

# Reply Statement on

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## Effect of NextWave's Participation in the C-block Auction on Antigone and Devco

*Submitted by*

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*Submitted to*

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1919 M Street NW  
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on April 11, 1997

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### Introduction

I have been asked by Antigone Communications Limited Partnership ("Antigone") and PCS Devco, Inc. ("Devco") to respond to the April 1, 1997 statement of Professors R. Preston McAfee and John McMillan on my comment on the impact that NextWave Telecom, Inc. ("NextWave") had on the outcome of the C-block Broadband PCS Auction. First let me state that Professors McAfee and McMillan ("M&M") are brilliant auction theorists with impressive qualifications. Their published work on auctions is among the best in a high-quality literature. Their statement, however, is in a whole different category.

I strongly disagree with all of McAfee and McMillan's conclusions, and with their implication that my March 11, 1997 was a departure from my prior writings on the spectrum auctions. I agree with and stand by all of the quotes they reported from my prior work. Nothing I said in my prior statement contradicts any of my past research and writings on the spectrum auctions. In this response, I explain why their conclusions are wrong, and why it is they who have departed from their prior writings.

I am commenting as an auction expert. For the last fourteen years, I have conducted research on auctions. I have written over twenty articles on auction theory and practice, which appear in major scholarly journals. Since December 1993, my teaching, research, and consulting has focused on spectrum and related auctions, especially the FCC spectrum auctions. I served as the auction strategist for three companies (PageNet, Pocket Communications, and CD Radio) that were major participants in FCC spectrum auctions, and advised a third (MCI) that eventually decided not to participate. For over one year, I advised the FCC on auction design and implementation. My recent auction related activities are documented in the abbreviated vita attached to my earlier statement.

My reply comments are based on my extensive experience with all of the FCC's simultaneous multiple round auctions, especially the C-block auction in question. In my

role as auction strategist for Pocket Communications (formerly DCR Communications), I analyzed the C-block auction on a round-by-round basis, and submitted a written strategic report following each day of the auction. Over the five-month duration, I became intimately familiar with the strategies and behavior of the bidders in the C-block auction. My analysis reflects this extensive first-hand experience. In addition, the analysis is based on the publicly available bidding data (see the auction page at the FCC's web site, [www.fcc.gov](http://www.fcc.gov)) and other public information. All specific numbers are taken from the FCC's auction tracking software for the C-block auction, which I designed and developed for the FCC.

In what follows, I provide detailed comments on their statement.

## **Executive Summary**

Professors McAfee and McMillan assert the my “estimate of a 25 percent price effect for NextWave’s price effect is far too high to be credible.” Yet they offer no analysis of their own suggesting a different number. My 25 percent figure is based on a detailed and careful economic analysis, using state-of-the-art modeling techniques. Their analysis is simply “25 percent is a big number.” Yes, they do criticize some of the assumptions that led me to the 25 percent figure, but they make no effort to test how sensitive my results are to my particular assumptions. I will demonstrate that my conclusion remains true even when one makes extremely conservative assumptions.

NextWave had a large effect on prices in the C-block auction. You don’t need any fancy economic models to see this – common sense will do. NextWave bought 41% of the C-block spectrum. This was an auction with severely budget-constrained bidders. McAfee and McMillan are asking you to believe that removing this bidder (with 41% of the money) would not have a large effect on prices. The notion is absurd. Any impartial bidder, investment banker, or economist that worked on this auction will tell you that NextWave had a large effect on prices. When I was first asked to comment on this case, my initial reaction was, “Are you kidding – you want me to state that NextWave had a large effect on prices? Do you want me to argue that the world is round too?” I was shocked that something so obvious was up for debate.

Now if I had said prices would be 50% lower, then that would be a big number. How can taking away 41% of the money result in prices being 50% lower? But I said 25% based on a careful analysis of the nearly 30,000 bids in the auction. The difference between 41% and 25% reflects the fact that some bidders’ budget constraints were tied to prices. These

bidders were forced to reduce demand as prices rose. Hence, without NextWave, because of the lower prices, some of the money that left the auction would have stayed.

Professors McAfee and McMillan assert that my conclusion that Antigone and Devco would have won licenses in the absence of NextWave is “unsupported and unpersuasive.” In this reply, I will make my arguments clearer with simple examples and I will identify the effects of alternative modeling assumptions. However, if my analysis was “unsupported and unpersuasive,” what is their analysis, and why did they not present it in their statement? The few calculations they do make are totally irrelevant to the case (as I will show).

The only argument that McAfee and McMillan can offer to support their claim that Antigone and Devco would not have won licenses is their self-described “common-sense” look at the bidding data: Antigone and Devco were not the second-highest bidder in any market. In a simultaneous multiple-round auction with the substitution and arbitrage options it affords, looking at only the second-highest bidder defies common sense. I can illustrate this with a simple example.

Suppose there are three bidders for two identical items. Bidder 1 has values of 10 for the first item and 10 for the second. Bidders 2 and 3 only desire a single unit and have values of 9 and 5, respectively. It is easy to imagine a scenario in which the bidding exceeds 5, so Bidder 3 is forced to drop out, but where the bidding continues for a while before Bidder 1 decides to reduce its demand to 1 item and end the auction. (This is meant to be a private value example: the values are privately known, so Bidder 1 is unable to know that fighting with 2 over the second unit is not worth the cost.) If you are not convinced of the plausibility of this outcome, just try it. Conduct a mock FCC auction with this setting (tell the subjects only their own values!) and you will find that Bidder 3 always loses and is rarely the second-highest bidder on either item. Yet without Bidder 1 (NextWave), Bidder 3 always wins at a price of zero. There is nothing special about this example. It illustrates the powerful forces of demand reduction and substitution in the FCC spectrum auctions.

Accordingly, common sense tells you that Antigone and Devco would have won licenses.

## Specific Rebuttals

I begin by addressing each of McAfee and McMillan's bulleted points in their Executive Summary (McAfee and McMillan's points are in *italics*, my responses to each are in regular type):

- *The highly competitive nature of this auction was noted elsewhere by Cramton, and NextWave's absence would not have changed this. The particular facts of the C-block auction contradict Professor Cramton's "counterfactual" exercise in demand reduction.*

Yes, the C auction was highly competitive relative to the AB auction. However, it was still far from the realm of perfect competition where participants are unable to affect price. NextWave purchased 41% of the C-block spectrum. After the re-auction, NextWave's winnings increased to a 46% market share. This constitutes substantial market power, regardless of the number of other bidders. Indeed, U.S. Treasury auction rules intended to limit market power in Treasury auctions forbid any single bidder from acquiring more than 35% of an issue. Like the C auction, Treasury auctions involve a handful of large "primary dealers" and hundreds (even thousands) of small bidders.

Ausubel and Cramton (1996) prove quite generally that the forces of demand reduction are present even with many bidders. In ascending-bid auctions like the C auction where bidders can move among licenses that represent the best value, bidders that demand multiple items have an incentive to reduce demand. The greater the quantity being purchased, the more the bidder reduces demand. However, demand reduction is not just a theory – it is widely believed to be an important element of strategy in the FCC spectrum auctions. I was originally prompted to write on this subject based on my experience in the first FCC auction. For PageNet, a large bidder in the nationwide narrowband PCS auction, demand reduction was without question the primary strategic issue. This was a highly competitive auction with an initial eligibility ratio of 8.8, well in excess of the 6.7 ratio in the C auction. The importance of demand reduction is not a function of the eligibility ratio; rather, it is a function of the size of the largest bidders and the slope of the aggregate demand curve around the market-clearing price. My estimate is based on all of the relevant data; McAfee and McMillan's critique is based on irrelevant numbers.

From my extensive experience advising Pocket Communications in the C auction, I can say that demand reduction was the dominant strategic issue in the auction. Pocket was

well aware that the quantity of spectrum it bid for affected the price and made public statements to this effect. NextWave's actions during the course of the C-block auction indicate that demand reduction was almost certainly a major strategic issue for NextWave. All the bidders know that the auction ends when the bidders "agree" on how to split up the licenses. The question is what prices are needed to dissuade some bidders from asking for more. In the end, NextWave made room for some smaller rivals and it also punished attempts by others to encroach on NextWave's territory.

When one looks carefully at the facts of the C-block auction, one finds that my analysis of demand reduction is quite compelling. Consider, for example, what happened in the C re-auction shortly after the close of the original auction. BDPCS and National Telecom PCS defaulted on 18 licenses that originally sold for \$874.2 million. The FCC wisely chose to promptly re-auction these licenses. The auction began and concluded less than two months after the close of the original auction. Quoting from Ausubel and Cramton (1996, p. 31):

Interestingly, prices in the re-auction were 3% higher than prices in the original auction. Consistent with demand reduction, NextWave (by far the largest bidder in the original auction, purchasing 41% of the available spectrum) bought 60% of the re-auctioned spectrum. This occurred despite the fact that NextWave had not been the second-highest bidder on any of these licenses in the original auction. Indeed, in the original auction, NextWave had dropped out of the bidding for these licenses at prices well below the prices it paid in the re-auction. Observe that NextWave, as the largest bidder, had the strongest incentive to hold back its demand in the original auction, in order to reduce prices. However, in the re-auction, it could bid up to its true value on these licenses, since aggressive bidding would no longer increase the prices it paid on the licenses it had won in the original auction. Meanwhile, the president of the second-largest winner publicly acknowledged the importance of demand reduction, at the conclusion of the C-Block Auction. "About three or four weeks ago, we stopped trying to expand our footprint," said Dan C. Riker, President of [Pocket] Communications. "Our analysis was that if we tried to buy any other significant markets we'd be displacing someone who would use the money to do something someplace else, and it was going to be a continuous round-robin with the prices going up, so we just said the hell with it, let's stop." (PCS Week, May 8, 1996, p. 3.)

- *Because of FCC rules and limits on its eligibility, NextWave could not win all markets and did not bid on 295 licenses, or nearly 60 percent of the licenses on offer. If "all markets were competitive," as Cramton said, including those 295 markets on which NextWave was not a bidder, then it is implausible that NextWave's participation could have made a large difference in prices.*

The fact that NextWave was not eligible to win all licenses is totally irrelevant. A bidder in an auction can have a large effect on price without being eligible to win the whole lot. Consider a simple example. Suppose there are four identical items and no bidder can win more than two. Bidder 1 has values of 10 each for each item. Bidder 2 has values of 9 each for each item; Bidder 3 has values of 5 each for each item. In addition there are two hundred bidders with values of 4 each for each item. With Bidder 1 (NextWave), the auction ends with Bidder 3 winning no items and a price of \$5 on each item. Without Bidder 1, the auction ends at a price of \$4 for each and Bidder 3 wins two items. Notice that there are lots of bidders and Bidder 1 is able to win only half the items, yet without Bidder 1, Bidder 3 wins licenses and prices are reduced by 20%. Again there is nothing special with this example.

- *Demand reduction, as posited by Professor Cramton, makes sense only insofar as firms have considerable market power, as demand reduction amounts to a sharing out of the available licenses among the bidders.*

As already pointed out, demand reduction applies in any auction where a bidder is buying more than a single item and the slope of the demand curve at the market clearing price is not zero. **Both of these assumptions are satisfied in the C auction.** The economic importance of demand reduction depends on the size of the largest bidders and the slope of the demand curve around the market-clearing price. I have explicitly calculated the demand curve from the auction data using the best techniques available and making a minimum of assumptions. The slope is far from zero. NextWave bought 41% of the spectrum. **NextWave had market power.** Thus, both conditions are met and I can conclude without a doubt that demand reduction was economically important in the C auction. To prove otherwise, McAfee and McMillan must demonstrate that 41% is near 0 and that the demand curve has zero slope. Obviously it is impossible for them to do so, so they fall back on their “common sense:” (1) 25% is a big number and (2) a simplistic look at the auction data shows that Antigone and Devco were not the second-highest bidder anywhere.

- *The C-block auction was close to a common-value auction, in that values were highly correlated (evidence for this is that in many markets there were more than two bidders near the closing price), thus limiting the potential for demand reduction.*

In a common-value auction with vigorous competition, the absence of a single bidder is of no importance to price. This is simply another way of saying that when the aggregate

demand curve is flat, then demand reduction is not important. A bidder has no incentive to cut back, because doing so has so little effect on price.

However, this argument requires not only the assumption that the C-block auction “was close to a common-value auction,” but as McAfee and McMillan acknowledge (1997, p. 5) that “budget constraints exceed total supply at the common value.” While we could debate whether the common-value assumption makes sense for the C-block, their assumption that “budget constraints exceed[ed] total supply at the common value” is absurd. **To a first-order approximation, budget constraints were critical to the auction outcome. Valuations were secondary.** The downward sloping demand curve comes from three sources: (1) a budget constrained bidder is forced to buy less as prices rise, (2) some (small) bidders were significantly self-financed and so these bidders had an economic incentive to drop out when prices exceeded their valuations, and (3) some bidders had budget constraints that were linked to prices, which forced them to cut back drastically as prices rose. To a first approximation, it was budgets that determined prices.

- *Demand as of round 40 already reflected whatever equilibrium level of demand reduction was going to prevail. In an auction with few participants, demand reduction might have made a difference, but is a minor factor in an auction with many vigorous competitors and highly correlated values as were present in the C-block.*

Yes, demand at round 40 reflects the equilibrium level of demand reduction assuming that NextWave is present, but the level of demand reduction by the other large bidders depends on NextWave’s presence. Without NextWave, the bidders increase the quantity they purchase and as this quantity increases so does the incentive to reduce demand. If no bidders increase the quantity they purchase, then 41% of the spectrum goes unsold without NextWave, which could only happen if the price is zero.

- *Cramton’s assumptions further generate an implausible estimated demand curve for Antigone that is peculiarly elastic, showing a doubling in demand at a 6 percent decrease in price. This curious elasticity occurs at a price that conveniently is the 25 percent reduction of the average price paid at the C-block auction that he claims would be produced by excluding NextWave.*

McAfee and McMillan’s calculation makes no sense. The C auction is for discrete items. As a result, every bidder’s demand curve must be a step function. Hence, at the edge of each step, demand is infinitely elastic (and totally inelastic on the step). Since my demand

curves are constructed from the actual auction data, they necessarily have these steps for each and every bidder. Calculating elasticities only makes sense for the aggregate demand curve formed from aggregating the 255 individual demand curves.

- *This estimated demand curve for Antigone falls apart in the face of the facts of the C-block. Many of the licenses in which Antigone showed an interest were won for prices within Antigone's demand curve. In fact, GWI PCS, Inc. won Ft. Pierce, a specific market that Professor Cramton claims Antigone would have won in the absence of NextWave, for \$31.61 pop. Antigone, however, dropped out of the bidding for Ft. Pierce at \$26.00/pop, well below the amount predicted by Professor Cramton's demand curve.*

Again, McAfee and McMillan's argument makes no sense. It is well understood by everyone familiar with the auctions that the valuation of a license depends on more than just the number of people covered. Prices in the C block ranged from a low of \$1.44/pop (Pittsburg, KS) to a high of \$77.13/pop (Kahului, HI). This wide range of prices is seen in all the spectrum auctions and is to a large extent explained by a handful of publicly observable factors. McAfee and McMillan's own research (Ausubel et al. 1997) demonstrates that a simple model with just 8 explanatory variables explains 53% of the variation in prices across markets. Critiquing Antigone's demand curve based on the raw price data is absurd. By McAfee and McMillan's reasoning there were 254 very stupid bidders that did not see the enormous value of Pittsburg, KS at \$1.44/pop.

- *Professor Cramton's conclusion that Antigone is likely to have won West Palm Beach and Ft. Pierce is further flawed because it ignores the interdependence of such markets with Miami, and that these markets and Miami were eventually won by a single bidder.*

Market synergies have been found to be statistically significant. However, these local synergies – though measurable – are weak. This is shown in McAfee and McMillan's own analysis of the auction data (Ausubel et al. 1997).

A far stronger effect is demand reduction or making room for one's smaller rivals. GWI, the winner of Miami, did not express much of an interest in the southern Florida markets until very late in the auction. Prior to its next to last bid (round 53), GWI had placed just a single bid in Miami, whereas GO bid on Miami 17 times up to round 52. Without NextWave, who bid in Miami 12 times up to round 30, GO would almost surely have won

Miami. GWI would have had plenty of other major markets to go after (and for which GWI expressed preference).

But why would GO not go after Ft. Pierce and pick up the small synergy? GO was price sensitive. It had constraints (either values or budgets) which prevented it from pushing prices too high. GO appears to have lost interest in Ft. Pierce at a bid of \$8.8 million (Antigone's final bid was \$11.8 million) in round 30. It did not bid on Ft. Pierce again until round 54 when it placed its dramatic last bid on a Florida aggregation. Apparently it was saying, "look I am serious; I want this whole southern region." Obviously, GO was not. Without the NextWave presence, it would have been easy for Antigone to make GO give up on Ft. Pierce.

Finally, McAfee and McMillan neglect to assess whether the contiguous markets of West Palm Beach, Ft. Pierce, and Melbourne, Florida would have provided Antigone with sufficient synergies even without Miami. Given the growth levels of these markets and their other favorable demographic characteristics, it is rather presumptuous for two economists with no expertise in the distribution of PCS demand to assume that Ft. Pierce and West Palm Beach were more interdependent with Miami than with each other or Melbourne. Their own detailed analysis (Ausubel et al. 1997) determines that the synergies are small, so why assert that synergies are large in this particular case without any supporting evidence?

- *Finally, speculation regarding Antigone and Devco's Florida winnings absent NextWave are belied by the fact that Antigone did not participate in the subsequent D, E, and F block auction, and Devco's participation was significantly below the levels predicted by Cramton's model, notwithstanding significantly lower prices than in the C-block auction.*

My model does not predict who bids how much across auctions. Each auction has a different set of bidders with different budget constraints. There is no reason to expect prices to be the same, even when the items are identical. In this case, the items are quite different. Many bidders in the C block intended to use technologies that required 30 MHz licenses. (Yes, it would be possible in theory for a small bidder to aggregate all three licenses, but this would expose the bidder to enormous aggregation risk, since all-or-nothing bids on the 30 MHz aggregation of D, E, and F were not allowed. As an empirical matter, in none of the 493 markets did a bidder win all three blocks within the market.) Antigone was such a bidder. Antigone's financing was conditioned on winning 30 MHz

licenses. Antigone simply did not have money to bid on 10 MHz licenses. This is why it did not participate in the DEF auction.

Moreover, even for those capable of participating in the DEF auction, it would be natural to anticipate (incorrectly) that prices would be high and so decline to participate or participate at a reduced initial eligibility level, as was the case for Devco. Indeed, Janice Obuchowski, Executive Vice President of NextWave, on June 24, 1996, predicted quite confidently in her Keynote Address to potential DEF auction participants that prices would be even higher in the DEF auction than they were in the C auction (*The PCS Auctions Conference*, Washington, DC, organized by Telecommunications Reports). Why would one question her, after watching (just two weeks later) NextWave drive the prices in the C re-auction above those in the C auction. Apparently, potential competing bidders listened to her, became frightened, and funding for the DEF auction dried up.

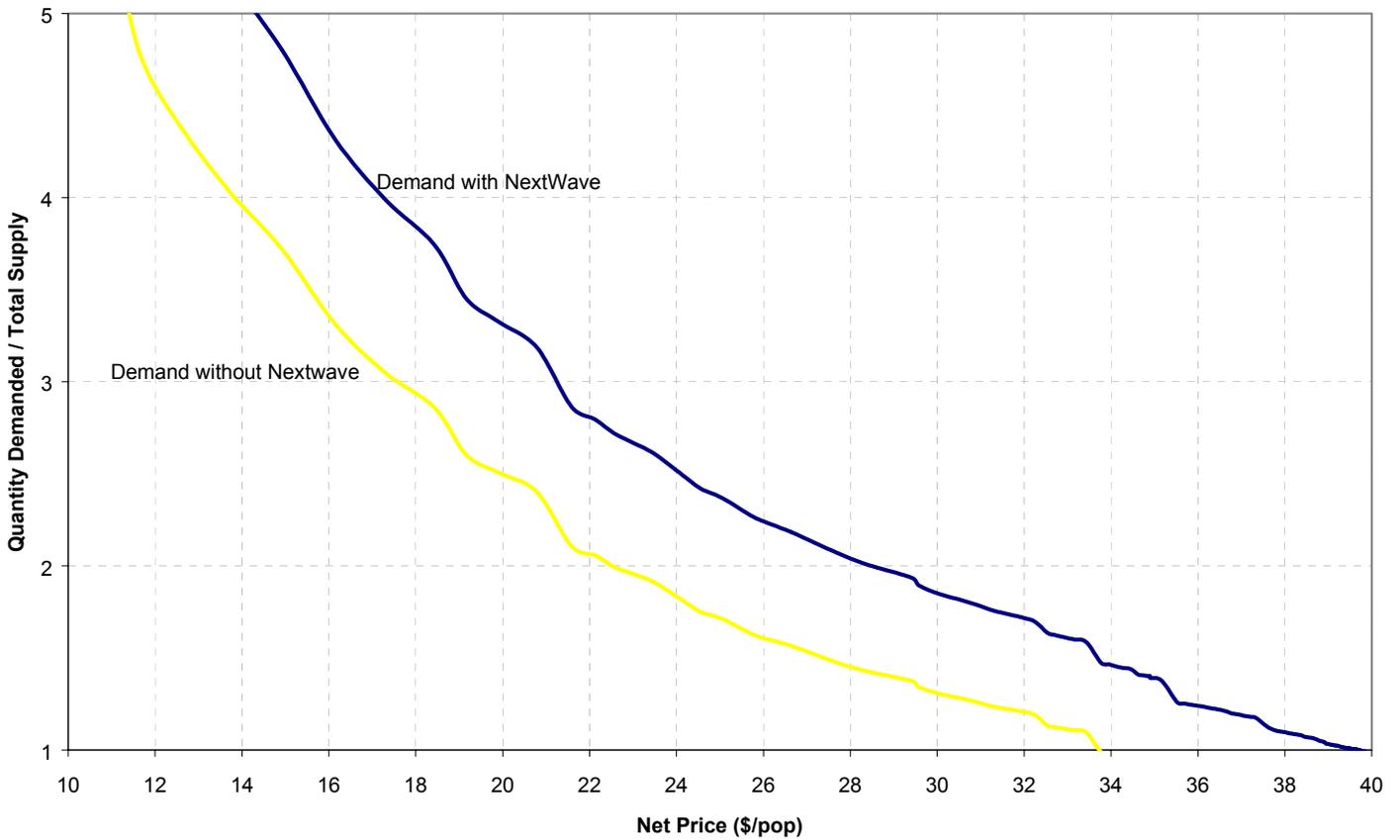
Antigone and Devco did correctly anticipate that bidding in the C re-auction was pointless. Antigone and Devco were confident that NextWave would be coming back for more in the re-auction, since NextWave could bid aggressively in the re-auction without increasing the prices it paid in the original auction.

### **Likely Price Effect without Demand Reduction**

Even if we assume (unrealistically) that no bidders engage in further demand reduction as a result of NextWave's absence, prices are still much lower without NextWave. Figure 1a shows the aggregate demand curve under this overly conservative assumption. In this case, the auction ends when prices reach \$33.60, a 16% drop in prices. Hence, only about one-third of the 25% drop is attributable to further demand reduction by the top-ten large bidders. Two-thirds of the drop (16%) would still occur without any further demand reduction by the large bidders.

From this robustness check, I conclude that both Antigone and Devco would have won licenses were it not for NextWave.

**Figure 1a. Demand for Spectrum in C-block Auction with and without NextWave  
Assuming No Further Demand Reduction by Large Bidders**



McAfee and McMillan assert (p. 5), “Another assumption that Cramton makes in order to arrive at his 25 percent estimate is that the top-ten bidders have fixed budgets.” This is false. I make no such assumption. I am well aware that some bidders bid more at lower prices and I take this fully into account in my 25 percent estimate – not just for the top-10 bidders, but for each and every one of the 255 bidders in the auction. The aggregate demand curve is downward sloping, because (1) some bidders drop out when prices get too high and (2) some bidders choose to spend less at lower prices. If I did make the assumption of fixed budgets, then my estimate would be closer to 41%, rather than 25%. Any information contained in McAfee and McMillan’s chart on page 6 of their statement is fully captured by the demand curve that I construct from all the bids.

McAfee and McMillan content (p. 6), “Extrapolating from round 30 of the auction to final outcomes is pure guesswork.” I engage in no such extrapolation. My analysis is based on all the bids for the entire auction. I begin my detailed market-by-market analysis of the bidding at round 30, precisely because the price and assignment information in the bidding prior to round 30 is less reliable. In some situations, early in the auction bidders

may have an incentive to bid insincerely (that is, not bid on licenses that give them the highest value net of current prices). However, in more competitive auctions, like the C block auction, such strategies are widely viewed as ineffective. Even in the AB auction, in which competition was weak, most of the bidders appeared not to engage in insincere bidding. The notable exception was GTE, but at a post-auction conference of auction experts (Princeton University, November 1995) the consensus of the audience was that this strategy was ineffective. Cramton (1997) presents a detailed round-by-round analysis of the AB auction and finds a strong tendency for sincere bidding: bids even early in the auction contained reliable information about relative prices and the likely winners. Milgrom (1995, p. 44) also finds in the AB auction “evidence that many bidders did indeed adopt such straightforward strategies.” Incentives for sincere bidding are much stronger in the more competitive C auction.

McAfee and McMillan “are puzzled by the quantitative methodology Professor Cramton uses in his submission.” (p. 6) I am surprised by their confusion, because I am using tried-and-true methodology of good economic modeling. In good modeling, one begins by making strong assumptions that yield a simple and tractable model and then one relaxes these assumptions to see how sensitive the results are to the assumptions. For example, in analyzing markets economists begin with the extremes of perfect competition and monopoly, before considering the more realistic analysis of oligopoly, where a limited number of firms compete. Likewise, the Wireless Bureau took the natural first step of analysis in making the unrealistic assumption that the markets could be considered in isolation (i.e., there are no substitution possibilities across markets). Had Antigone or Devco been the second highest bidder in a market against NextWave, then this would be proof that NextWave harmed Antigone and Devco. The natural next step is to go to the other (more realistic) extreme that the licenses are perfect substitutes (although each license represents a different quantity of spectrum, so the prices will not be equal across markets). This was the first step in my analysis. The natural final step is to recognize the full strategic possibilities of the bidders in a market-specific analysis, which takes into account the preferences of the bidders as revealed in their bidding. This was the second step of my analysis. My second step is unrelated to the Wireless Bureau’s preliminary step. In particular, my market-specific analysis recognizes the ties across markets.

McAfee and McMillan’s speculations about the motivation for my analysis are wrong and inappropriate. My methodology is flawless. The aggregate demand curve approach is the best approach for identifying the overall price effect that NextWave had in the auction. It has been used in scholarly articles published in respected journals (e.g., Cramton 1995).

My market-specific analysis is the best approach for identifying whether Antigone and Devco would win licenses, and if so which ones. In sharp contrast, McAfee and McMillan's modeling strategy is simply to have none. They present no model or analysis that determines an alternative to my careful calculations.

## Implications of NextWave's Pushing Prices Substantially Higher

Professors McAfee and McMillan state "the effect of NextWave's participation was to prevent the other bidders from earning excess profits." In McAfee and McMillan's view, NextWave, by not conforming to the rules, was simply preventing windfall profits. This view is clearly wrong. The C-block winners bid prices well in excess of the large firms bidding in the AB auction (and then later for the DE blocks). An estimate from McAfee and McMillan's research is that "prices in the C auction were about 80% higher than in the AB auction, netting out the value of bidding credits and installment payments." (Ausubel et al. 1997, p. 16.) Prices in the DEF auction were even lower. Most C-block winners are in financial trouble. (Pocket Communications declared Chapter 11 on March 31, 1997.) If the auction rules are enforced – as they should be – there will be many defaults. If NextWave was needed to prevent windfalls in the C auction, then there had to have been huge windfalls in the AB auction. Yet post-auction stock prices of the AB winners have fallen, not risen. Prices were pushed to unreasonable levels by NextWave's aggressive bidding, funded by unlawful foreign equity.

How could this happen? Why don't the bidders drop out when prices reach their valuations as McAfee and McMillan contend? There are three responses. First, some bidders who were in the auction to make a profit (like Antigone, Devco, GO, Personal Connect, and US Airwaves) did drop out. Second, as I explained in my prior statement, there was a severe agency problem in many cases, because the control group was playing with other people's money. For them, it was worth the gamble, even a bad gamble, to go ahead. The savings and loan crisis is an apt analogy. Third, to at least some extent, NextWave's aggressive bidding fueled a bidding frenzy. When one major bidder bids so high, other bidders question their own assumptions and bid higher. The bidders naturally tell themselves, "NextWave must know something that suggests that these licenses are worth much more than we initially estimated. Hence, we can safely bid higher." What the other bidders did not know is that NextWave was speculating wildly. In a letter to the Securities & Exchange Commission, on 3 February 1997, NextWave states, "the Company did not even have enough contingent Series B subscriptions to meet the FCC's 5% deposit requirement until shortly before the close of the C-block Auction."

Moreover, a significant portion of the money NextWave did have was unlawful foreign equity.

Irrational bidding frenzies are not uncommon to auctions. Economists refer to this as the Winner's Curse, which may arise whenever bidders make estimates of the value of the items and the values and estimates are positively correlated. Bidders with higher estimates are willing to bid more than bidders with lower estimates, and so the bidders with the highest estimates tend to win the auction. The winner's curse occurs when a bidder does not consider the fact that winning implies that you have overestimated the most. The winner's curse is so widely studied in economics, because it is prevalent in practice. Naïve bidders do not sufficiently shade their bids. Even trained subjects in controlled economic experiments often fall prey to the winner's curse.

There is good reason to believe that the winner's curse was present in the C auction. First, nearly all of the 255 bidders in the C auction were small firms inexperienced in auctions. Most firms did not have the resources either to do sophisticated valuation studies or to hire auction experts. As a result, most of these firms were shooting from the hip. They were looking at the leaders, especially NextWave, to guide their bidding.

## **The Importance of Enforcing the Rules**

The spectrum auctions have been an enormous success with benefits extending throughout the world. Through the careful and rigorous work of the FCC, the U.S. has taken a leadership role in promoting innovative and highly efficient auction designs for the sale of scarce public resources. I am proud to be a participant in this process. This is why I am so concerned about the damage that will be done if the auction rules are not enforced.

The beauty of an auction is that it forces the auctioneer (the government) to state explicit rules of sale. The government has a strong incentive to enforce these rules, because to do otherwise undermines the integrity of the auction process. Without enforcement, bids become meaningless. Lack of enforcement introduces a whole new level of game playing, which destroys the efficiency of the auction. With enforcement, bidders with the highest values win the spectrum; without enforcement, bidders with the most optimistic views about how lax enforcement will be win the spectrum.

In his scholarly work, McMillan rightly emphasizes the importance of clear and unbending auction rules: "Auctioning requires simply that the rules be set in advance so that the firms understand at the time of the bidding what the government will require of them should they win." (McMillan 1995, p. 9) "In an auction, the rules must be stated in advance. It is correct to say that auctions eliminate the government's discretion, in that they prevent the government from awarding licenses on unannounced criteria, or from changing the criteria in the middle of the process." (McMillan 1995, p. 10) "Auctioning merely requires the government to say clearly and precisely what the criteria are, and to stick to them. Auctions reduce the scope, in other words, for arbitrary bureaucratic decisions." (McMillan 1995, p. 10) I could not agree more strongly.

The C-block auction presents the first major challenge to the integrity of the auction program. The bidders and investors in future auctions understand this and are watching closely. The FCC can enforce the clear and explicit rules or it can cave in to the auction winners. Compromising the auction rules in this case will have disastrous consequences to future auctions, both in revenue and especially efficiency terms. I urge the FCC to strictly enforce the auction rules. When bidders break the rules (as NextWave did), eject them. When bidders fail to pay on time, foreclose. Taking a hard line will avoid countless legal challenges from prior auction participants and will preserve the FCC's outstanding track record in implementing auctions. The choice is clear.

NextWave has already asked the FCC to ignore the fact that it violated the foreign ownership rules. Now NextWave is asking the FCC to postpone interest payments. Granting NextWave's requests will undermine the entire auction program.

## **Conclusion**

Having carefully reviewed the statement of Professors McAfee and McMillan, my conclusions are unaltered. They did not identify any flaws in my analysis. Their claims are based either on no analysis, incorrect or incomplete information, or on flawed assumptions about the auction setting.

Hence, I still find that NextWave's participation in the C-block auction had a substantial impact on auction prices. Without NextWave, the C-block auction would have ended with prices about 25% below the actual prices. These lower prices would have meant that both Antigone and Devco would have significant winnings. In particular, I estimate that Antigone would have won at least 2.0 million pops and Devco would have won at least 0.4

million pops. Even if one (erroneously) assumes that the remaining bidders would not engage in further demand reduction, Antigone would still win substantial pops without NextWave. Although there is uncertainty in the precise quantity of the winnings, Antigone and Devco surely would have won licenses without NextWave.

Moreover, I still find that if NextWave did participate in the C-block auction, but at a level reduced by one-third, so that they would conform with the foreign ownership rules during the auction, then prices in the C-block auction would have been about 8% lower. Based on a detailed analysis of NextWave's and Antigone's bidding, I estimate that Antigone would have won three markets covering 1.6 million pops in this case. Although this is an estimate subject to error, I find it highly implausible that Antigone would not win any licenses in this case.

I declare under penalty of perjury that all statements of fact made herein and not subject to official notice are true and correct, and that all opinions set forth herein are true and correct to the best of my belief and knowledge.

Executed this 11<sup>th</sup> day of April 1997.

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