 above, suppose Station A and Station B have co- and adjacent-channel interference restrictions on all channels. Station A is reassigned from channel 25 to channel 18. Station B is reassigned from channel 45 to channel 26. Station A must vacate channel 25 before Station B can move to channel 26 so that neither station will experience undue interference. Therefore, the Example 1 graphic includes a directed arc from Station A to Station B since Station A must transition before Station B (Station B is *dependent* on Station A in order to transition).

Example 2: Daisy-Chain

10. Multiple dependencies can be connected, forming a *daisy-chain*. Example 2 illustrates a daisy chain of 4 stations. Station A must transition before Station B. Station B must transition before Station C. And Station C must transition before Station D. Thus, Stations A, B, and C all must transition before Station D can transition.

11. Daisy-chains can involve numerous stations and multiple transition dependencies. Figure 1 below illustrates a single daisy-chain involving 29 stations in the Northeast in a simulated outcome where the Commission repurposes 84 MHz of broadcast spectrum through the incentive auction.

[9] The Commission's rules governing interference between stations before and after the post-auction transition will limit interference between stations that are both operating on their pre-auction channels and between stations that are both operating on their post-auction channels, respectively. *See also infra* § III.A.20 (1) (defining the constraint which will be used by the Phase Assignment Tool to avoid undue interference *during* the transition).

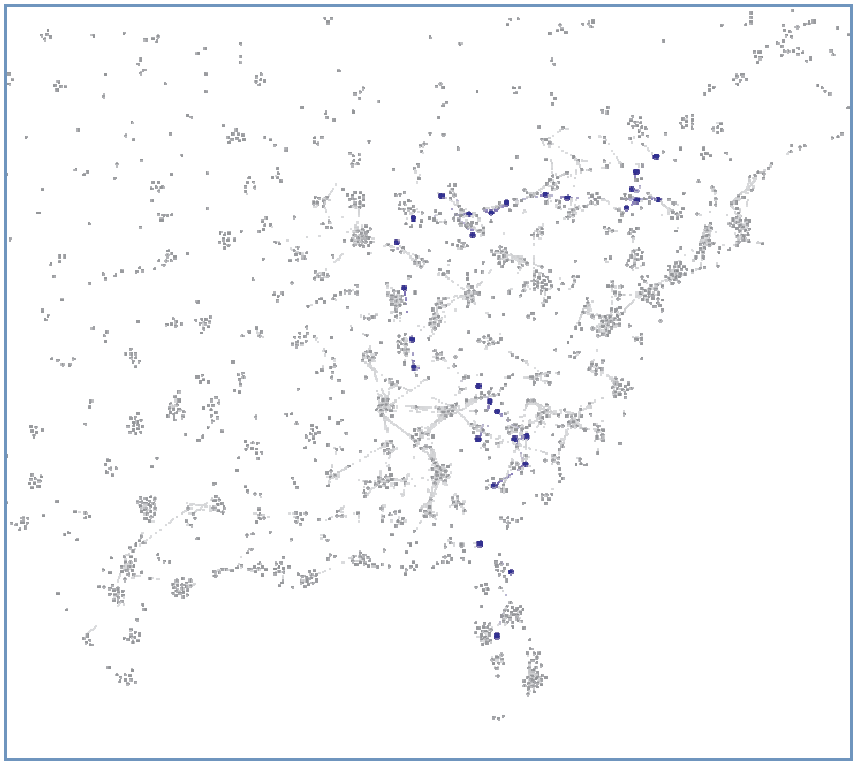
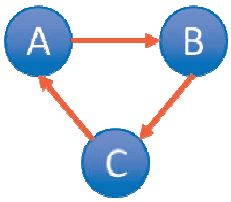


Figure 1: *Stations are nodes in gray, arcs connecting stations represent a dependency. Nodes in blue are stations involved in a 29-station daisy chain.*

12. Successful coordination to avoid undue interference among the stations illustrated in Figure 1 will be challenging, given the number of stations involved and their distance from one another. In order to reduce or eliminate the need for coordination, the chain could be broken by assigning stations to transition during different time periods or "phases." At least 29 separate transition phases would be needed to break the chain completely so that every station in the chain could transition without the need for coordination. A large number of transition phases undercuts other potential transition goals, such as transitioning stations within the same region at the same time and avoiding the need for multiple channel rescans by viewers. Therefore, in order to balance these goals, a certain number of stations within a daisy chain would need to be assigned to the same transition phase, thereby reducing or "collapsing" the daisy chain into a more manageable size. For example, the six northern-most stations in the 29 station daisy-chain in Figure 1 above could be assigned to the first transition phase. Each station in this collapsed daisy chain would have to coordinate with one or more of the other stations in the chain in order to test their equipment without undue interference, but such coordination would be more manageable because of the much smaller number of stations, particularly if they are also more localized geographically. However, as illustrated by Example 3 below, the staff's analysis indicates that certain dependencies, known as "cycles," cannot be broken by assigning stations to different transition phases.

Example 3: Cycle



13. Example 3 shows a cycle consisting of three stations. Station A needs to transition from channel 20 to channel 17; Station B needs to transition from channel 28 to channel 20; and Station C needs to transition from channel 17 to channel 28. Because all three stations cannot operate simultaneously on channels 17, 20, or 28, they must transition from their pre-auction to their post-auction channels simultaneously in order to commence operation on their post-auction channel. They must also coordinate in order to test equipment on their post-auction channels without causing increased interference to one another. In such circumstances, the dependencies between stations cannot be broken by assigning stations to different transition phases and these stations must be assigned to the same phase.

14. Cycles of much greater complexity than Example 3 are likely to occur during the post-auction transition process. Figure 2 below shows another simulated outcome in which the auction repurposes 84 MHz of broadcast spectrum. The cycle consists of 196 stations and reaches from the Southeast region of the United States through the Northeast and into Canada.

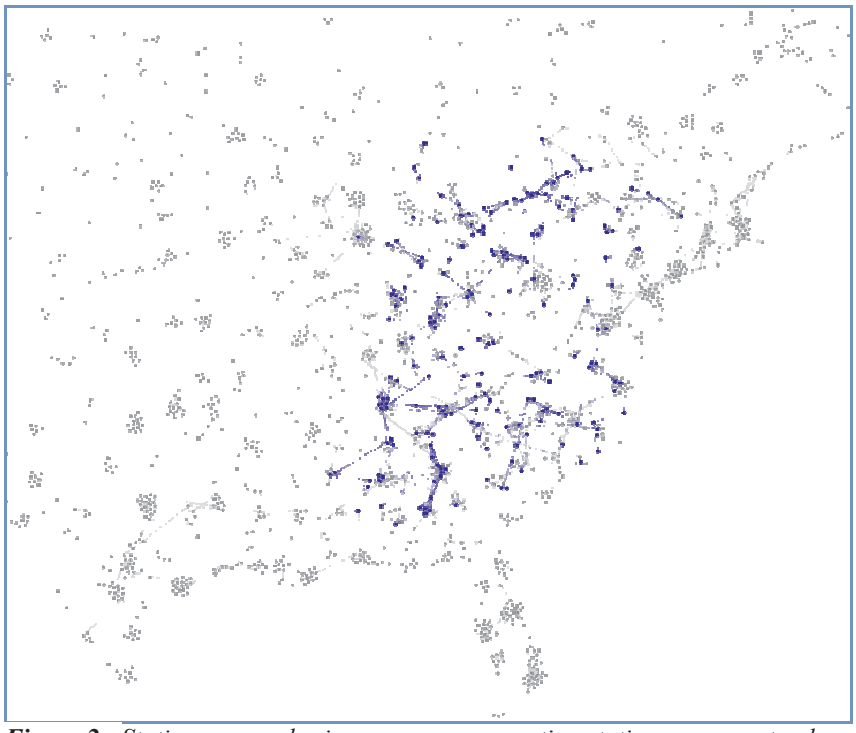


Figure 2: *Stations are nodes in gray, arcs connecting stations represent a dependency. Nodes in blue are stations involved in a 196-station cycle.*

15. The challenge created by daisy-chains and cycles described above becomes more complicated when all dependencies are considered. Daisy-chains can intersect and overlap, creating a larger and more complicated daisy-chain. A cycle can also be part of a daisy-chain. As a result, hundreds of stations may be inter-dependent and one station may require tens (or even hundreds) of stations to

transition first in order to be able to begin operating on its post-auction channel. Figure 3 below shows another simulated 84 MHz outcome with a set of 796 inter-dependent stations.

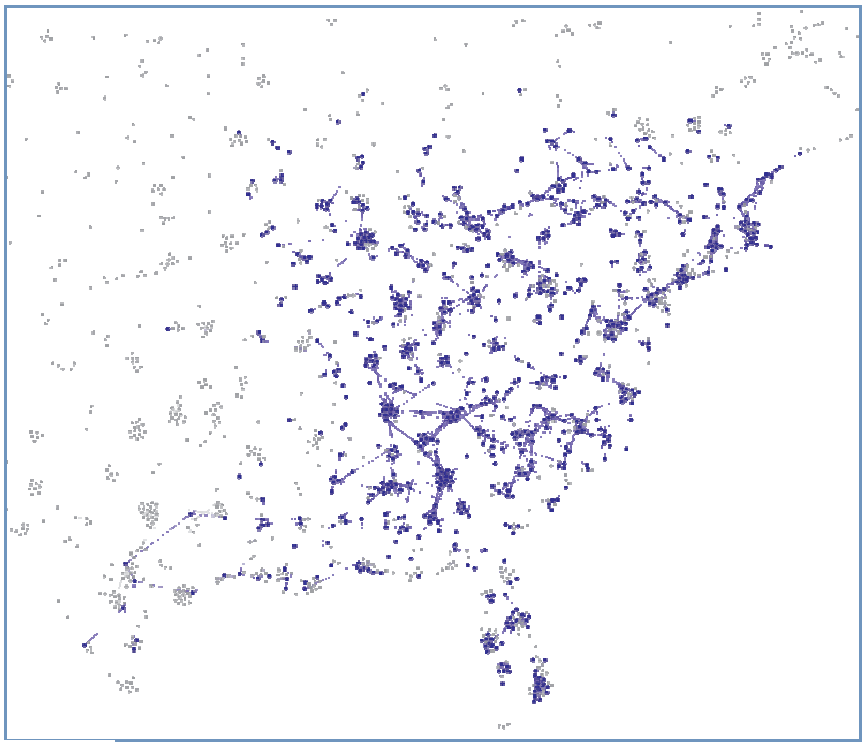


Figure 3: *Stations are nodes in gray, arcs connecting stations represent a dependency. Nodes in blue are the 796 stations with shared dependencies.*

16. As indicated above, transition phases are a useful tool to address dependencies between stations. Stations may be assigned to different phases in order to break daisy chains, or to the same phase in order to facilitate coordination by stations involved in a cycle, or to achieve other goals. We refer to inter-dependent stations assigned to the same phase as a "linked-station set" and the individual stations in the linked-station set as "linked stations." Stations that are part of a linked-station set must coordinate their testing with other stations in the set so as to avoid undue interference and must transition to their post-auction channel together.

17. Another means of breaking dependencies is to allow temporary, limited increases in station-to-station (pairwise) interference that exceed the 0.5 percent allowed under the Commission's rules governing pre-auction and post-transition interference relationships. As discussed in the *Transition Scheduling Proposal Public Notice*, allowing temporary, limited increases in pairwise interference will significantly reduce the number of dependencies between stations and in turn reduce the size, number, and complexity of daisy chains and cycles.[10] Additionally, the staff's analysis indicates that allowing temporary, limited increases in pairwise interference will not result in significant aggregate interference increases.[11]

[10] *See Transition Scheduling Proposal Public Notice,* 31 FCC Rcd at 10823, 10831-32 (Appx. A), paras. 16, 27-28.

[11] *See id.* at 10832, para. 28. Although all simulations have substantiated that significant aggregate interference increases are unlikely (*see infra* § III.B.1 (Baseline Results)), the Bureau will check the maximum aggregate interference incurred by each individual station and, if greater than five percent, attempt to find an alternative solution that reduces the interference of all stations to below five percent. *See Public Notice*, para. 18.

18. Another means of breaking dependencies would be to assign stations in complicated daisy chains or cycles to operate on temporary channels prior to transitioning to their post-auction channels. Stations assigned to temporary channels would have to "move" twice, first to their temporary channels and then to their ultimate post-auction channels. Because the overwhelming majority of commenters were opposed to mandatory temporary moves,[12] the adopted methodology will not require any station to use a temporary channel during the transition. However, as discussed in the *Public Notice*, staff will consider voluntary requests by stations to use either individual temporary channel or temporary joint use of a channel .[13]

III. THE PHASE ASSIGNMENT TOOL

19. Under the methodology we adopt, stations will be assigned to one of 10 transition phases. Every station in a phase must cease operating on its pre-auction channel at the end of the phase, i.e., the phase completion date. Stations will be assigned to phases using the Phase Assignment Tool. This Section discusses the Phase Assignment Tool as well as the constraints (*i.e.,* rules by which all assignments generated by the tool must abide) and objectives (*i.e.*, goals for creating the assignments). We begin by listing the specific constraints that will be imposed and the objectives used,[14] followed by a discussion of the results of staff analysis illustrating the rationale underlying the procedure.

A. Constraints and Objectives

20. Based on the staff's analysis and the record developed to date, we adopt the following constraints and objectives for assigning stations to phases. Phase assignments must satisfy all of these defined constraints.[15] The objectives will be applied to identify a solution that best satisfies the Commission's transition goals. The Phase Assignment Tool prioritizes the objectives in the sequence listed below. Subsequent objectives are constrained by prior objectives.

Constraints:

(1) *A station cannot cause more than two percent new interference to another station during the transition.* This constraint seeks to avoid undue interference during the transition and to provide stations with as much flexibility as possible to test equipment on their post-auction channels before transitioning.[16] Although in many cases stations may be able to achieve these goals through coordination with affected stations, coordination may not be feasible in situations involving large-scale and complex dependencies among stations. As discussed in more detail in this *Public Notice*, allowing temporary, limited increases in pairwise interference will reduce the number and complexity of dependencies without resulting in significant aggregate interference increases. Doing so is also likely to promote other potential goals, such as reducing the number of channel rescans. Although allowing higher levels of temporary interference—up to five percent—would further

[12] *See, e.g.*, CCA Comments at 9; Cordillera, et al. Comments at 8 n.11; FAB Reply at 1; Joint Broadcast Commenters Comments at 16; NAB Comments at 15, Reply at 5; Sinclair Reply at 6; WatchTV Comments at 1.

[13] *Public Notice* at III.B.2 (Temporary Joint Use of Channels and Temporary Individual Channel Assignments). *See also Broadcast Transition Procedures Public Notice* at 14-15, paras. 46-47 (describing procedures for requesting special temporary authority to, among other things, operate on a temporary channel on an individual or joint basis).

[14] ISED Canada is considering using a similar approach for Canadian stations and specific transition details will be published as part of its domestic process. As a result, the Baseline Results section of this Appendix may change as set forth in this Appendix. *See infra* Appx. A § III.B.1 (Baseline Results).

[15] While the restriction on temporary channels was included as a constraint in the proposal (*Transition Scheduling Proposal Public Notice*, 31 FCC Rcd at 10825-26 (Appx. A), paras. 20), because we will not require any station to use a temporary channel during the transition it is unnecessary to include this restriction as a constraint in the final tool. The tool will not assign stations to temporary channels even absent such a constraint.

[16] *See supra* § II (Dependencies and Means of Breaking Them).

reduce dependencies, we will allow no more than two percent as a balance between avoiding undue interference and achieving the goal of limiting dependencies.

(2) *No stations in Canada will be assigned to transition before the third transition phase.* Due to dependencies between domestic and Canadian stations, a joint transition plan with Canada was agreed to by the FCC and Innovation, Science and Economic Development Canada (ISED Canada). In keeping with our discussions with ISED Canada, stations in Canada will generally be assigned to later transition phases, and in no case before the third transition phase. This constraint will promote efficient use of cross-border resources and respect the minimum notification periods to Canadian TV stations established in ISED's 600 MHz decision.[17]

(3) *There will be no more than 10 transition phases.* Limiting the number of transition phases to 10 strikes a reasonable balance between decreasing the number of linked-station sets in each phase and other transition goals, such as transitioning stations within the same region at the same time and avoiding the need for multiple channel rescans by viewers. Limiting the number of phases to 10 also will facilitate monitoring of the transition process.[18] Canadian stations not impeding the transition of U.S. stations or the ability of the U.S. to repurpose the new 600 MHz[19] may be permitted to continue to operate beyond the tenth phase based on rules to be established by ISED Canada.

(4) *All stations within a DMA will be assigned to no more than two different transition phases.* This DMA constraint provides similar benefits to a purely regional approach. By clustering stations in a particular geographic area into the same transition phase, this constraint will make resource allocation more efficient. For instance, tower crews will be able to focus on multiple stations in a specific area during a single phase. Importantly, the constraint will limit the number of rescans consumers will have to complete as a result of the transition. While this constraint potentially limits the ability of the tool to minimize the number and/or size of linked-station sets within a transition phase, on balance we believe that the benefits to consumers and broadcasters outweighs the burden.

(5) *The difference in the number of stations in the largest transition phase and the smallest transition phase will be no more than 30 stations.*[20] This constraint balances the number of assigned stations in each phase, which in turn helps manage limited resources by ensuring that they can be spread more evenly across the 10 transition phases.

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[17] *See Decision on Repurposing the 600 MHz Band*, August 14, 2015, available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11049.html.

[18] Note that the methodology assumes that all winning bidders affecting the first phase of the transition who have agreed to go off-air completely, or that become a channel sharee of another station with a post-auction channel assignment, will have gone dark before the stations in the first transition phase begin testing of their equipment (*e.g.*, two months before the end of the first transition phase). This assumption is reasonable given the expected timeline for paying winning stations and the estimated time for the first phase to complete.

[19] *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* GN Docket No. 12-268, Second Report & Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 13071, 13083, para. 23 (2014) (*ISIX R&O*).

[20] If it is not feasible to assign stations in such a way that the difference in the number of stations in the largest transition phase and the smallest transition phase is less than or equal to 30 stations, then an optimization will be performed minimizing the difference between the largest transition phase and smallest transition phase, and subsequent optimizations will be limited to no more than 1.1 times the number found in this optimization. This strikes an appropriate balance between restricting the difference in size between the largest and smallest transition phases while providing additional flexibility to achieve other objectives.

(6) *Every transitioning station will be assigned to one transition phase.*

(7) *No phase can have more than 125 linked stations.* The dependencies created by the interference constraints can affect a large number of stations across large geographic areas. This constraint will limit the effect of those dependencies and, to the extent that coordination is needed, facilitate a manageable transition process for broadcasters. We believe the 125-station limit strikes a balance between minimizing dependencies and other goals.[21]

(8) *No station falling into the "complicated" category for purposes of the Phase Scheduling Tool will be assigned to Phase 1.*[22] This constraint will help to ensure that the stations facing the most challenging and time-consuming transitions have adequate time, and to avoid the risk of such stations delaying others' transitions in the event of delays.

Objectives:

(1) *Assign U.S. stations whose pre-auction channels are in the 600 MHz Band to earlier phases in order to clear the 600 MHz Band as quickly as possible, while simultaneously assigning all Canadian stations and U.S. stations whose pre-auction channels are in the remaining television bands (U.S. TV-band stations) to later phases, where possible.* This objective promotes a number of goals. It helps to clear the 600 MHz Band expeditiously. It also avoids the problem of Canadian and U.S. stations competing for limited resources and provides Canada with the time needed for its transition. To implement this objective, the Phase Assignment Tool weights assignments for stations transitioning from the 600 MHz Band after transition Phase 8. Similarly, the Phase Assignment Tool weights assignments for Canadian stations and U.S. TV-band stations assigned to any transition phase earlier than Phase 9. The weights for stations not transitioning out of the 600 MHz Band before Phase 9 is significantly higher than the weights for U.S. TV-band stations or Canadian stations transitioning early.[23] The Phase Assignment Tool minimizes the sum of all weights incurred by the phase assignments.

(2) *Minimize the sum, over all DMAs, of the number of times a DMA must rescan.* This objective benefits viewers by minimizing the number of rescans necessary in a market and creates regionalized clusters that will make resource allocation more efficient. As with the fourth constraint above, the use of DMAs attempts to provide similar benefits to those that would flow from a purely regional approach. This DMA-based objective attempts to move all stations within the same DMA into the same phase if such a solution can be found consistent with all constraints and prior objectives.

(3) *Minimize the total number of linked stations.* Whereas the seventh constraint above limits the total number of linked stations in a phase to 125, this objective minimizes the total number of linked stations throughout all phases of the transition. This objective seeks to provide as many stations as possible with the ability to test their equipment on

[21] If it is not possible to limit the number of linked stations in a phase to 125, then an optimization will be performed minimizing the maximum number of linked stations in any phase, and constraining the number of linked stations in any phase in subsequent optimization to no more than 1.2 times that maximum number. This strikes an appropriate balance between minimizing the number of linked stations in any phase while providing additional flexibility to achieve other objectives.

[22] *See infra* § IV.C (Pre-Construction Stage Inputs).

[23] We use the following weights when determining assignments: U.S. stations in the 600 MHz Band assigned to phase 9 are assigned a weight of 20; U.S. stations in the 600 MHz Band assigned to phase 10 are assigned a weight of 200; U.S. TV-band stations and Canadian stations assigned before phase 9 are assigned a weight of 1.

their post-auction channel while simultaneously broadcasting on their pre-auction channel without the need to coordinate.

(4) *Minimize the difference between the number of stations in the largest transition phase and the smallest transition phase.* Similar to the fifth constraint above, this objective equalizes the number of assigned stations in each phase by minimizing this maximum difference. We believe that evening out the number of stations assigned to each transition phase will help manage limited resources by ensuring that they can be spread more evenly across the transition phases.

21. After the Phase Assignment Tool has determined an assignment of all stations to phases, the aggregate interference for each station in each phase will be calculated. In the unlikely event that any station is predicted to incur aggregate interference greater than five percent, we will rerun the Phase Assignment Tool to attempt to find an equivalent solution that satisfies all of the previous optimizations.[24]

22. The Phase Assignment Tool may also be used during the transition to consider proposed changes to and, as appropriate, modify phase assignments where such reassignments will not impact the overall schedule. We recognize that unforeseen events may occur during the transition that may warrant adjustments in order to ensure that the transition proceeds in a timely fashion. If we modify phase assignments during the transition, the Phase Assignment Tool will restrict reassignments to later transition phases in order to provide certainty to stations that any adjustments will not require them to transition earlier than their originally scheduled phase completion date. Any exceptions will require the consent of any station moved to an earlier phase.

B. Preliminary Results of Staff Analysis

1. Baseline Results

23. This Section presents results from running the Phase Assignment Tool using representative final channel assignment plans, for two alternative 84 MHz spectrum clearing scenarios. We have updated these Baseline Results from those used in the *Transition Scheduling Proposal Public Notice* to reflect the fact that higher clearing targets above 84 MHz are no longer relevant given the current status of the incentive auction. In each scenario, all of the constraints above are satisfied and the objectives applied in the order specified above. The joint transition plan will consist of U.S. and Canadian stations. We also assume that Mexican stations will have already completed their transition to their new channels below channel 37 prior to the end of the first phase.[25]

24. Figures 4 and 5 below present histograms for these two representative 84 MHz scenarios, showing the total number of broadcast stations that transition in each phase and within each phase how many are (a) Canadian stations,[26] (b) U.S. stations whose pre-auction channel is in the new 600 MHz Band and (c) other U.S. stations that nevertheless must change channels. The figures show that the 600 MHz Band is mostly clear of U.S.-based impairments by the end of Phase 8. Also, the very few Canadian stations that may impede U.S. stations from transitioning are assigned to early transition phases. Table 1 sets forth the number of stations that are part of linked-station sets in each of the two scenarios. Table 2 details the maximum temporary aggregate interference (calculated consistent with the methodology

[24] *See supra* para 17 n.11.

[25] The Phase Assignment Tool assumes that Mexican stations will have transitioned to their new channels before the phase completion date of the first transition phase. *See Exchange of Coordination Letters with IFT Regarding DTV Transition and Reconfiguration of 600 MHz Band Spectrum*, U.S.–Mex., July 15, 2015, available at http://wireless.fcc.gov/incentiveauctions/learn-program/resources.html (*Mexican Coordination*).

[26] All Canadian stations are included in the simulations. Those Canadian analog stations that will remain on their current analog channel but are required to convert to digital are not currently reflected in the Phase Assignment Tool. However, the final joint transition plan and schedule will include all analog and digital Canadian stations changing channels and/or converting to digital. *See also, supra* n.5 and accompanying text.

presented in the Aggregate Interference Public Notice)[27] that any station would face during the transition in either of the two 84 MHz scenarios.

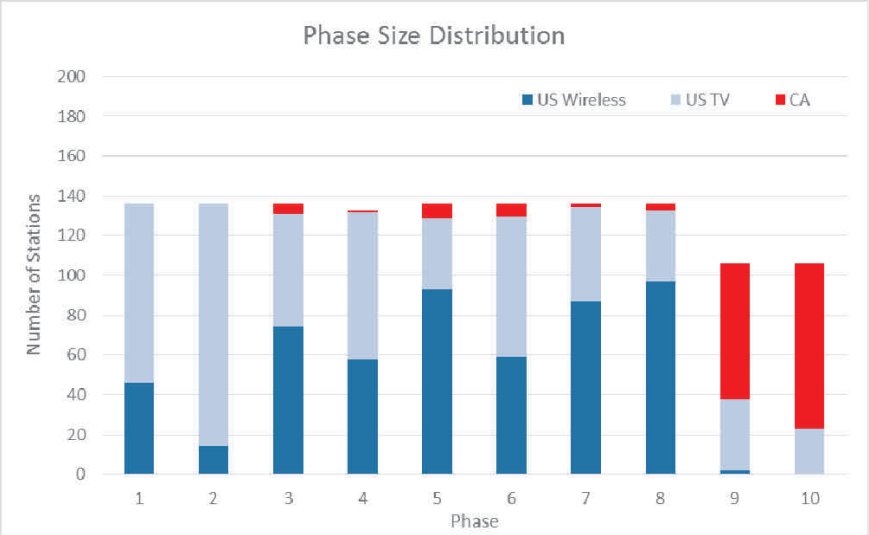

Figure 4: *84 MHz Clearing Scenario A*

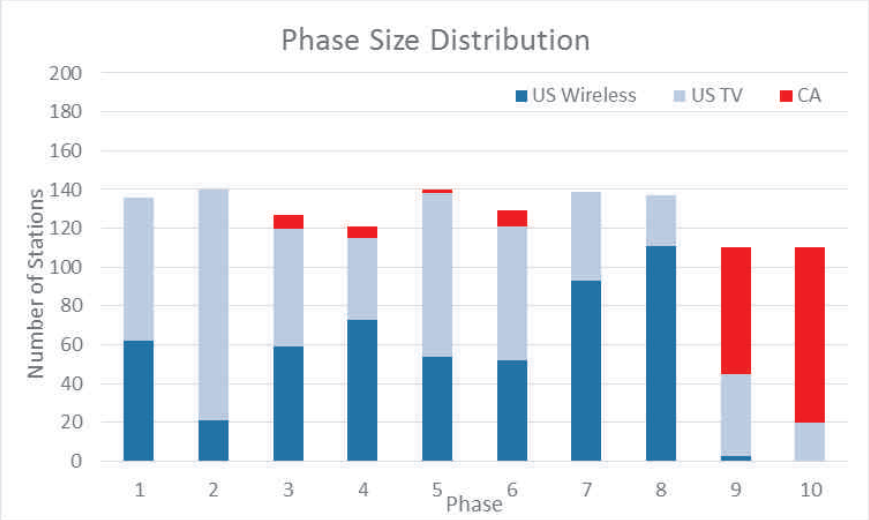

Figure 5: *84 MHz Clearing Scenario B*

[27] *See ISIX R&O,* 29 FCC Rcd at 13074-78, paras. 5-12.

Scenario	# of stations that must move to new channels	# of linked stations	Size of the largest linked-station set	Median linked-station set size	# of linked-station sets	# of stations in largest phase	% of U.S. DMAs with more than one rescan
A	1,297	752	125	3	89	136	36%
B	1,289	717	116	2	72	140	39%

Table 1: *Comparison between 84 MHz scenarios*

Scenario	Pairwise temporary interference limit	Max aggregate interference	Number of stations with aggregate interference greater than 2%
A	2.0%	1.39%	0
B	2.0%	1.46%	0

Table 2: *Two 84 MHz scenarios showing impact on temporary aggregate interference with a 2% pairwise limit*

IV. THE PHASE SCHEDULING TOOL

A. Overview

25. After stations are assigned to phases by applying the Phase Assignment Tool, we will use the Phase Scheduling Tool to inform the determination of a phase completion date for each phase.[28] The Phase Scheduling Tool estimates the total time necessary for stations within a phase to perform the tasks required to complete the transition process. In this Section, we discuss the Phase Scheduling Tool and its inputs, including the specific tasks required for stations to transition and the estimated time required to complete each task.

26. The Phase Scheduling Tool models the various processes involved in a station transitioning to its post-auction channel.[29] It divides these processes into two sequential stages: (1) the "Pre-Construction Stage" and (2) the "Construction Stage." While separate processes within a stage may occur concurrently, such as equipment procurement and zoning applications, all processes within the Pre-Construction Stage must be complete before the station is ready to move to the Construction Stage. For example, in the model, the Construction Stage process of installing a new primary antenna cannot occur until after the new antenna is manufactured and delivered during the Pre-Construction Stage. A transition phase cannot end until all stations in the model assigned to that phase have completed both stages and are ready to operate on their post-auction channels.

27. Some processes require specialized resources that may be in limited supply. The Phase Scheduling Tool models these limited resources by constraining the amount available at any given time. If a station needs a constrained resource to complete a process, and the resource is unavailable because other stations are using it, the model places the station in a queue until the required resource is available. As described in more detail below, the processes within each phase are not designed to be a comprehensive listing of every task required to complete the transition; we have instead separated those

[28] The phase completion date for each phase will also be the construction permit deadline assigned to each station within a given phase. This is the date that each station within a phase will be required to cease operating on its pre-auction channel.

[29] As discussed in the *Public Notice*, the Phase Scheduling Tool does not mandate that broadcasters use particular vendors or access resources in a particular order in the real world. It is a simulation tool created to assist the Commission in setting reasonable deadlines for phases. *Public Notice* at para. 30.

processes which need resources that are most limited in supply and therefore likely will have the biggest impact on scheduling.

28. For each Stage, the Phase Scheduling Tool uses two inputs: (1) the time it would take for a station to complete the tasks required for that stage if all resources are available when needed; and (2) the estimated availability of constrained resources. The Phase Scheduling Tool uses these inputs to calculate how long it will take each station within a transition phase to complete all work associated with both Stages. The output of the tool is the estimated number of weeks from the start of the transition required for all stations assigned to a phase to complete all of the necessary transition tasks, test equipment on their post-auction channels, and be ready to operate on their post-auction channels.

29. Since it is not possible to know the exact order stations will begin each process, the Phase Scheduling Tool uses discrete event simulation to model this uncertainty. The Phase Scheduling Tool does assume, however, that a station assigned to an earlier phase will begin its Pre-Construction Stage processes requiring a constrained resource (e.g., ordering an antenna) before a station assigned to a later phase. By assigning the station order within a transition phase randomly, called the "simulation order," and simulating the transition processes, the Phase Scheduling Tool provides a single estimate of the time required for all stations assigned to a phase to complete each transition phase. The Phase Scheduling Tool operates by simulating stations completing the transition and outputs the time needed to complete each phase given a simulation order in which stations have access to scarce resources. The tool will run 100 simulations each with a different simulation order. The tool then provides the average time in weeks it takes to complete a phase. Based on those results, the Bureau may then exercise limited discretion to modify the phase completion dates from the average durations calculated by the tool to account specifically for certain factors that may warrant deadline adjustments, such as the relative length of the testing periods for each phase or seasonal considerations. For example, the phase completion date may be moved later if an early phase consisting primarily of stations in northern regions of the United States is projected to end in the middle of winter.[30]

30. The Phase Scheduling Tool also enables the staff to analyze the sensitivity of transition phase time estimates based on changes in input data. During the transition, as new information becomes available, the tool can be rerun to assess the potential impact of unforeseen developments on the overall schedule.[31] To give additional certainty to stations, if we decide to use the Phase Scheduling Tool during the transition to modify phase completion dates, we will not move any phase completion date forward without the consent of the impacted station.

31. The following subsections detail the specific processes or tasks that the Phase Scheduling Tool models for each stage, as well as the estimated time and resource availability for each process. We adopt the estimates provided in the *Transition Scheduling Proposal Public Notice* with the exception of time allocated to tower construction on towers with multiple stations. The revised estimates are based on data contained in the *Widelity Report*,[32] submissions from interested parties, submitted comments, and informational discussions with tower crew companies, other antenna and transmitter manufacturers, and broadcasters.[33] We believe that the estimates are conservative and that they reasonably capture each

[30] *See supra* n.5 and accompanying text (regarding requirement to consult with ISED Canada).

[31] For example, in the unlikely event that a station is deemed "unable to construct" the facility specified in the *Closing and Reassignment Public Notice*, the Bureau may need to modify the transition schedule in order to grant an application filed during the first priority window for an alternate facility or channel. *See Public Notice* at para. 45. *See also id.* at § III.B.1 (Consideration of the Transition Schedule When Evaluating Requests for Alternate Facilities, Expanded Facilities, Alternate Channels, STAs, and Waivers of Transition Deadlines)

[32] *See Media Bureau Seeks Comment on Widelity Report and Catalog Costs of Potential Expenses and Estimated Costs*, GN Docket No.12-268, Public Notice, 29 FCC Rcd 2989 (MB 2014) (*Widelity Report*).

[33] *See, e.g.*, Letter from Digital Tech Consulting, Attach., *Broadcast Spectrum Repacking Timeline, Resource and Cost Analysis Study*, 24 (filed Nov. 6, 2015) (DTC Study); Letter from Digital Tech Consulting, Attach., *Response*

(continued….)

aspect of the transition. The final subsection below shows sample outputs of the Phase Scheduling Tool for the two baseline Phase Assignment Tool simulation set forth in the prior section.

B. Modeling the Transition Stages

32. The individual tasks required for a station to complete its transition have been grouped into two stages: (1) the Pre-Construction Stage and (2) the Construction Stage. In the Pre-Construction Stage, a station completes two tasks: ordering and delivery of the main and auxiliary antennas; and administration and planning work, which includes zoning, administration, legal, possible structural tower improvements, equipment modifications, and other activities. In the Construction Stage, a station completes two additional tasks: construction related work and tower crew work. The tasks included in each Stage are shown in Figure 6 below.

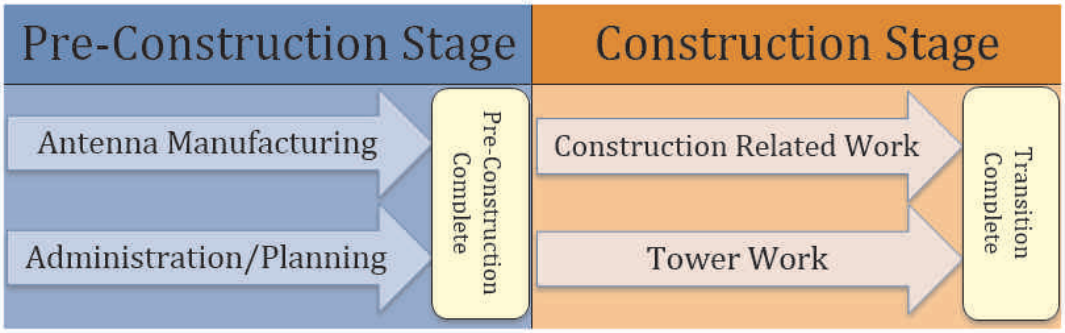

Figure 6: *Overview of the transition stages*

33. The Phase Scheduling Tool groups together all tasks within a stage that can be done regardless of how many other stations are performing similar tasks. However, since there are two constrained resources that are dependent on the actions of others (antenna deliveries and tower crew availability), these tasks are separated out and the model considers how resource availability impacts the total completion time for any station in either stage. We note that there are many other resources that are not specifically identified but are essential to completion of the transition process. Based on the staff's analysis and the record developed to date, resources such as auxiliary antenna manufacturing, transmitter manufacturing, transmission line manufacturing and RF component installers do not affect the time required for a station to complete its transition. The availability and manufacturing capacity of these resources have been identified as being sufficient to fulfill the expected demand during the transition (i.e., these resources have been designated as being "unconstrained") and therefore these resources are not broken out separately in the Phase Scheduling Tool. Instead, as illustrated in Figure 6, the tasks related to these unconstrained resources have been grouped into the general tasks of Administration/Planning, which is within the Pre-Construction Stage, and Construction Related Work, which is within the Construction Stage.[34] The Phase Scheduling Tool uses conservative estimates for the time requirements in order to assure that they meet the individual needs of each station.

(Continued from previous page)
to T-Mobile and CCA Reports on the Broadcast Spectrum Repacking Timeline, Resource and Cost Study (filed Mar. 17, 2016) (DTC Responsive Study); Letter from T-Mobile USA, Inc., Attach., *On Time and On Budget: Completing the 600 MHz Incentive Auction Repacking Process within the FCC's 39-Month Relocation Deadline and the Budget Established by Congress* (Feb. 17, 2016) (T-Mobile Study); Letter from T-Mobile USA, Inc., Attach., *On Time and On Budget: A Response to Digital Tech Consulting, Inc.'s March 2016 Presentation on the State of Broadcaster Relocation Resources* (filed May 11, 2016) (T-Mobile Responsive Study). *See also Public Notice* at § III.A.2 (Phase Scheduling Tool).

[34] Other required resources such as RF consultants and structural engineers will need to complete their work by the end of the initial 3-month filing window for construction permit applications, and therefore, also are not considered a constrained resource for purposes of the Phase Scheduling Tool.

C. Pre-Construction Stage Inputs

34. There are two components to the Pre-Construction Stage: (1) the time required for antenna equipment to be ordered, manufactured and delivered (a significant constraint) and (2) the time required for all other planning and administration activities necessary to prepare for construction (called "Administration/Planning"). The Administration/Planning component includes zoning, administration, legal work, and pre-construction alterations to tower and transmitter equipment. Since administration and planning activities take place in parallel and the activities of one station are unlikely to impact the ability of others to perform the same activities, the model simply estimates the *total time* needed to complete all of these activities.

35. The Phase Scheduling Tool categorizes stations based on the difficulty of completing these activities. The Commission used a similar "bucketing" approach for categorizing stations in the Final Channel Assignment.[35] Time estimates were derived by taking estimates from Widelity and, where appropriate, adding "slack" time so that the overall estimate of the time required would be a conservative one.[36] The time estimates are shown in Table 3 below.

Station Classification	Administration/ Planning	Based on Widelity Case Study[37]
"Complicated" [38]	72 Weeks	Case 4
DTV	32 Weeks	Case 1
Class A	24 Weeks	Case 3

***Table 3**: Estimates for Administrative/Planning work*

36. The Administration/Planning time estimate establishes the *minimum* amount of time required for a station to complete the Pre-Construction Stage. While Administration/Planning work is occurring, stations likely will also place orders for their main antennas. The time estimates for this component of the Pre-Construction Stage include manufacturing and delivery time once the antenna manufacturers receive orders from stations. If no station had to wait for its main antenna to be manufactured and delivered, then the maximum amount of time it would take any station to complete the Pre-Construction Stage would be the 72 weeks allotted for the "complicated" stations to complete their planning activities. However, the ability of manufacturers to produce enough antennas may impact the

[35] *Application Procedures for Broadcast Incentive Auction Scheduled to Begin on March 29, 2016; Technical Formulas for Competitive Bidding*, 30 FCC Rcd 11034, 11176 (Appx. E) (WTB 2015) (*Auction 1000 Application Procedures Public Notice*).

[36] The *Widelity Report* estimates that Administration/Planning could take up to 72 weeks for "complicated" stations (primarily due to zoning), up to 20 weeks for the average DTV station and up to 12 weeks for the average Class A or other lower power station. To be conservative, we added another 12 weeks to the Administration/Planning estimates for the non-complicated stations since these timelines were more aggressive. However, we expect this work will start during the 3-month filing window for construction permits (if not earlier, when each station receives its confidential letter with its final channel assignment). *Widelity Report*, 29 FCC Rcd at 3037-46 (Widelity Case Studies).

[37] Details on each of these case studies can be found in the *Widelity Report*. *Id.*

[38] For the purposes of the Phase Assignment Tool and the Phase Scheduling Tool, "complicated" stations are those at locations previously determined as likely to face extraordinary hurdles. *See Broadcast Incentive Auction Scheduled to Begin 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*), GN Docket No. 12-268, Public Notice, 30 FCC Rcd at 8975, 9104, paras. 279-80 (2015) (*Auction 1000 Bidding Procedures Public Notice*); *Auction 1000 Application Procedures Public Notice*, 30 FCC Rcd at 11176 n.9 (Appx. E) ("Certain towers will require extraordinary means to move a station to a new channel . . . [S]tations at the following locations in the U.S. will be considered extraordinary: Mt. Sutro, Willis Tower, Hancock Building, Empire State Building, Times Square, Mount Mansfield, Lookout Mountain.").

overall schedule. Therefore, the Phase Scheduling Tool includes antenna manufacturing and delivery as a specific resource constraint. The Phase Scheduling Tool considers a station to have completed its Pre-Construction Stage only after all of its Administrative/Planning work is completed and its antenna is delivered.

37. For purposes of delivery time estimates, stations are divided into two categories, based on the assumption that manufacture and delivery of directional antennas for full power stations will require more time than for non-directional and Class A antennas (of either type). The time estimates shown in Table 4 are based on the assumption that the antenna manufacturers will begin manufacturing antennas as soon as the orders are received unless they are manufacturing at their current capacity.[39]

Station Classifications	Time to deliver requested antenna
Directional DTV Antennas	24 Weeks
Non Directional and Class A Antennas	12 Weeks

***Table 4**: Standard estimates for satisfying antenna requests*

38. The Phase Scheduling Tool also includes a specific number of antennas that can be manufactured and delivered at any given time. Based on those numbers, some stations may be able to receive their antennas without waiting for any additional time, but other stations may have to wait for their antennas to be delivered. The Phase Scheduling Tool will place such stations in a queue until the antenna can be delivered, based on the station's assigned number in a simulation order.[40] In addition, the Phase Scheduling Tool will assume that manufacturers have an inventory of 20 antennas at the start of the 39-month transition period, and that capacity will increase over the course of the transition period. These assumptions are listed in Table 5 below.[41]

	Capacity		
Category	**Year 1**	**Year 2**	**Year 3**
Antenna Manufacturing Capacity	80/Month	84/Month	88/Month

***Table 5**: Antenna Manufacturing Capacity Estimates*

39. The completion of the Pre-Construction Stage for a given station is the maximum completion time for these two activities – either Administration/Planning activities or the manufacture and delivery of the antennas. For stations in early phases, more time usually will be required for Administration/Planning. Stations assigned to later phase will likely have completed

[39] The time estimates for antenna delivery are generally consistent with, if not more conservative than, those cited in the *Widelity Report*, which estimated 3 months except for deliveries to complicated stations. *Widelity Report*, 29 FCC Rcd at 3037-46.

[40] For example, assume that five stations (A, B, C, D, and E) with simulation order 1, 2, 3, 4, and 5 respectively, need to have an antenna delivered to complete the Pre-Construction Stage, there are currently only three antennas available, but additional antennas are being manufactured over time. Stations A, B, and C will each be able to have their order fulfilled for their antenna without having to wait. Stations D and E will need to wait for their order for an antenna to be fulfilled. When manufacturing capacity becomes available, station D will receive it, and when capacity for a second antenna becomes available station E will receive it.

[41] These estimates are based on public statements by manufacturers regarding their planned ramp up in anticipation of the transition and the assumption that these manufacturers plan on maintaining market share. *See, e.g.*, Wireless Estimator, ERI to accelerate completion of TV channel repack post FCC's Broadcast Incentive Auction, (April 19, 2016), http://wirelessestimator.com/articles/2016/eri-and-t-mobile-deal-for-crews-and-facilities-puts-39-month-repack-deadline-closer-to-being-met/. We also assumed a conservative 5 percent growth rate.

Administration/Planning activities before the delivery of their antennas, so in most cases Pre-Construction Stage will be completed when their antennas are delivered.

D. Construction Stage Inputs

40. Construction Stage modeling is similar to Pre-Construction Stage modeling and consists of two activities: (1) the time to complete all general facets of construction (called "Construction Related Work"); and (2) the time required by tower crews to complete installation of equipment on the tower. As with Pre-Construction Stage activities, these activities can occur in parallel but the estimated completion time for the Stage is the time required to complete both these activities. In addition, like the Administration/Planning category in the Pre-Construction Stage, the Construction Related Work category is a catch-all category that incorporates several types of activities. The estimated time for this category includes estimates of the time to complete all construction work and associated management and coordination activities. More specifically, Construction Related Work includes estimates for the time associated with installing the transmitter components, combiners, RF mask filters and the transmission line to the tower base. Construction Related Work also allows time for any possible installation of liquid cooling systems, AC power, and connection to remote control equipment and input signal connections if required. Finally, Construction Related Work includes time required for performing any tower modifications and any final testing of the system. Table 6 lists the estimates of the time to complete all work included in the "Construction Related Work" category.[42]

Station Classifications	Construction Related Work	Based on Widelity Case Study #
"Complicated"	32 Weeks	Case 4
DTV	24 Weeks	Case 1
Class A	12 Weeks	Case 3

***Table 6**: Minimum Estimated Time for Construction Related Work*

41. The Construction Related Work column reflects estimates of the minimum amount of time required for a station to complete the Construction Stage. The other process in the Construction Stage work is tower work. The time required for tower work is both tower and antenna specific. Table 7 lists the different characteristics that determine the amount of time required to perform tower work.[43]

Tower Height	Base Time (in Days)	Change from Base Time							
		Location		Type		Transmission Line		Licensed Auxiliary Antenna	
		Side	Other	Panel	Other	Flexible	Rigid	Yes	No
0-499 Feet	10	0	0	5	0	-5	0	4	0
500-999	15	0	0	3	0	0	0	5	0
1000-1999	25	-5	0	0	0	0	0	3	0
2000 or over	40	-5	0	0	0	0	0	3	0

***Table 7**: Tower Crew Time Estimates*

[42] Based on Widelity time estimates for the various work streams that fall under Construction Related Work. *See Widelity Report*, 29 FCC Rcd at 3037-46.

[43] These times were based on feedback from industry. *See, e.g.,* T-Mobile Responsive Study at 39-40. This table does not reflect the time to install an auxiliary antenna. *See infra* para. 44 (describing how auxiliary antennas are handled in the Phase Scheduling Tool).

42. If a station did not need to wait for an antenna crew to become available in order to complete its tower work, then the amount of time the station would take to complete the Construction Stage would be the longer of the time estimated for construction related work and the time estimated for the station to complete work on its tower. However, not every station will be able to have a tower crew as soon as needed. When modeling to generate estimates for phase completion times, the Phase Scheduling Tool will place any station that is waiting for a tower crew to become available in a queue until a crew becomes available, based on the station's assigned number in a simulation order.[44] Stations will be removed from the queue according to their simulation order.[45]

43. We include in the Phase Scheduling Tool specific estimates regarding the number of available tower crews. The record developed to date reflects different estimates as to the number and types of tower crews that will be available.[46] In light of the variance in these estimates, we will place tower crews into three buckets: (1) U.S. crews capable of servicing towers that are particularly difficult to work on due to height or location; (2) U.S. crews that are capable of servicing easier towers; and (3) Canadian crews. U.S. stations on towers that are above 300 feet in height and that are top-mounted or located on a candelabra can only draw from the pool of U.S. crews that can handle such difficult sites. Other U.S. stations can only draw from the other pool of U.S. crews, on the assumption that these difficult site crews will be fully occupied. Canadian stations can only draw from the pool of Canadian crews. It is likely that crews will travel between countries, but separating the crews in this way provides a more conservative estimate of the number of crews available in each country. We expect that the number of crews will increase as the transition proceeds.[47] The specific estimates we will use are set forth below in Table 8.[48]

	Number of Crews		
Country	**Year 1**	**Year 2**	**Year 3**
USA – Difficult Sites	25	26	27
USA – Other Sites	26	28	30
Canada	22	22	22

Table 8: *Number of Tower Crews*

44. Other assumptions incorporated into the Phase Scheduling Tool are:

(1) The estimated time required to complete work on a tower is reduced or discounted if

[44] For example, if five stations are ready to construct their facilities in the model at the same time, but there are only two available tower crews, some of the stations will have to wait for the tower crews to complete work for other stations before they are able to begin construction on their facilities. Once a crew becomes available the station with the lowest simulation order will begin its tower work.

[45] *See infra* para. 43(discussing the three possible queues for tower crews in which stations can be placed). *See also* Table 8 (providing estimates for the size of each of these pools).

[46] *Widelity Report*, 29 FCC Rcd at 3011-12 (estimating no more than 14 qualified tower crews to work on complex sites and 30 to 40 other crews that can handle simpler jobs. It may be possible to supplement with crews from Canada and members of international tower crews); DTC Responsive Study at 17-21 (estimating 21 qualified tower crews for complex sites and four additional regional crews for simpler projects); Letter from T-Mobile USA, Inc., Attach., *On Time and On Budget: Completing the 600 MHz Incentive Auction Repacking Process within the FCC's 39-Month Relocation Deadline and the Budget Established by Congress*, 37-40 (Feb. 17, 2016) (T-Mobile Study) (estimating 41 tower crews and an additional 27 crews that firms expect to hire in the future); T-Mobile Responsive Study at 36 (identifying 51 qualified tower crews).

[47] *See, e.g.,* Letter from T-Mobile USA, Inc., 2 (filed Apr. 12, 2016) (representatives for RIO Steel & Tower and Grundy Telecom Integration have expressed their plans to hire additional "experienced climbers"); *Widelity Report*, 29 FCC Rcd at 3012 (stating that additional crews could come from the cellular industry and from other countries).

[48] Tower crew estimates were based on feedback from industry and from ISED Canada. We assume a conservative growth rate in U.S. tower crews of 5%, but no growth in Canadian crews (which is very conservative).

more than one station on the tower is transitioning in the same phase. The Phase Scheduling Tool assumes that antenna installations will be performed by a single tower crew at the same time for all stations located on a given tower that are assigned to the same phase. Based on comments received and the record developed to date, we are adjusting the time upwards for the time required to complete the work on towers with multiple stations.[49] Construction on the tower will commence when the first station on that tower is ready to begin its construction work and the *total time* to complete all construction for all stations on that tower is equal to (a) the time required for the most difficult station (we assign this time to the first station) plus (b) the sum of the time estimates for all stations other than this first station, multiplied by 50 percent. We believe that these revised discounts are appropriately conservative.[50]

(2) The Phase Scheduling Tool assumes that 75 percent of all stations (including those with a licensed auxiliary antenna) will need to install an auxiliary antenna. For each station requiring an auxiliary antenna, the tool adds one additional week of tower crew time to the tower crew time, which is the maximum time required for an auxiliary in Table 7.

(3) Where the estimated time required to complete an entire transition phase is less than four weeks because much of the work (other than transmission testing on the new channel) has already occurred prior to the start date for the testing period of that transition phase, the testing period window is scaled up to allow four weeks for testing.[51]

E. Sample Output

45. This Section provides sample results of the Phase Scheduling Tool using the baseline Phase Assignment Tool results presented in Section III.B.1 above and the constraints and objectives in Section III.A for simulated auction outcomes involving the two 84 MHz clearing scenarios. Although Tables 9 and 10 below show the average number of weeks from the start of the phase to the phase completion date, each phase completion date will be listed as a specific date when the final transition schedule is released in the *Closing and Reassignment Public Notice*. The outputs of each clearing scenario are represented graphically below in Figures 7 and 8, respectively. As both Figures show, stations within each phase cannot start testing until the prior phase is complete, and all stations within a phase must cease operating on their pre-auction channels by the phase completion date.

46. Figures 7 and 8 below are a graphical representation of the time estimates from the Phase Scheduling Tool and represent estimates only. Although the tool produces reasonable time estimates based on the detailed inputs set forth in this Appendix, it does not account specifically for certain factors that may warrant deadline adjustments, such as the relative length of the testing periods for each phase or

[49] *See Public Notice* at para. 39.

[50] Staff believes that 50% is a reasonable (and conservative) discount between the previously proposed 95% discount which was generally supported by American Tower and the 20% or 10% discount that Cordillera, et al. suggests. Any discount smaller than 50% would substantially remove the time savings produced by the same tower efficiencies which American Tower suggests. *See* American Tower Comments at 4 (noting that ensuring that all stations located on the same tower transition during the same phase will maximize efficiencies, cost savings and climber safety by eliminating the need for tower crews to work on the same tower multiple times to separately transition different stations, and allowing tower owners and managers to coordinate process for all stations located on the same tower); *See*, Cordillera, et al. Comments at 10 (suggesting that timing estimates for multi-station towers should be assumed at 100 percent for the first station, 90 percent for the second station, and 80 percent for any additional stations).

[51] The four week minimum allows additional flexibility for the Commission to adjust deadlines for stations due to unforeseen circumstances. For example, if many stations in the same phase experience a natural disaster, those stations' deadline could be extended and the multiple subsequent phases testing periods could be shortened to three weeks.

seasonal considerations. For example, the phase completion date may be moved later if an early phase consisting primarily of stations in northern regions of the United States is projected to end in the middle of winter.[52] Thus, the Bureau may adjust the phase completion dates from the average durations calculated by the tool to take such factors into account, consistent with the overall 39-month transition deadline imposed by the Commission's rules.

84 MHz Scenario A

	Phase Number									
	1	2	3	4	5	6	7	8	9	10
Average number of weeks from Phase Start to Phase Completion Date	69	76	104	108	112	118	125	139	149	153

Table 9: *Number of weeks from the start of a phase to the phase completion date*

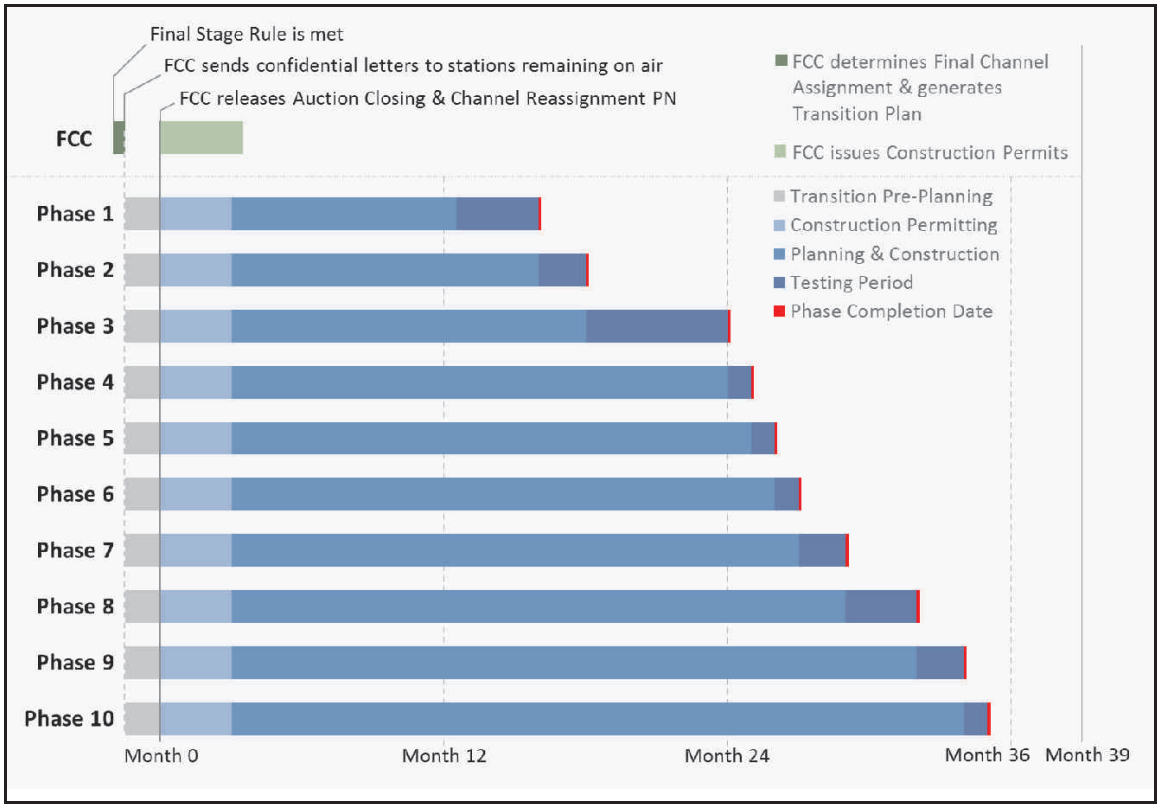

Figure 7: *Phase Timelines at 84 MHz Scenario A*

[52] *See Public Notice* at paras. 42 and 43.

84 MHz Scenario B

	Phase Number									
	1	2	3	4	5	6	7	8	9	10
Average number of weeks from Phase Start to Phase Completion Date	69	77	84	104	110	115	132	137	142	147

Table 10: *Number of weeks from the start of a phase to the phase completion date*

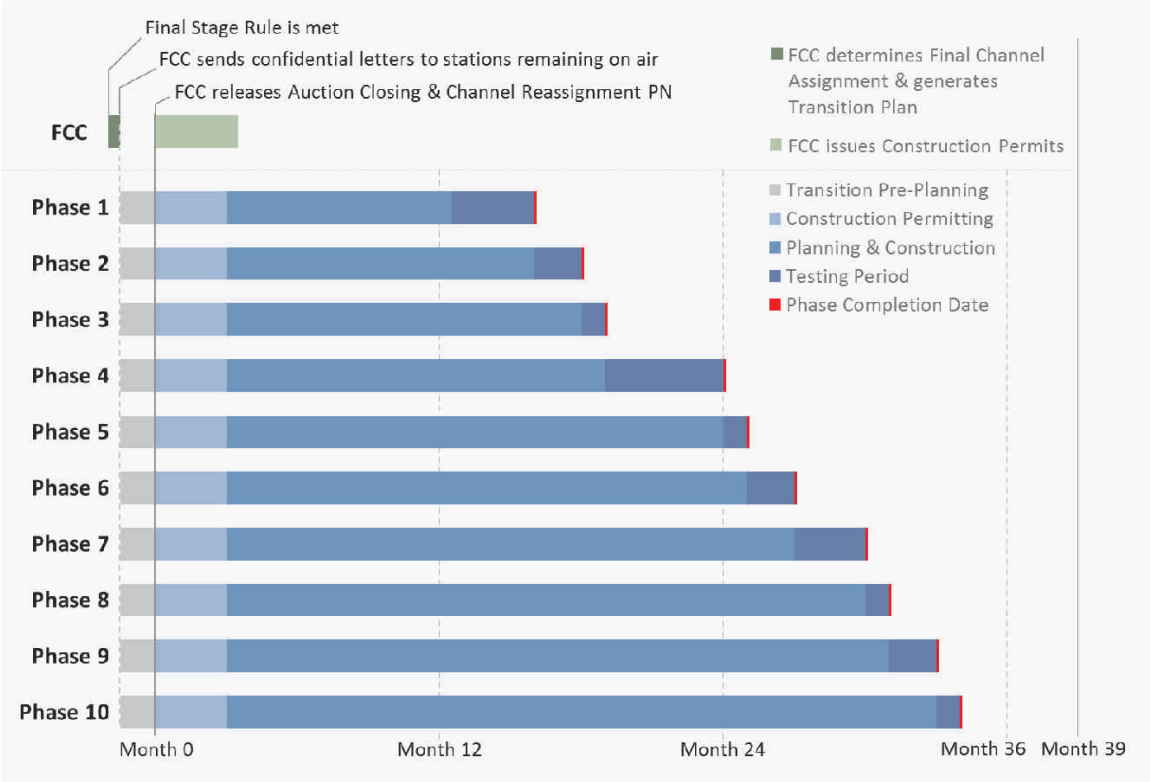

Figure 8: *Phase timelines at 84 MHz Scenario B*

APPENDIX B

Final Regulatory Flexibility Act Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] an Initial Regulatory Flexibility Analysis ("IRFA") was incorporated in the *Transition Scheduling Proposal Public Notice*. The Bureau sought written public comment on the proposals in the *Notice*, including comment on the IRFA. This Final Regulatory Flexibility Analysis ("FRFA") conforms to the RFA.[2]

A. Need for, and Objectives of, the Rule Changes

2. The Federal Communications Commission (Commission) delegated authority to the Media Bureau (Bureau) to establish construction deadlines within the 39-month post-incentive auction transition period for television stations that are assigned to new channels in the incentive auction repacking process. Pursuant to the Commission's direction, the Bureau, in consultation with the Wireless Telecommunications Bureau (WTB), the Office of Engineering and Technology (OET) and the Incentive Auction Task Force (IATF), has developed a plan for a "phased transition schedule."

3. The Bureau will use a Phase Assignment Tool that will use mathematical optimization techniques to assign stations to one of 10 "transition phases." The phases will have sequential testing periods and deadlines or "phase completion dates." The phase completion date is the last day that a station in its assigned phase may operate on its pre-auction channel. The specific constraints and objectives the Bureau adopted are set forth in Appendix A to the *Transition Schedule Public Notice*.

4. The Bureau will use a Phase Scheduling Tool to estimate the time required for stations in each phase to complete the tasks required to transition to their pre-auction channels in light of resource availability. Appendix A to the *Transition Schedule Public Notice* describes the Phase Scheduling Tool and its inputs in detail. The Bureau will run the Phase Scheduling Tool with different simulation orders to produce a range of estimated times for each transition phase. The Bureau will use the resulting range of estimated times to guide its determination of a phase completion date for each transition phase. Appendix A details the specific tasks or processes that the Bureau will model in the Phase Scheduling Tool for each stage of the transition process, as well as the estimated time and resource availability for each task.

5. All transition phases will begin at the same time, but will have sequential phase completion dates. Each phase will have a "testing period" defined by a start and end date with the end date corresponding to the phase completion date. While stations may engage in planning and construction activities at any time prior to their phase completion date, equipment testing on post-auction channels will be confined to the specified testing periods in order to minimize interference and facilitate coordination. Other than for the first phase, the testing period will begin on the day after the phase completion date for the prior phase. Whether a station needs to coordinate with other stations during the testing period will depend on whether it is part of a "linked-station set," that is, a set of two or more stations assigned to the same phase with interference relationships or "dependencies." Stations that are not part of a linked-station set may test on their post-auction channels during the testing period without the need for coordination. Stations that are part of a linked-station set must coordinate testing with stations in the set so as to avoid undue interference. Such stations must transition to their post-auction channels simultaneously.

6. While the Bureau originally contemplated that no stage would have a testing period shorter than four weeks, it concluded that it may adjust the amount of time given to the testing periods of some phases to accommodate the overall transition schedule, particularly in the early transition phases.

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA"), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] *See* 5 U.S.C. § 604.

7. The Bureau noted that, after the final stage rule is met, it will send each eligible station that will remain on the air after the auction a confidential letter identifying the station's post-auction channel assignment, technical parameters, and assigned transition phase. After the conclusion of the assignment phase of the forward auction, the Commission will release the *Auction Closing and Channel Reassignment Public Notice* (*Closing and Reassignment Public Notice*), announcing that the reverse and forward auctions have ended and specifying the effective date of the repacking process. Among other things, the *Closing and Reassignment Public Notice* will provide the post-auction channel assignment and technical parameters of every station eligible for protection in the repacking process that will remain on the air after the incentive auction. The *Closing and Reassignment Public Notice* will also announce the transition phase, phase completion date, testing period for each reassigned station, and whether the station is a part of a "linked-station set." Stations reassigned to new channels will have three months from the *Closing and Reassignment Public Notice* release date to file construction permit applications proposing modified facilities to operate on their post-auction channel facility specified in the *Closing and Reassignment Public Notice*. The Bureau will then issue each station a construction permit, including the phase completion date as the construction permit deadline for that station.

8. The Bureau noted that there are various instances in which some stations may seek to construct an expanded facility or alternate channel that differs from the technical parameters assigned in the *Closing and Reassignment Public Notice*. Some stations may also request extensions of their construction deadlines and seek authority to continue operating on their pre-auction channel after their phase completion date, including a waiver of their phase completion deadline. In evaluating such requests, the Bureau announced that it will examine the impact that grant of such requests would have on the phased transition schedule. The Bureau stated that, although it does not intend to grant requests that would disrupt the transition, its aim is not to discourage stations from proposing alternative transition solutions that could create efficiencies or resolve unforeseen circumstances. After evaluation, if the Bureau grants such a request it may choose to modify transition phase assignments and construction deadlines of the requesting station, or if necessary, other stations; however, no other station will be assigned to an earlier transition phase than it was originally assigned to without its consent.

9. The Bureau concluded that there may be situations in which the voluntary use of either individual temporary channels or temporary joint use of a channel may aid the transition. Therefore, the Bureau will permit reassigned Class A and full power stations to make a request to operate on a temporary channel either on an individual or joint basis. When seeking authorization to operate on an individual temporary channel or engage in temporary joint use of a channel a broadcaster must file with the Commission a request for STA proposing the channel it wishes to operate on and including the specific technical parameters. Such requests may be made at any time during the transition period and must demonstrate that the proposal both complies with the Commission's technical rules and will not otherwise interfere with the transition. A request for use of an individual temporary channel will be restricted to replicating a station's pre-auction coverage area and population served and broadcasters should, at a minimum, evaluate whether their operation would require coordination with neighboring stations that are not already in the same linked-station set, would result in new linked-station sets, or whether significant construction will be required to commence operation, which could divert resources from other stations. Furthermore, depending on the station's proximity to Mexico or Canada, coordination approval to operate on a temporary channel may be required from that particular country.

10. The Bureau declined to explicitly prohibit a broadcaster from operating during the transition on a temporary channel in the new wireless band that is vacant. However, to balance the interests of wireless operators to start construction and commence operations in cleared spectrum, when evaluating requests for individual use of a temporary channel in the new wireless band we will require broadcasters to demonstrate that there is no reasonable alternative to operating in the new wireless band and provide written consent from the wireless licensee of the channel that broadcaster wishes to temporarily operate, as well any wireless licensee(s) that would otherwise be required to protect the broadcaster's operations under the Commission's inter-service interference (ISIX) rules.

11. The Bureau concluded that, in the case of a request for temporary joint use of a channel the applicant (joint user) must include with its request a written authorization from the licensee of the host station. A joint user will continue to be a Commission licensee, and will temporarily operate at variance from its authorized parameters pursuant to STA. As such, a joint user must continue to comply with all requirements under the Rules and the Act that they would otherwise be required operating on their own channel. Because joint use of a channel is only temporary and the sharee will ultimately operate on its own channel, the Bureau concluded that it is important for the station to maintain coverage of its community of license and require a sharee to continue to cover its community of license.

12. The Bureau concluded that interim and auxiliary facilities will be an important part of the transition for broadcasters and that it will take action as appropriate to facilitate the use of such facilities and equipment. In order for a station to continue operation on its pre-auction channel while its current primary antenna is removed and a new channel antenna is installed, the Bureau announced that it expects many stations will need to utilize auxiliary facilities and equipment. The Bureau concluded that nothing it had adopted restricts a station from filing a request for STA to operate on its post-auction channel using an auxiliary facility prior to its phase completion date.

13. The *Transition Scheduling Proposal Public Notice* provided guidance on the prohibited communications rule as it pertains to broadcasters and the post-auction transition—particularly their ability to hold discussions with vendors not covered by the rule. A great many of the preparations that broadcasters may undertake with respect to transition to post-auction channel assignments will not involve prohibited communications. For example, broadcasters may communicate with third parties not covered by the prohibition, such as consulting engineers and counsel, without violating the prohibition, even if the communication discloses bids and bidding strategies. A broadcaster or other covered party still should take care, however, that the third party to which such communications are made does not convey the information to another covered party, which would violate the prohibition. In addition, broadcasters may communicate with other covered parties regarding many issues in the post-auction transition without disclosing bids and bidding strategies. For example, broadcasters that did not apply to participate in the auction do not have bids and bidding strategies of their own to disclose and so may communicate regarding their own post-auction transition without violating the prohibition. Such broadcasters must bear in mind, however, that they still are prohibited from communicating any other incentive auction applicant's bids and bidding strategies of which they may learn, such as a channel sharing partner's bids or bidding strategies. Finally, broadcasters that did apply but kept that fact confidential also may be able to communicate regarding post-auction channel assignments without disclosing bids and bidding strategies.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

14. Free Access & Broadcast Telemedia, LLC, and EICB-TV East, LLC (FAB/EICB) were the only commenters to file comments directly addressing the IRFA in this proceeding. FAB/EICB argue that, in the IRFA, the Commission failed to consider the impact or costs of its proposal on low power television stations (LPTV).[3] We considered these concerns when composing the Public Notice.[4]

C. Description and Estimate of the Number of Small Entities to Which the Rules Will Apply

15. The RFA directs agencies to provide a description of, and where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[5] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small

[3] FAB/EICB Reply Comments at 5-6.

[4] *See Transition Scheduling Proposal Public Notice* at para. 15 (declining to mandate the use of temporary channels).

[5] 5 U.S.C. § 603(b)(3).

organization," and "small governmental jurisdiction."[6] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[7] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[8] Below, we provide a description of such small entities, as well as an estimate of the number of such small entities, where feasible.

16. *Television Broadcasting*. This economic census category "comprises establishments primarily engaged in broadcasting images together with sound."[9] The SBA has created the following small business size standard for such businesses: those having $38.5 million or less in annual receipts.[10] The 2007 U.S. Census indicates that 808 firms in this category operated in that year. Of that number, 709 had annual receipts of $25,000,000 or less, and 99 had annual receipts of more than $25,000,000.[11] Because the Census has no additional classifications that could serve as a basis for determining the number of stations whose receipts exceeded $38.5 million in that year, we conclude that the majority of television broadcast stations were small under the applicable SBA size standard.

17. Apart from the U.S. Census, the Commission has estimated the number of licensed commercial television stations to be 1,386 stations.[12] Of this total, 1,221 stations (or about 88 percent) had revenues of $38.5 million or less, according to Commission staff review of the BIA Kelsey Inc. Media Access Pro Television Database (BIA) on July 2, 2014. In addition, the Commission has estimated the number of licensed noncommercial educational (NCE) television stations to be 394.[13] NCE stations are non-profit, and therefore considered to be small entities.[14] Therefore, we estimate that the majority of television broadcast stations are small entities.

18. We note, however, that in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations[15] must be included. Our estimate, therefore, likely

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[6] 5 U.S.C. § 601(6).

[7] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[8] 15 U.S.C. § 632.

[9] U.S. Census Bureau, 2012 NAICS Definitions, "515120 Television Broadcasting," at http://www.census.gov/cgi-bin/sssd/naics/naicsrch. This category description continues, "These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public. These establishments also produce or transmit visual programming to affiliated broadcast television stations, which in turn broadcast the programs to the public on a predetermined schedule. Programming may originate in their own studios, from an affiliated network, or from external sources."

[10] 13 CFR § 121.201; 2012 NAICS code 515120.

[11] U.S. Census Bureau, Table No. EC0751SSSZ4, *Information: Subject Series – Establishment and Firm Size: Receipts Size of Firms for the United States: 2007* (515120), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ4&prodType=table.

[12] *See Broadcast Station Totals as of December 31, 2016,* Press Release (MB rel. Jan. 5, 2016) (*Broadcast Station Totals)* at https://apps.fcc.gov/edocs_public/attachmatch/DOC-340211A1.docx

[13] *See Broadcast Station Totals*, *supra*.

[14] *See generally* 5 U.S.C. §§ 601(4), (6).

[15] "[Business concerns] are affiliates of each other when one concern controls or has the power to control the other or a third party or parties controls or has to power to control both." 13 CFR § 21.103(a)(1).

overstates the number of small entities that might be affected by our action because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. In addition, an element of the definition of "small business" is that the entity not be dominant in its field of operation. We are unable at this time to define or quantify the criteria that would establish whether a specific television station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any television station from the definition of a small business on this basis and is therefore possibly over-inclusive to that extent.

19. *Class A TV and LPTV Stations*. The same SBA definition that applies to television broadcast stations would apply to licensees of Class A television stations. As noted above, the SBA has created the following small business size standard for this category: those having $38.5 million or less in annual receipts.[16] The Commission has estimated the number of licensed Class A television stations to be 417.[17] Given the nature of these services, we will presume that these licensees qualify as small entities under the SBA definition.

20. There are also 1,966 LPTV stations and 3,789 TV translator stations.[18] Given the nature of these services, we will presume that all of these entities qualify as small entities under the above SBA small business size standard.

21. *Wireless Telecommunications Carriers (except satellite)*. The appropriate size standard under SBA rules is for the category Wireless Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.[19] Census Bureau data for 2012, show that there were 967 firms in this category that operated for the entire year. Of this total, 955 had employment of 999 or fewer, and 12 firms had employment of 1,000 employees or more. Thus under this category and the associated small business size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities that may be affected by our action.[20]

22. *Wired Telecommunications Carriers*. The North American Industry Classification System ("NAICS") defines "Wired Telecommunications Carriers" as follows: "This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services; wired (cable) audio and video programming distribution; and wired broadband Internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry."[21] The SBA has developed a small

[16] 13 CFR § 121.201; NAICS code 515120.

[17] *See Broadcast Station Totals*, *supra*.

[18] *See id.*

[19] 13 CFR § 121.201, NAICS code 517210.

[20] *See* http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ5&prodType=table.

[21] U.S. Census Bureau, 2012 NAICS Definitions, "517110 Wired Telecommunications Carriers" at http://www.census.gov/cgi-bin/sssd/naics/naicsrch. Examples of this category are: broadband Internet service providers (*e.g.*, cable, DSL); local telephone carriers (wired); cable television distribution services; long-distance telephone carriers (wired); closed circuit television ("CCTV") services; VoIP service providers, using own operated wired telecommunications infrastructure; direct-to-home satellite system ("DTH") services; telecommunications carriers (wired); satellite television distribution systems; and multichannel multipoint distribution services ("MMDS").

business size standard for wireline firms for the broad economic census category of "Wired Telecommunications Carriers." Under this category, a wireline business is small if it has 1,500 or fewer employees.[22] Census data for 2007 shows that there were 3,188 firms that operated for the entire year.[23] Of this total, 3,144 firms had fewer than 1,000 employees, and 44 firms had 1,000 or more employees.[24] Therefore, under this size standard, we estimate that the majority of businesses can be considered small entities.

23. *Cable Television Distribution Services.* Since 2007, these services have been defined within the broad economic census category of Wired Telecommunications Carriers, which category is defined above.[25] The SBA has developed a small business size standard for this category, which is: All such businesses having 1,500 or fewer employees.[26] Census data for 2007 shows that there were 3,188 firms that operated for the entire year.[27] Of this total, 3,144 firms had fewer than 1,000 employees, and 44 firms had 1,000 or more employees.[28] Therefore, under this size standard, we estimate that the majority of businesses can be considered small entities.

24. *Cable Companies and Systems.* The Commission has developed its own small business size standards for the purpose of cable rate regulation. Under the Commission's rules, a "small cable company" is one serving 400,000 or fewer subscribers nationwide.[29] Industry data shows that there are currently 660 cable operators.[30] Of this total, all but ten cable operators nationwide are small under this size standard.[31] In addition, under the Commission's rate regulation rules, a "small system" is a cable system serving 15,000 or fewer subscribers.[32] Current Commission records show 4,629 cable systems

[22] 13 CFR § 121.201; NAICS code 517110.

[23] U.S. Census Bureau, 2007 Economic Census. *See* U.S. Census Bureau, American FactFinder, "Information: Subject Series – Estab and Firm Size: Employment Size of Establishments for the United States: 2007 – 2007 Economic Census," NAICS code 517110, Table EC0751SSSZ5; available at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

[24] *Id*. With respect to the latter 44 firms, there is no data available that shows how many operated with more than 1,500 employees.

[25] *See also* U.S. Census Bureau, 2012 NAICS Definitions, "517110 Wired Telecommunications Carriers" at http://www.census.gov/cgi-bin/sssd/naics/naicsrch.

[26] 13 CFR § 121.201; NAICS code 517110.

[27] U.S. Census Bureau, 2007 Economic Census. *See* U.S. Census Bureau, American FactFinder, "Information: Subject Series – Estab and Firm Size: Employment Size of Establishments for the United States: 2007 – 2007 Economic Census," NAICS code 517110, Table EC0751SSSZ5; available at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

[28] *Id*. With respect to the latter 44 firms, there is no data available that shows how many operated with more than 1,500 employees.

[29] 47 CFR§ 76.901(e). The Commission determined that this size standard equates approximately to a size standard of $100 million or less in annual revenues. *Implementation of Sections of the Cable Television Consumer Protection And Competition Act of 1992: Rate Regulation,* MM Docket No. 92-266, MM Docket No. 93-215*,* Sixth Report and Order and Eleventh Order on Reconsideration, 10 FCC Rcd 7393, 7408, para. 28 (1995).

[30] NCTA, Industry Data, Number of Cable Operators and Systems, http://www.ncta.com/Statistics.aspx (visited October 13, 2014). Depending upon the number of homes and the size of the geographic area served, cable operators use one or more cable systems to provide video service. *See Annual Assessment of the Status of Competition in the Market for Delivery of Video Programming,* MB Docket No. 12-203, Fifteenth Report, 28 FCC Rcd 10496, 10505-6, para. 24 (2013) ("*15th Annual Competition Report*")*.*

[31] *See* SNL Kagan, "Top Cable MSOs – 12/12 Q" available at http://www.snl.com/InteractiveX/TopCableMSOs.aspx?period=2012Q4&sortcol=subscribersbasic&sortorder=desc (subscription).

[32] 47 CFR § 76.901(c).

nationwide.[33] Of this total, 4,057 cable systems have less than 20,000 subscribers, and 572 systems have 20,000 or more subscribers, based on the same records. Thus, under this standard, we estimate that most cable systems are small entities.

25. *Cable System Operators (Telecom Act Standard)*. The Communications Act of 1934, as amended, also contains a size standard for small cable system operators, which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000."[34] There are approximately 54 million cable video subscribers in the United States today.[35] Accordingly, an operator serving fewer than 540,000 subscribers shall be deemed a small operator if its annual revenues, when combined with the total annual revenues of all its affiliates, do not exceed $250 million in the aggregate.[36] Based on available data, we find that all but ten incumbent cable operators are small entities under this size standard.[37] We note that the Commission neither requests nor collects information on whether cable system operators are affiliated with entities whose gross annual revenues exceed $250 million.[38] Although it seems certain that some of these cable system operators are affiliated with entities whose gross annual revenues exceed $250,000,000, we are unable at this time to estimate with greater precision the number of cable system operators that would qualify as small cable operators under the definition in the Communications Act.

26. *Direct Broadcast Satellite (DBS) Service.* DBS service is a nationally distributed subscription service that delivers video and audio programming via satellite to a small parabolic "dish" antenna at the subscriber's location. DBS, by exception, is now included in the SBA's broad economic census category, Wired Telecommunications Carriers,[39] which was developed for small wireline businesses. Under this category, the SBA deems a wireline business to be small if it has 1,500 or fewer employees.[40] Census data for 2007 shows that there were 3,188 firms that operated for that entire year.[41]

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[33] The number of active, registered cable systems comes from the Commission's Cable Operations and Licensing System (COALS) database on October 10, 2014. A cable system is a physical system integrated to a principal headend.

[34] 47 U.S.C. § 543(m)(2); *see* 47 CFR § 76.901(f) & nn. 1-3.

[35] *See* NCTA, Industry Data, Cable's Customer Base, http://www.ncta.com/industry-data (visited October 13, 2014).

[36] 47 CFR § 76.901(f); *see FCC Announces New Subscriber Count for the Definition of Small Cable Operator*, Public Notice, 16 FCC Rcd 2225 (Cable Services Bureau 2001).

[37] *See* NCTA, Industry Data, Top 25 Multichannel Video Service Customers (2012), http://www.ncta.com/industry-data (visited Aug. 30, 2013).

[38] The Commission does receive such information on a case-by-case basis if a cable operator appeals a local franchise authority's finding that the operator does not qualify as a small cable operator pursuant to § 76.901(f) of the Commission's rules. *See* 47 CFR § 76.901(f).

[39] *See* 13 CFR § 121.201, 2012 NAICS code 517110. This category of Wired Telecommunications Carriers is defined as follows: "This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services; wired (cable) audio and video programming distribution; and wired broadband Internet services. *By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.*" (Emphasis added to text relevant to satellite services.) U.S. Census Bureau, 2012 NAICS Definitions, "517110 Wired Telecommunications Carriers," at http://www.census.gov/cgi-bin/sssd/naics/naicsrch.

[40] 13 CFR § 121.201; 2012 NAICS code 517110.

[41] U.S. Census Bureau, 2007 Economic Census. *See* U.S. Census Bureau, American FactFinder, "Information:

(continued….)

Of this total, 2,940 firms had fewer than 100 employees, and 248 firms had 100 or more employees.[42] Therefore, under this size standard, the majority of such businesses can be considered small entities. However, the data we have available as a basis for estimating the number of such small entities were gathered under a superseded SBA small business size standard formerly titled "Cable and Other Program Distribution." As of 2002, the SBA defined a small Cable and Other Program Distribution provider as one with $12.5 million or less in annual receipts.[43] Currently, only two entities provide DBS service, which requires a great investment of capital for operation: DIRECTV and DISH Network.[44] Each currently offers subscription services. DIRECTV and DISH Network each report annual revenues that are in excess of the threshold for a small business. Because DBS service requires significant capital, we believe it is unlikely that a small entity as defined under the superseded SBA size standard would have the financial wherewithal to become a DBS service provider.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

27. The *Transition Schedule Public Notice* does not contain proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, it does not contain any new or modified information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4).

E. Steps Taken to Minimize Significant Impact on Small Entities and Significant Alternatives Considered

28. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standard; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[45]

29. In general, alternatives to proposed rules or policies are discussed only when those rules pose a significant adverse economic impact on small entities. In this context, however, the transition plan set forth in the *Transition Schedule Public Notice* generally confers benefits. In particular, the intent of the plan is to ensure that all stations are able to complete a timely transition to their final post-auction channel facilities without delay and without incurring unnecessary costs.

30. The Bureau declined to adopt a proposal by the National Association of Broadcasters (NAB) to not assign stations to phases until stations have completed necessary structural and engineering studies. Alternatively, NAB suggested that initial phase assignments should be "preliminary" and should

(Continued from previous page)
Subject Series – Estab and Firm Size: Employment Size of Establishments for the United States: 2007 – 2007 Economic Census," NAICS code 517110, Table EC0751SSSZ5; available at http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5&prodType=table.

[42] *Id*.

[43] *See* 13 CFR § 121.201, NAICS code 517510 (2002).

[44] S*ee 15th Annual Competition Report*, 28 FCC Rcd at 10507, para. 27. As of June 2012, DIRECTV is the largest DBS operator and the second largest MVPD in the United States, serving approximately 19.9 million subscribers. DISH Network is the second largest DBS operator and the third largest MVPD, serving approximately 14.1 million subscribers. *Id*. at 10507, 10546, paras. 27, 110-11.

[45] 5 U.S.C. § 603(c).

be re-evaluated after stations have filed their construction permit applications and cost estimates in order to allow the Commission to more fully understand their scope of work and timing for moving to a new channel. The Bureau found that NAB's suggested approach would have a chilling effect on the transition by undermining the incentive for broadcasters, including small entities, to begin preparing for the transition in earnest. The Bureau concluded that information used to create the transition schedule is sufficiently detailed and reliable to establish phased transition deadlines once the final channel reassignments have been established. The Bureau determined that launching an organized, phased schedule at the earliest opportunity will provide broadcasters, equipment manufacturers and other vendors and consultants, wireless providers, and television viewers with certainty and stability. Doing so is particularly important as broadcasters prepare their construction permits, coordinate with other broadcasters, and begin construction planning.

31. The Bureau also declined suggestions to collect additional or different information about stations that face difficult approval processes or procurement issues prior to assigning stations to phases. The Bureau found that its Phase Assignment Tool already includes a constraint identifying certain stations as complicated based on data collected by the Bureau to date. Regardless of the difficulty of any one stations' move, because of dependencies between stations and interference constraints, the Bureau concluded that certain stations must move together in the same phase or certain stations must move in one phase before additional stations can move in a subsequent phase. The Phase Assignment Tool is designed to organize the transition of over 1,000 broadcast stations in an orderly fashion that respects station dependencies and interference constraints, in addition to accounting for individual stations complexities, while simultaneously protecting television viewers.

32. The Bureau declined to cap aggregate interference finding that that doing so would provide little benefit while imposing significant costs by dramatically increasing the computational difficulty of the Tool. However, recognizing the potential problems with a cap, NAB suggested as an alternative that, after stations are assigned to phases, the Bureau determine whether any station has greater than five percent aggregate interference, and if so, make appropriate adjustments. Consistent with this suggestion, the Bureau announced that it will attempt to find an alternative phase assignment for any station predicted to receive more than five percent temporary aggregate interference, consistent with the constraints and objectives.

33. To minimize consumer disruption during the 39-month transition period, and to promote the efficient use of tower crews, the Bureau announced that all stations within a DMA will be assigned to no more than two assignment phases. Broadcast commenters put forward a variety of proposals to modify this constraint, but the Bureau found that none described how their respective proposals would affect the overall phase assignments. Therefore, it rejected those proposals. The Bureau found that assigning stations within a DMA to two, potentially nonconsecutive phases, is crucial in providing the optimization with the flexibility to satisfy other constraints, such as limiting the number of linked stations per phase and keeping a relatively consistent number of stations assigned to each phase. The proposals by broadcast commenters would threaten the Tool's ability to balance competing goals. At the same time, the Bureau agreed with broadcasters that minimizing viewer disruption and efficiently clearing DMAs are laudable goals and, accordingly, the Bureau adopted the objective of minimizing the total number of times a DMA must rescan. If it is possible to satisfy the optimization's constraints and its first objective, and still assign stations to only one DMA, the optimization will attempt to do so using the second objective. The Bureau found that this approach gives the optimization the flexibility to balance competing constraints while continuing to prioritize consumers and regional clusters.

34. The NAB proposed that the Bureau should treat the "125 linked stations" constraint as an objective. The Bureau declined this proposal finding that NAB did not propose a metric for determining how much additional time should be added to a phase with more than 125 linked stations under its proposed approach.

35. Despite broadcast commenters' objections, the Bureau decided to prioritize clearing the 600 MHz Band as the first objective. The Bureau concluded that phase assignments must satisfy each of

the nine constraints it adopted, most of which are designed to protect broadcasters. The Bureau concluded that the four objectives it adopted strikes the appropriate balance and will encourage the expeditious clearing of the 600 MHz Band.

36. The Bureau also declined Cordillera, et al.'s proposal that the two primary objectives be to maximize the health and safety of tower crews and the homes and businesses that are in close proximity to towers and to minimize service disruptions to viewers and users of other services that share broadcast towers. The Bureau concluded that Cordillera et al. had not explained how the Bureau could incorporate such goals into the mathematical optimization model and it was unaware of any mechanism to accomplish the task. The Phase Scheduling Tool estimates time periods for construction tasks based on industry information, and the Bureau believed that relying on such information is reasonable and will help to promote health and safety.

37. The Bureau further declined to adopt Cordillera, et al.'s proposal that additional factual scenarios be given additional time in the Phase Scheduling Tool. The Bureau found that the tool already provides estimates intended to account for the ordinary time necessary to complete various tasks. However, in response to the comments from Cordillera, et al. concerning potential coordination with other services (e.g., FM radio or cellular providers) operating on the same tower as the reassigned station, the Bureau decided to substantially reduce the same tower discount in order to add back some time to account for the additional coordination that will be required. The Bureau found that this new discount will make the total tower work times adequately conservative to account for not only other television broadcasters but also other broadcast and non-broadcast facilities on the tower.

38. In order to facilitate a timely and orderly transition, the Bureau concluded that it must evaluate on a case-by-case basis requests for modification of any station's facility or transition deadline as set forth in the Closing and Reassignment Public Notice, to assess the impact of such requests on the transition schedule plan. Accordingly, it adopted the method for evaluating such requests proposed in the Transition Scheduling Proposal Public Notice. Although it stated that it does not intend to grant requests that would disrupt the transition, the Bureau stated that its aim is not to discourage stations from proposing alternative transition solutions that could create efficiencies or resolve unforeseen circumstances that could otherwise force a station to go dark. Nonetheless, such proposals should specifically demonstrate that implementation would not interfere with other stations' transition efforts and address how implementation of the proposal may affect the transition schedule. If the Bureau grants such a request after considering such effects, it stated that it may choose to modify transition phase assignments and construction deadlines of the requesting station or, if necessary, other stations; however, no other station would be assigned to an earlier transition phase than it was originally assigned without its consent. NAB and E.W. Scripps supported the establishment of a process by which a station can request a different transition phase, although neither proposed a specific process or explained why the Commission's existing rules would be insufficient. The Bureau found that existing Commission processes are sufficient to address such requests. Commenters also suggested that stations should have the flexibility to move to either an earlier or later transition phase. The Bureau stated that such requests will be subject to a high burden of proof and will be reviewed in its prescribed manner to determine the requests impact on the overall transition schedule as well as viewers. The Bureau also declined AT&T's suggestion that it adopt a special sanction system related to transitioning stations, finding that such a proposal was not supported by the record. In addition, the Bureau concluded that a station that does not comply with the requirements of any Commission order may be subject to action as contemplated by the Commission's rules.

39. The Bureau determined not to mandate the use of temporary channels which avoided possible additional burdens on stations and MVPDs as well as LPTV and TV translator stations. T-Mobile requested a prohibition of voluntary temporary operation in the new wireless band; however, the Bureau found that entirely foreclosing this option could undercut the benefit of allowing broadcasters to request temporary channels because there may be limited available temporary channels in the TV band.

40. The Bureau declined to adopt suggestions on how the Commission should manage its

staff and resources during the transition period. The Bureau concluded that it will commit to dedicating sufficient resources to monitor the progress of the transition. While commenters representing the interests of LPTV and TV translator stations provided several actions the Commission could take to ease the impact of the transition on LPTV and translator stations, the Bureau found these proposed actions have already been addressed in other Commission proceedings.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Rules

41. None.

G. Report to Congress

42. The Commission will send a copy of the *Transition Scheduling Plan Public Notice*, including this FRFA, in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act. A copy (or summary thereof) will also be published in the Federal Register.

H. Report to Small Business Administration

43. The Commission will send a copy of the *Transition Scheduling Plan Public Notice*, including this FRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

APPENDIX C

List of Parties Filing Comments and Shorthand Names

COMMENTS

American Tower Corporation (American Tower)
Association of Federal Communications Consulting Engineers (AFCCE)
AT&T (AT&T)
Block Communications, Inc., et al. (Block)
California Oregon Broadcasting, Inc., CNZ Communications, LLC, Gray Television, Inc., Local Media Holdings, LLC, Media General, Inc., Nexstar Broadcasting Group, Inc., Venture Technologies Group, LLC (Joint Broadcast Commenters)
Cohen, Dippell and Everist, P.C. (Everist)
Competitive Carriers Association (CCA)
Cordillera Communications, Cox Media Group, Meredith Corporation (Cordillera, et al)
CTIA (CTIA)
DTV America Corporation (DTV America)
E.W. Scripps Compnay (E.W. Scripps)
Electronics Research, Inc. (ERI)
Gregg Fehrman and Donald Doty (Stainless)
Grundy Telcom Integration Inc. (Grundy)
LPTV and Translator Parties- Northeast Gospel Broadcasting, Inc., Grace Worship Center, Inc., EICB-TV West, LLC, the National Translator Association, and the Advanced Television Broadcasting Alliance (LPTV)
LPTV Spectrum Rights Coalition (Spectrum Rights)
National Association of Broadcasters (NAB)
National Translator Association (NTA)
NCTA - The Internet & Television Association (NCTA)
OTA Broadcasting, LLC (OTA)
Public Broadcasting Service, America's Public Television Stations, Corporation for Public Broadcasting (PTV)
RIO Steel & Tower, Ltd. (RIO)
Sinclair Broadcast Group, Inc. (Sinclair)
T-Mobile USA, Inc. (T-Mobile)
Tower Engineering Professionals, Inc / TEP Design Build, Inc. (TEP)
WatchTV, Inc. (WatchTV)

REPLY COMMENTS

CCA
CTIA
DTV Utah, LC (DTV Utah)
Everist
Free Access & Broadcast Telemedia LLC, EICB-TV East, LLC (FAB)
LPTV
NAB
Rohde & Schwarz USA, Inc. (Rohde and Schwarz)
Sinclair
T-Mobile
Word of God Fellowship, Inc. d/b/a The Daystar Television Network (WOGF)