

E. The Spectrum Should Be Subject To Auctions If It Is Used For Service To Subscribers For Compensation.

The Commission proposes to apply a "principal use" test to determine whether or not a service is provided to subscribers for compensation rather than for "private service."²¹ Alternatively, the Commission asks whether the entire service should be subject to auctions if there is any service to subscribers for compensation no matter how minimal.²²

The Commission should apply an "all or nothing" test for three reasons. First, this test promotes the like treatment of like services. If a licensee is using part of its spectrum to offer services for compensation, it will have a distinct financial advantage over other competitors if it didn't pay for its spectrum through an auction. That's not justified. Second, the "principal use" test can be used as a loophole or regulatory safe-harbor to gain an advantage based on the regulatory classification of the spectrum used. We have all seen how that has developed with ESMR providers. The Commission should not encourage these regulatory distortions. Third, the Commission's proposal will be an administrative headache; rulings will have to be issued on numerous requests and challenges to determine the principal use. In contrast, the "all or nothing" test is simple.

²¹ NPRM, para. 32.

²² NPRM, para. 33.

VI. DEFINITIONS OF DESIGNATED ENTITIES.

The Commission also asked for comment on its definition of businesses owned by women and minorities. We support a standard that women- and minority-backed applicants should be 50.1% owned by these groups. Simple control is too weak to deter abuses. This definition should also be applied to a consortium to determine its eligibility for any preferential treatment.

VII. ADMINISTRATIVE ISSUES.

A. The Application Process Should Be Easy To Administer And Simple For Bidders.

The Commission apparently bases its application requirements²³ and post-auction processing requirements²⁴ on procedures used in the past for cellular radio licensing and certain private radio licensing by lottery. The lottery procedures were designed, largely by trial-and-error, to address circumstances not present here. The Commission should not adopt those procedures but instead should adopt vastly simplified procedures consistent with awarding licenses by competitive bids.

The objectives of the application process are to assure that a qualified bidder receives the license,²⁵ "to

²³ NPRM, paras. 96-101.

²⁴ NPRM, paras. 110-113.

²⁵ NPRM, para. 96.

reduce the administrative burdens of the initial stages of the auction process, avoid unnecessary delay in the availability of service, and encourage applicants to participate in the process.²⁶ We respectfully submit that the proposed process will potentially discourage bidders and impose unnecessary administrative chores. We thus suggest the following changes:

1. Forms.

The proposal to require a "short-form application" from each prospective bidder modeled on the transmission sheet for cellular applications, Form 464, is a good one.²⁷ We suggest, however, that the form should be viewed not as a traditional radio license "application" but rather as a "statement of an intention to bid." The short-form application should contain the essentials to establish the bidder's qualifications and eligibility (e.g., cellular affiliation, small or minority business) to bid for the particular spectrum block. It should include a certification from a responsible officer of the bidder stating that the bidder understands and is prepared to comply with all the rules and requirements of the radio service open for bids as well as other applicable regulations.²⁸

²⁶ NPRM, para. 97.

²⁷ NPRM, para. 97. Form 464 is currently being used for applications for cellular unserved areas. See Public Notice, "Dates and Filing Requirements for Applications for Cellular Radio Unserved Areas," Report No. CL-93-36 (Dec. 23, 1992).

²⁸ NPRM, para. 98. Cellular Lotteries, Memorandum Opinion and Order on Further Reconsideration, 59 Rad.Reg.2d 407, 410 (1985).

There is no reason to require a long-form application or any other paperwork from any prospective bidder prior to the auction. Only the winning bidder should have to submit the "long form," which should not be Form 401 or Form 574²⁹ but rather an entirely new form relevant to licensing by auction. It does not improve the efficacy of the Commission's processes or otherwise further the public interest to require bidders to prepare, and for the FCC to store on its premises, reams of paperwork that will never be reviewed. In the cellular radio service all applicants must file the Form 401, but the Commission's staff only reviews, and entertains petitions to deny, the application of the tentative selectee in the lottery. The Commission has acknowledged that the only purpose of the filing requirement is to discourage insincere applicants. If the Commission's bidder qualification rules are adequate to deter speculation, and we believe that they will be, it will not be necessary to construct a mound of paperwork as an impediment to unqualified bidders.

2. Letter-Perfect Requirement.

The "letter-perfect" standard, proposed at para. 100, is a vestige of the lottery environment in which the Commission had to deal with literally thousands of applicants, many

²⁹ NPRM, para. 97 n.84.

unqualified.³⁰ While it may be true, as the Commission states in para. 100, that "use of a letter-perfect standard should not unduly burden or affect applicants," that finding begs the question whether the standard will unduly burden the Commission. The standard, first adopted for cellular lotteries,³¹ was part of an ultimately unsuccessful effort to pre-screen applications to discourage lottery entrants. In an auction, in contrast, the requirement of an up-front payment and a deposit substitute for all the procedural hurdles used in lottery proceedings.³² Given the other entry requirements for prospective bidders and the unlikelihood that there will be thousands of them, there is no reason for the Commission to commit to expending staff resources policing the letter-perfect standard.

³⁰ Cellular Unserved Areas, First Report and Order and Memorandum Opinion and Order on Reconsideration, 6 FCC Rcd 6185, 6207-08 (1991). "Specifically, we proposed to dismiss applications which did not comply with our letter-perfect standard and which did not comport with minimal standards of acceptability.... Because we continue to be concerned about potential abuses in our application process, the rules we are adopting for unserved areas should promote the filing of applications only by persons sincerely interested in building and operating cellular systems...."

³¹ Cellular Lotteries, Memorandum Opinion and Order on Reconsideration, 58 Rad.Reg.2d 677, 695-96 (1985).

³² The Commission also may impose system construction and expansion requirements and may require the winning bidder to demonstrate its ability to meet those requirements (in its long-form application) before issuing the license. See, e.g., Use of the 220-222 MHz Band, 6 FCC Rcd 2356, 2363 (1991). For Personal Communications Systems, the Commission has stipulated forfeiture of the license for failure to meet construction standards. 47 CFR §99.103(e).

3. Certification.

We support the certification requirements described in para. 98, which are similar to those already in use in cellular transmittal sheet Form 464. We also urge the Commission to adopt its proposal in para. 99 to include the option of asking for a waiver on the application form. The Commission must make allowances for unusual situations and changing circumstances in this dynamic industry. We have described our own unique situation in Section IV. If our proposal described there is not adopted, we would file a waiver request before the application date.

4. Auction Process.

We believe that the process proposed at para. 101 needs some modification. Again, it is not appropriate to use rules adopted for lotteries for auctioning licenses. First, as shown above, there is no reason for the Commission to pre-screen applications to determine their acceptability for filing. If a bidder has submitted the required transmittal form along with the up-front payment and the certification that it meets eligibility requirements, no pre-screening is necessary. The Commission need only issue a Public Notice listing the bidders.³³ We suggest that the Commission provide 90 days notice of an auction and require applications - actually notices of intent to bid - be filed 30 days before the date set for the

³³ There should be adequate notice of any auction to permit sufficient time for parties to file waiver requests regarding the eligibility criteria and to allow the Commission time to rule on the request before applications are due.

auction. Eliminating pre-screening will make it easy for the processing staff to compile and publish a list of prospective bidders within a few days of receiving the applications.

If the Commission modifies its procedures as suggested here, there is no reason to accept amendments to applications at any time. Amendments are also a vestige of cellular licensing practices in which the Commission had many more specific construction and deployment requirements than it will for PCS, and many speculators, all of whose applications would be considered simultaneously. With only a short-form application before the auction, there is nothing for prospective bidders to amend. After the auction the Commission could require the winning bidder to submit its construction plans demonstrating compliance with the applicable deployment and coverage rules.³⁴ Given that bidders would not, and could not be expected to, fully design systems in advance of the auction, the Commission should allow a reasonable time for submission of the complete system design on a form akin to the cellular Form 401 or 489.

5. Petitions to Deny.

The Commission poses two options in para. 111 for reviewing substantial and material issues of fact. The second option - placing the auction winner's application on Public Notice for 30 days - is far more administratively efficient.

³⁴ As indicated at note 34, supra, the winning bidder will already have certified that it will meet the deployment schedule and other technical requirements established in the Commission's rules. The purpose of the "long form" or "technical" filing will be only to provide the specifics of the systems for the Commission's information.

The Commission should, in this case, use those rules that have been refined through years of cellular proceedings which now require that only the tentative selectee's application is subject to petitions to deny.³⁵

The petition-to-deny process may become quite complicated and contentious unless the Commission specifies by rule those issues that will be considered germane to a winner's qualifications. The second-highest bidder for each block will have every incentive to thwart through any possible means the winning bid. The other licensees for the same geographic area will similarly have every incentive to obstruct each other's construction schedules and deployment plans unless the Commission makes it difficult to do so. Accordingly, we urge the Commission to specify by rule the licensee qualification issues which are "substantial and material" and which, consequently, may be addressed in petitions to deny.³⁶

6. Procedures When the Winner is Disqualified.

We believe that the circumstances in which the winner will be disqualified³⁷ will be relatively rare, given the price of entering the auction. In the event that a winner is

³⁵ See, e.g., 47 CFR §1.823(b). See also 47 CFR §1.1604, where similar procedures are used for certain mass media licensing.

³⁶ The Commission should also consider adopting generic rules constraining the behavior of petitioners similar to those adopted in Cellular License Renewals, 7 FCC Rcd 719 (1992). See 47 CFR §§22.444 and 22.445. Consistent with our recommendation above, the Commission need not require a full technical submission nor entertain challenges to the technical submission in petitions to deny.

³⁷ NPRM, para. 113.

disqualified, the Commission should not spend the time, effort, and money to auction the spectrum again. The simplest - and fairest - process is to award the license to the second-highest bidder in the auction. Conducting a second auction after the bids are revealed would produce perverse consequences. Each bidder would presumably know what each other bidder offered the first time and what the winning bid was. There is no public interest to be served by conducting another auction that cannot be met equally well by giving the license to second-highest bidder, allowing that bidder seven days to submit its long-form application, and continuing with the processing. Awarding the license to the second-highest bidder encourages participants to bid up to their full value, which promotes Commission objectives.

B. Deposit and Payment Requirements.

The NPRM proposes an up-front payment of 2 cents per megahertz-pop.³⁸ We support this proposal. A substantial up-front payment will discourage speculators. We propose that the two cents per megahertz-pop deposit be applied as follows: on each day of the auction, a bidder would be qualified to bid on any collection of licenses for which the sum of its megahertz-pops is no more than the number for which the bidder has previously deposited two cents per megahertz-pop. For example, if a bidder made a deposit of \$24 million it would be permitted to bid on any combination of licenses not exceeding

³⁸ NPRM, para. 103.

1200 million megahertz-pops. This would allow the bidder to bid on 40 MHz of licenses covering regions with a combined population of 30 million. (The \$24 million is the product of two cents per megahertz-pop, times 40 MHz, times 30 million pops.)

We support the Commission's proposal that requires winners to increase their up-front payment to 20 percent and to require full payment by the auction winner within 41 days of the close of the auction.³⁹ Neither an installment payment option nor a royalty plan is appropriate except for designated entities. Up-front payments and deposits encourage the winners to provide services quickly. Installment and royalty⁴⁰ payment plans give the licensees an incentive to stretch out the process which will delay new services and competition. Those plans are therefore inconsistent with the Commission's goals.

C. Collusion.

The Commission asks whether or not it should adopt rules specifically prohibiting collusive conduct. Further rules are not necessary. Successful collusion requires a small number of total players. The PCS auctions will have a large number of bidders. Agreement and enforcement among parties will be difficult to reach. The bidders lack experience from similar auctions, and they will not be able to enforce their agreement

³⁹ NPRM, para. 175.

⁴⁰ A royalty plan would be difficult to administer because of the problem of calculating the base value amount upon which royalties would be determined.

in subsequent auctions. One of the benefits of the simultaneous auction we propose is the inability to enforce any agreement because there are no subsequent bidding rounds, unlike a sequential auction.

Additionally, existing laws are adequate to deter collusion. Unlike small private antique and art auctions, the PCS auctions will receive great attention by the media and the Commission, and possibly the Department of Justice. If there is suspicious behavior, it will be apparent. This likelihood of discovery and prosecution will deter collusion.

VIII. CONCLUSION.

We recognize the Commission's objective is to develop the best overall auction structure - a structure which serves the goals of Congress and the Commission and generates the greatest revenues for the government. Professors Milgrom and Wilson have shown that the Commission's proposal does not award the licenses to the Highest Value Bidders and thus does not maximize revenues for the government. The proposal developed by Professors Milgrom and Wilson does. Their auction structure gives all parties an equal chance to develop their strategies. Permitting everyone's strategy an opportunity to win will

produce the highest returns for the Commission: the rapid deployment of new services and technologies to the most customers, competition in wireless services, and the greatest new revenues.

Respectfully submitted,

PACIFIC BELL
NEVADA BELL



JAMES P. TUTHILL
THERESA L. CABRAL
BETSY STOVER GRANGER

140 New Montgomery St., Rm. 1529
San Francisco, California 94105
(415) 542-7664

JAMES L. WURTZ

1275 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 383-6472

Their Attorneys

Date: November 10, 1993.

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

In the Matter of)
)
Implementation of Section 309(j))
of the Communications Act)
Competitive Bidding) PP Docket No. 93-253
)
)

AFFIDAVIT OF PAUL R. MILGROM AND ROBERT B. WILSON

STATEMENT OF PAUL R. MILGROM

1. My name is Paul R. Milgrom. I am the Shirley and Leonard Ely, Jr. Professor of Humanities and Sciences and Professor of Economics at Stanford University in Stanford, California, 94305.

2. I received an A.B. degree in Mathematics from the University of Michigan and an M.S. in Statistics and a Ph.D. in Business from Stanford University. My academic specialty is microeconomic theory, with an emphasis on how the design of institutions affects economic performance. Since 1990, I have been a coeditor of the largest circulation academic journal in the economics profession—the American Economic Review. I have also served on the editorial boards of several other economics journals. I have been the recipient of numerous awards and honors, including Fellowships in the American Academy of Arts and Sciences and the Econometric Society. I have also received Fellowship grants from the John Simon Guggenheim Foundation, the Center for Advanced Study in the Behavioral Sciences, and the Center for Advanced Studies in Jerusalem.

3. My research into auctions spans my entire academic career. My Ph.D. dissertation dealing with competitive bidding won the Leonard J. Savage prize as the best dissertation in North America using Bayesian statistical methods in economics. I subsequently published eight articles about competitive bidding, including six in refereed journals and two surveys published in books. My articles about auctions are among the most cited ones in that subfield of economics and have been reprinted in collections of articles as exemplary works of analysis. The Commission's own NPRM cites my 1989 article on auctions.

4. I have experience with the economics of regulated industries. I gave testimony to the Federal Energy Regulatory Commission concerning pricing on the Trans-Alaska pipeline and I have testified at trial concerning the economics of the insurance industry. I have also given written testimony concerning environmental regulations to the National Oceanographic and Atmospheric Administration (NOAA).

5. In the telecommunications industry, I have had one consulting engagement. I advised Southern New England Telephone Company concerning the loss in value of their century-old contract with AT&T following the restrictions imposed on AT&T by the MFJ.

STATEMENT OF ROBERT B. WILSON

6. My name is Robert B. Wilson. I am the Atholl McBean Professor of Economics in the Graduate School of Business at Stanford University in Stanford, California, 94305.

7. I received the Bachelors degree A.B. in Mathematics, the Masters degree M.B.A. in Business Administration, and the Doctoral degree D.B.A. in Managerial Economics, all from Harvard University. The Norwegian School of Economics conferred an honorary Doctor of Economics degree on me. My research speciality is microeconomic theory, with an emphasis on the design and operation of markets, and the role of strategic behavior. I have served on the editorial boards of several scholarly journals. I am a Fellow of the Econometric Society and the American Academy of Arts and Sciences. I received fellowship grants from the Ford Foundation and the John Simon Guggenheim Foundation, and I was a fellow for a year at the Center for Advanced Study in the Behavioral Sciences.

8. I have studied auctions for twenty-seven years. My publications include nine technical articles and three survey articles on this subject. Currently I am completing a book on competitive bidding and auction design commissioned by the Electric Power Research Institute. My article in 1969 was the first to study auctions in which bidders' values are statistically correlated (as presumably is the case with the PCS auction), and my 1977 article was the first to provide a general analysis of auctions with common components of bidders' values, which is the source of what is now called the

winner's curse.

9. I was a consultant on the subjects of competitive bidding strategies and auction design for the Department of Interior for four years. I was a consultant for two oil companies regarding preparation of bids for leases on the Outer Continental Shelf. Subsequently I prepared computer software for use by the Department of Interior to evaluate auction designs. My only previous oral and written testimony on this subject was before the Federal Energy Regulatory Commission concerning auctions of leases for oil and gas exploration on the North Slope of Alaska.

10. My familiarity with regulated industries derives mainly from eleven years as a consultant for the Electric Power Research Institute. This work included a book on pricing that included studies of pricing practices in the telecommunications industry, and studies of auctions of bulk power supplies mandated by the Public Utility Regulatory Policies Act.

JOINT STATEMENT OF PAUL R. MILGROM AND ROBERT B. WILSON

11. We have been asked by Pacific Bell and Nevada Bell to evaluate the proposed auction design in the NPRM adopted by the Commission on September 23 and released on October 12. We have therefore focused our attention on Sections III and V of the proposed rulemaking, in addition to paragraph 12, which sets out the objectives of the enabling legislation.

I. SUMMARY AND CONCLUSIONS

12. The NPRM's emphasis on placing the license in the hands of the bidders who value them most highly is the most appropriate way to implement several of the objectives described in section 309(j)(3) in the Act. The bidders with the highest values for the licenses are likely to be among those most able to use the spectrum efficiently to deliver new and valuable services to consumers in a short period of time. Moreover, the likelihood that the licenses will actually be placed in the hands of the highest value bidders can differ significantly among auction designs.

13. The primary auction design for PCS spectrum proposed in the Commission's NPRM, which combines sealed combination bids for certain collections of licenses with individual oral bidding for MTA and BTA licenses, fails to promote the objectives in Section 309(j)(3) of the Act, because it would not tend to place licenses in the hands of those that value them most. Instead, its proposed use of combination bidding would create a bias in favor of those submitting combination bids, enabling them to win licenses even if they were to have no advantage over the bidders for individual licenses in terms of either their costs or the quality of services that they could deliver. In addition, the sequencing of sales for non-combination bids would make it unnecessarily difficult for bidders intending to combine MTAs or BTAs to create regional networks to formulate a suitable bidding strategy.

14. A more effective system for promoting the goals of Section 309(j)(3) would involve the simultaneous sale of all the licenses, using either repeated

stages of sealed bids or, if technically feasible, a simultaneous electronic auction. The system of repeated sealed bids shares some of its basic features with the Commission's preferred basic method of oral bidding, with bids ascending gradually until no bidder is willing to raise any bid any further. However, written sealed bids have the advantage of making it practical to conduct simultaneous sales of large numbers of licenses, thereby allowing bidders to have maximum information about the prices of all licenses when making their decisions. The simultaneous system is superior to each of the several alternative auction methods identified in the NPRM. In particular, it avoids the bias toward combination bidders in the system proposed in the NPRM and, by reducing the guesswork involved in sequenced sales of licenses, would tend to promote an efficient allocation of the licenses.

15. The wide dissemination of technical information among bidders would tend to promote the assignment of licenses to the highest value bidders, to raise auction revenues, and to mitigate the information disadvantages of smaller bidders. We encourage the Commission to assemble and disseminate such information.

16. Whatever system of bidding is selected should be tested in a laboratory setting before final implementation. The scale and complexity of the bidding problem faced by bidders during the proposed auction will be virtually unprecedented, and the details of implementation should be worked out in laboratory trials to make the bidders' decisions as easy as possible.

II. WILLINGNESS TO PAY AS THE PROPER AUCTION CRITERION

17. The Act specifies a number of objectives for the Commission to promote, including the development and rapid deployment of new technologies to all areas of the country, economic opportunity and avoiding excessive concentration of licenses, the recovery for the public of a portion of the value of the spectrum, and efficient and intensive use of the electromagnetic spectrum. These objectives are diverse, and the Commission's proposal properly uses a combination of devices to promote them.

18. Since a bidder's abilities to introduce valuable new services and to deploy them quickly, intensively and efficiently increase the value of a license to a bidder, an auction design that awards licenses to those bidders with the highest willingness to pay tends to promote the development and rapid deployment of new services in each area and the efficient and intensive use of the spectrum. In addition, in view of the expected intense competition during the auction, the prices paid by this group of what we shall call the "highest value bidders" are likely to constitute a significant fraction of the social value of the licenses, consistent with another of the Act's objectives. When used in combination with the proposed limits on ownership of licenses and with policies to promote participation by women and minority owned businesses and rural telephone companies, awarding licenses to the highest value bidders is the best way to promote the rapid deployment and efficient use objectives of the Act, and a good way to promote the revenue objective.

19. The value of a license to a bidder may depend not only on the

license itself and on the bidder's technology, but also on which other licenses it acquires. A bidder that acquires a collection of licenses covering adjacent portions of the spectrum or the same parts of the spectrum in adjacent geographical areas or in wide regions of the country may be able to offer additional services at lower cost, resulting in higher value for its customers and higher profit for itself. All such values merit consideration in planning the design of this auction. The proper goal of the auction design is to maximize the total of all such values.

III. ASSESSMENT OF COMBINATION BIDDING

20. The NPRM requests comment on a two-stage auction design for PCS licenses in which, first, sealed bids are submitted for combinations of licenses; second, open bidding for individual licenses is conducted; and third, the sealed bids are opened. If the highest combination bid exceeds the sum of the individual bid prices, it is proposed to award the licenses to the highest combination bidder. As the NPRM notes (at paragraph 62), a two-stage system of bids in which there is competition for individual licenses followed by sealed bids for certain combinations of licenses creates a free rider problem among the bidders for individual licenses.

21. The free rider problem is a standard problem in economics, in which several individuals are asked to make a contribution to provide some public good or advance some common cause that benefits each of them. Any individual can get a "free ride" by refusing to contribute, letting the burden fall on the other contributors. The standard result is that voluntary contributions

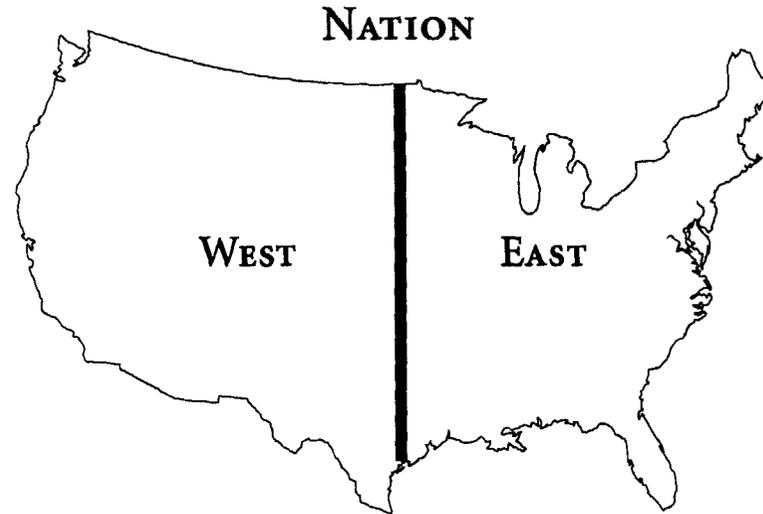
are too low and too little of the public good is provided.

22. Similarly, in this auction design, there is a free rider problem among the individual bidders. Each bidder for an individual license could, by bidding more than the minimum required to be high bidder for its own license, contribute to the likelihood that the sum of the individual bids will exceed the highest combination bid. That is, it would contribute to an outcome that benefits all the individual bidders. The usual logic of free riding applies here: individual bids are too low relative to the efficient outcome for the individual bidders as a group and, as a result, the combination bid is too likely to be the winning bid. This disadvantages the bidders for individual licenses in comparison with the combination bidders.

23. This problem of a bias in favor of the combination bidders is a general one that is due to the free rider problem alone and does not depend on particular features of the setting in which the proposed auction will take place. The bias in favor of combination bidders leads to inefficiencies in those cases where more value would be created by having licenses assigned to the individual bidders.

24. The attached figure, labeled Figure 1, illustrates how this bias can damage efficiency in the case where combination bids are allowed for national bidders competing against regional bidders. In this simplified example, there are just two geographical regions, East and West, and one band of spectrum available in each region. There are two bidders in each region—W1 and W2 in the West and E1 and E2 in the East—and two national bidders N1 and N2. In this

FIGURE 1



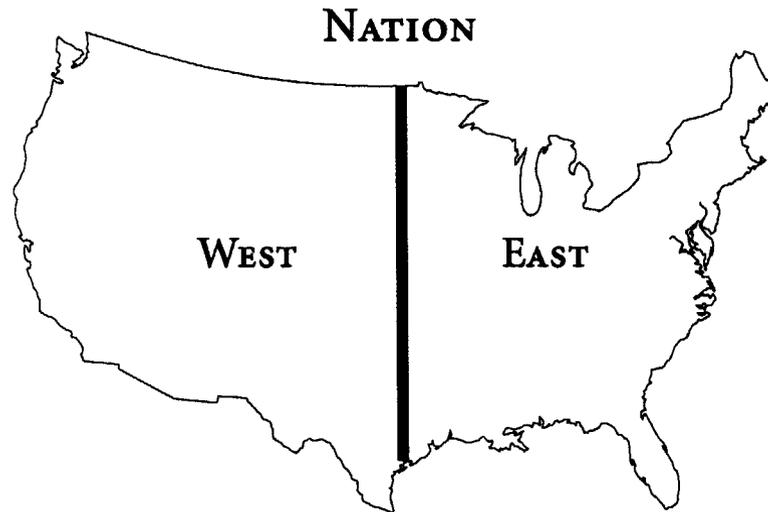
West		East		Nation = West + East	
<u>Regional Bidder</u>	<u>Maximum Willing to Pay</u>	<u>Regional Bidder</u>	<u>Maximum Willing to Pay</u>	<u>National Bidder</u>	<u>Maximum Willing to Pay</u>
W1	20	E1	20	N1	35
W2	10	E2	10	N2	32

LIKELY FINAL BIDS IN AUCTIONS

Oral			Sealed Bid	
	<u>West</u>	<u>East</u>	<u>Sum of Bids</u>	<u>Nation</u>
W1	10.1	E1 10.1	20.2	N1 32.1
W2	Lose	E2 Lose	—	N2 Lose

N1 wins the license for the entire nation since its bid of 32.1 exceeds the sum of W1's and E1's final bids of 20.2, despite the fact that N1 has a lower value for the license (35) than W1 and E1 combined (40).

FIGURE 2



West		East		Nation = West + East	
<u>Regional Bidder</u>	<u>Maximum Willing to Pay</u>	<u>Regional Bidder</u>	<u>Maximum Willing to Pay</u>	<u>National Bidder</u>	<u>Maximum Willing to Pay</u>
W1	20	E1	20	N1	45
W2	10	E2	10	N2	42

LIKELY FINAL BIDS IN AUCTIONS

Oral			Sealed Bid	
	<u>West</u>	<u>East</u>	<u>Sum of Bids</u>	<u>Nation</u>
W1	10.1	E1 10.1	20.2	N1 42.1
W2	Lose	E2 Lose	—	N2 Lose

N1 wins the license for the entire nation since its bid of 42.1 exceeds the sum of W1's and E1's final bids of 20.2. Since N1 is the highest-value bidder, in this case, combination bidding produces an efficient outcome.

hypothetical example, the maximum willingness to pay of the regional bidders adds up to 40, while neither national bidder would be willing to pay more than 35 for a national license. Consequently, efficiency would require assigning licenses to the regional bidders W1 and E1.

25. In the interests of simplicity, let us analyze this example as if all the bidders know all the information described in Figure 1, including the values placed by other bidders on these licenses. Assuming that the regional bidders are unable to coordinate their bids, the most likely outcome is the one shown. In each regional auction, the regional bidder with the highest value (E1 and W1) bids just enough to win, leading to prices of about 10 in the East and the West. In the national sealed bid auction, bidder N1 bids just enough to win, leading to a price of about 32. The result is that the two licenses are awarded to the national bidder. This outcome occurs despite the fact that the sum of the values of the "winning" regional bidders is 40, which is higher than the value of either national bidder. That is, the combination bidding leads to an inefficient allocation of the licenses.

26. Notice that even if the regional bidders anticipate this outcome, neither bidder alone can do anything to prevent it. The Western region winner W1, acting alone, would have to raise its bid to 22 to prevent this outcome, but that price exceeds its value of 20. The same analysis applies to the Eastern region winner, E1. If E1 and W1 were to agree in advance to coordinate their bids, with each bidding 18 instead of 10, they could ensure that the national bidder N1 could not profitably win the auction. However, such coordination is unlikely without some explicit agreement among the bidders,

which is eliminated by the proposed rules and may be illegal.

27. For contrast, suppose this example were to be modified as shown in Figure 2, so that the national bidders are those with the highest values. Once again, it is the national bidders who would win the license. This is a general feature of combination bidding without uncertainty: the auction rules ensure that the national bidder will win whenever it should win but also allows the national bidder to win in some circumstances when it should not. The auction is biased in favor of national bidders.

28. The bias is a consequence of the free rider problem among bidders for individual licenses or small numbers of licenses. As we have seen, the free rider problem can be present even when there are just two regions and two individual winners, but it tends to grow worse when the number of what we may call "individual winners" grows. For while coordinating bids without communication is difficult in the case of two bidders, such coordination is difficult even with communication when the number of individual bidders to coordinate grows. In the planned auctions, where there is potentially a very large number of individual winners—up to 51 bidders for regional MTA licenses to coordinate against the national bidders—this problem has the potential to be quite severe.

29. The winners and losers and the magnitude of the loss created by combination bidding would depend on which licenses were eligible for combination. One proposal would be to make all combinations of licenses eligible, but that has practical difficulties. It would allow the possibility