

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of )  
 )  
Experimental Design for Examining )  
Performance Properties of Simultaneous ) DA No. 05-1267  
Multiple Round Spectrum License Auctions )  
With and Without Combinatorial Bidding )

**COMMENTS OF LEAP WIRELESS INTERNATIONAL, INC.**

Leap Wireless International, Inc., on behalf of itself and its affiliates and subsidiaries (collectively, “Leap”), hereby offers these comments in the above-captioned proceeding.<sup>1</sup>

**I. INTRODUCTION**

Leap provides consumers with state-of-the-art mobile wireless services in a package targeted to meet the needs of those who are under-served by more traditional wireless service offerings. Leap’s services, marketed under the “Cricket” brand name, offer a simple and affordable alternative to traditional wireless and landline service, allowing customers unlimited usage within their calling area for a flat monthly rate and with no signed contract required.

Leap has participated in several FCC spectrum auctions, most recently winning licenses in Auction No. 58. As a general matter, Leap has a continuing interest in ensuring that smaller, mid-sized and regional wireless carriers are able to participate meaningfully in the

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<sup>1</sup> *Comment Sought on Experimental Design for Examining Performance Properties of Simultaneous Multiple Round Spectrum License Auctions With and Without Combinatorial Bidding*, Public Notice, DA 05-1267 (May 2, 2005) (“Public Notice”).

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Commission's competitive bidding processes and to gain access to increasingly scarce radio spectrum that is necessary for such carriers to grow and compete in the Commercial Mobile Radio Services ("CMRS") marketplace. Leap supports continued examination and refinement of the Commission's auction design and bidding rules. Leap urges, however, that any experimental data gathered to support future changes in the Commission's auction design include data that helps to assess the potential impacts of auction design modifications on smaller carriers.

With respect to further Commission experimentation with combinatorial, or "package," bidding, and the comparison to the Commission's standard Simultaneous Multiple Round ("SMR") auction design, Leap and its outside consultants have examined the study prepared by Professors Goeree and Holt regarding an experimental auction design that would specify the analytical procedures, economic environments and criteria by which to evaluate Simultaneous Multiple Round Package Bidding ("SMRPB") versus non-package SMR bidding.<sup>2</sup> As explained below, Leap's main concern with the proposed design is that it may underestimate the magnitude of the so-called "threshold problem" and its effects on smaller bidders. Leap believes that the design can be readily adjusted to capture and measure the severity of the threshold problem – a result that would be useful in assessing future possible refinements to the Commission's current auction formats.

Leap also offers other comments on ways in which the proposed experiments could be usefully improved.

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<sup>2</sup> J. Goeree and C. Holt, "Comparing the FCC's Combinatorial and Non-Combinatorial Simultaneous Multiple Round Auctions: Experimental Design Report (April 27, 2005) ("Goeree/Holt Report").

**II. THE PROPOSED EXPERIMENTS SHOULD ADEQUATELY ACCOUNT FOR THE “THRESHOLD” PROBLEM**

One of the primary objectives of both theoretical analysis of package bidding and package bidding experiments has been to find auction designs and configurations that will produce efficient results despite the possibility of “exposure” and “threshold” problems. As the Goeree/Holt Report acknowledges, an “exposure” problem can arise in auctions that do not allow combinatorial bids, in scenarios in which a bidder has a higher valuation on a combination of licenses than the sum of that bidder’s valuations for the individual licenses. Table 1 below provides an example:

Table 1: The Exposure Problem

Bidder/License	East	West	National = East + West
I	10	0	10
II	0	10	10
III	0	0	<b>25</b>

In this scenario, Bidder III places a value of 25 on gaining a national license, but places no value on the East or West licenses alone. If the prices of East and West are in the aggregate less than 25, Bidder III should be willing to enter bids for both. However, if Bidder III places separate bids on both East and West in a round, it risks winning one and not the other, thus incurring a financial loss. The standard SMR auction does not allow a bidder to place a package bid on a two or more licenses. For this reason, a bidder in this position who wishes to win both licenses will incur risk, or *exposure*, when it place separate bids for the two parts of the package. If Bidder III does not want to risk winning one license, the auction will, in this example, result in an inefficient allocation: Bidder I will win the East license and Bidder II will win the West license.

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One way to avoid the inefficient allocations arising from the exposure problem is to permit package bids, such that a bidder can make a single offer for a group of licenses. However, again as the Goeree/Holt Report recognizes, the package bidding approach raises a different problem for bidders (likely to be smaller bidders) that are interested “only in small packages or even a single license.”<sup>3</sup> The problem is known as the “threshold” problem and is illustrated in Table 2 below:

Table 2: The Threshold Problem

Bidder/License	East	West	National = East + West
I	<b>15</b>	0	15
II	0	<b>15</b>	15
III	0	0	20

In the example of Table 2, Bidder I should win East, and Bidder II West. Their combined values are 30. If Bidder III submits a package bid for a National license of 20, and the standing high bids on East and West are 5 each, then neither Bidder I nor Bidder II has an individual incentive to make up the shortfall of 10 plus an increment to outbid the standing high bid on the National license. The National bidder will always know how much it has to bid to top the combined bids of the bidders competing only for single licenses. In addition, the National bidder does not have to coordinate with other bidders.

In contrast, the bidders for the single licenses know only what is required to top the second highest bids on the individual licenses. They cannot know how much they will individually need to bid – in part because they will not know what the other single license bidders are willing to bid – in order to top the National bidder’s standing high bid. The single

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<sup>3</sup> *Goeree/Holt Report* at 9.

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license bidders may not have to bid much (or a high fraction of their own valuations) to become the standing high bidder. For East and West to win in the example of Table 2, they have to coordinate bidding, and agree on how much each party should raise its bid.<sup>4</sup>

The Goeree/Holt proposal includes payoff distributions that are designed to compare the efficiency of SMR auctions and SMRPB auctions when there are exposure problems and threshold problems present. The proposal – correctly, in Leap’s view – includes scenarios of the type described by Tables 1 and 2 above. Leap’s primary concern, however, is that the proposed experiments do not account for the possible severity of the threshold problem in a SMRPB auction, especially one with many regional licenses.

For example, the impact of the threshold problem is likely to be more severe than is indicated by the example in Table 2. The following modification of Table 2 illustrates how severe the threshold problem can be: suppose that instead of two regions there were ten. Also, suppose that each of the ten small bidders each has a value of 15 for one license, and that the one national bidder has a value of 100. Also, assume that the second highest bids for each individual license are 4, and that 5 is the amount the bidders have to bid for individual licenses to become standing high bidders.

Here, the proportions are the same as in Table 2: the sum of the small bidder valuations is 150 and is 50% more than the value that the large bidder places on the national license. As the standing high bids are 5 for each license, it will be virtually impossible for the

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<sup>4</sup> In previous PCS auctions, Leap was competing for a few regional licenses in competition with much larger, national operators. Combinatorial bidding tends to favor these national operators. Previous experiments, such as the Plott trials at Caltech ten years ago, provided a bulletin board mechanism or standby queue to help the regional bidders solve the threshold problem. The Commission also has acknowledged the utility of a standby queue in “allow[ing] parties seeking individual licenses to coordinate their bids in order to beat a prevailing bid for a combination of licences.” *In the matter of Section 309(j) of the Communications Act – Competitive Bidding*, 9 FCC Rcd 6858 (1994), ¶ 5 (citation omitted).

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small bidders to win when the large bidder can place a package bid. The ten small bidders would have to individually raise their own bids, without competing offers to prompt them to do so, from 5 to 11, at least on average, to top the National bidder. The ten small bidders also would likely need to meet and agree to coordinate bids. Such a meeting would be impractical and possibly illegal.

The Goeree/Holt Report has not fully delineated the types of scenarios that will be tested. But Leap strongly recommends that the scenarios tested capture key aspects of the environment that will likely exist in real-world FCC auctions. The Goeree/Holt proposal provides an illustration in which the range of values for two local bidders is between 100 and 200 for each license, and range of values for national bidder is between 200 and 500. This undoubtedly understates the likely magnitude of the threshold problem. If package bidding for an auction featuring 734 Cellular Market Areas (“CMAs”) were allowed, for example, then it would likely be the case that a number of small bidders would need to coordinate to overcome the threshold problem. In an auction with 734 regions, the severity of the threshold problem is likely to be much greater than in the ten-license example above – and a far cry from the problems posed by the two-license example.<sup>5</sup>

The threshold problem also will likely be exacerbated by the simultaneous auctioning of licenses of varying size (as the Commission has done in a number of previous

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<sup>5</sup> The threshold problem is further exacerbated by the presence of bidders of different sizes. In Auction 58, there were small bidders, such as Peter Akemann and Sungilt, bidding for a few licenses against somewhat larger bidders, such as Leap or MetroPCS, which acquired regional footprints. Leap and MetroPCS were, in turn, competing with larger bidders such as Cingular Wireless and Verizon Wireless, which have national footprints. Thus, there can be threshold problems within threshold problems. In such situations, the smaller bidders will have very little chance of winning in competition with the larger bidders.

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auctions). The following example illustrates that the magnitude of the threshold problem can be larger with asymmetric licenses:

Table 2: Asymmetric Threshold Problem

	High Bid	Min Increment
NYC	\$2,057,010,000	\$145,612,000
Boston	\$191,599,000	\$18,939,000
New London, CT	\$1,522,000	\$170,000
New Haven, CT	\$15,325,000	\$1,120,000
Olean, NY	\$1,594,000	\$76,000
Oneonta, NY	\$1,721,000	\$324,000
Plattsburgh, NY	\$193,000	\$9,000
Portland, OR	\$65,428,000	\$3,141,000
Poughkeepsie, NY	\$5,093,000	\$311,000
Scranton, PA	\$4,806,000	\$299,000
Worcester, MA	\$5,231,000	\$615,000
Washington, DC	\$217,527,000	\$12,232,000
All but NYC	\$510,039,000	\$37,236,000
All but NYC + BOS	\$318,440,000	\$18,297,000

The values in Table 2 come from Auction No. 35. If there is a package bid on all licenses but NY, then the bidders on the individual licenses would need to find a way to increase their offers by the aggregate increment. In this case, the aggregate increment is approximately \$37.2M for all of the licenses except New York City. The bidders on the eleven licenses thus would need to raise their individual bids by an average of more than \$3.4 million each. While bidders for Boston or Washington, D.C. might be willing to take such action, all eleven bidders likely would not. For example, \$3.4 million is clearly a large sum relative to the \$1.5M price of the New London license.

The Auction No. 35 increment for Boston was \$18.9 M, which is essentially the same as the aggregate increment for the other licenses (excluding New York) in the package.

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The increment for the other licenses in the package is approximately \$18.3M. The Current Price Estimate methodology does prorate the increments. However, the magnitudes involved suggest that if a bidder for one of the larger licenses in the package is unwilling to meet the prorated increment, then the others will have difficulty making up a small gap. In addition, if there is a package including a New York City bid, then the increment for that license alone, \$145M, will dominate any required increments for the other licenses in the package.

Leap believes that the experimental design can be readily adjusted to capture the potential severity of the threshold problem by considering trials in which there are  $N$  local bidders and 1 global bidder. By varying  $N$ , the experimenters can identify the relative merits of the SMR and SMRPB based on the number of licenses, or regions, in the auction. In addition, the experimenters can include licenses of different sizes in their trials. What follows is one suggestion of how to do so. The experimenters can conduct a few trials with three types of licenses: small licenses that count one activity point each, mid-size licenses that count 5 points each and large licenses that count 10 points each. The experimenters can then consider trials with configurations as follows:

- 1) A set of experiments with twenty licenses of 1 point each;
- 2) A second set of experiments with four licenses of 5 points each;
- 3) A third set of experiments with two licenses of 10 points each; and
- 4) A fourth set of experiments with five 1 point licenses, one 5 point license and one 10 point license.

All of these trials would involve the same magnitude of points, and presumably, potential payments to experiment participants. Such asymmetric trials would afford the experimenters



and the Commission an opportunity to identify the impact of asymmetries in license size on the ability of bidders to work through the threshold problem.

### III. OTHER CHANGES SHOULD BE MADE TO THE PROPOSED EXPERIMENTS

To the extent that the value of the proposed experiments is providing relevant analysis to inform the FCC “in making auction design choices for upcoming spectrum license auctions, and ... ways to fine tune the rules and procedures for the chosen mechanism,”<sup>6</sup> Leap has certain other concerns about the proposed experiments that would be desirable for the Commission to address.

#### A. Auction Duration

Of some concern to Leap is the potential auction duration. Previous FCC auctions have taken over 80 bidding days and 200 rounds to complete. Based on limited data, a Cybernomics analysis indicates that SMRPB auctions may take three times as many rounds to complete relative to the length of SMR auctions.<sup>7</sup> Recent changes in starting prices and bid increments for FCC SMR auctions have shortened auction duration, but at the possible cost of decreased efficiency due to excess bid increments. The large increments can result in significant overshooting of market clearing prices, resulting in decreased revenues and decreased efficiency. In addition, the large increments can fail to provide bidders with an adequate opportunity to determine what packages may be feasible so as to work around exposure problems.

The Goeree/Holt proposal does contemplate comparing relative durations of the SMR and SMRPB auctions. Leap recommends that the experimenters consider providing more

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<sup>6</sup> *Public Notice* at 1.

<sup>7</sup> See Cybernomics, Inc., *An Experimental Comparison of the Simultaneous Multi-Round Auction and the CRA Combinational Auction* (Mar. 15, 2000), at 3. Available at <http://wireless/fcc.gov/auctions/combin2000/releases/98540191.pdf>.

time between rounds in an SMRPB auction, as the additional complexity will, in practice, require bidders more time for bidders to evaluate the much higher number of possible package bids after each round. The experimenters should also consider providing student subjects with bid tracking tools and have the subjects provide written documentation of bids of the type that actual bidders need to make for each round of bids. The FCC routinely makes a bid tracking tool available to bidders in its SMR auctions, and adding such a component to the experiments not only would inject realism into the experiments, but would also provide the Commission with better results to inform decisions about auction design.

### **B. Pricing Rule**

Leap is concerned about the fact that the pricing rule used in the Goeree/Holt proposal can still result in oscillations in the minimum acceptable price on various licenses and packages. Harstad, Pekec and Rothkopf provide an example about how seemingly irrelevant bids can affect minimum required bids.<sup>8</sup>

Two or more bidders can find a solution to the threshold problem only if they all agree to a set of increases of their individual bids to collectively top a bid on a package. In the example from Table 1 above, Bidders I and II need to agree to increase their bids from 7 to 10.5 each. In a symmetric case, the Commission's Current Price Estimate ("CPE") formula will force them to do so in symmetric steps. This result may appear fair, but can be inappropriate or ineffective. For example, if I's value for East in Table 2 is 10.9 and II's for West is 19.1, then

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<sup>8</sup> R. Harstad, A. Pekec, M. Rothkopf, "Reply Comment to DA02-260 – Comment Sought on Adding to Auction Inventory and Further Modifying Package Bidding Procedures" (Feb. 26, 2002) (see appendix). Available at <http://wireless.fcc.gov/auctions/31/releases/da020260-spectrum.pdf>

their combined value remains 30, but a symmetric CPE will fail to achieve the necessary coordination Bidders I and II to coordinate to outbid the National bidder.

The FCC has considered different rules for setting minimum acceptable bids. Previously, the Commission sought comment on various options, and elicited different views from various experts.<sup>9</sup> The Commission's ultimate decision based on those comments seems to be a significant departure from the versions for which comments were requested (compare options iii on pages 36 and 38 of the March 19, 2002, Public Notice<sup>10</sup> with page 1 of the February 4, 2002, Public Notice).<sup>11</sup> The Goeree/Holt experiments would be timely opportunities to test alternatives in this regard so that the Commission's conclusions regarding future pricing rule modifications can be supported by experimental data.

### C. Mutual Exclusivity Provisions

Finally, the mutual exclusivity provisions of the Goeree/Holt SMRPB proposal call for bidders to track much more information than should be required. All bids in all rounds, except for those that have been directly topped, can become winning bids. For example, when there are six regions and two licenses in each region, there are 64 possible national licenses with exactly one license in each region and over 100 possible national licenses. A bidder can submit a bid in round 1 on a national license package, which is not a provisional winning bid at the end

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<sup>9</sup> See, e.g., Allen & Company Incorporated and Spectrum Exchange Group, LLC, "Comments of Spectrum Exchange Group, LLC and Allen & Company Incorporated" (Feb. 9, 2002). Available at <http://wireless.fcc.gov/auctions/31/releases/da020260rhapmr-reply.pdf>

<sup>10</sup> Public Notice, Auction of Licenses in the 747-762 and 777-792 MHz Bands Scheduled for June 19, 2002 – Further Modification of Package Bidding Procedures and Other Procedures for Auction No. 31 (rel. March 19, 2002). Available at <http://wireless.fcc.gov/auctions/31/releases/da020659.pdf>

<sup>11</sup> Public Notice, Auction of Licenses in the 747-762 and 777-792 MHz Bands Scheduled for June 19, 2002 – Comment Sought on Adding to Auction Inventory and Further Modifying Package Bidding Procedures (rel. Feb. 4, 2002). Available at <http://wireless.fcc.gov/auctions/31/releases/da020260.pdf>

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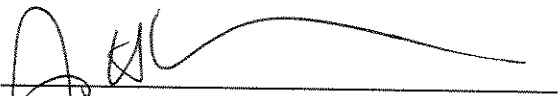
of round 1. The auction can go any number of rounds – previous FCC auctions have run for more than 200 rounds. That bidder's first round bid may never be a provisional winning bid until the last round. Each bidder needs to keep track of its possible winning bids, which can be virtually all of its bids, as well as all possible provisional winning bids of rivals. Bidders have no simple way of determining minimum required bids for each and every package and license, other than tracking all bids made on all packages in all rounds. This feature of the Goeree/Holt proposal thus adds troubling complexity to the auction process.

**IV. CONCLUSION**

Leap appreciates the opportunity to comment upon the proposed experiments regarding SMR and SMRPB auction designs. Leap urges the Commission to adopt the foregoing modest modifications to the proposed experiments.

Respectfully submitted,

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