

AUCTIONS FOR UNIVERSAL SERVICE OBLIGATIONS

Dennis Weller
Chief Economist
GTE

600 Hidden Ridge
HQE01J25
Irving, Texas 75038

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This paper proposes the use of auctions for determining which carriers should undertake a universal service obligation, and what compensation they should receive for performing this function. The auction would reveal carriers' valuations of the USO, determine the number of USO providers endogenously, and provide an alternative to traditional cost-of-service regulation.

INTRODUCTION

At the 1996 ITS conference in Seville, I presented a paper on the problem faced by a regulator seeking to manage the transition from a regulated monopoly environment to one of competition. In that paper, I drew a distinction between the aspects of traditional regulation that were intended to control the incumbent's exercise of market power, and those that were designed to achieve socially desirable policy objectives, such as universal service. For the transition to competition to succeed, asymmetric measures to control market power would have to be phased out as the incumbent's market power diminished. However, if the regulator wished to maintain some market interventions in the new competitive market, in order to meet social policy goals, then a new method for this would have to be devised – one which did not rely on the market power of the incumbent.¹ I suggested that a process of competitive bidding would allow the regulator to assign the universal service obligation to carriers, and to determine the compensation those carriers should receive.

Shortly after ITS '96, I began a project, working jointly with Paul Milgrom and David Salant, to develop an auction framework for this purpose. In December, 1996, Paul Milgrom delivered the Nobel Lecture here in Stockholm, in which he provided an overview of the application of auctions to universal service.² This paper will describe the specific auction mechanism for we have since developed.³

¹ In terms of the taxonomy developed by Cherry and Wildman (1996), the traditional pervasive regulation imposes a universal service obligation on the incumbent which is asymmetric and unilateral. The challenge for the regulator is to develop a new approach in which the obligation is symmetric (in that it can be applied to firms other than the incumbent) and multilateral (it involves a transaction in which the carrier takes on the obligation in return for compensation).

² See Milgrom (1996). Milgrom was invited to deliver the lecture in honor of William Vickrey, who had died before he had the opportunity to come to Stockholm himself. The design of a universal service auction provides a practical application of Vickrey's important work in the field of auction theory.

³ Padmanabhan Srinagesh and Valter Sorana have also participated in this project. In addition, I have benefited from discussions with Evan Querel, Greg Rosston, Barbara Cherry, and Jeremy Bulow.

I propose that the universal service obligation for small geographic areas should be put up for auction when those areas are nominated for bidding by one or more of the carriers. The auction would be a single-round, sealed bid; the form of the bid would be the per-customer support amount the carrier would require. The auction is designed to allow more than one carrier to win, with the number of winners in a given area determined endogenously. Each carrier chosen as a universal service provider is paid the amount of the highest accepted bid. A limited form of conditional bidding is used to take account of possible economies of density. Repeated auctions over time allow this framework to adapt to changes in technology, costs, or policy objectives. Although the program described here is designed to be compatible with a competitive local service market, I also see it as a mechanism for achieving the transition to that competitive market.

Before I describe the auction design in more detail, it will first be necessary to provide some background on the universal service policy objective the auction is designed to achieve.

MARKET INTERVENTIONS FOR UNIVERSAL SERVICE

A. Universal Service Through Pervasive Regulation

In many countries, authorities have, as part of their pervasive regulation of the incumbent, intervened to hold rates for basic local service at levels below those that would have been set by firms in a competitive market. In order to ensure revenue sufficiency, these regulators have allowed incumbent firms to set relatively high prices for other services the firms provide, such as interexchange access, long distance service, some local rates for business customers, and “vertical services” such as calling features.

The effects of this policy in the United States are quite striking. Figure 1 gives an overview of the market intervention on prices, by major service category, for the areas in 28 states where GTE provides local telephone service as the incumbent. The bars show contribution, calculated as the difference between revenue at current rates and direct or TSLRIC cost, in dollars per year by category. Reading from left to right, Figure 1 shows very large

positive contributions for interstate switched access,⁴ intrastate switched access,⁵ toll calls within GTE's serving areas, and vertical services. The bar on the right hand side of Figure 1 shows a very large negative contribution for residence local service. For comparison, Figure 2 shows what the contributions would look like if rates were rebalanced to yield the same total revenue, but with a constant percentage markup over TSLIC by service category. Taking these constant-markup rates as a rough guide to market rates, the differences between the two sets of bars provide an indication of the degree to which regulation has intervened to displace the rates from these market levels.⁶ For the leftmost category alone, interstate switched access, the difference in revenue between the two price levels is about \$1.2 Billion per year for GTE; for the local carriers in the U.S. as a whole it is more than \$6 Billion.⁷

While Figures 1 and 2 reveal a very large flow of funds across services, they obscure what is going on in two important ways. First, the charts show aggregates across geographic areas; thus, they fail to show the very large differences in cost from one area to another. Recent cost modeling has suggested that costs can vary by an order of magnitude, even within the serving area of a rural central office. Figure 2 suggests that, on average, residential local rates have been set almost \$23 below their market levels. However, in some low-density rural areas this difference might be much larger – several hundred dollars per month -- while in some urban areas residential rates may be much closer to, and even above, their costs. Second, the Figures are averages across individual customers. In aggregate, the two price vectors shown in the charts yield the same revenue. However, the distribution of usage for access, long distance, and vertical services across customers is highly skewed; for example, only six percent of the end-user

⁴ This is access provided through the switched telephone network for long distance calls that originate in one state and terminate in another. These rates are regulated by the FCC.

⁵ This is the same access for long distance calls that originate and terminate within the boundaries of a state. These rates are regulated by the state regulatory commission in each state.

⁶ If anything, these figures are probably conservative as an indication of the difference between current local rates and market levels. Local service is the least elastic of the categories on the chart; if firms take demand characteristics into account in determining their margins, then the markup for local service would be higher than the uniform level shown here.

⁷ This figure includes only rates for the larger service areas designated “nonrural” under the 1996 Telecommunications Act; the national total would thus be somewhat higher. On the other hand, the current access rates include recovery of a portion of the costs of a new fund to subsidize telecom services for schools and libraries.

locations GTE serves generate almost half of the demand for interexchange access. As a result, the two price vectors produce very different revenues when the demand of individual customer is evaluated. If, for example, a new local carrier were to enter GTE's serving area in Texas, and attempt to serve all of GTE's local residence customers, it would find that the revenue from all services would fail to cover costs for 78% of those customers.⁸

This system of price manipulation has been sustainable, if inefficient, in a sole-provider environment. With the introduction of competition, two new concerns arise. First, the high margins for services on the left side of Figure 1 will induce firms to focus their entry strategies on the minority of customers who have high demand for those services.⁹ Second, the low current prices for local service will largely preempt entry into local service markets. This will especially be true for rural areas where costs are high, relative to the average rates.

B. The Universal Service Obligation To Be Auctioned

For the purposes of this paper, I will assume that regulators wish to continue the existing market intervention in some form. This means that the generally available rate for basic service in many areas will be held below market levels; there may also be requirements with respect to quality, tariffing, and other non-price attributes of the service. By making this assumption, I do not necessarily mean to endorse this policy; however, I believe that it is realistic to assume that important elements of the current market intervention will persist for a long time.

Many observers have suggested that it is not necessary to subsidize local price levels generally in order to maintain a high level of subscription, and that some more narrowly targeted program, perhaps tied to the customer's income level, would achieve the policy goals.¹⁰ Further, a recent paper by Robert Crandall indicates that the distributional effects of rate rebalancing

⁸ For this analysis, I have assumed that the competitor's costs are the prices for unbundled network elements that have been established on an interim basis by state regulators in Texas. This is a conservative basis for calculating the entrant's costs; if GTE were to sell its current output vector in Texas at those prices, GTE's revenue would be about 36% lower than it is today.

⁹ A recent article in the trade press reports that in the first quarter of 1998 new entrants in the U.S. added more new business lines than did the incumbent local telephone companies.

¹⁰ There are programs in the U.S. which provide additional funding to customers based on their income level; these are generally referred to as lifeline programs. I will not discuss these plans here.

would not be as severe as many policy makers appear to fear. While the distribution of usage is highly skewed, if customers are segmented by income, Crandall finds a mix of high and low volume customers within each income group. For the lowest income segment Crandall examines, those with household income below \$10,000 annually, 45% of the average monthly bill represents charges for long distance service. For this reason, Crandall finds that if rates were to be rebalanced, without any universal service mechanisms to cushion the effects, the average welfare loss among the lowest income group would be only about \$6 per year, compared with an average expenditure for telecommunications among that group of about \$490 per year. What's more, although one of the objectives is to support service for high-cost rural customers, a system which generates the necessary funds through high long distance rates will place a disproportionate burden on those same rural customers, since they tend to make more long distance calls than subscribers in urban areas.

All of this notwithstanding, the political economy of low basic service rates is powerful, and persistent. In a recent paper, Gerald Faulhaber explained the preference for low local rates in the context of a simple median voter rule model. In this model, candidates for regulatory commissions announce, as their "platform," the price vectors they would establish if elected. Because local service is consumed by almost all voters, and usage of other services is less widespread, the median voter model picks candidates who endorse low local rates. Over the last few years, usage of services other than basic local service has become more democratic; that is to say, the distribution has become more uniform. As this trend continues, the public policy emphasis on low subscription rates may diminish. However, it is likely to be with us for a long time. Indeed, the Telecommunications Act of 1996 establishes universal service as a national goal, and requires both federal and state regulators in the U.S. to ensure that rates for basic local service are affordable, and also that rates in rural areas are "reasonably comparable" to rates in urban areas.

The auction framework described here is designed to allow a regulator to intervene in the market for basic local service in order to impose a universal service obligation on carriers, while minimizing the distortion caused by the intervention. The nature and extent of the intervention are not specified; it is simply assumed that the regulator will make public the terms of the obligation, so that firms will be able to evaluate what they are bidding for.

C. The Need For An Obligation To Serve

I have described the market intervention as taking the form of a universal service obligation. I envision this obligation as the auctionable item for which carriers would bid. Let me explain why I believe that an obligation to serve is necessary to sustain an intervention in the price or terms of basic local service.

Local customers are extremely heterogeneous with respect to the cost of serving them, and with respect to the amount and mix of services they buy. Looking at small geographic areas, as I have suggested, will reduce, but not eliminate, the heterogeneity on the cost side. On the demand side, even customers who are close neighbors may vary dramatically in their purchases. Suppose we construct a variable S , whose value for each customer in an area is the amount of the side payment that would be required to make a carrier just willing to serve that customer at the local price and terms required by the regulator. Within any given area, S would vary from a large positive value to zero, reflecting the heterogeneity of the customers.

Given perfect information, the regulator could set a customer-specific universal service payment equal to that customer's value of S . No obligation to serve would then be necessary, since supply would be forthcoming voluntarily. However, such information does not exist; even if it did, a plan administered at the individual customer level would be quite complex. Instead, real-world universal service programs generally provide the carrier with an average support payment per customer. Suppose that average payment is SA . In the absence of a service obligation, customers with values of S above SA would not be served. The only way to ensure that everyone is served would be to set SA at the maximum value of S ; this would be very expensive, since the authority would overpay for all but one of the customers. The only way to ensure that all customers are served in return for an average payment is to link the receipt of the payment to an obligation to serve any customer who requests service.¹¹ In such a scheme, the regulator effectively shifts its information problem onto the carrier; the carrier, in turn, performs

¹¹ In the U.S., incumbent carriers generally have such an obligation today. However, tariffs usually contain provisions which impose "line extension" charges if the customer is located more than a certain distance from existing facilities. This adds considerable complexity to the problem of devising a symmetric obligation for carriers in a competitive market, and in the

an averaging function. It makes money on some customers and loses money on others, something it would normally be unwilling to do, but which it accepts in return for the compensation offered by the regulator.¹²

For such a scheme to be sustainable, the obligation must be symmetric for all carriers who receive the support payments. If only carrier A has an obligation (say, because it is the incumbent) and carrier B does not, then carrier B can selectively serve customers with values of S below S_A , leaving those with higher values of S to carrier A. This is classic “cherry-picking” behavior. The offer of ubiquitous service at a uniform price by carrier A will not discipline this behavior. Because the customers’ demands are heterogeneous, carrier B can offer nonlinear packages of local, long distance, video, and so on, which are attractive only to customers with high demand for services with high margins. Even if, in setting S_A for the area, the regulator can accurately estimate an average value for S , the support received by carrier A will be less than the sum of the S values for its customers, and the amount received by carrier B will be greater than the sum of the S values for its customers.

In order for symmetry to be maintained, the obligation must be crafted in such a way that each carrier faces similar probabilities of serving customers with different values of S . This can never be achieved precisely, but could be approximated by a requirement that each carrier offer a service that a) meets the basic service definition established by the regulator; and b) is offered to all customers in the area at a price no higher than a ceiling set by the regulator.¹³

D. Universal Service Obligations and Market Structure

interests of simplicity I will assume here that the carrier must serve any customer in a given area at a single price.

¹² Of course, even in an unregulated market, there may be losses on certain customers, because practical limits of transactions costs and information make some price averaging necessary. However, these effects are small in scale compared to the gains and losses created by the current price system in telecommunications.

¹³ The objective here is to ensure that the obligation itself does not create an asymmetry among the carriers who take on the obligation. We nonetheless want the carriers to compete on the basis of price, innovation, service packaging, and so on, so there is a tradeoff. I believe that the weak constraints suggested here represent a reasonable balance. Carriers would be able to reduce price below the constraint, add features to the package beyond those required, and offer additional packages at higher prices.

One objective of any universal service program should be to minimize any resulting distortion in the market outcome. However, it is inevitable that the universal service support will affect market structure to some degree. If the market intervention is significant (for example, if local rates are held far below their market levels) then it will be very difficult for a carrier to compete as a ubiquitous provider of basic service without the support payments. If one wished above all to avoid asymmetry among carriers resulting from universal service support, one would make the universal service obligation mandatory for all carriers as a condition of entry. But this would introduce a new distortion, because niche entry by carriers wishing to offer different services, or focus their efforts on certain market segments, would be precluded. On the other hand, for reasons discussed above, it is not possible to achieve the universal service policy goal unless any carrier that receives support payments also undertakes an obligation to serve.

The middle ground, which I explore here, is a two-tiered market structure. Any firm can enter, without taking on any universal service obligation, and can offer any service it wishes, at any price. A subset of carriers agrees to take on the universal service obligation, in return for compensation. The auction provides a means for selecting these carriers, and for finding the level of compensation needed to make them willing to accept the obligation.

The next question is: what is the subset of carriers that should undertake the obligation? Traditional regulation has awarded an exclusive franchise, on the assumption that this would allow the carrier to realize economies of scale and density. Most auctions award the item being sold to a single bidder, and such an auction would be a method for selecting a sole universal service provider. Such an auction would create competition among bidders for the right to receive the support payments. This competition “for the market” would help to minimize the amount of support needed.

However, if we wish to design a universal service program that is compatible with competition, it hardly seems reasonable to begin with a model that assumes a single universal service provider. If only one carrier is supported, then customers may be deprived of the benefits of competition “in the market”, in the form of ex post competition among the supported carriers. The strength of this effect will depend on the level of the market intervention, and hence of the support being provided. On the other hand, if supported carriers split the market, then each carrier may experience higher costs.

Rather than have the regulator choose a priori what the number and identity of the universal service providers should be, the auction design proposed here seeks to make this selection endogenously through the market process of the auction itself. This framework allows different market structures to be chosen in different areas, depending on the cost characteristics of the area, the relative efficiencies of the firms, and other factors. At the same time, allowing more than one firm to win the auction creates new challenges with respect to preventing collusion and ensuring symmetry among the winners. I will discuss in more detail below the basis on which these endogenous choices would be made.

WHY AN AUCTION?

Most of the discussion about universal service, in the U.S. and elsewhere, has focused on estimating the cost of the basic service, and deriving support levels by comparing this cost to some estimate or assumption regarding revenue. Compared to this alternative, an auction offers a number of advantages over traditional cost-of service approaches as a means to select universal service providers, and to determine the level of the support payments.

In a recent survey, Elmar Wolfstetter cited three reasons for the use of auctions:

- Speed of sale,
- To reveal information about buyer's valuations (in this case, sellers' valuations)
- To prevent dishonest dealing between the seller's agent and the buyer (here, the buyer's agent and the seller).¹⁴

The application of auctions to universal service has all three of these advantages.

A. Speed

With respect to speed of sale, competitive bidding offers a means to settle long-standing regulatory controversies, and allow an effective universal service mechanism to be put in place. In the U.S., debates over the cost and revenue estimation necessary for the traditional approach have created a procedural logjam. The FCC, for example, was charged by Congress with adopting its version of a universal service plan within 18 months of the passage of the Telecommunications Act of 1996. As of this writing, more than 28 months have passed, and the

¹⁴ Wolfstetter (1996)

FCC has yet even to choose the cost model it will employ, or to gather any data on the revenue to which these costs will be compared. Announcements in the last week suggest that the process will be delayed for at least another year.

Recall that the current prices, on which an implicit method of support is built, provide incorrect incentives for investment and entry. Implementing an explicit universal service plan would allow the prices for services on the left of Figure 1 to be rebalanced downward toward the “market” levels I have indicated in Figure 2. This would remove artificial incentives to enter those markets. At the same time, explicit funding would associate revenue with the provision of local service which would compensate carriers for the costs of providing it. Until this can be done, entry into local markets will be preempted. Delay in correcting these price signals will be costly, in the sense that efficient development of competition in these markets will also be delayed.

B. Revealing Carriers’ Valuations

Auctions provide a means of revealing carriers’ valuations of the universal service obligation itself. The current process has been lengthy precisely because it has proven extraordinarily difficult for regulators to determine these valuations through traditional means. For example, in a 1996 case before the California utility commission, parties presented their estimates of the funding needed in California. Pacific Bell estimated this amount at \$1.7 Billion annually; AT&T’s estimate was zero. Last week, in a hearing before FCC and state commissioners, not much had changed. One party (me) estimated the amount of funding the FCC should provide at about \$6 Billion; AT&T suggested that the funding should be zero.¹⁵ Clearly, a regulator faced with a record like this has two things: a free hand to choose any number within a very wide range, and a great deal of uncertainty as to whether the number chosen can possibly be correct. Similarly, the FCC’s difficulty in choosing a cost model stems from the fact that the available models, each of which has been sponsored by an interested party, differ so drastically in their results.

¹⁵ If the FCC did not care for either of those numbers, there were other parties in the room proposing \$600 Million, \$2.8 Billion, and \$4 Billion.

Competitive bidding obviates the need for the regulator to make such unappealing choices.¹⁶ Each bid will reflect the bidder's own expectations with respect to costs as well as revenues.¹⁷ Further, bidders will also consider any other factors which they may find relevant, but which the traditional approach cannot include. For example, if the regulator establishes a quality requirement for universal service that the carrier would not choose to meet in the absence of the obligation, or if dealing with the regulator is burdensome, the bid would reflect the carrier's assessment of these factors.

C. Agency Incentives

In the discussion above, I have described universal service as an exercise in correcting relative prices so that carriers will have correct incentives for entry and investment. Another useful way to look at universal service is as a procurement exercise. The regulator, acting as agent for the public, wishes to have carriers perform a function – the universal service obligation -- which they would not undertake voluntarily without compensation. It seeks to select vendors to provide this service, and to determine how much they should be paid. Seen in this light, the choice with respect to the number of universal service providers in an area is the same as the choice of sole sourcing versus multiple suppliers for a government supply contract.¹⁸

Since the regulator is acting as the agent of the public in this procurement process, some of the same concerns which motivate use of competitive bidding in procurement apply here.¹⁹ It

¹⁶ As will be seen below, the auction design proposed here does not do away with cost models entirely, since it uses the traditional cost-revenue comparison to establish an initial level of support. However, it does provide a means for correcting errors in that amount, and for adjusting the support level over time, without recourse to the cost model.

¹⁷ Milgrom (1996) presents an auction design in which each bidder has a dominant strategy. However, there may be a tradeoff between achieving symmetric treatment of winning bidders, which the design presented here does, and arranging for dominant strategies to hold.

¹⁸ Dana and Speier (1994) analyze a problem of government procurement, and develop a design for competitive bidding which seeks to make the choice of sole sourcing or dual sourcing endogenous. The analysis is similar in many ways to that developed independently by Milgrom (1996).

¹⁹ Partly to make the auction process more transparent, in the design presented here the item to be auctioned is well specified in advance, and the bidding is one-dimensional. The selection rule for determining the winner can therefore also be specified in advance, and requires no scoring rules or subjective judgement on the part of the regulator.

is unusual for a government agency to specify what is to be purchased, and also to be able to determine the price the government will pay. The regulator will naturally wish to deliver high-quality service to its constituents, but this may involve a difficult policy choice between higher local prices or a substantial universal service fund. This choice can be made more palatable by simply moving the constraint through a change in the assumptions with respect to revenues or costs in the traditional analysis. This is a form of opportunistic behavior in which part of the cost of universal service is hidden elsewhere in the system, an approach made easier by the extremely obscure nature of the universal service calculations now being debated.

An auction approach, in contrast, imposes a healthy market discipline on the regulator. The regulator gets to specify the universal service obligation - how the local service will be defined, what the price ceiling will be, and so on – but the market, through the bidding process, will decide how much funding will be required to carry out those requirements. Knowing this, it is likely that regulators will be more careful to specify only those requirements whose benefits justify their costs.

D. Adjustment Over Time

Another advantage of the auction approach is that it provides a means for correcting any errors in the support amounts that are initially determined. Further, repeated auctions over time will incorporate any new information about new technology or changes in input prices. If regulators change the terms of the universal service obligation – say by adopting a more advanced definition of basic service – subsequent bids will automatically reflect this change.

One of the difficulties in using a cost-of-service approach to universal service is that it will tend to perpetuate cost-of-service regulation indefinitely, since any adjustment to the support amount over time will require revision of the cost and revenue estimates. An auction mechanism would provide an ongoing means for establishing universal service support levels as regulators move away from reliance on traditional regulatory tools.

E. Other Advantages

In addition to advantages outlined above, the auction approach provides a means for selecting the low cost providers to undertake the universal service obligation, thus minimizing

the cost of supply. The traditional cost-of-service approach does not offer any means for doing this. Instead, the traditional method would choose a take-it-or-leave-it support amount, which would have to be available to any carrier. If the amount is set too high, the production of inefficient firms will be subsidized; if too low, production by efficient firms will be preempted.

Finally, the auction provides the regulator with a means of determining what support amount is sufficient, which may be important for legal as well as economic reasons. The auction design proposed here will never require a carrier to undertake the universal service obligation for less than the amount of its own bid. The auction thus ensures that each carrier's support amount is "sufficient" in its own estimation.

OBJECTIVES OF THE AUCTION DESIGN

As discussed previously, the design of a universal service auction involves tradeoffs among a number of objectives. In particular, three major objectives were balanced to arrive at the design described here.²⁰ They are as follows:

First, we wish to promote ex post competition "in the market" among the carriers selected to provide universal service. The benefit from this competition is assumed to increase with the number of carriers chosen, but with diminishing returns; each carrier added provides less incremental benefit than the last.

Second, we wish to minimize the cost of supply. Because economies of density are expected to be present, it is assumed that the average cost increases as more universal service providers are chosen.

Third, we wish to minimize the amount of support, so as to minimize the deadweight losses involved in collecting and distributing it.²¹ The amount of support is minimized through competition "for the market" in the bidding process.

²⁰ Milgrom (1996) analyzes an earlier form of this objective function using the optimal auction framework developed by Myerson (1979). The auction design described here is a simplified adaptation of the results of such an optimization.

²¹ It is important in this context to remember that the need for universal service funding is largely determined when the extent of the market intervention is specified by the regulator. If, for example, local prices are to be held well below market levels, then a large amount of support will be required. The current implicit method of collecting the necessary funds by charging higher prices for other services is quite inefficient. For a given support requirement, it certainly

There are other design considerations that are not included in this objective function. The auction should be structured to minimize opportunities for collusion by the bidders. The feature of the proposed auction that allows more than one carrier to win, and that provide the same per-customer support payments to all winners, gives rise to concerns about collusive behavior that the auction design must address.

The auction must be simple, so that the costs both for the administrator and the participants are reasonable. If, as I suggest, the auctions are held for small geographic areas, so as to reduce the heterogeneity among customers within the area, then it will be necessary to hold a relatively large number of auctions, and the value of the item auctioned in each will be relatively small.²² It is therefore important that the costs of the auctions themselves be minimized.

Because we desire to have, if possible, effective ex-post competition in each of these areas, we should also arrange the auction and the resulting support payments to be as symmetric and competitively neutral as possible. At the same time, in order to be practical, an auction framework has to recognize that the incumbent local carriers begin with an asymmetric obligation at the start of the process. Indeed, the auction plan provides a mechanism though which incumbents can withdraw from their obligations, and be replaced by new carriers. This is a process which is contemplated in the 1996 Telecommunications Act, but the law does not spell out the means by which this would occur.

The auction should be designed to perform well given the expected cost characteristics of the markets for basic local telecommunications for which the universal service obligations are to be assigned. Two such concerns will be discussed here. First, there are likely to be economies of density; a carrier's unit cost will increase if the number of customers it serves in a given area declines. Thus, each bidder's cost will be affected by the number of competitors with whom it is sharing the market. Second, I have recommended that the obligation should be auctioned for

creates greater deadweight losses than an explicit funding mechanism that collects the same funds through a broad-based surcharge or tax. Thus, minimizing the proportion of the universal service funding that is provided through explicit means does not minimize deadweight losses.

²² There are other good reasons for assigning the universal service obligation, and determining support, over small areas. Since any carrier that accepts funding will be required to offer service throughout the area, keeping the area small will minimize the barrier to entry this might pose for an entrant.

small geographic areas. While dividing territory into small units helps by allowing different support levels to match differences in cost, it may also create dependencies, or synergies in cost among the areas, so that the bids submitted for different areas may no longer be independent.

Finally, the advantages already listed for auctions are also objectives for the auction design. We wish auctions to assure sufficiency of support, to correct initial support estimates where necessary, and to adjust support amounts to reflect changes over time in costs, input prices, technology, and the definition of basic service.

A. Comparison With Frequency Auctions

Auctions have found a number of different applications in the regulation of various industries. Auctions have been used to assign rights to use scarce frequencies, to match demand and supply for electricity on a power grid, to value stranded assets, and to choose airline companies who will provide subsidized service on low-density routes. Of these, the application which has been most widely used, and which has received the most attention, is the auctioning of spectrum. Because the structure of these auctions is familiar to most of us, it may be useful to compare and contrast the spectrum auctions with the universal service problem I am addressing here.

In the frequency auctions, as here, rights (or obligations) are to be assigned for geographic areas. However, in order to provide a wireless service which is attractive to consumers, a carrier must be able to cover a serving area of some size; the size of the serving area is one dimension of the quality of the service. Thus, in the frequency auctions, spectrum rights for relatively large geographic areas have been sold, and the auctions have been designed to allow bidders to take account of synergies among these areas – in this case, synergies on the demand side. In contrast, as long as interconnection agreements are in place, the quality of a fixed wireline service does not vary with the size of the carrier's serving area. This makes it possible to auction universal service obligations for smaller areas, although it may create additional concern with respect to synergies on the cost side.

Because the wireless services to be offered (such as PCS) have generally been new ones, it has been felt by the auction designers that bidders might have considerable uncertainty about the value of each property, and that the common value component of each bidder's valuation would be relatively high. Simultaneous multiple-round auctions have often been used, to allow

information to be generated through the bidding process, as well as to allow bidders to modify their strategies to take account of synergies across areas. Since the value of each property auctioned has been relatively high, the costs of a multiple-round auction, both for the administrator and the bidders, have not been a significant concern.

Several different considerations apply to the universal service auctions considered here, and these have led to a difference in the proposed auction design. First, unlike the frequency auctions, I propose here to allow more than one bidder to win, to share the universal service obligation, and to receive the same level of support per-customer. This creates concern about possible collusion that is not present to the same extent in the frequency auctions.²³ If carriers can find a way to collude, each can share in the benefits without the need for any side payments among the parties. For this reason, the design I suggest here is a single-round, sealed bid auction, which would be much less vulnerable to collusion than the multiple-round design used in the spectrum auctions. Signaling through the bids themselves is not possible, any firm can exclude others by defecting, and there are no subsequent rounds in which the excluded players could recover or discipline the defector.

In the framework I propose, auctions will be held at regular intervals over time, and small areas will be included in these auctions as firms nominate them for bidding. This raises the possibility that firms might collude over time in these different auctions. I believe that such collusion would be very difficult. The number of small areas to be auctioned is quite large – depending on the geographic unit chosen, there could be as many as three hundred thousand in the U.S., although only a small subset is likely to be auctioned at any given time. The number of possible bidders in any auction is also large – it would include the 1,300 incumbent carriers, many of whom are already venturing into their neighbors' territory, new local providers, long distance companies, wireless carriers, and cable companies. Any given area could be nominated by any one, or more, of these firms. This is not to say that each auction will necessarily have a large number of participants. It does mean, however, that it would be difficult for a set of firms seeking to collude in the auction for area A to control when area B might be nominated, or how many firms not party to the collusive agreement might participate in the auction for B.

²³ Of course, even in the frequency auctions, there has been some concern raised over collusive behavior.

Because the service to be provided by the universal service carrier(s) is the same basic service that is provided today, the common value aspects of the cost and demand for the service should be less significant than was the case in the frequency auctions.²⁴ This in turn reduces the value of generating information within multiple auction rounds, and makes the use of a single round design more appropriate.²⁵ Further, the simplicity of the single-round approach is appealing here. There are many properties to be auctioned, each of which is likely to have a small value, compared to the average value of the properties in spectrum auctions. The single-round, sealed-bid design will help to keep the costs for both the administrator and the bidders small relative to the value of the obligations being auctioned.

ELEMENTS OF THE AUCTION DESIGN

I will now describe the specific elements of the auction I propose. First, the regulator would establish ground rules for the auction, and would prequalify prospective bidders. Second, a nomination process would be used to determine which areas would be auctioned at any given time, and bidders would be registered. Third, the auction itself would be held. Finally, the results of the auction would be implemented. I will discuss each of these in turn.

GROUND RULES AND CERTIFICATION OF BIDDERS

Before auctions can begin, there are several preparatory steps the regulator must take:

The regulator must establish the terms of the universal service obligation, and publish those terms. They could be reviewed and revised periodically, but the obligation in effect at the time any given auction is held will govern that auction.²⁶

²⁴ This is not to suggest that new technologies could not be used to provide the current basic functions.

²⁵ Note that, because large numbers of areas would be auctioned over time, it would be possible for a bidder in a given auction to learn what values had been placed on areas with similar characteristics in previous auctions. Once a sufficient base of this information has been assembled, it might also be possible for a regulator to use this information to set support levels in areas which have not yet come up for auction.

²⁶ More specifically, the relevant obligation would be the one in effect on the first day of the “window” for nomination that precedes the auction (more on the nomination process below.)

The regulator would choose the geographic units for which the universal service obligation would be auctioned. Preferably, these would be some existing standard unit, such as those established by the Census Bureau in the U.S., or the area served by an existing central office. These would be known by the firms, but not open to manipulation by any of the firms.

The regulator would announce the procedures for the auction in advance.

Finally, the regulator would certify carriers as qualified bidders. (I will refer to these as QBs.) This will ensure that any carrier that wins the auction will have the capability to fulfill the terms of the obligation. I suggest that this certification be done in advance, rather than as part of any particular auction; this will save time during the auction process, and would be less costly, since each firm would be certified only once. Only QBs would be permitted to nominate an area to begin the bidding process. Note that this certification might employ somewhat different criteria than those used to certify a carrier simply to operate. Today, if a new carrier enters, the regulator can still rely on the incumbent to carry out its social policy goals. But one possible outcome of the auction is that the incumbent might lose; this means that the regulator must be confident that any QB could perform the universal service role by itself, in the absence of the incumbent.

THE NOMINATION PROCESS

One way to implement universal service auctions would be simply to open every one of the small geographic areas to bidding at once. The difficulty with this is that, in order to have an auction, one must have bidders. The development of local competition is likely to occur gradually over time. New firms will enter first in limited markets, and then proceed to additional areas through some process of diffusion. Thus, entrants will appear in each area, and be willing to participate in bidding for a universal service obligation, at different times over the next few years. In some areas, new firms might never choose to enter. It would be very difficult for the regulator to anticipate the timing and location of competitive entry. Therefore, I propose a flexible process whereby firms could nominate areas for bidding when they are ready to participate. This would allow the firms themselves, rather than the regulator, to determine the number and location of the auctions over time. It would provide entrants with a means for adjusting the support level in a given area as a condition of its entry there. It would also spread

out the auctions over time, so that the regulator does not have to manage auctions for all of the small areas at once.

I propose that the regulator, at the outset of this process, would establish an initial level of universal service support for each area, based on a traditional comparison of estimated costs and revenues. This amount would be paid to the incumbent for each customer served. When an entrant is ready to undertake the universal service obligation in a given area, it would prompt bidding by nominating that area. The results of the auction would then select the universal service providers for the area, and set a new level of support; these results would supercede the initial support amount. There would also be a provision which would allow the incumbent to initiate the bidding process by applying to withdraw; I will discuss this further below.

A. Windows for Nomination

I suggest that the entire process I describe here, from nomination through bidding to implementation, be held on a regular schedule, say twice each year. The dates on this schedule would be announced in advance. The process of this “bidding cycle” would begin with a preannounced “window” of perhaps two weeks, at six month intervals, during which any QB could nominate one or more of the small areas.²⁷ This allows all of the areas to be auctioned in any six-month period to be handled together, simplifying administration. The incumbent in each area would not be allowed to nominate that area at this point in the process. A moderate deposit would be required, refundable if the carrier subsequently submits a qualified bid; this would discourage frivolous nominations. At the close of the nomination window, the regulator (or a third-party administrator appointed by the regulator) would announce the areas nominated, and the identities of the QBs submitting nominations.

If an auction has previously been held in an area, and if that auction resulted in a change in the number or identity of the universal service providers, then no nominations will be accepted for that area for a period of three years. This provides prospective bidders with a “contract” period on which they can base their bids. For example, it provides some idea of the time interval over which the bidder might be able to recover investments made to satisfy the obligation. In

choosing this “contract” period, there is a tradeoff between allowing an adequate time to amortize these investments, and allowing new firms who enter after the first auction to participate. I suggest three years as a reasonable balance between these objectives.²⁸ However, if an incumbent were to be the sole winner of an auction, it would not thereby be protected from having another entrant nominate the area in the next six-month “window”.

B. Reserve support amounts

At the same time that nominations are announced, the administrator would also post reserve support amounts for each area nominated. Qualified bids for that area may be no higher than this amount. Actually, the announcement of the reserves would be a formality, because I propose that the reserve for each area should be calculated according to a formula known to all the parties, so that anyone can determine what the reserve would be for any area.

The reserve would be arrived at by taking the sum of the current price ceiling and the current support level in the area, and multiplying that sum by a predetermined number R . The product would then be added to the current support amount to arrive at the reserve support level for the auction. For example, if the current rate ceiling were \$20 and the current support level \$10, and R were 0.2, then the reserve support level would be \$16.

C. Registration of Bidders

Once the nominations have been announced, the administrator would open another “window” in time in which any QB could register to bid for any of the areas nominated. This second process allows any qualified firm to participate in the auction, so that a QB will not gain a first-mover advantage by nominating an area. At the end of the registration window, the administrator would announce all of the qualified bidders for each area.

²⁷ A firm whose business plan called for a certain serving area could get out a map, identify the set of the regulator’s small areas which most closely approximated the firm’s desired serving area, and nominate those areas.

²⁸ A possible variation would be to establish a somewhat shorter “contract” period after the first auction held in a given area, and then a longer contract period after any subsequent auctions. This might be based on the belief that additional entrants are most likely to make their appearance during the first few years.

D. Application to Exit

If no nominations are submitted for a given area, then the incumbent can initiate a somewhat different process by applying to exit. By doing so, the incumbent is informing the regulator that it no longer wishes to have the universal service obligation in that area, at least not at the current support level. When an application to exit is received, the regulator will then ask if any QB is willing to undertake the obligation in that area for the current support amount. A window would be opened for QBs to respond. Depending on the response, three outcomes are possible:

- If one QB volunteers, then that carrier will become the only universal service provider in the area, and will receive the same per-customer support amount the incumbent had been getting. The incumbent is excluded; it has no further obligation, but also receives no support.
- If more than one QB volunteers, then those QBs will participate in an auction to determine which of them will undertake the obligation. Neither the incumbent, nor any other carrier, will be allowed to take part in this auction. The reserve will be set at the incumbent's current support level, since all of the participating firms have already indicated that they are willing to serve for that amount. The details of the auction would otherwise be like the auction described in the next section.
- If no QB volunteers, then the area will be deemed nominated, and a window will be established for prospective bidders to register. The details of the auction would then be like the auction described in the next section.

The application to exit provides the incumbent with a means to prompt bidding on an area, if for some reason entrants have chosen not to nominate the area. However, the process described here imposes a certain discipline; the incumbent must feel confident that the current support level is so low that no one will be willing to serve for that amount. If the incumbent applies to exit in areas where the existing support is in fact sufficient, it runs the risk of being excluded from that support altogether.²⁹

²⁹ This discipline will not be effective in areas where the initial support amount is zero. I discuss below the issue of bids at zero.

THE BIDDING PROCESS

Once the registration of bidders has been completed, the auction can be held. All of the areas nominated in a given six-month period will be auctioned on a preannounced date, in separate, simultaneous auctions. The auction will be a single-round, sealed bid. The form of each bid will be the monthly per-customer support amount the QB requires in order to undertake the universal service obligation in that area. Valid bids must be no higher than the reserve established for that area.

A. Conditional Bids To Reflect Economies Of Density

Each bidder would be asked to submit two bids for each area. The first bid would be the support amount the carrier would require if it is the only carrier selected in that area. The second bid would be the support amount the carrier would require if it is one of two or more carriers selected. The purpose of these conditional bids is to allow carriers to reflect in their bids the effects of any economies of density.³⁰ If the carrier must compete with other supported carriers in the area, then it would expect to serve fewer customers, and the density of the customer set it does serve will be lower than if it were the only universal service provider. The second bid allows the carrier to incorporate its estimate of the resulting difference in unit cost.³¹

B. Determination Of Winners

As discussed above, the auction is designed to allow more than one carrier to win; the number of bids accepted is determined endogenously. This is done by accepting bids that fall within a certain range of the lowest bid.

³⁰ The same idea could lead to separate bids for every possible outcome (1,2...n winners), but I suggest two as a reasonable compromise between simplicity and the need to capture economies of density.

³¹ David Salant has experimented with one of the universal service cost models to evaluate the magnitude of the economies of density. This was done by reducing the number of customers served in each area, while keeping the same areas, route miles and so on, to reflect the assumption that the carrier would not be able to predict which customers in the area it would serve, and would thus have to have facilities throughout the area. Reducing the carrier's market share in this fashion by half increased unit costs by 52%.

In order to select winners, the administrator would start with the first element submitted by each of the bidders. The QB with the lowest first bid is a winner. To decide whether any other bids are also accepted, the administrator then compares the other QB's second bid to the lowest first bid. The following acceptance rule is then applied:

- 1) If the second element of at least one competing bid does not exceed the lowest first element by more than $X\%$ of the sum of the lowest first bid and the basic service rate ceiling, then any bid whose second element falls within that range will be accepted.
- 2) If no competing second bids are within the range described in 1), but at least one second bid is within $Y\%$, then that bid will be accepted.
- 3) Otherwise, only the lowest first bid is accepted.

This acceptance rule is designed to approximate the optimal auction with respect to the objective function described above. It accepts more bidders where bids are close together, fewer when bids are farther apart, and only one when no second bid is within some reasonable range of the lowest bid. When bids are close together, the cost of having additional universal service providers, in terms of the additional support required, is relatively small. It therefore makes sense to benefit from the additional ex post competition “in the market” these additional providers may bring. When bids are far apart, the cost of this additional competition, in terms of additional support, increases, and the decision rule reduces the number of bids accepted. Eventually, where the range of bids is very wide, the regulator chooses to support only one carrier.

The bids are also the best indicator of the relative efficiency of the carriers, and the effect of adding carriers on the overall cost of supply in the market. Suppose, for example, we have already accepted two bidders, A and B, and are considering whether to accept a third, higher bid from carrier C. If we assume that C would take customers equally from A and B, then the cost of accepting C is the number of customers C attracts, times the difference between C's bid and the average of the bids from A and B.

By choosing the parameters X and Y in the acceptance rule, the regulator can adjust the tradeoff it makes between ex post competition and the minimization of cost. Wide acceptance ranges will, on average, allow more supported carriers, more competition “in the market,” and

higher costs. Smaller ranges will encourage more vigorous competition “for the market” in the bidding process, and limit support to the most efficient carriers, but may also limit ex post competition. In effect, the regulator must decide how much more it is willing to pay to have more competition in the market.

Note, however, that once the regulator has established the policy parameters, the auction will apply them to each area, and the outcome will depend on the cost structure of the carriers in each area, as revealed through the bidding. Many carriers may be chosen in one area, while a sole universal service provider is supported in another.

C. Determination Of The Support Amount

All firms whose bids are accepted will receive the same support amount for each customer they serve. This symmetry is necessary to ensure that the program is neutral with respect to ex post competition in the market. Each carrier that takes on the universal service obligation as a result of the auction will be required to serve any customer in the area who requests service. The support will thus be distributed among the carriers by the customers themselves as they choose among the supported carriers. If a customer changes carriers, the support will go with the customer; that is to say, the support is “portable” among the different universal service providers in a given area. The customer may also choose a carrier that is not a winner of the auction, but support will not be provided to that carrier.

The support will be established at the level of the highest accepted bid; this will be the first element if only one carrier is chosen, and the second element if more than one carrier is chosen. There are several reasons for choosing this payment rule:

First, it ensures that support will always be sufficient for each of the carriers chosen. No carrier is ever required to serve for a support amount lower than its bid.

Second, this approach approximates the outcome in a competitive market where firms have different costs. The price is set by the marginal unit, and firms with lower costs earn rents.

Finally, if certain assumptions are met, the expected value of the support will not depend on the payment rule chosen.³² The regulator is thus free to choose the payment rule to meet other objectives, such as competitive neutrality and sufficiency.

The acceptance rule is also designed to minimize any opportunity for a carrier to gain by manipulating the difference between the first and second elements of its bid. When more than one carrier is accepted, the lowest bidder is compensated for any loss in economies of density that may result from sharing the market, but the estimate of this effect used in determining the compensation is the one submitted by the carrier with the highest accepted bid. The second element submitted by the lowest bidder has no effect on the support amount.

E. Withdrawals

Once the auction results have been announced, I propose that the winning carriers should be given the opportunity to withdraw. Withdrawals will be sequential; the lowest bidder gets the first option to withdraw, then the second lowest, and so on. This provides some reward for being the lowest bidder. The payment rule will then be reapplied as if the withdrawn bid had not been made. However, the acceptance rule will not be reapplied; that is, a carrier that was not a winner before withdrawals cannot become a winner as a result of any withdrawals. Further, no area can be left without a universal service provider as a result of withdrawals; this means that, in some cases, the highest accepted bidder may not be permitted to withdraw.

The purpose of allowing withdrawals is primarily to take account of cost synergies across areas. A bidder may submit a bid for area 1 which would be predicated on the carrier also winning area 2. If the carrier does not win area 2, it may choose to withdraw from area 1.

F. Exceptions

If there are no qualified bids, or if the incumbent is the sole bidder, then the incumbent is required to continue as the universal service provider in the area. If the area was nominated by another carrier, then the incumbent will receive the support level in effect before the area was

³² This equivalency occurs because bidders will take the payment rule into account in formulating their bids. See Milgrom (1996), Vickrey (1961), Bulow and Roberts (1989).

nominated. If the carrier has applied to exit the area, and no other carrier has agreed to serve at the original support level, then the incumbent will receive the reserve support level.

These provisions recognize the asymmetric obligation with which the incumbent begins the process, and the practical reality that it is not acceptable for an area to be left without service at the terms the regulator wishes to maintain. At the same time, the rules provide a mechanism for support levels to be increased in areas where the incumbent applies to exit, but only after the process has taken a number of steps which entail risk for the incumbent.

IMPLEMENTATION OF THE AUCTION RESULTS

Once the auction results have been determined, a transition process will be necessary to implement them. It may be reasonable to vary the length of the transition, depending on the new market structure that is established by the auction. If the incumbent continues to perform as a universal service provider, a relatively short transition (say 90 days) may be sufficient for any new carriers to take up their responsibilities. However, if the incumbent is not selected, a longer transition (perhaps one year) may be needed for the newly selected providers to take the incumbent's place.

A. Measures to ensure performance

The regulator will face the problem of enforcing the requirements of the universal service obligation, and ensuring performance by all of the carriers who have undertaken those obligations. This is a challenge created by the new, more competitive environment, and it would exist regardless of whether an auction is used to select universal service providers; the same problem would arise if we drew lots to select these carriers, or indeed if we just supported all carriers.

In the traditional system of a single provider and pervasive regulation, the regulator has ample means to ensure performance. The firm is well known and has a large sunk investment; it's not going anywhere. Further, because the regulator controls many aspects of the firm's business, it has many opportunities to discipline the firm. If the company's universal service performance is not satisfactory, it may find that its tariffs don't get approved, its rate of return is lowered, or its productivity offset is increased.

The regulator does not have the same pervasive oversight of new entrants. However, I believe that carefully crafted rules, consistently followed, would enable the regulator to assure performance. I have already suggested that QBs be prequalified to weed out firms lacking the ability to perform. After the auction, the regulator could require the winners to post bonds. Halfway through the transition period, any new universal service provider could be required to file an implementation plan detailing how it intends to provide service; this would help the regulator to identify potential problems before responsibility is actually handed over. Finally, and most importantly, the regulator would have to establish large penalties for carriers that do not perform, and maintain a credible threat that those penalties would actually be imposed.

One of the advantages of auctioning a small area is that the challenge faced by a new firm to serve the entire area is reduced. By the same token, from the regulator's perspective, any performance problem may be limited to certain areas. Finally, because the auctions would be spread over time, one of the penalties the regulator can impose on a firm that does not perform in one area is a ban on participation in future auctions for other areas.

B. Transfer of the Obligation

I propose that a universal service provider should be able to sell or transfer its obligation in a given area to any other QB at any time, provided that the transfer does not reduce the number of universal service providers in that area. In effect, there could be a secondary market in universal service obligations. This would allow a carrier that, for whatever reason, fails to win the auction in an area it values highly, to negotiate with another carrier for whom the area may have less value.

This approach provides another limited mechanism for dealing with the issue of cost synergies among the areas. It also would allow a firm entering an area to become a universal service provider by acquiring the obligation of another carrier. Further, it would provide another option for dealing with performance problems; a carrier that found it difficult to perform might sell its obligation to another QB.

C. Rebidding At The End Of The Contract

As noted above, if the auction does not result in a change in the number or identity of the universal service providers, then the area will be open for nomination again in the next six-month window. This addresses any concern that the incumbent would use an auction at an early stage to “lock up” a market for the length of the contract period.

If the auction does result in a change in the number or identity of the universal service providers, then no nominations will be accepted for the length of the “contract” period; I have suggested that this might be three years. After that time, the area will again be open to nomination. If it is nominated again, then another auction will be held using the same design I have described above. Unlike the first auction, any QB can nominate the area, and the auction procedure will be the same, regardless of whether the nomination is submitted by one of the existing universal service providers in the area, or by another QB. However, an auction need not occur at the end of the contract period; the existing arrangements would continue until some QB chooses to nominate the area.

D. Bids At Zero

In some areas, the price ceiling and the terms required of universal service providers may not be a binding constraint; these may be no more favorable than those firms would offer voluntarily. The auction results should provide an indication of this; in areas where the requirements are close to the market rates and terms, one would expect to see very low support bids. However, it is not clear what incentive a carrier would ever have to bid a support level of zero, since, at the least, the carrier is taking on an obligation to serve that it would not otherwise have.

One way of dealing with this would be to offer some sort of bonus to any firm that bids zero. This could take the form of a payment to that carrier which would continue for some time, after which the universal service obligation would be eliminated in that area.

E. Winning and Losing the Obligation

In order for the auction to place an appropriate value on the universal service obligation, that obligation must be a clearly defined, auctionable item, the “ownership of which is determined by the auction. This means that the auction winners must win the obligation, and the

losers must lose it. The test of the regulator's commitment will come in the implementation phase: the regulator must be willing to impose the obligation symmetrically on all the winners, including new entrants. The regulator must also avoid imposing any special obligations on carriers – including the incumbent – who lose the auction. This will be a challenge, since it is natural for both the regulator and the entrant to rely on the presence of the incumbent. Yet it is clear that the bidding will be affected dramatically if the firms believe that the incumbent will still be required to supply in the event that it loses, or that winners other than the incumbent could shirk, relying on the incumbent to serve customers they turn away.

This is not to say that losers would have no obligations at all. The laws of most countries establish broad requirements on carriers. For example, common carriers in the U.S. are prohibited from unreasonable discrimination. In fact, the development of competition in the U.S. has focused attention on identifying what basic requirements of state and federal law apply to common carriers in general – an issue which held little interest in the sole provider environment.

A new and parallel obligation has been created by the 1996 Telecommunications Act. Incumbent telephone companies are required to unbundle the functions of their existing networks, and provide them to competitors in the form of unbundled network elements, or UNEs. The prices for these elements are set by negotiation, with either party able to seek arbitration by the state regulatory commission. In effect, then, the levels of these rates are determined by the states, either directly or through their influence on the negotiations. The debates over these prices have involved the same cost models and estimates, and the same difficulties, as the debates over universal service funding.

The question then arises of whether the two obligations – unbundling and universal service – can be independent. If the incumbent is required to provide UNEs at regulated prices, whether it wins or loses the universal service auction, then the prices of the UNEs will have a very direct effect on the outcome of the auction. The UNE prices will represent the opportunity cost of winning the auction for the incumbent as well as the entrant. If the incumbent wins, it will receive the universal service support. If it loses, it will receive revenue from selling UNEs to the firm that wins. Thus, each of the bidders will base its bid in large part on the UNE rates. If the auction results are dominated in this fashion by UNE prices determined through traditional

regulatory means, then the auction will be unable to reveal the bidders' private valuations in the manner intended.

One way to mitigate this problem would be to eliminate the obligation to provide UNEs at regulated rates for any incumbent that loses a universal service auction. It could reasonably be argued that if one or more new firms have been willing to make a binding offer to serve all of the customers in given area – and if those firms knew, when they submitted their bids, that the incumbent would not be required to supply them if it lost – then the incumbent's facilities are not essential. If unbundling is a transitional mechanism designed to deal with the asymmetric starting position of the incumbent, then a reasonable criterion for dispensing with that transitional device would be the arrival of ubiquitous local competition.

This is not to say that an entrant that wins an auction would not choose to purchase the use of the incumbent's underlying facilities for all or part of its provisioning needs. An auction structured in the way I suggest would force a prudent firm to base its bid on its own costs, since it would not be certain whether, and at what price, it could obtain the incumbent's facilities. Ex post, however, it would be mutually advantageous for the new universal service provider and the incumbent to negotiate an agreement. Each would bring certain advantages to the negotiations: the incumbent would have facilities in place, but the new universal service provider would have the revenue stream. In practice, it is likely that the gains from trade will be split between the parties.³³

PROVISIONS FOR COST SYNERGIES

I have suggested that small areas should be put up for bid in separate, parallel auctions. Because each auction is a single-round, sealed bid, the bidder will not know when it submits a bid for area A whether it has won area B. This will not be a concern if the two areas are independent. However, if the cost of serving area A depends in some way on whether the same carrier is also the universal service provider in area B, then the firm may submit a bid for A that it cannot fulfill unless it also wins B.

One of the existing universal service cost models was used to evaluate the likely magnitude of cost synergies among areas in a given auction. This analysis indicates that the

effects of cost synergies in this context will be relatively small, typically in the range of 2 or 3 % of the cost of serving any given area³⁴. Preliminary results with a model of wireless costs indicates effects that are somewhat greater, but still relatively modest.

The auction design proposed here makes certain limited provision for synergies. First, bids within a certain range are accepted. This means that small synergy effects are not likely to affect the probability that a carrier's bid will be accepted. Second, if a carrier wins an area which, in light of results elsewhere, it does not want, it can withdraw. Third, obligations can be traded ex post. Thus, a carrier that fails to win an area that is important to its cost structure can seek to obtain the obligation in that area after the auction.³⁵

If synergy effects are found to be large, then a more complex design, involving conditional bids, may be warranted. However, for the limited magnitude of the synergies found so far, the simpler design described here appears to be reasonable.

CONCLUSION

Auctions provide a method for regulators to reconcile their desire to promote competition with their continued commitment to universal service. Competitive bidding is a market mechanism for deciding which firms should provide universal service, and how much they should be paid for doing so. Many of the current efforts to reform telecommunications policy have seemed only to create more legal and regulatory disputes; oddly enough, a process that began with a desire to rely more on markets, and less on regulation, has in fact given cost-of-service regulation a new lease on life. Competitive bidding provides an approach that is more likely to reveal the amount of universal service support accurately, and which also allows regulators to move away from traditional regulatory methods. Finally, by revealing information

³³ Note that an important factor in the negotiations would be the severity of the penalty the new universal service provider would face for nonperformance.

³⁴ The analysis begins with a base or "core" area, typically a town center, that the carrier would serve without support. The carrier considers bidding for two outlying areas, A and B. Each adds an incremental cost IC(A) and IC(B) if added separately, and IC(A+B) if both are added to the core area. The measure of the magnitude of the synergy between A and B is the index: $[IC(A) + IC(B)] / IC(A+B)$.

³⁵ Note also that losing the auction for a given area does not preclude a carrier from operating there.

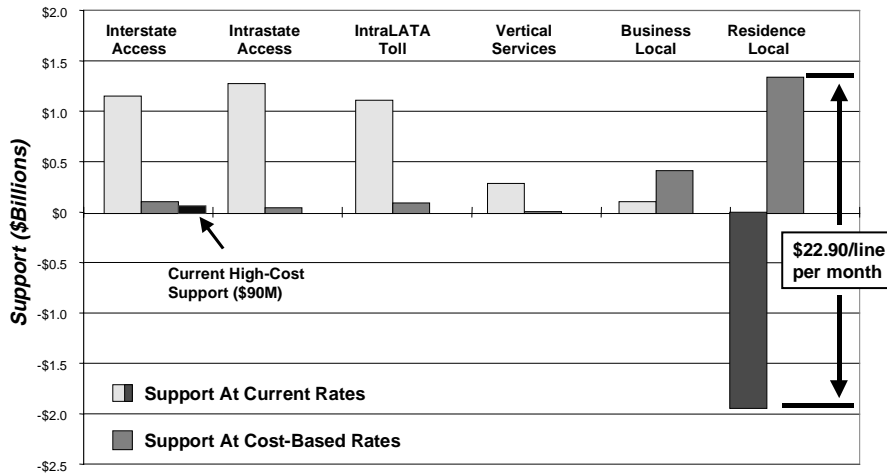
about the most effective market structure, the auction itself provides a mechanism for the transition to competition.

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GTE's Universal Service Support By Service



* Interstate contribution excludes EUCL charges