May 7, 2015

VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268;
Broadcast Incentive Auction Comment Public Notice Auction 1000, 1001 and 1002, AU Docket No. 14-252

Dear Ms. Dortch:

The Expanding Opportunities for Broadcasters Coalition (the "Coalition") hereby submits these Informal Comments pursuant to Section 1.1206 of the Commission's rules.

Our Coalition appreciates the efforts of the FCC staff to strike the appropriate balance between providing broadcasters with the information they need for price discovery in this first-of-its-kind incentive auction and protecting the confidentiality of television licensees and the integrity of the auction. Although this is no easy task, the Commission must provide broadcasters with greater visibility during the reverse auction. As the agency has recognized, providing ample opportunities for price discovery will help broadcasters "refine and feel more confident in their bidding decisions."[1] The FCC's outside auction economist, Paul Milgrom has observed that "when bidders are uncertain about their valuations, they can acquire useful

[1] *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, FCC 14-50, ¶ 449 (rel. June 2, 2014).

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information by scrutinizing the bidding behavior of their competitors . . . weaken[ing] the winner's curse and lead[ing] to more aggressive bidding."[2]

Under the proposal in the *Auction Comment Public Notice*, however, broadcasters would lack access to even basic information, such as the clearing target for the current stage, whether DRP is on or off, and whether any stations have been frozen. The FCC must adopt a more flexible information policy that provides participants with such fundamental information about the auction.

Additionally, the Commission must provide broadcasters with an appropriate disclosure at the end of each round of bidding to allow participants to analyze bidding activity and make informed decisions. Providing this type of information is standard in any FCC auction, and the reverse auction should be no different. Attached hereto is a proposal from economist Peter Cramton that would allow the agency to provide useful information to broadcasters while, at the same time, addressing the type of unique concerns that could arise during a reverse spectrum auction.[3]

We appreciate the Commission's ongoing consideration of this issue and strongly urge it to adopt the proposals herein to make auction participation as attractive as possible to the broadcast community.

Respectfully Yours,

/s/ Preston Padden /s/

Preston Padden
Executive Director
Expanding Opportunities for Broadcasters Coalition

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[2] *See* Paul R. Milgrom and Robert J. Weber, *A Theory of Auctions and Competitive Bidding*, 50 Econometrica 1095 (1982).

[3] The Coalition filed an earlier version of Dr. Cramton's paper on May 5, 2015.

Information Policy in the Broadcast Incentive Reverse Auction

Peter Cramton[1]

April 2015

Abstract

I present a simple information policy for the reverse auction of the FCC's broadcast incentive auction. It is based on a DMA aggregation of the vacancy measure, which the FCC calculates in each round for each band and station. DMA vacancy would provide broadcasters with much needed outcome discovery, yet present the information in a sufficiently aggregated and anonymous form that the information could not be used to support collusive strategies. This is the hallmark of an effective information policy in a dynamic auction for many interrelated items.

Introduction

Outcome discovery—both with respect to prices and winnings—plays a key role in improving bidder decision-making, especially in auctions with many items where portfolio and other inter-item constraints are important. In this brief note, I present an effective information policy based on the FCC's vacancy measure. I recommend that in each round and band, station vacancy be aggregated to the Designated Market Area (DMA) level and be reported to the public. DMA vacancy is easy to calculate and provides much needed information to improve broadcaster decision making. Provided the auction occurs at a gradual pace, DMA vacancy is an excellent information policy that strikes the right balance between promoting outcome discovery and mitigating collusive behavior.

DMA vacancy is easy to define and calculate

In descending clock auctions, the standard information policy is to reveal excess supply in each market. The reverse auction is more complex because markets are not readily defined as competition among stations depends in a complex way through interference and domain constraints. The FCC has proposed a measure of vacancy as a suitable proxy for excess supply in the reverse auction (FCC 2014, section 3.6, pp. 108-9). It would be natural to base the information policy on this measure.

Vacancy $V_{t,s,b}$ is calculated before each bidding round t for each station s and band b. It is a number between 0 and 1. A larger value of $V_{t,s,b}$ "indicates that band b is relatively less congested in the station's neighborhood, given the current relinquishment options of every station and the options that may become available to them."

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[1] Peter Cramton is Professor of Economics at the University of Maryland; since 1983, he has conducted widely-cited research on auctioning many related items, and has applied that research to major auctions of radio spectrum, electricity, financial securities, and other products. I am grateful to a member of the Expanding Opportunities for Broadcasters Coalition (EOBC) for funding this research. The views presented are my own and not necessarily those of EOBC or its members.

Vacancy is calculated as a weighted average as

$$V_{t,s,b} = \begin{cases} 1 & \text{if } N(t,s,b) \in \varnothing \\ \dfrac{\sum_{s' \in N(t,s,b)} Volume(s') \cdot f(t,s',b)}{\sum_{s' \in N(t,s,b)} Volume(s')} & \text{otherwise.} \end{cases}$$

Where

$N(t,s,b)$ is the set of all active stations in the neighborhood of station *s* in band *b* whose current relinquishment option is below band *b*, and for which band *b* is a permissible band; these are the stations that are potential competitors for station *s* for the remaining vacant spaces in band *b*.

The neighborhood of station *s* in band *b* is the set of stations, including station *s*, that are directly connected (within distance 1) to station *s* in the interference graph for band *b*.

Band *b* is permissible for station *s* if either (i) band *b* is the pre-auction band of station *s*, or (ii) band *b* is below the station's pre-auction band according to the order: low-VHF is below high-VHF is below UHF.

$f(t,s,b) = \frac{X}{Y}$, where *X* is the maximum of ½ and the number of channels in band *b* to which station *s* can be feasibly assigned given the tentative assignment, and *Y* is the number of channels in band *b*.

$Volume(s)$ is the volume of station *s* as defined in the auction rules:

$$Volume(s) = (\text{Broadcast population of station } s)^{\alpha} \cdot (\text{Interference count of station } s)^{\frac{1}{2}}.$$

We consider two values for *α*, in the definition of volume: *α* = ½ is the volume measure as initially proposed by the FCC; *α* = ¼ is the reweighted volume as proposed in Cramton et al. (2015).

One issue with the vacancy measure as defined above is that it is station specific, rather than based on a market. This is problematic since the disclosure of a station specific measure if disclosed to all parties would lead broadcasters to attempt to figure out additional information about the behavior of other broadcasters by reverse engineering the formulas above with station specific data. One way to address this is to only disclose the $V_{t,s,b}$ to the owner of station *s* rather than all broadcasters. However, such limited disclosure of station specific information is a poor information policy, since it gives extra information to broadcasters owning many stations. This would seems unjustifiable from a public policy perspective.

The correct fix is to make public a market-level aggregation of vacancy. The appropriate level of aggregation is DMAs, since DMAs are familiar and useful markets in broadcasting. For each market *M* in the set of all DMA markets,

$$Vacancy(t,M,b) = \frac{1}{\#M} \sum_{s \in M} V_{t,s,b},$$

where *#M* is the number of stations in DMA *M*. This market-specific vacancy measure can now be disclosed to all broadcasters and the public before each round *t*. The DMA aggregation simplifies the information disclosure as there are only 210 DMAs, reveals the same outcome-discovery information to all parties, and prevents the reverse engineering of formulas to gain additional information.

Some DMAs may be too small to provide sufficient aggregation to conceal identities. In these "too small" DMAs would be merged with its closest neighboring DMA, where closeness is defined based on a metric of connectedness. For the most part, these "too small" DMAs tend to be less important in the reverse auction, but there are certainly exceptions where the "too small" DMA neighbors a critical DMA. The details remain to be worked out.

DMA vacancy provides much needed information to improve decision making

Although we are still in the process of testing DMA vacancy as an information policy, I believe it has a lot of promise. DMA-level information is apt to be quite helpful to bidders evaluating alternative strategies, yet given the low concentration of ownership at the DMA-level it would seem that broadcasters would not be able to exploit the information to enforce collusive strategies. Indeed, the definition of vacancy is based on aggregating information from a large number of stations. First there is the fact that the station-specific definition includes all stations it is directly connected to. On average a station has 49 direct neighbors. Second DMA vacancy aggregates all stations within the DMA. On average a DMA has over 10 stations. Further the within DMA market structure is typically unconcentrated. As show in Cramton et al. (2015, p. 28), the weighted average HHI at the DMA level is 1,218. The DOJ and FTC merger guidelines consider any market with concentration less than 1,500 as unconcentrated.

We are studying the effectiveness of DMA vacancy for outcome discovery using the simulations from Cramton et al. (2015). As soon as that work is complete we will be in a better position to evaluate the value of DMA vacancy for outcome discovery.

Outcome discovery requires the auction to occur at a gradual pace

One thing is clear: regardless of the details of the information policy, it will make sense for the FCC to maintain a steady and gradual pace in the reverse auction. A one percentage point price reduction from the opening price is desirable each round. This will give bidders time to make critical decisions and will enable bidders to plan on when these critical decisions will need to be made. Further there is no possibility that the auction can continue too long. The auction is sure to end within one hundred rounds, as prices reach zero at round 100.

Conclusion

Revealing DMA vacancy before each round for each band is a promising information policy. DMA vacancy scores well with each of the FCC's main objectives:

- *Efficiency*. The DMA vacancy information allows for improved decision making for broadcasters making irreversible decisions among a multitude of options. Yet, it is hard to see how this information could be used as part of a collusive strategy.
- *Transparency*. Revealing DMA vacancy greatly improves outcome transparency. Bidders have a much better sense of where prices may be heading.
- *Simplicity*. DMA vacancy is a simple arithmetic average of information the FCC already plans to calculate. Decision making will involve less guesswork. This simplifies decision-making and improves efficiency.
- *Fairness*. All bidders (and the public) receive the same outcome discovery information with which to inform their decision making.

Although more study is needed to evaluate DMA vacancy as an information policy, it appears to be a promising approach.

References

Cramton, Peter, Hector Lopez, David Malec and Pacharasut Sujarittanonta (2015), "Design of the Reverse Auction in the Broadcast Incentive Auction," Working Paper, University of Maryland.

Federal Communications Commission (2014), "Comment Sought on Competitive Bidding Procedures for Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002," FCC 14-191, released 17 December 2014.