

WHY LARGE LICENSES ARE BEST FOR THE 700 MHz SPECTRUM AUCTION

PETER CRAMTON[†]

17 April 2007

[†] Professor of Economics, University of Maryland, and President, Criterion Auctions. My curriculum vitae is attached as Appendix B. This paper was funded by Verizon Wireless. The views expressed are my own.

Summary 1

- I. The License Structure for the 700 MHz Auction Should Recognize that Larger Wireless Networks Are more Efficient..... 2
 - A. Secondary Markets Have Aggregated the Fragmented Spectrum Sold at Auction 2
 - B. Most Countries Award Advanced Wireless Spectrum in Nationwide or Regional Licenses..... 7

- II. Bidding in the AWS Auction Demonstrates the Benefits of the Large License Scheme... 8
 - A. A Significant Aggregation Risk Premium Was Paid for REAG Licenses 9
 - B. CMA and EA Licenses Were Aggregated to REAG Licenses in the AWS Auction 10

- III. SpectrumCo’s Proposed 700 MHz Band plan Would Harm Consumers 13
 - A. The EA and CMA License Schemes Would Increase Carriers’ Costs and Disserve Consumers..... 13
 - B. SpectrumCo’s Proposed License Structure for the 700 MHz Auction Differs Substantially from the AWS Band Plan..... 14

Conclusion 16

SUMMARY

The wireless industry in the United States has a nationwide structure. This structure has resulted from strong market forces, such as consumer demand for nationwide service and supplier scale economies. Consumers have benefited enormously from intense competition for a nationwide product, which has improved the quality of wireless services and lowered the price paid for those services. The FCC's band plan for the 700 MHz auction recognizes that this competitive market structure is best served by large regional (EAG or REAG) licenses. These large regional licenses would significantly reduce both the carriers' costs of participating in the auction and costs of providing service after the auction. The alternative of using small blocks would, by contrast, be inefficient and result in significant cost to the consumer.

Although the FCC's simultaneous multi-round (SMR) auction allows for the aggregation of many small licenses, the aggregation is imperfect. As licenses become more fragmented bidders face greater difficulties in forming their desired footprints. Gaming behavior also becomes more of a problem, especially if the auction is fully transparent. Parking strategies,¹ which undermine the activity rule, become more effective because bidders can see the identity of opponent bidders on any given license. Speculator strategies to create holes in an operator's footprint and then sell the spectrum to that operator post-auction are also more effective. This gaming behavior reduces auction efficiency.

An important advantage of the large-license band plan is the reduction of aggregation risk—the possibility that the bidder will have significant holes in its desired footprint. With large licenses, bidders can safely bid for and obtain the benefits of the large regional licenses. As a

1. "Parking" refers to the act of bidding temporarily on a license that the bidder does not want in order to maintain eligibility. Typically it occurs on licenses with multiple active bidders, so that it is likely that the bidder will be bumped by another bidder. This strategy is particularly effective in a transparent auction because the bidder can better identify where there is little risk of getting stuck on an undesired license.

result, both auction efficiency and auction revenues are enhanced compared with an auction based on small geographic licenses. Bidding in last year's AWS auction illustrates that there is significant demand for larger licenses and, as a result, REAG licenses sold at a significant premium over the EA and CMA licenses.² This premium reflects in part aggregation risk.

I. THE LICENSE STRUCTURE FOR THE 700 MHz AUCTION SHOULD RECOGNIZE THAT LARGER WIRELESS NETWORKS ARE MORE EFFICIENT

Currently, the license structure for both the upper and lower 700 MHz bands includes regional (EAG) licenses only. This license structure correctly recognizes that carriers can deploy networks and offer services more efficiently in large geographic areas. Secondary market transactions confirm the economic value of large licenses. Over time commercial wireless operators have aggregated geographically fragmented licenses, not only the more than 2000 PCS licenses sold at auction, but the nearly 1500 cellular licenses assigned in the early days of this industry by comparative hearing or lottery.³ This aggregation is costly in both time and money. In particular, aggregation requires negotiations between separate parties, which can sometimes be frustrated by holdouts or delayed as part of negotiation tactics.⁴ It is therefore unsurprising that nearly all countries sell advanced wireless spectrum as nationwide or large regional licenses—the U.S. is one of the few exceptions.

A. Secondary Markets Have Aggregated the Fragmented Spectrum Sold at Auction

In the last decade operators have aggregated the fragmented cellular and PCS spectrum in large service areas that are more efficient and directly benefit consumers. While this aggregation

2. See http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=66 for bidding information for this auction.

3. These figures do not include the thousands of licenses assigned to SMR operators that Nextel purchased to aggregate into a nationwide footprint.

4. Peter Cramton, Evan Kwerel and John Williams, *Efficient Relocation of Spectrum Incumbents*, 41 J.L. & ECON., 647, 647-675, October 1998.

was ultimately to the benefit of the consumer, it came at considerable cost. In his 2003 paper on wireless regulation, Thomas Hazlett reviewed the wireless industry between 1995 and 2003⁵ and found evidence of significant license aggregation during that time frame. In particular, by 2002 five wireless carriers (AT&T, Cingular, Sprint PCS, T-Mobile, and Verizon) provided service on a nationwide basis using either cellular or PCS spectrum or both. During that period, those five carriers had amassed a combined 3,094 PCS and cellular licenses to provide nationwide coverage.⁶ The sixth nationwide carrier at the time, Nextel, provided nationwide coverage by acquiring 41,833 SMR licenses.⁷

The initial duopoly structure of the industry was “expensive and extremely fragmented”⁸ and was followed by several PCS auctions and “hundreds of mergers . . . sticking together regional and national networks.”⁹ This substantial aggregation activity was costly in both terms of time and money and required literally thousands of negotiations and commercial transactions.¹⁰ In those cases, where carriers purchase existing networks rather than bare spectrum, the price paid for licenses does not include the hundreds of millions of dollars spent in the past decade on transitioning customers to different technologies and customer service and billing systems.

5. Thomas W. Hazlett, *Is Federal Preemption Efficient in Cellular Phone Regulation?*, 56 FED. COMM. L. J. 155, 193 (December 2003) [“Hazlett”].

6. *Id.* Note that the cumulative numbers that Hazlett uses are more than the original number of licenses assigned. This is due to FCC policies that permit disaggregation and partitioning of licenses as well as its decisions to disaggregate prior to reauction certain PCS C block licenses that were returned to the FCC.

7. *Id.*

8. *Id.* at 163.

9. *Id.* at 168.

10. For example, Verizon Wireless has achieved its footprint through more than 50 secondary market transactions and PCS auctions, including two reauctions of PCS spectrum returned to the FCC. *See, e.g.*, CELLCO PARTNERSHIP, SEC FORM 10-K at 3-4 (filed March 27, 2003) (listing secondary market transactions with Price Communications and Northcoast Communications, L.L.C.); *id.* at 7 (stating that Cellco Partnership had acquired its spectrum licenses through “application lotteries, mergers, acquisitions, exchanges, FCC auctions, and allotments”).

These early cellular and PCS awards occurred at a time when the economic benefits of large service areas were not yet clear.¹¹ We now know that nationwide service offerings are providing significant benefits to consumers. In particular, aggregation of spectrum in the wireless industry is associated with significant price *decreases*—an economic phenomenon that is unexpected unless consolidation allows firms to enjoy significant economies of scale. The Commission has, in fact, been the major chronicler of this trend in its Annual Competition Reports.¹²

During this time period when consumers increasingly sought service from national and large regional players,¹³ according to Hazlett, the average price per minute of wireless voice services decreased from \$0.51 per minute in 1995 to only \$0.12 per minute in 2002.¹⁴ License aggregation in the United States was not only costly to producers but the delay caused by the small area licensing scheme was also costly to consumers. The per minute cost of wireless voice service in 2002 was less than 25 percent of the cost of wireless voice service in 1995. Had license aggregation been less difficult for wireless service providers, wireless prices likely would have fallen more rapidly during this time period and consumers in, for example, 1998, would have enjoyed wireless rates below the \$0.30 per minute they actually paid.¹⁵

11. *Hazlett, supra* note 5, at 194.

12. Hazlett provides the Commission's key findings regarding competition and consolidation through the Seventh Annual Competition Report, released in 2002. *Id.* at 225-35. I provide an updated list of such findings in Appendix A of this paper.

13. In 1995 the six largest wireless carriers in the United States provided service to only 55 percent of wireless subscribers, by 2002 that figure was approximately 77 percent. *Id.* at 197.

14. *Id.* The FCC cites similar figures for the same period, citing estimates of \$.43 per minute in 1995 and \$.11 per minute in 2002. *See In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Radio Services*, Eleventh Report, 21 FCC Rcd. 10267, (2006), at tbl. 10, 106 ["*Eleventh CMRS Report*"].

15. *Hazlett, supra* note 5, at fig. 2, 197. The FCC has shown that the trend of strong national and regional players combined with falling prices continues. In its most recent Competition Report, the FCC noted that the price per minute had dropped to \$.07 by 2005. *See Eleventh CMRS Report, supra* note 14, at tbl. 10, 106.

The reduction in roaming charges that has occurred since 1995 is directly attributable to spectrum aggregation and has significantly benefited consumers. In particular, industry analysts have stated that roaming calls are significantly more expensive, on a per minute basis, than local calls.¹⁶ Furthermore, nationwide calling plans, which drastically reduce or eliminate roaming fees, are only feasible when a sufficient footprint has been assembled and have been cited as being significantly beneficial to the consumer.¹⁷

Table 1 shows yearly roaming revenues as a percentage of total wireless service revenues between 1995 and 2005.

TABLE 1: ROAMING REVENUES AS A PERCENT OF TOTAL WIRELESS SERVICE REVENUE BETWEEN 1995 AND 2005

Year	12-Month Revenues (\$k)	12-Month Roaming Revenues (\$k)	Roaming Revenues (% of Total)	Roaming Revenues (% of Non-Roaming)
1995	16,460,516	2,173,003	13.20	15.21
1996	21,525,861	2,737,177	12.72	14.57
1997	25,575,275	2,858,432	11.18	12.58
1998	29,637,742	3,166,656	10.68	11.96
1999	37,214,819	3,837,994	10.31	11.50
2000	45,295,550	4,134,626	9.13	10.05
2001	58,726,376	3,698,683	6.30	6.72
2002	71,117,599	3,872,035	5.44	5.76
2003	81,185,272	3,874,488	4.77	5.01
2004	95,515,593	3,956,823	4.14	4.32
2005	108,534,727	4,136,492	3.81	3.96

Source: CTIA, Semi-Annual Wireless Industry Survey, June 2006 *available at*: http://www.ctia.org/research_statistics/index.cfm/AID/10030.

16. See, e.g., Sean P. Butson & Craig A. Mallitz, Legg Mason, *What's Next for Wireless: A Roadmap for Wireless Investors*, EQUITY RESEARCH INDUS. ANALYSIS Jan. 2001, at 14, 20.

17. See, e.g., *id*; LINDA J. MUTSCHLER & PAUL WUH, MERRILL LYNCH, *THE NEXT GENERATION III: WIRELESS IN THE U.S.* 17 (1999). Also, the FCC has noted that roaming charges have declined in recent years, and that roaming charges are typically highest for regional rather than national carriers. See *Eleventh CMRS Report, supra* note 14, at ¶125; Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, *Seventh Report*, 17 FCC Rcd. 12985, 12997-98, (2002) (stating that regional carriers had been building nationwide footprints through market transactions in an effort to compete with carriers that offered “attractive nationwide pricing plans.”).

The data in Table 1 indicate that roaming revenues as a percent of total wireless service revenues have declined steadily since 1995. In particular, roaming accounted for 13.2 percent of all service revenues in 1995, but only 3.8 percent of revenues in 2005. The first nationwide wireless plan was AT&T's digital one-rate plan, which was introduced in 1998.¹⁸ By early 2002, both Cingular Wireless and Verizon Wireless had also begun to offer nationwide one-rate plans.¹⁹ A conservative measure of forgone consumer savings due to spectrum aggregation that occurred between 1995 and 2001—the date at which national calling plans began to become prevalent in the market—is the reduction in roaming fees that would have occurred had roaming charges applied with the same intensity in a particular year (say 1997) as they did in 2001. One can calculate these forgone savings by multiplying non-roaming revenues in 1997 (\$22.7 billion) by the ratio of roaming revenues to non-roaming revenues in 2001 (0.0672) and then subtracting this figure from roaming revenues in 1997.²⁰ Using this methodology, one finds that consumers paid, on average \$1.4 billion in additional yearly roaming fees between 1995 and 2000. Consumer interest in eliminating or reducing their roaming charges was obvious as long ago as 1998, as evidenced by the demand for AT&T's Digital One Rate when first introduced. The launch of Digital One Rate led to a nearly 40 percent increase in subscribers in one quarter and caused other carriers to immediately follow suit.²¹ In addition, carriers' nationwide aggregation of spectrum has permitted significant service innovation and led to considerable benefits to the consumer beyond a decrease in expenditure on roaming.

18. See, e.g., Richard Ashton, *AT&T goes after high-end market with Digital One Rate Plan - Company Business and Marketing*, HOME OFFICE COMPUTING, Sept. 1998, available at: http://findarticles.com/p/articles/mi_m1563/is_n9_v16/ai_21074358.

19. See, e.g., MERRILL LYNCH, *THE NEXT GENERATION VII*, Feb. 21, 2003, at tbl. 15, 29.

20. Put differently, and estimate of roaming revenues in 1997 had spectrum aggregation in 1997 reached 2001 levels is \$2.8 billion – (0.0672) x \$22.7 billion, where 0.0672 = \$3.7 billion / \$55 billion.

21. *Cellular One Chases Markets, Hoping Subs Will Naturally Come*, MOBILE PHONE NEWS (Aug. 16, 1999).

B. Most Countries Award Advanced Wireless Spectrum in Nationwide or Regional Licenses

Nearly all countries award nationwide licenses or large regional licenses. Many countries that initially offered smaller licenses have more recently offered nationwide licenses for advanced wireless services. All the European 3G awards were nationwide. Similarly, awards in Taiwan, Israel, and Singapore awarded licenses on a nationwide basis. In 2005, the PCS auction in Mexico consisted of only nine regional markets. Similarly, the 2001 PCS auction in Canada, which has a geographic area larger than the United States, consisted of spectrum separated into 4-10 MHz blocks auctioned in each of 14 main regional markets.²² The vast majority of auctions for advanced wireless spectrum have wisely recognized that wireless telecommunications has substantial scale economies.

One country that used a more geographically fragmented approach when auctioning spectrum for advanced wireless services was Australia. Still, Australia's PCS auctions, which took place in 1998, 1999, and 2000 included only 21 geographic regions for a country four-fifths the size of the United States.²³ Although Australia's license structure was more fragmented geographically than the REAG licenses in the United States, Australia's license structure is far *less* fragmented than either the EA or CMA licenses. The United States is alone when it auctions advanced wireless spectrum in geographic pieces as fragmented as the EA and CMA licenses. For a country the size of the United States, large regional (as opposed to nationwide) licenses may be justified, but splitting the country into hundreds of geographic "markets" is inconsistent with the economics of the industry.

22. A list of licenses and blocks let at the Canadian PCS auction is available at <http://strategis.ic.gc.ca/epic/site/smt-gst.nsf/en/sf05522e.html>. The A, B, C, and D consisted of 14 licensed territories. Presumably because of population scarcity in certain territories, some of those licenses were unsold. In the A block, only 11 licenses were sold. In the B, C, and D blocks, 12 licenses were sold.

23. See, e.g., ACA Spectrum Auctions—Table of PCS Lot Prices at Auction, *available at*: http://auction.acma.gov.au/auction_results/2nd_pcs_results_page/pcs_lot_prices.pdf.

II. BIDDING IN THE AWS AUCTION DEMONSTRATES THE BENEFITS OF THE LARGE LICENSE SCHEME

It would make sense for the FCC to adopt small geographic schemes if wireless service providers demanded broadband spectrum in small geographic areas, but the economic evidence is to the contrary. As the previous section outlines, the industry trend has been to favor spectrum that covers large geographic areas. Also, the recent AWS auction further buttresses this point. That auction demonstrated that nearly all the demand came from large, existing providers or new entrants bidding for nationwide or super-regional footprints. An analysis of bidding in the AWS auction reveals that significant benefits exist in auctioning broadband spectrum rights in large geographic license sizes through regional licenses. The first benefit of a large license scheme is that the problem of aggregation risk—that is, the risk of losing a geographic region when that region is required to complete a larger footprint—is either reduced or eliminated. Second, bidding data from the AWS auction shows that REAG licenses are small enough to take advantage of regional complementarities that exist.

In light of bidding that occurred in the AWS auction, the analysis of this auction in SpectrumCo's white paper is invalid.²⁴ In this white paper, Coleman Bazelon argues that smaller license sizes are appropriate for the 700 MHz auction, and he uses certain bidding data from the AWS auction to support his argument. However, the following analysis of the AWS auction shows that Bazelon's analyses and conclusions regarding the AWS auction are incorrect.²⁵

24. Coleman Bazelon, *The Economics of License Sizes in the FCC's 700 MHz Band Auction*, Attachment to *Letter from Michele Farquhar on behalf of SpectrumCo, ex parte* filing, WT Docket No. 06-150 (Jan. 8, 2007) ("*SpectrumCo White Paper*").

25. Furthermore, it is unclear whether SpectrumCo is purchasing spectrum with the intent of deploying that spectrum itself or as an investment that it intends to sell to a network provider at some future date. Recent comments of Comcast President Brian Roberts suggest that SpectrumCo purchased AWS licenses without a specific intent to build out a network and deploy that spectrum. *CMSCA – Comcast Corporation at Bear Stearns 20th Annual Media Conference*, Final Transcript, (Mar 6, 2007) ("A couple answers, another reason that we bought spectrum. If the

A. A Significant Aggregation Risk Premium Was Paid for REAG Licenses

A bidder that desires a nationwide footprint or major regional footprint would be indifferent between winning that footprint through CMA, EA, or REAG licenses so long as it can be certain that no significant holes will exist in its footprint. However, were a bidder to attempt to purchase spectrum in the entire Northeast through CMA licenses, that bidder risks the possibility that it would be outbid by a competitor on key licenses in the Northeast, such as Boston and New York. Bidding on the entire Northeast through CMA licenses but losing key licenses in Boston and New York would dramatically harm the bidder's business plan. Without package bidding, and without the ability to easily substitute from the CMA licenses back up to a REAG license, the bidder faces significant aggregation risk. This economic phenomenon is the exposure problem.

To eliminate the risk of being stranded on many small licenses after being outbid on key locations, a bidder can choose to bid on the REAG licenses. Because the REAG licenses allow bidders to shield themselves against aggregation risk, those licenses will command a price premium over EA or CMA licenses. In the AWS auction, a significant price premium was paid for the REAG licenses, consistent with the bidders' desire to avoid aggregation risk. Specifically, the price of REAG licenses in the AWS auction was \$0.66 per MHz-Pop. By contrast, EA licenses sold for \$0.45 per MHz-Pop, and CMA licenses sold for only \$0.39 per MHz-Pop. Overall, EA prices were 32% below REAG prices, and CMA prices were 41% below REAG

world goes in a direction that we don't today anticipate we now possess 20 MHz of urban spectrum in 99% of our cable markets. I think that's a great asset and it's probably making us money while we sit here. So we have to wait and see, but I think it gives us barter, it gives us opportunity and it gives us value for our shareholders.”).

prices. These substantial price differences demonstrate the strong demand for large licenses, the limited substitution across geographic schemes, and the desire to avoid aggregation risk.²⁶

In his white paper, Bazelon states that “some AWS demand would have been lost but for smaller licenses.”²⁷ Although this statement is true, that same statement could be made regardless of how finely the spectrum was sliced—counties, zip-codes, neighborhoods—all would result in some tiny licenses being won by some tiny bidder. Even Bazelon realizes that too small a license size could be counter to an efficient auction result, and argues that “only one license is needed to meet demand for smaller geographic areas.”²⁸ The FCC must recognize that there are significant costs to using only small license sizes for advanced wireless. These costs must be weighed with any benefits of the small licenses. In the AWS auction, the outcome demonstrates that the benefits of the small licenses were small and the costs were large.

B. CMA and EA Licenses Were Aggregated to REAG Licenses in the AWS Auction

Despite the costs, one might argue that there are additional advantages to a CMA or EA license structure if large bidders prefer to aggregate those licenses in a manner that is inconsistent with REAG licenses. That is, if geographic license synergies are significantly different from the REAG geography, CMA or EA licenses might make sense. In his white paper on license size in the 700 MHz auction, Bazelon takes this very position, asserting that “exclusively using large license blocks *assures* that most of those complementary values will not

26. This differential cannot be attributed to any significant differences among the various AWS frequency blocks. Although certain blocks may have had slightly greater encumbrances than others, none were so severe as to be able to skew the prices paid at auction. In fact, during the FCC proceeding that led to the adoption of the final AWS band plan, many parties asserted that the frequencies in the F block were the most impaired. *See, e.g.,* The Wireless Communications Association International Petition for Reconsideration of Ninth Report and Order, In the Matter of Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, ET Docket No. 00-258, (June 23, 2006) at 14, 22. Those licenses sold for the highest price per MHz-pop.

27. *SpectrumCo White Paper, supra* note 24, at 9.

28. Coleman Bazelon, *Principles for Choosing 700 MHz Block License Sizes, Attachment to Letter from Michele Farquhar on behalf of SpectrumCo, ex parte* filing, WT Docket No. 06-150 (Mar. 6, 2007) at 3-4.

be realized.”²⁹ That is, Bazelon claims that although complementarities would exist between small geographic 700 MHz licenses, those complementarities are smaller than the REAGs license size. However, the final license assignment in the AWS auction shows that this logic is incorrect.

In the first place, 13 different bidders, including two DEs, won the 36 REAGs licenses that cost a total of \$7.6 billion. If geographic license synergies were significantly different from the REAG geography, then one would expect that EAs and CMAs would be much more expensive than REAGs. However, the auction demonstrated no such excess demand for small licenses to form different geographic configurations. If anything there was excess demand for REAGS, exhibited not only by the price paid for that spectrum, but also by the number of bidders that sought and won CMA and EA spectrum in REAG, or near REAG configurations. To determine whether geographic complementarities in CMA and EA licenses were sufficient to support *additional* REAG licenses in the AWS auction, consider the geographic footprints that large bidders formed through a combination of CMA and EA licenses in the AWS auction. Table 2 presents the percent of REAG population covered by a combination of CMA and EA licenses by five large bidders that won CMA and EA licenses in the AWS auction.

TABLE 2: PERCENT OF REAG POPS COVERED WITH EA AND CMA BIDS IN AUCTION 66

REAG	T-Mobile (%)	Cricket (%)	Cingular (%)	SpectrumCo (%)
Northeast	76.3	19.3	19.9	96.8
Southeast	37.3	40.8	66.5	94.0
Great Lakes	45.9	9.7	39.7	87.2
Miss. Valley	5.3	66.5	13.1	89.0
Central	42.6	10.1	98.5	88.7
West	65.0	32.1	98.7	95.6

29. *Id.* at 6-7.

As the data in Table 2 indicate, in addition to paying a premium to purchase the several REAGs that were for sale in the AWS auction, in several cases major bidders used CMA and EA licenses to cover the majority of pops in the various REAGs. One large bidder used CMA and EA licenses to cover the majority of pops in each REAG. Another used CMAs and EAs to cover the Central and West REAGs and a large portion of the Southeast REAG. A third and fourth bidder each purchased a majority of the Northeast, Mississippi Valley and West REAGs. The major bidders bid in a manner that suggests that geographic complementarities in the AWS auction existed at the regional and national level. This behavior also suggests that the auction could have supported at least one more, if not two more REAGs. Therefore, the only real advantage of selling AWS spectrum in the form of CMA and EA was to allocate 1.6 percent of the spectrum, measured in net winning bid value, to bidders that preferred small licenses.

Ultimately, while the strong demand for REAGs and purchase pattern of EAs and CMAs illustrates that bidders preferred the REAG license structure, several bidders in the AWS auction attempted to create REAGs out of EAs and CMAs. However they were not completely successful, and hence, were subjected to substantial aggregation risk.

Still other bidders with large regional interests, such as the satellite joint venture, Wireless DBS, did not even attempt to aggregate EAs and CMAs to achieve its business plan, which required nationwide coverage. Wireless DBS bid aggressively on the REAGs until the end of day 4 when REAG prices exceeded the prices on the EA and CMA licenses by an order of magnitude. Although Wireless DBS desired a nationwide footprint, it was unwilling to attempt to construct a nationwide footprint from EAs and CMAs despite the fact that these licenses were considerably cheaper than the REAGs. Wireless DBS knew that the prices for the EAs and CMAs would escalate, but it had no way of knowing how much. Most likely, it recognized that there was a real possibility that it would have either been stuck with several small licenses that

were inconsistent with its business plan or it would have been forced to bid more than its valuation to achieve the large aggregation it required. In short, Wireless DBS decided never to bid on the EAs and CMAs, rather than accept substantial aggregation risk.

III. SPECTRUMCO'S PROPOSED 700 MHZ BAND PLAN WOULD HARM CONSUMERS

SpectrumCo has recently advocated a band plan that would sell 42 of the 60 MHz of spectrum in the 700 MHz band according to the EA structure. Furthermore, 12 MHz of spectrum would be sold as CMAs. All told, SpectrumCo's band plan would increase the number of licenses in the 700 MHz auction from 30 to 1,450. Were this fragmented approach adopted, the number of borders in any carrier's footprint would increase dramatically. As a result, the quality of wireless services provided on this spectrum would decrease, and the cost of those services to consumers would increase. Furthermore, the 700 MHz auction would suffer from all the problems that were evident in the FCC's first AWS auction.

A. The EA and CMA License Schemes Would Increase Carriers' Costs and Disserve Consumers

There are distinct economic advantages to covering large geographic regions with the same frequency band. In particular, the problem of borders is reduced. A border problem occurs when carriers in neighboring license territories operate on the same band. Interference with one another is the main problem, but a second problem is the handoff from one band to another as the customer crosses the border. An increase in the number of borders or an increase in population near the borders magnifies the problem. Smaller license sizes inevitably create additional borders.

To combat interference and manage handoffs at a border, wireless carriers must build more complex and expensive networks. In addition, carriers must engage in costly coordination

and negotiation with their neighbors. Handoff solutions at borders (band switching, for example) are both expensive and imperfect. The result is higher cost of service and lower service quality.

The border problem is further exacerbated if neighboring carriers use a different technology. In such a circumstance the carriers run the risk of being stranded on a technology island—that is, isolated from other carriers that use the same technology and therefore make band switching feasible. In particular, if, at the license border, the adjacent licensee in the same band is using a different technology (for example one carrier uses CDMA and the other uses GSM) handoffs solutions are often impossible. The only remaining solution for the carriers may be to implement guard bands and technically complex and less reliable cross-band handoffs, both of which result in costly and inefficient use of spectrum.

These are the costs of a patchwork network, which is almost inevitable when licenses are based on small geographic areas, and sold in a standard SMR auction. The auction allows only imperfect aggregation of neighboring licenses within the same band. The CMA scheme is especially problematic, since it is incompatible with the EA and EAG schemes, and is based on MSA/RSA market definitions that are now a quarter-century old. For example, in a market such as Atlanta, which has grown substantially over the last twenty-five years, the CMA scheme makes little sense. A bidder must win seven CMAs to cover what is now the Atlanta MSA, according to the most recent census data.³⁰

B. SpectrumCo’s Proposed License Structure for the 700 MHz Auction Differs Substantially from the AWS Band Plan

The existing band plan for the 700 MHz auction has 5 blocks of spectrum all in EAG form for a total of 30 licenses, as shown in Table 3.

30. The Atlanta MSA now contains twenty-eight different FIPS codes that cover portions of twenty-six different counties (the query that generated this data can be downloaded at

TABLE 3: SCHEDULED LICENSE STRUCTURE FOR SPECTRUM IN THE UPPER AND LOWER 700 MHz BANDS

Band	Block	MHz	License Form	Number of Licenses
Upper 700 MHz	D	2 x 10 (paired)	EAG	6
Upper 700 MHz	C	2 x 5 (paired)	EAG	6
Lower 700 MHz	A	2 x 6 (paired)	EAG	6
Lower 700 MHz	B	2 x 6 (paired)	EAG	6
Lower 700 MHz	E	6 (unpaired)	EAG	6

In its *ex parte* SpectrumCo proposes a radically different band plan with a total of 1,450 licenses, as shown in Table 4.

TABLE 4: SPECTRUMCO'S PROPOSED LICENSE STRUCTURE FOR SPECTRUM IN THE UPPER AND LOWER 700 MHz BANDS

Band	Block	MHz	License Form	Number of Licenses
Upper 700 MHz	D1	2 x 5 (paired)	EA	176
Upper 700 MHz	D2	2 x 5 (paired)	EA	176
Upper 700 MHz	C	2 x 5 (paired)	EA	176
Lower 700 MHz	A	2 x 6 (paired)	EA	176
Lower 700 MHz	B	2 x 6 (paired)	CMA	734
Lower 700 MHz	E	6 (unpaired)	REAG	12

The SpectrumCo band plan greatly increases the complexity of the auction. And despite SpectrumCo's repeated allusions to the similarities between its band plan and the AWS band plan,³¹ the two bear little in common. Specifically, in the AWS auction, 40 MHz (44 percent of the spectrum) was allocated to large regional licenses, 30 MHz (33 percent of the spectrum) to Economic Area licenses, and 20 MHz (22 percent of the spectrum) to CMA licenses. Here SpectrumCo would have only 10 percent of all the available spectrum, and *zero percent* of the paired spectrum allocated for large licenses. Seventy percent of the spectrum would be allocated

http://www.census.gov/population/estimates/metro_general/List4.txt). To cover this combined geographic area one must purchase spectrum licenses for seven different CMAs (numbers 17, 371, 372, 373, 374, 375, and 376).

31. See *gen. Letter from Michele Farquhar on behalf of SpectrumCo, ex parte* filing, WT Docket No. 06-150 (Jan. 8, 2007); *Letter from Michele Farquhar on behalf of SpectrumCo, ex parte* filing, WT Docket No. 06-150 (Mar. 6, 2007).

to EAs. Such a change would be warranted if the 700 MHz spectrum demands were consistent with the small license schemes. However, there is ample evidence that the winning demands for the 700 MHz spectrum will be for large licenses.

The SpectrumCo band plan would increase aggregation risk, and it would create border problems. Aside from the unsupported speculation that there is substantial demand for small licenses,³² there are no benefits that will offset the considerable costs of SpectrumCo's proposed band plan. The results of the recent Auction No. 66 and the fact that three auctions were required to sell CMA licenses in the Lower 700 MHz C block, suggest that demand for small licenses in the 700 MHz band is weak at best. Because the SpectrumCo band plan would result in a less efficient auction and higher service costs, it should not be adopted.

CONCLUSION

There is compelling evidence that a band plan that incorporates large geographic licenses, like the AWS band plan, is consistent with the demands for advanced wireless spectrum. Both auction outcomes and secondary-market transactions over the last 12 years confirm that it would be inappropriate for the FCC to adopt a band plan that is predominantly comprised of small licenses. Strong market forces have led the wireless market to converge to a highly competitive, nationwide structure.

“Small is beautiful” applies to many things, but not to the 700 MHz band plan. The fundamental reasons are supply and demand. On the demand side, consumers greatly value a nationwide service. If asked why I love my cell phone and broadband data service, chief among my reasons is that they work seamlessly wherever I travel in the US. I am not alone. This is the

32. It is important to note that despite its focus on small licenses, SpectrumCo acquired spectrum in large regional swathes, overlapping between 80 and 100 percent with REAG boundaries.

primary reason for the evolution of a nationwide market. On the supply side, there are scale economies in networks, handsets, and marketing that also drive us to the competitive nationwide market structure we enjoy today.

In the early days of spectrum auctions, the FCC wisely erred on the side of licenses that were too small. This made sense, since the FCC did not know how the market would evolve. After over a decade of experience, we have seen the evolution of the wireless marketplace and learned that the consumer demand and supply conditions necessitate large licenses. Also, the aggregation of small licenses at auction is imperfect and costly. The FCC should weigh the costs and benefits of small licenses in deciding on the band plan. In the case of the 700 MHz spectrum, the benefits are undocumented and the costs are great. The FCC should auction the remaining 700 MHz spectrum using large regional licenses.