Lessons from the United States Spectrum Auctions

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Mr. Chairman and members of the Senate Budget Committee, I am honored to appear before you today. My remarks are about the spectrum auctions in the United States. I will discuss spectrum auction successes, failures, and what I think are key issues in upcoming spectrum auctions. Although I have advised many governments and private parties on spectrum auctions, these remarks are my own views.

Since December 1993, I have been involved extensively in spectrum auctions around the world. I have advised the Federal Communications Commission (FCC) on the design and conduct of spectrum auctions. I have advised several other governments on spectrum auctions, including Mexico, Australia, Canada, and Austria. I have also advised the U.S. Department of Justice on collusion issues related to the FCC spectrum auctions. Additionally, I have served as the auction expert for numerous bidders in spectrum auctions around the world. My research on spectrum auctions is available from my web site www.cramton.umd.edu. The research appears in about a dozen articles published in academic journals.

The FCC auctions have shown that using an auction to allocate scarce resources is far superior to the prior methods: comparative hearings and lotteries. With a well-designed auction, resources are allocated efficiently to the parties that value them the most, and the Treasury obtains much-needed revenues in the process.

Since July 1994, the FCC has conducted two-dozen spectrum auctions, raising over $20 billion for the U.S. Treasury (not all of which has been collected). The auctions assigned thousands of licenses to hundreds of companies. Overall, the auctions have been a tremendous success, putting essential spectrum in the hands of those best able to use it. The auctions have fostered innovation and competition in wireless communication services. Taxpayers, companies, and especially consumers have benefited from the auctions. In comparison with other countries, the FCC auctions represent the state-of-the-art in spectrum auction design and implementation. The FCC began its auctions with an innovative design, and has continued to improve the auctions since then. The FCC's leadership in spectrum auctions has had positive consequences worldwide. Many countries wisely have imitated the FCC auctions; those that have not have suffered from inefficient license assignments and other flaws.

All but two of the FCC auctions have used a simultaneous ascending design in which groups of related licenses are auctioned simultaneously over many rounds of bidding. In each round, bidders submit new higher bids on any of the licenses they desire, bumping the standing high bidder. The auction ends when a round passes without any bidding; that is, no bidder is willing to raise the price on any license. This design is a natural extension of the English auction to multiple related goods. Its advantage over a sequence of English auctions is that it gives the bidders more flexibility in moving among licenses as prices change. As one license gets bid up, a bidder can shift to an alternative that represents a better value. In this way, bidders are able to arbitrage across substitutable licenses. Moreover, they can build packages of complementary licenses using the information revealed in the process of bidding.

There is now substantial evidence that this auction design has been successful. Revenues often have exceeded industry and government estimates. The simultaneous ascending auction may be partially responsible for the large revenues. By revealing information in the auction process, bidder uncertainty is

reduced, and the bidders safely can bid more aggressively. Also, revenues may increase to the extent the design enables bidders to piece together more efficient packages of licenses.

Despite the general success, the FCC auctions have experienced a few problems from which one can draw important lessons. These problems and the challenges of upcoming auctions will be the focus of my remarks. Although I am focusing on past problems, I must reiterate that the auctions have been a remarkable success. The fact that there have been some bumps along the road is not an indication of any failure by the FCC, but rather an inevitable consequence of an ambitious program in a setting of great uncertainty and technological change. Even the best quarterback throws an occasional interception, and even the best quarterback can improve by watching the films.

Reduce the effectiveness of bidders' revenue-reducing strategies

The information and flexibility available to the bidders in a simultaneous ascending auction is a two-edged sword. Although desirable in reducing bidder uncertainty and promoting efficient license aggregations, the information and flexibility—in certain circumstances—can be used to reduce auction prices. In particular, revenue-reducing strategies may be effective when bidder competition is weak and when bidders already have a sense of who should win what. In this case, the auction is best thought of as a negotiation among the bidders, in which bidders are only able to communicate through their bids. The auction ends when there are no disagreements about who should win what.

Revenue-reducing strategies take several forms, but two are most important. The first is demand reduction. This is the tendency for a bidder to reduce its spectrum demands, knowing that demanding less will tend to reduce spectrum prices. This is a unilateral strategy that is best addressed in the choice of the band plan and geographic scope of the licenses. License structures that make it more difficult for the bidders to split up the spectrum are less vulnerable to demand reduction. For example, offering large nationwide licenses, in which no bidder can win more than one, prevents the bidders from splitting up the spectrum at auction.

The second revenue-reducing strategy is retaliatory bidding. This can be thought of as coordinated demand reduction. It is sending another bidder the message that they should stay off your licenses, if they want you to stay off their licenses. Retaliatory bids were especially clear in early auctions when it was possible to use the trailing digits of bids to identify relevant markets. The bidders were effectively able to say things like, "I'll stay out of New York, if you stay out of Los Angeles." This tactic was eliminated by the FCC by requiring bids to be stated in an integer number of bid increments above the standing high bid. However, it is still possible for bidders in certain circumstances to use retaliatory bidding to keep prices low. Retaliatory bidding is best minimized through careful choice of activity rules, reserve prices, and bid increments.

Spectrum caps effectively limit anticompetitive concentration

A spectrum cap is a direct method of limiting the concentration of spectrum for a particular type of service in a particular area. Its advantage is that it is a bright-line test that is easy to enforce, both before and after the auction. It has played a critical role in ensuring that there are many competitors for mobile wireless services in each market. This competition has led to clear gains for consumers. Its disadvantage is that it is overly simplistic. Spectrum caps cannot take into account the specifics of each situation, and determine whether consumers would be made better or worse off with greater concentration of ownership.

The best policy on spectrum caps is a middle ground, where binding caps are imposed in initial auctions, but then these caps give way once it is believed that vigorous competition has been established. Then individual mergers can be reviewed on a case-by-case basis.

In setting and revising spectrum caps, the FCC should err on the side of too stringent a cap, since it is much harder to breakup a firm than to allow a merger. If concentration is viewed as a potential problem going into an auction, then spectrum caps, rather than case-by-case review, must be used, since only caps can provide an instantaneous determination of what is allowed and what is not. Such a rapid response is essential in a simultaneous ascending auction. Bids must be binding commitments until they are topped. Hence, at every point in the auction, the bidders must know what is allowed and what is not.

Typically, spectrum caps lower auction revenues, but there is one important exception. In situations where incumbent bidders have an advantage, a spectrum cap may actually increase revenues and promote efficiency. In such a situation without a spectrum cap, non-incumbents may be unwilling to participate in the auction, knowing that the incumbents will ultimately win. As a result, in the auction without the cap only the incumbents show up, there is a lack of competition, and the incumbents split the licenses up among themselves at low prices. With the cap, the non-incumbents know that non-incumbents will win licenses, giving them the incentive and ability to secure the needed financing from capital markets. A competitive auction with market prices results. Although this situation may seem special, I believe it is a realistic case. This phenomenon of incumbent bidders getting good deals, because of a lack of non-incumbent competition, appears to have occurred in some prior auctions.

Special treatment for designated entities should be implemented carefully

One of the auction objectives that Congress gave the FCC is to have a diversity of auction winners. While small and diverse owners may well be a desirable goal for broadcast media with editorial content, the same arguments likely do not apply to basic communications like PCS.

Special treatment to designated entities is to some extent premised on the idea that small is beautiful. But what we have learned in the last several years is that there are significant scale economies in wireless communications. Part of the scale economy is the bargaining advantage it creates with equipment suppliers. Another part is scale economies in marketing. But perhaps the largest is the value that consumers place on seamless nationwide roaming. As a result, the marketplace has shifted toward nationwide services in most wireless categories. These nationwide services are necessarily billion dollar deals, or tens-of-billions in the case of broadband mobile services. What consumers need is a variety of strong national competitors. In many cases, the small regional players cannot compete. The designated entity rules may simply be setting up the small businesses for failure. This is not desirable, especially given that the unjust enrichment rules, discussed below, effectively prevent resale to the higher-valued use should failure occur.

On balance, the best policy may be to discontinue favors to designated entities, and to use spectrum caps to guarantee new entry where desirable and to prevent over-consolidation of spectrum. An alternative is to offer non-incumbents bidding credits to encourage new entry. My reason for this conclusion has to do with the practical difficulties of effectively implementing favors for designated entities, which I discuss below.

The FCC has used bidding credits, set-asides, and installment payments to encourage the participation and success of designated entities. The idea is that without special treatment, these small businesses would find it difficult to compete with the large incumbents. The favored treatment can serve to "level the playing field," and thereby foster innovation and intensify competition.

Although this is a valid point in theory, and even has some empirical support, the FCC must be cautious when using favors for designated entities. A vivid example is the FCC's only major setback, the C-block broadband PCS auction. (Other disappointing auctions were IVDS and WCS, but none have involved the economic loss seen in the C-block.) The auction failed largely because of overly attractive installment payments (10% down and 6-year interest-only at the risk-free 10-year Treasury rate). This

encouraged speculative bidding, which led to all the major bidders defaulting and declaring bankruptcy. Even now, years after the auction, much of this C-block spectrum lies unused, tied up in bankruptcy litigation. Installment payments were a bad idea, because they advantaged the bidders with the most speculative business plans. In addition, installment payments put the FCC in the role of banker, an activity in which the FCC has no advantage. Since the C-block experience, the FCC no longer offers installment payments, a decision I fully support.

To preserve the integrity of the auctions, Congress should make clear that bidders cannot tie up licenses in bankruptcy proceedings. The end of the auction must be the final determination of terms, not the beginning of negotiations with the FCC under the threat of bankruptcy. My understanding is that this clarification is needed even in auctions without installment payments.

The two other instruments to favor designated entities—set-asides and bidding credits—may be desirable in special situations. The typical situation is one where the FCC is attempting to encourage competition in the auction and the post-auction market for wireless services. By leveling the playing field between incumbents and new entrants, competition may be enhanced.

Still, set-asides and bidding credits have serious potential problems. Gauging the right level of set-asides or bidding credits is extremely difficult. Also, it is nearly impossible to target the favor to the desired group. The creation of fronts, carefully constructed to satisfy the rules but circumvent their intent, has been a constant problem.

One general rule, whether using set-asides or bidding credits, is that it is best for incumbents and non-incumbents to compete in the same auction. Then if competition among non-incumbents is sufficiently robust, the non-incumbents will be able to spill over to the licenses that incumbent bidders can bid on. This spillover increases competition, and hence revenues in the auction.

Another problem with favors for designated entities is their impact on the resale of spectrum. The auction rules prohibit resale to a non-designated entity for a period of time, and include an "unjust enrichment" provision that requires that the FCC be paid back the bidding credit plus interest. The reality has been that the bidding credits are often bid away by competition among designated entities. Indeed, even after accounting for the value of the installment payments and the bidding credits, the C-block auction resulted in prices that were well above what the large firms paid in the AB-block auction. Given these facts, it is difficult to understand why the small firms are required to pay a huge "unjust enrichment" penalty, when there is no unjust enrichment. As it stands, the penalty is so large that it is often an insurmountable barrier to trade.

Perhaps the most serious problem with favors to designated entities is that they greatly complicate the auction process. Too often the rules for designated entities become a central issue in establishing the auction procedures. These rules are complex. They are difficult to write, difficult to enforce, and difficult to defend. The absolute worst outcome in a spectrum auction is having the licenses tied up in litigation. Until the litigation is resolved the building of communication services cannot begin. Even the risk of litigation can have a disastrous effect on auction participation, and hence revenues. Both the Congress and the FCC should do what they can to make sure that spectrum resources are not destroyed by litigation.

In the upcoming reauction of C-block licenses, I recommend eliminating the set-aside for small-businesses. Rather I would use a spectrum cap, or possibly bidding credits, to encourage new entry. Consumer interests are best served by the entry of strong competitors. Given the significant scale economies, it is unlikely that true small businesses can provide this competition.

Implementing an effective auction takes time and involves difficult tradeoffs

A second auction disappointment was the Wireless Communication Services (WCS) auction, held in April 1997. Revenues in this auction were a tiny fraction of what they might have been. The main problem was the stringent out-of-band emission limit. Equipment manufacturers warned that this would threaten the commercial viability of this spectrum. The low prices at auction and the absence today of activity in this band appears to confirm that the equipment manufacturers were right. At the time of the decision, the FCC was facing a difficult tradeoff between the rights of prior winners of neighboring licenses and the WCS use. Such decisions are always difficult, but the FCC was under intense time pressure to meet the timetable that Congress set for the auction. This aggressive timetable may well have led the FCC to make a too-hasty decision on interference rules, which damaged the value of this spectrum. Congress's desire for receiving revenues according to its fiscal calendar may have resulted in substantially reduced auction revenues.

The FCC has been put in a similar position in the upcoming 700 MHz auction of UHF channels 60-69. My hope is that the FCC is better equipped to handle this challenge; my fear is that critical aspects of the auction may be rushed.

Facilitate efficient clearing when auctioning encumbered spectrum

An issue of increasing importance is the auctioning of encumbered spectrum. Most of the current and future spectrum auctions have incumbents. These incumbents must either be cleared or worked-around in order for the new entrant to provide a service. Negotiations between the new entrant and the incumbent are often difficult due to holdout by the incumbent. A second problem occurs when multiple new entrants benefit from the clearing of a single incumbent; then each new entrant can hope to free-ride on the clearing done by others. These problems often prevent or delay the efficient clearing of the spectrum. The FCC can play an important role in adopting rules that promote the efficient clearing of the spectrum by structuring the rules of negotiation appropriately. The broadband PCS rule-making is a good example. The FCC adopted rules that went a long way in minimizing the holdout and free-rider problems that undermine efficient clearing.

The upcoming 700 MHz auction is a more difficult case. This spectrum currently is used for analog television channels 60-69. The spectrum cannot be used for new services until the analog broadcasters terminate over-the-air broadcasting on these channels. Since the FCC appears not to have the authority to adopt PCS-type rules that promote efficient clearing, the best that the FCC can do is to not create barriers to efficient clearing. In particular, it is important that incumbent broadcasters retain their must-carry status and DTV allotment, even after their analog UHF broadcast is terminated. Otherwise, a broadcaster will have an artificial incentive to stay, blocking the new communication service.

Continue to innovate in auction design

In the long-term, the FCC will want to expand its auction capabilities to allow for two-sided auctions. For example, in an auction of encumbered spectrum, the FCC can allow holders of existing licenses to bring their licenses to the table. In this way, bidders can purchase in one auction the complementary assets (the old and the new license).

A second area of innovation is the development of practical methods for combinatorial auctions, which allow bidders to bid on packages of complementary licenses. Combinatorial auctions have been an active area of study by the FCC and other researchers. These new auction forms promise further improvements in an already successful auction program.

Promote market-based tests in spectrum management

The FCC auctions are a critical step in the march toward market-based spectrum management. The FCC and Congress should continue on this path. Flexibility should be the norm, not constraints. Constraints should appear only when those constraints help foster a more competitive environment by adding essential structure. My specific recommendations are:

- Allow service flexibility
- Allow technical flexibility
- Set initial interference rules, but allow trading
- Set initial geographic and bandwidth scope to an ex ante view of how spectrum will be used, but allow spectrum partitioning and geographic disaggregation
- Eliminate buildout requirements
- Allow transfers of licenses

Many of the current restrictions are holdovers from the days of comparative hearings. These needless regulations should be eliminated. The rate of technological change is now so great that attempting to craft specific regulations as was done in the past is hopeless and destructive. Rather, the FCC and Congress should focus on broad principles that encourage competition. Congress especially should refrain from the micro-management of spectrum policy. The complex economic and engineering tradeoffs are much better left to a specialized agency.

Make markets work better

Communications policy today is not about regulating a monopolist; it is about making markets work better. To satisfy this new mission, the FCC must transform itself in the new millennium. The FCC's auction program is a major step, and a vivid illustration, of where it should be headed.

I have pointed out a few bumps in an otherwise remarkable auction program. Most of these bumps are where good intentions got in the way of sound economics. In the new world of auctions and competition, the economics cannot be ignored. Good policy must respect the economic forces of markets. Indeed, policy decisions should follow from the simple question: "Does this policy promote competition in communication services?" If the answer is yes, I am all for it.