Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Expanding the Economic and Innovation	)	Docket No. 12-268
Opportunities of Spectrum Through Incentive	)	
Auctions	)	
	)	

REPLY DECLARATION OF JEFFREY A. EISENACH

March 10, 2013

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I. INTRODUCTION AND SUMMARY

1. I have been asked by the Expanding Opportunities for Broadcasters Coalition ("Coalition") to provide my opinion with respect to certain economic issues arising out of the initial Comments filed in this proceeding and other developments since my Initial Declaration was filed on January 24,[1] including the discussions that took place at the Stanford Conference on the FCC Incentive Auction ("Stanford Conference") on February 25-26, 2013.[2]

2. In my Initial Declaration, I concluded that success in the incentive auction should be defined as the timely transfer from willing sellers to willing buyers of as much spectrum as the former are prepared to sell and the latter are prepared to buy at market clearing prices, and identified three primary principles the Commission should follow in order to achieve this objective: Eliciting broad participation from both buyers and sellers; fostering a process of price discovery in which both buyers and sellers are faced with the opportunity costs of obtaining (or retaining) spectrum rights; and, striking a balance between accommodating sufficient complexity to achieve the first two objectives while maintaining sufficient simplicity to assure workability. This Reply Declaration is organized around the same broad topics.

3. To briefly summarize, Section II addresses issues associated with broadcaster participation in the auction, including explaining why proposals to tie bidding in the reverse auction to arbitrary valuation metrics would lower participation and proposing that the Commission adopt auction design features to (a) facilitate package bidding in the reverse auction and (b) provide incentives for participation by broadcasters willing to offer multiple stations.

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[1] *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Notice of Proposed Rulemaking*, WT Docket No. 12-268 (October 2, 2012) (hereafter NPRM); *Declaration of Jeffrey A. Eisenach* (January 24, 2013) (hereafter Initial Declaration). The opinions expressed here are based on currently available information and are subject to revision should new information become available. My qualifications are discussed in my Initial Declaration, which also includes a copy of my Curriculum Vitae.

[2] An agenda and copies of presentations from the conference are available at http://siepr.stanford.edu/fcc_conference.

Section III addresses issues relating to price discovery, including the urgent need for further progress on the repacking model and its relationships to other aspects of auction design, including the mechanism for adjusting clearing targets in markets where supply falls short of the national target.[3] Section III also addresses AT&T's proposal for a "single pass" reverse auction, which I conclude would harm price discovery, leading to a less efficient outcome and ultimately to less spectrum being repurposed. Section IV discusses the need for the Commission to make public additional information about repacking constraints in order to allow both potential auction participants and outside economic experts to assess the implications of repacking constraints for the overall auction design. Section V presents a brief summary of my conclusions.

II. THE AUCTION MUST ELICIT BROAD PARTICIPATION

4. As noted in the Coalition's Reply Comments, to which this declaration is attached, the comments filed with the Commission in late January reflect wide agreement that the Commission should seek the broadest possible participation by broadcasters.[4] As I explain in the first section below, proposals to adopt "reference prices" or rely on arbitrary "scoring" models would ensure that broadcaster participation falls below the economically efficient level, that a suboptimal amount of spectrum is exchanged, and that the risk of a failed auction is increased. Rather than trying to artificially cap broadcaster returns, the Commission should ensure that broadcasters receive full value for their licenses – that is, that payments to broadcasters are based on the value of their licenses to the Commission's ability to conduct a successful auction and, ultimately, to satisfying the clearing target. The second and third subsections below propose auction design elements designed to achieve this objective, namely

[3] As discussed in my Initial Declaration, the national clearing target should be at least 120 MHz.

[4] *Reply Comments of the Expanding Opportunities for Broadcasters Coalition* (March 10, 2013) (hereafter EOBC Reply Comments).

package bidding (in the reverse auction) and a bidding credit system designed to reward the network effects generated by broadcasters who bring multiple stations to market.

A. Efforts to Reduce Broadcaster Returns Will Depress the Amount of Spectrum Exchanged

5. Despite what appears to be a virtual consensus among commenters on the importance of maximizing broadcaster participation and spectrum supply, proposals to "score" bids or establish reference prices based on some measure of a station's value as a going concern continue to be advanced.[5] Such proposals would have the perverse effect of reducing the amount of spectrum exchanged, perhaps even resulting in a failed auction.

6. As a preliminary matter, it is important to keep in mind that, unlike in prior auctions in which the government was both seller and auctioneer, in this auction it is only the latter. Accordingly, its objective should be limited to facilitating exchanges between willing buyers and willing sellers. By inserting a "wedge" between buyer and seller, arbitrary reference prices or scoring schemes can only result in preventing voluntary (and hence tautologically mutually beneficial) exchanges, which are also presumptively welfare-enhancing. The Commission should not place artificial barriers between buyers and sellers, but instead allow bids in the reverse auction to be set by the overall level of demand *in the forward auction*.

7. Proposals designed to cap broadcaster returns appear to be grounded in three basic assumptions: (a) broadcast licensees whose reservation prices are below the bid offered in the reverse auction will relinquish their licenses; (b) the value of a broadcast station license to a licensee (and hence the licensee's reserve price) is a function of the station's historical

[5] See EOBC Reply Comments at 9, 18-19; see also Stanford Conference, Presentation of Jeremy Bulow (January 26, 2013). Note that the use of the word "scoring" here refers to scoring based on any metric *other than* the value of broadcast spectrum to meeting the clearing targets.

profitability; and, (c) some broadcasters have "hold-up power" which could allow them to extract extraordinary returns through opportunistic behavior. I explain immediately below why the first two assumptions are incorrect, and address the third assumption (hold-up power) in Section III below.

8. First, the assumption that broadcasters will relinquish their licenses if the amount bid exceeds their reserve price is premised on the faulty assumption that all broadcasters whose reserve prices are below the winning bid will participate in the auction in the first instance. In fact, entry in this auction is endogenous, meaning that each broadcaster has to make two distinct choices: (a) whether to participate; and, (b) conditional on participation, whether to relinquish its spectrum for a given price. Broadcasters will make each choice based on an assessment of risk-adjusted expected returns in each state of the world – that is, they will maximize expected profits under uncertainty.

9. Each broadcaster's decision regarding whether to participate in the auction will be based on the expected value of participation, adjusted for uncertainty. Obviously, a *necessary* condition for participation is that the Commission establish a reserve price that exceeds the broadcasters' reservation price; otherwise the expected value of participation is zero (or, assuming fixed costs of participation, negative), with complete certainty.[6] But simply setting a high reserve price does not guarantee participation: That will depend on each broadcaster's assessment of its *expected* return.

10. Based on the results of prior auctions, the novelty and unavoidable complexities of this auction in particular, and the extremely dynamic nature of the downstream

[6] To avoid this problem, the Coalition has recommended not only that the Commission set high reserve prices, but also that it allow broadcasters to proffer what amounts to an intra-round bid in the first round, i.e., to which they could state their reservation price if it was higher than the reserve price.

communications markets involved, the distribution of possible estimates of winning bids for any given broadcast license in the incentive auction is unavoidably wide.[7] Broadcasters will be forced to estimate the returns to participation in an environment of substantial uncertainty. Any policy, including scoring and reference prices, which either reduces the mean of the distribution of possible returns, or increases the level of uncertainty, will reduce participation and cause broadcasters – *including broadcasters who would have accepted the market clearing price conditional on having participated* – not to participate in the first place.

11. The second erroneous assumption behind scoring or reference price proposals is that broadcast licensees' reservation prices are highly correlated with their historical profitability.[8] In fact, a station's past profitability is neither a meaningful measure of its value in the incentive auction nor a useful predictor of its owners' reservation price. In general, the value of an economic asset is determined by what others are willing to pay for it – its opportunity cost, or value in exchange, rather than its value in use. Heretofore, broadcasters have been unable to capture the full exchange value of their licenses, because they have been prohibited from trading them with anyone except other broadcasters (and, of course, prohibited from using them for anything but broadcasting). When Congress passed the Spectrum Act, it lifted this *de facto* embargo, and in so doing fundamentally altered the value of broadcast licenses.

12. Proponents of scoring or reference prices may respond that the incentive auction is a "once in a lifetime opportunity," that broadcasters who fail to participate will have no choice but to go back to broadcasting (in perpetuity), and that pre-auction returns to broadcasting are therefore a reasonable proxy for license values in a post-auction world. But every element of

[7] See generally Jeffrey A. Eisenach, "Revenues from a Possible Spectrum Incentive Auction: Why the CTIA/CEA Estimate is not Reliable," (March 31, 2011) (available at http://ssrn.com/abstract=1800132).

[8] See e.g., Stanford Conference, Presentation of Coleman Bazelon (February 26, 2013).

this argument is flawed. As I explained in my Initial Declaration, pre-auction enterprise values are unlikely to be highly correlated with post-auction values for a variety of reasons, nearly all of which mitigate in favor of increasing station values. For example, a reduction in the number of broadcast stations is likely to increase the going concern value of stations which remain on the air;[9] technological changes are likely to continue increasing the value of spectrum of all kinds, including broadcast licenses;[10] and, looking ahead, it is extremely unlikely (even implausible) that the instant auction will be the only opportunity for broadcast licensees to obtain increased license flexibility and/or to receive compensation for relinquishing their spectrum. Once again, broadcasters will make decisions about participation, and about whether to accept any given bid, based on the risk-adjusted expected value of the alternatives, and while each broadcaster presumably will base its estimate on its own set of assumptions, few are likely to assume the post-auction world will look just like the pre-auction world, adjusted for inflation.[11]

13. To reiterate, the discussion above applies not just to scoring and reference prices, but to each and every design feature which reduces the risk-adjusted expected value of the incentive auction to broadcasters: Every such feature (or, rather, bug) increases expected value of continuing to hold the license *relative* to the value of relinquishing it. Thus, for example, if

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[9] Importantly, broadcast stations remaining in the market after the auction will have opportunities, just as in the current market, to engage in a variety of value-enhancing activities, including joining broadcast groups, obtaining network affiliations, and so forth. The fact that a licensee has been relatively unprofitable in the past is thus not a guarantee that it would expect to continue being relatively unprofitable in the future.

[10] It is interesting, for example, that mobile broadband providers have begun testing broadcasting technologies, suggesting that the "point-to-multipoint" aspect of broadcast licenses may be less of a constraint than some have assumed. See e.g., Todd Spangler, "CES: Verizon's McAdam Sees Broadcast Video over LTE in 2014," *Multichannel News* (January 8, 2014) (available at http://multichannel.com/telco-tv/ces-verizons-mcadam-sees-broadcast-video-over-lte-2014/141109).

[11] See also Initial Declaration at ¶16, n. 12 (citing Peter Cramton, "Peter Cramton, "Spectrum Auction Design" (August 24, 2012) at 3 ("[E]ncouraging price discovery is extremely important. We need a dynamic process, because unlike some situations, in the case of spectrum auctions, *there is much uncertainty about what things are worth*.") (emphasis added).

the Commission were to adopt limitations on bidders in the forward auction which effectively prevented broadcasters from facing the entire demand curve, it would increase the expected value, in relative terms, of waiting for a future opportunity in which such limits might be loosened or eliminated altogether. By the same token, any missed opportunity to ensure that bids in the reverse auction fully reflect the value of the spectrum being purchased will result in lower participation, and higher reservation prices, by increasing the relative value of the "but-for world." For that reason, as discussed immediately below, the Commission should consider allowing package bidding in the reverse auction and creating bidding credits for broadcasters who proffer multiple licenses.

B. The Commission Should Allow Package Bidding in the Reverse Auction

14. The exposure problem in multiple object auctions is well understood: Bidders' reservation prices for complementary lots are interdependent, such that a straightforward bidding strategy in an auction for multiple lots may leave the bidder worse off than if she had not participated, and result in suboptimal trades.[12] The NPRM acknowledges the exposure problem in the forward auction, and requests comments on the use of package bidding to address it.[13] As the simple example below demonstrates, however, the exposure problem is not limited to mobile broadband carriers, but also potentially affects broadcasters.

15. Suppose there are two geographic areas, A and B. Bidder I has a station in each territory. Bidder II has a station in A only and Bidder III has a station in B only.

- Bidder I values its joint holdings of A and B at a total value of 10, but conditional on not having both stations, the marginal value of each station to Bidder I is 4. This reflects the fact that

[12] See generally Paul Milgrom, *Putting Auction Theory to Work* (Cambridge University Press, 2001) at Chapter 8.

[13] See NPRM at ¶62.

economies of scale and scope create synergies in value for multiple station owners (or, put differently, that broadcasting licenses are complements).[14]

- Bidder II values its station A at 5 + e, where e is a very small number.

- Bidder III values its station B holding at 1.

16. Consider a reverse auction which begins with an initial bid of 15 for each station. Suppose that each bidder decides its willingness to stay based on whether the total offer is profitable assuming the current prices are the final prices.

TABLE 1:
REVERSE AUCTION OUTCOME IN THE FACE OF COMPLEMENTARITY

Price of A	Price of B	Supply offer I	Supply offer II	Supply offer III
15	15	A and B	A	B
….	….			
5 + e	5 + e	A and B	-	B
….	….			
	4	A	-	B

17. The outcome depicted in Table 1 is that Bidder I sells A at 5 + e and keeps its B station. Bidder II keeps its A station and Bidder III sells B for 4.

18. Consider the payoff to Bidder I. His value after the auction is 5 + e + 4 < 10. Thus, under such a strategy, Bidder I ends up worse off from participating in the auction than if he had not participated at all. One particularly important thing to note about the problem faced by Bidder I is that even a drop-out rule taking into account the total sale price relative to the total reservation value at a point in time does not save her from potentially losing value as a result of

[14] See e.g., Jeffrey A. Eisenach and Kevin W. Caves, *The Effects of Regulation on Economies of Scale and Scope in TV Broadcasting*, Navigant Economics LLC (June 2011) at 15-16.

participating in the auction. Since Bidder II drops out at 5 + e, Bidder I gets stuck with selling A without a guarantee of being able to sell B before the total price drops to 10.

19. Bidder I's predicament is particularly problematic because there is no obvious conservative bidding rule that would protect her from such situations under conditions of uncertainty. Thus, this problem could cause multi-station owners to forego the auction altogether in order to avoid the risk of loss – or, put differently, to lower their estimate of the risk-adjusted expected return from participation.

20. Given the many aspects of auction design that remain undecided, it would be premature to propose a specific mechanism for incorporating package bidding into the reverse auction. That said, the Commission should seek to do so, since a failure to address the exposure problem will result in a suboptimal level of broadcaster participation.

C. The Commission Should Provide Volume Credits for Broadcast Participants

21. The incentive auction is essentially a two-sided market,[15] with the FCC playing the role of "third-party auctioneer." Like many multi-sided (or "platform") markets, the products at issue are characterized by network effects, meaning that the value of participation on each side is a function in part of the number of participants on the other. Further, there are fixed, sunk costs of participation: participants will only join if the risk-adjusted expected value of doing so is positive.

22. The success of such markets depends on their ability to achieve "critical mass," that is, to attract sufficient participation on each side of the market to generate participation from

[15] See generally Jean-Charles Rochet and Jean Tirole, "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association*, 1;4 (June 2003) 990-1029; Jeffrey H. Rohlfs, *Bandwagon Effects in High-Technology Industries* (MIT Press, 2003); Mark Rysman, "The Economics of Two-Sided Markets," *Journal of Economic Perspectives* 23;3 (Summer 2009) 125-143.

the other side – a problem which is commonly referred to as the "chicken and egg problem"[16] or the "start-up problem."[17] Expectations play a particularly important role in platform markets, since customers choose whether to participate on the basis of expectations about the market's future success: For example, consumers choose computer operating systems based on expectations about which system is most likely to achieve critical mass and thus generate benefits necessary to recoup sunk costs (e.g., hardware, learning).

23. All of these phenomena are at work in the incentive auction, where the value of participation on each side depends on *expectations* about the level of participation on the other, and the question of whether the auction will achieve critical mass – i.e., the exchange of the economically optimal amount of spectrum – hangs in the balance. Accordingly, the value of the auction is increasing in the number of broadcast licenses offered, at least over some relevant range, and any auction design that fails to incorporate this fact will result in a suboptimal supply of licenses and, ultimately, an inefficient auction outcome.

24. The economically efficient solution to the start-up problem is to subsidize participation until the market reaches sufficient scale to capture network effects and achieve a welfare-maximizing equilibrium.[18] In the incentive auction context, the primary objective of such subsidies should be to secure a sufficient supply of broadcast licenses to allow the auction to succeed. One approach to achieving this goal would be for the Commission to directly

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[16] See e.g., Rochet and Tirole at 990 ("More generally, many if not most markets with network externalities are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform. Platform owners or sponsors in these industries must address the celebrated 'chicken-and-egg problem' and be careful to 'get both sides on board.'").

[17] See Rohlfs at 36-45.

[18] See e.g., Rohlfs at 56 ("Concerned efforts by suppliers and/or government intervention may be required to solve the start-up problem and get to a larger, better equilibrium…. After a critical mass is achieved, demand for the product is subject to positive feedback.")

subsidize participation (e.g., by paying broadcasters to register), but this approach could fall prey to opportunistic behavior, since a broadcaster with no intention of selling could capture the subsidy by registering and then withdrawing at the first bid. An alternative approach would be for the Commission to offer volume credits for *successful multiple-license bidders*[19] in the reverse auction, reflecting the fact that the value of licenses offered is increasing over some relevant range. Such credits could be modeled on the forward auction bidding credits discussed by Che, Haile and Kearns, i.e., they might take effect only after the clearing targets for a particular area have been achieved, thus ensuring that they do not have the unwanted effect of reducing the amount of spectrum exchanged.[20]

III. THE AUCTION SHOULD FOSTER PRICE DISCOVERY

25. In my Initial Declaration, I explained why effective price discovery demands that the forward and reverse auctions be held simultaneously, that both auctions should adopt a multiple dynamic bid design, and that the auction design allow for recognition of complementarities between spectrum licenses.[21] In the first subsection below, I discuss the interrelationships between the process for adjusting clearing targets, regional variations in valuations between the forward and reverse auctions, and the repacking model, and note that the Commission does not appear to have advanced concrete proposals for addressing these issues. In the second section I explain why a single-pass design in the reverse auction would conflict with effective price discovery and should be rejected.

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[19] That is, broadcast license holders who relinquish more than one license in the auction.

[20] See Yeon-Koo Che, Phil Haile and Michael Kearns, *Design of the FCC Incentive Auctions* (January 25, 2013) (Attachment A to Comments of AT&T) at 64-5 (hereafter CHK).

[21] See Initial Declaration at ¶¶ 16-19.

A. The Auction Design Should Permit Price Discovery between Buyers and Sellers

26. As noted by more than one participant at the February 25-26 Stanford conference,[22] the Commission appears to have dedicated relatively little attention to two closely related challenges: (1) how to adjust clearing targets in the face of supply shortfalls in some markets; and, (2) how to adjust prices to reflect regional variations in scarcity in the face of the costs associated with the sale of impaired licenses. Both questions are intimately related to the workings of the repacking model, including the algorithm used to address the cascading nature of the repacking exercise across geographies.

27. While the technical challenge of designing an auction which matches supply and demand as efficiently as possible are substantial, the underlying principle the Commission should pursue is not complicated: The prices paid to achieve clearing targets in each geographic area in the reverse auction should be determined to the maximum extent feasible by the overall valuations expressed by bidders in the forward auction. Supply and demand – not contrived scoring rules or reference prices – should determine the prices paid and the quantities exchanged.

28. Building this broad principle into the design rules for the incentive auction will raise a number of complex challenges. To begin, it is generally agreed that the Commission should be able to achieve a 120 MHz clearing target in most areas through repacking alone. In these areas, no broadcasters will be asked to relinquish their licenses, and no reverse auctions will be held. The costs of clearing spectrum in these markets will be limited to the costs of repacking. In many if not all of these markets, revenues from the sale of the corresponding

[22] See e.g., Stanford Conference, Presentation of Victor Tawil (February 25, 2013); Stanford Conference, Presentation of Andy Skrzypacz (February 26, 2013).

mobile broadband licenses in the forward auction will exceed the costs of repacking, producing excess revenues.

29. The existence of excess revenues from spectrum abundant areas ("SAAs") is fortunate, as it is very possible – indeed, likely – that revenues from the forward auction in the remaining markets (probably 20 or so DMAs where spectrum is scarce; hence "Spectrum Scarce Areas," or "SSAs.") will not be sufficient to meet broadcasters' reserve prices in these auctions: In order to achieve the clearing targets in as many markets as possible, the Commission will need to utilize excess revenues from the SAAs to pay for the relinquishment of licenses in SSAs.

30. The question of how to allocate excess revenues across geographies immediately raises a number of issues the Commission has not resolved, or even addressed in detail, including: (a) whether it permits package bidding in the forward auction (it should, for the same reasons as it should do so in the reverse auction);[23] (b) whether it adopts a non-uniform band plan, or decides to issue "impaired" licenses in SSAs, and how these decisions affect bidder valuations (and hence revenues) in the forward auction; (c) how it decides to adjust clearing targets in SSAs if supply falls short in some areas; and, (d) how the repacking model "values" licenses in the same area (but with different interference characteristics) as well as in adjoining areas (i.e., the extent to which broadcast licenses in one area are substitutes for licenses in adjoining areas).[24]

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[23] See NPRM at ¶67; see also CHK at 6 ("In the forward auction, many licenses are offered simultaneously. A bidders' valuation of a particular license may depend on which complementary licenses he is also able to acquire.").

[24] See NPRM Appendix C at 12 (discussing the "scoring rule" that will "determine how prices are decremented for each station in each round," which will "account for factors like the potential interference created by a station") and at 13 ("The details of the scoring will need to be examined further")

31. While the NPRM addresses many of these issues,[25] it does not do so in a comprehensive way that captures their interrelatedness, nor does it proffer a global solution that would provide a basis for commenters to assess the auction's overall outcomes and propose concrete, practical solutions.[26] It should seek to do so as quickly as possible, beginning, as discussed below, by releasing more information about its approach (or possible alternative approaches) to repacking. [27]

32. The issues discussed above also bear on the issue of potential hold-up problems, which are not explicitly raised in the NPRM but which have – as noted above – been proffered as a rational for the introduction of scoring and reference pricing schemes. It seems highly unlikely, however, that a properly designed reverse auction will be subject to any significant hold-up issues.

33. In general, the hold-up problem refers to the ability of the owner of a "must-have" item to extract all, or nearly all, of the surplus from an economic transaction. For example, the owner of a small parcel of real estate which is essential to a large office development might, by demanding an exorbitant price, attempt to extract most of the surplus created by the entire project.[28] On the face of it, however, broadcast licenses in the incentive auction are not like "must-have" real estate parcels because, for any given geographic area, there are likely to be multiple combinations of license relinquishments (including in adjacent areas) that could be used

[25] See e.g., NPRM at ¶62 (discussing closing conditions).

[26] A helpful discussion of many of these issues is presented CHK at 75-87.

[27] See e.g., CHK at 93 ("[I]t is clear that repacking complexity is a central concern in any reverse auction mechanism, and that the details of the actual repacking constraints and broadcaster valuations will significantly impact the potential computational complexity, costs for clearing, and other properties of the reverse auction.")

[28] See e.g., T. Miceli and C. F. Sirmans, "The Holdout Problem, Urban Sprawl, and Eminent Domain," *Journal of Housing Economics* 16 (2007) 309–319.

to achieve the clearing targets,[29] which is to say that broadcast licenses are substitutes, and it is not clear that any licensee will possess significant hold up power. Thus, while it is clear that some licenses are likely to be more valuable than others (in terms of their contribution to achieving the clearing targets), there is no basis for adopting arbitrary scoring or reference price schemes to address a purely hypothetical hold up problem.

B. The Commission Should Not Adopt a Single-Pass Approach

34. AT&T proposes that the Commission adopt a single-pass design for the reverse auction,[30] under which the reverse auction would be conducted prior to the forward auction.[31] Adoption of such a proposal would deprive broadcasters of valuable information, reducing the auction's efficiency and resulting in suboptimal broadcaster participation.

35. First, as the Commission notes, running the reverse and forward auctions concurrently "would provide reverse and forward auction bidders relevant information from the other side of the market while they are bidding."[32] AT&T's own economists recognize the importance of such price discovery in the forward auction:

> In a multi-object clock auction, clock prices provide valuable feedback along the way about where all prices are likely to end up. This facilitation of price discovery can enable bidders to focus on the most relevant sets of licenses and to reoptimize their spectrum aggregation strategies as the auction proceeds.[33]

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[29] See e.g., Stanford Conference, Presentation of Michael Kearns (January 26, 2013) (noting the "daisy chain" aspect of the clearing problem and estimating that the channel clearing problem involves over 1,300 "connected components").

[30] See AT&T Comments at 63-70; see also CHK at 71-74.

[31] See AT&T Comments at 65 ("[T]he bidding would not stop whenever the descending clock has ticked down to the price level needed to eliminate excess supply for (i.e., just meet) that target. Instead, the clock would continue ticking down to identify the revenue requirements for successively less ambitious channel-clearing targets, each time in conjunction with a repacking analysis.")

[32] See NPRM at ¶67.

[33] See CHK at 6.

Forcing broadcasters to participate in a single-pass auction would deprive them of information "from the other side of the market" and hence make it impossible for them to "reoptimize their … strategies as the auction proceeds," reducing their expected returns from the auction and defeating effective price discovery.

36. Second, as AT&T's economists also note, the single pass design would force broadcasters to reveal more information than is necessary to achieve an efficient auction outcome, effectively levying an "information tax" on auction participation and, again, lowering broadcasters' effective expected returns.[34]

37. Third, as both AT&T's economists and others also have noted, there is no basis for concluding that computational complexities pose a significant barrier to running the forward and reverse auctions concurrently. To the contrary, the simulation exercises discussed at the Stanford Conference suggest that the repacking problem is amenable to solution within very workable time frames.[35] Thus, the underlying premise for the single-pass approach – the need to address computational complexity – is missing.

IV. THE AUCTION DESIGN PROCESS NEEDS TO FOCUS ON IDENTIFYING POTENTIAL GLOBAL SOLUTIONS TO PRACTICAL CRITICAL PATH CHALLENGES

38. There is universal agreement that the technical challenges of designing and conducting the incentive auction are daunting. With this in mind, the Commission needs to begin to identify and address critical path challenges – those which must be overcome in order

[34] See CHK at 73 ("[R]everse auction bidders might be reluctant to reveal information unnecessarily."); see also *Comments of Expanding Opportunity for Broadcasters Coalition*, Docket No. 12-268 (Jan. 24, 2013) at 6 ("The prospect of the Commission asking broadcasters to disclose their minimum tender price in a competitive bidding process (even if such disclosure is purportedly confidential) will only breed great concern and distrust among the already skeptical broadcast community, thereby discouraging reverse auction participation. The Coalition strongly encourages the agency not to create the associated paranoia that proxy bidding will bring.")

[35] See e.g., Stanford Conference, Presentation of Kevin Leyton Brown (January 25, 2013); Kearns Stanford Presentation.

for the auction to take place and to succeed – such as those discussed in Section III (A) above. Equally important, it needs, as soon as possible, to address in concrete terms the interrelationships among the various auction design questions and propose workable, concrete solutions.

39. Currently, the single biggest obstacle to devising workable, global solutions is the absence of sufficient information on repacking constraints. While several private parties have provided assessments of the clearing problem,[36] the Commission last addressed the issue in detail in June 2010.[37] In order for the process to move forward, the Commission needs to release and seek comment on detailed specifications regarding interference constraints and the repacking algorithm it will apply.[38] And, in the likely event the Commission believes it will be necessary to utilize heuristic rules in order arrive at a workable solution, it should seek comment on those as well. For example, if the Commission has identified markets in which it will not require broadcast licenses to be relinquished in order to achieve the 120 MHz repacking target, it should release that information publicly.

V. CONCLUSIONS

40. The design of the incentive auction should be guided by three principles: Eliciting broad participation from both buyers and sellers; ensuring effective price discovery through a dynamic auction process; and, maintaining a balance between accommodating the inherent complexity of the exercise while keeping the ultimate design simple enough to be

[36] See e.g., Bazelon Stanford Presentation, Tawil Stanford Presentation.

[37] See Office of Broadband Initiatives, "Spectrum Analysis: Options for Broadcast Spectrum," OBI Technical Paper No. 3 (June 2010).

[38] See CHK at 76 ("[O]ur overriding message is that by releasing more detailed specifications of the repacking constraints involved, the FCC would enable outside experts to better assess the likely performance of the proposed reverse auction design and alternatives.") and at 93-94 (detailing the information needed).

workable and accessible to all potential participants. The time is now approaching when the Commission needs to devise and make available for public comment a specific, practical proposal (or a set of specific alternative proposals) to address the critical path challenges discussed above, and in the comments and expert declarations of other participants in this proceeding.