HOW INCUMBENTS BLOCKED NEW ENTRANTS IN THE AWS-1 AUCTION: LESSONS FOR THE FUTURE

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ABSTRACT

This study examines a concerted effort by major incumbents in the FCC's AWS-1 spectrum auction to target those new entrants whose entry harbingered significant potential competitive broadband threat if (1) they acquired national AWS footprint in the AWS-1 auction or (2) they acquired a strong regional or multi-regional base from which they could acquire national footprint in future auctions. Targeted new entrants were met with a tacitly-collusive strategy of blocking bidding, coalitions of multiple major incumbents which bid for the purpose of denying licenses to the new entrant rather than acquiring the licenses for themselves. A majority of the major incumbents ceased bidding on such licenses after the targeted new entrant ceased bidding. All but two targeted new entrants were denied any spectrum in the AWS-1 auction. There is evidence in the pattern of bids that the major incumbents' blocking bidding strategy may have been explicitly collusive and the incumbents were willing to pay a significant premium to block the targeted new entrants, indicated by the significantly higher mean price they paid for the spectrum they acquired than other bidders. The study concludes with a recommendation that effective anonymous bidding rules be adopted for the 700 MHz and other future FCC spectrum auctions, since only such rules could prevent use of this anti-competitive strategy by incumbents.

The most obvious possible distortion is that since firms' joint profits in the telecom market are generally greater the fewer competitors there are in the market, it is worth more to any group of firms to prevent entry of an additional firm than the additional firm is willing to pay to enter. So too few firms may win spectrum, and these winners may each win too much, exactly as a ''hands-off'' policy to merger control will tend to create an overly concentrated industry.

-- Paul Klemperer, *Auctions: Theory and Practice*, (Princeton, 2004), 112.

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Prolegoumenon: A Tale of Anonymous Bidding.

Congress and the FCC adopted auctions as a means of spectrum allocation largely only on the basis of arguments from economic theory about competition and efficiency. Over time, as empirical evidence from actual spectrum auctions accumulated, it became apparent that there was some disjunction between theory and practice: bidders were using the auction rules to engage in behaviors which hampered competition and reduced the efficiency of the resulting allocations. As early as 1999 Peter Cramton and Jesse Schwartz circulated a paper which identified tacitly collusive, anti-competitive behaviors on the part of bidders – code bidding and retaliatory bidding – in the PCS D, E, and F Block auction of 1996-97.[1] These signaling behaviors were used by bidders to gain a reputation for imposing costs on those who dared to bid against them and were used to limit the ability of new entrants, fearful of retaliation, to effectively compete against some established incumbents. Such signaling behaviors were possible only under conditions of open bidding. On another front, the "Linkage Principle,"[2] as it has been termed by Paul Milgrom, came under increasing attack from 1999 to 2004. The "Linkage Principle" holds that auction structures which disclose more information to bidders increase auction revenue. This "principle" has been shown to be false for auctions in which multiple objects and multidimemnsional bidder types are present.[3] This was

[1] Peter Cramton and Jesse A. Schwartz, "Collusive Bidding in FCC Spectrum Auctions," working paper, University of Maryland, 1999; the paper was later published as "Collusive Bidding in FCC Spectrum Auctions," *Contributions to Economic Policy & Analysis*, I:1 (2004), article 11.

[2] Paul Milgrom and Robert Weber, "The Theory of Auctions and Competitive Bidding", *Econometrica*, 50 (1982).

[3] Motty Perry and Philip J. Reny, "On the Failure of the Linkage Principle in Multi-Unit Auctions," *Econometrica*, 67 (1999). More recent scholarship has extended finding of failure of the "Linkage Principle" to a wider range of auction structures: Vijay Krishna, *Auction Theory* (San Diego, CA, 2002); Thierry Foucault and Stefano Lovo, "Linkage principle, Multi-dimensional Signals and Blind Auctions." working paper, HEC School of Management, 2003; S. Board, "Revealing Information in Auctions: The Efficiency Effect," working paper, University of Toronto, 2004.

particularly important because the "Linkage Principle" is the principal theoretical rationale for open bidding. In short, both empirical and theoretical evidence emerged that open auctions – auctions in which the identities and bids of all bidders were disclosed to the rest of the bidders – could produce anti-competitive, inefficient, and revenue non-maximizing outcomes.

The Office of the FCC's Chief Economist, Leslie Marx, resolved to do something in response to the growing mass of evidence that open auctions were problematic, and in connection with the upcoming AWS-1 auction proposed rules for anonymous bidding. The FCC's anonymous bidding proposal was enthusiastically supported by the U.S. Department of Justice, the Federal Trade Commission, and numerous consumers organizations and public interest groups. And the incumbents who were planning to bid in the AWS-1 auction launched a firestorm of criticism and an intense political campaign to prevent the adoption of anonymous bidding, including a letter to Chairman Martin threatening not to participate in the auction.[4] As one lobbyist for the incumbents told *Communications Daily*, "You can't go to the FCC and argue with an economist. This is a political play. These are businesses and this is of critical importance to these businesses. Economic theories be damned ... We'll be suited up and at the FCC." [5] Seldom have the incumbents been so frank.

The principal arguments assembled by the incumbents were that there was no need for the rules change and that anonymous bidding would prevent bidders from assessing appropriate complementarities as they bid to aggregate packages of spectrum in

[4] Interestingly, Verizon did not oppose anonymous bidding.
[5] *Communications Daily*, March 28, 2006.

accordance with their business plans. Some smaller bidders weighed in with the argument that anonymous bidding prevented them from avoiding head-to-head bidding wars with the major incumbents. Consumers organizations and public interest groups argued that the problems of signaling and other anti-competitive behaviors were real and only anonymous bidding could resolve them-- especially the problem that the incumbents used open bidding to identify new entrants for exclusion from acquiring spectrum, that bidders who hadn't decided before the bidding began on complementarities among the licenses which they were seeking were admitting to having no bidding strategy, and that smaller bidders like rural telephone companies were seldom challenged by major incumbents for the spectrum on which they routinely bid. In the end, resolution of the matter of anonymous bidding was not a question of arguments, but of political muscle.

T-Mobile proposed a compromise: anonymous bidding would not be used in the AWS-1 auction unless the modified eligibility ratio fell below three, i.e., unless the eligibility of qualified bidders produced a mean of less than three bidders per license. The FCC adopted the compromise.

It is interesting that the AWS-1 auction had among its qualified bidders four which never placed a bid, and seven which bid only once. Given how narrowly the modified eligibility ratio reached 3.05, if these marginal bidders had not been present, the auction would have been anonymous. There was certainly the impression left that the auction rules were gamed by the introduction of "qualified" bidders whose presence was solely to ensure that a modified eligibility ratio of three was achieved so that the AWS-1 auction would not be anonymous. The vigor with which several incumbents opposed anonymous bidding raises the question of whether they had any hand in arranging the

participation of these "ratio pumping" bidders in the auction. At the least, the AWS-1 auction experience suggested that "compromises" which introduce artificial conditions for implementation of anonymous bidding were an invitation for the rules to be gamed.

Anonymous bidding did not occur in the AWS-1 auction, and thus it provided a test of whose claims were the true: the incumbents or their opponents.

I. Major Incumbents Pursued a Tacitly-Collusive Strategy of Excluding Potentially Threatening New Entrants from Acquiring National Footprint in the AWS-1 Auction.

A. Focus of the Study.

Within days of the end of the AWS-1 auction industry analysts and public interest activists were mooting the fate of Wireless DBS LLC in the auction with speculations that the coalition of satellite television providers had been forced from the auction after failing to acquire any licenses in the face of opposition from a coalition of major incumbents. However, very little attention was paid to the specific dynamics of the interaction between incumbents and Wireless DBS LLC in the auction and no attempt was made to investigate whether a more general strategy of blocking new entrants who aspired to obtaining a national AWS-1 footprint had been pursued. This study focuses on identifying major incumbents, new entrants who were targeted for blocking by those incumbents, and the strategies used by those incumbents again targeted new entrants during bidding, evaluating the success of these blocking strategies, and recommending remedies for preventing such blocking strategies in future spectrum auctions.

B. A Broader Definition of Market Structure is Necessary for Analysis of the AWS-1 Auction.

It is necessary first to be clear about the market structure underlying the AWS-1 auction. The tendency to narrowly define this market as only wireless broadband

provision obscures more than it illuminates, and it runs contrary to much current theorizing in industrial organization. The wireless broadband market is nested in a more general broadband provision market and not merely firms which have substantial pre-existing wireless broadband deployments. Firms with substantial pre-existing DSL and cable modem broadband deployments must be regarded as critically-positioned incumbents for the AWS-1 auction. It is precisely the extraordinary capitalization resources of these latter firms, mainly cable and telephone companies, and their ability to integrate wireless broadband delivery with their existing systems which had enormous effect on their ability to succeed in the AWS-1 auction. This study, therefore, treats such bidders as incumbents.

C. The Absence of Anonymous Bidding in the AWS-1 Auction Facilitated Identification of New Entrants and the Incumbents' Blocking Strategy.

The absence of anonymous bidding in the AWS-1 auction afforded opportunities for incumbents to identify new entrants who represented a serious competitive threat and block them by concentrating collectively on rapidly outbidding them on licenses necessary for acquisition of a national AWS footprint. These tactics, for example, placed the principal DBS bidder, Wireless DBS LLC, in the AWS-1 auction at a considerable disadvantage. Wireless DBS LLC was unable to acquire a national footprint at auction, particularly in the Cellular Market Area (CMA) and Regional Economic Area Grouping (REAG) licenses, in large part because incumbent telephone and cable broadband providers were able to identify and block Wireless DBS LLC bids. Other new entrants such as Atlantic Wireless LP, Antares Holdings LLC, Dolan Family Holdings LLC, and NTELOS Inc. were also blocked. Atlantic Wireless obtained only 12.20% of the licenses upon which it bid; Antares Holdings and Dolan Family Holdings, like Wireless DBS,

obtained no licenses. NTELOS Inc. obtained 38.89% of the licenses it sought, but it is, as shown below, a special case. Wireless DBS LLC was sufficiently blocked that it effectively withdrew from the auction after the eleventh round. Dolan Family Holdings LLC withdrew after the twentieth round. Antares Holdings LLC withdrew after the thirtieth round. Atlantic Wireless LP was able to persevere through round ninety-seven.

Notable among incumbents participating in such blocking behavior were T-Mobile License LLC, SpectrumCo LLC, and Cingular AWS LLC. Barat Wireless LP,[6] MetroPCS AWS LLC, Denali Spectrum License LLC, and Cricket Licensee (Reauction),[7] Inc. also engaged in this blocking behavior. These incumbents obtained significant percentages of the licenses on which they bid: T-Mobile obtained 41.52% of the licenses on which it bid, SpectrumCo 60.89%, Cingular AWS 22.07%, Barat Wireless 25.76%, and Cricket Licensee (Reauction) 37.64%,. MetroPCS AWS and Denali Spectrum acquired significantly less of the licenses on which they bid – 12.12% and 5.88%, respectively. These two incumbents faced significant challenge from other incumbents as a result of intersecting bidding strategies. Although a major incumbent, Verizon chose less frequently to engage in blocking new entrant acquisition of national footprint; it still obtained 61.90% of the licenses on which it bid.

D. Identifying Major Incumbents and Targeted New Entrants.

For purposes of this study, a major incumbent was defined as a bidder owned by firm(s) with significant, pre-existing, national or near-national broadband deployment, whether wireless or landline. A targeted new entrant was defined as an entrant which bid on ten or more licenses and which was challenged by two or more incumbents at a rate at

[6] Barat Wireless LP is primarily owned by U.S. Cellular Corporation.

[7] Denali Spectrum License LLC and Cricket Licensee (Reauction) are primarily owned by LEAP International Wireless, Inc.

least two standard deviations higher than the mean rate at which each incumbent challenged all bidders. A challenged incumbent was defined as an incumbent which was challenged by two or more incumbents at a rate at least two standard deviations higher than the mean rate at which each incumbent challenged all bidders. Table 1 shows the rate of challenge on licenses by incumbents in standard deviations from the mean number of challenges to all bidders by each incumbent:[8]

Table 1.
Rate of Challenge by Incumbents in Standard Deviations from the Mean of Each Incumbent

	Challenging Incumbents							
Challenged Bidders	**T-Mobile License LLC**	**SpectrumCo LLC**	**Cingular AWS LLC**	**Cricket Licensee (Reauction), Inc.**	**Barat Wireless L.P.**	**Cellco Partnership d/b/a Verizon Wireless**	**Denali Spectrum License LLC**	**MetroPCS AWS LLC**
18th Street Spectrum LLC	0.5769	0.1334	-0.1065	0.0313	1.4360	-0.2013	-0.1858	-0.2559
3 Rivers Telephone Cooperative Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
ACS Wireless License Sub Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Advanced Communications Technology Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Agri-Valley Communications	0.2794	-0.4724	-0.0820	-0.5292	-0.3930	-0.2013	-0.1858	0.3565
Alenco Communications Inc.	0.2794	-0.4724	-0.4508	0.6719	-0.3930	-0.2013	-0.1858	-0.2559
Allcom Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
American Cellular Corporation	0.4686	0.2937	0.3298	0.3751	0.5640	-0.2013	-0.0554	-0.1063
Antares Holdings LLC	1.7670	**2.7728**	**3.0532**	**2.0231**	0.0969	-0.2013	0.6156	**3.1122**
Arapahoe Telephone Company d/b/a ATC Communication	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
AST Telecom LLC	-0.4644	4.0708	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Atlantic Seawinds Communications LLC	4.7421	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Atlantic Wireless LP	**2.1600**	**2.6672**	**2.7818**	**2.0341**	1.6144	0.5377	0.2703	-0.2559
AWS Wireless Inc.	1.1594	0.8897	0.8999	0.9172	0.4074	0.1035	0.0173	0.4859
Aztech Communications Inc.	-0.4644	-0.4724	-0.4508	**3.6746**	-0.3930	-0.2013	-0.1858	-0.2559
Barat Wireless LP	1.5078	1.5927	**2.1311**	-0.5292	-	0.7169	0.4941	0.3936
Beehive Telephone Company Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
BEK Communications Cooperative	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Bend Cable Communications LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Big Bend Telecom LTD	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Big River Telephone Company LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559

[8] In Table 1 **boldfaced** numbers are rates of challenge two or more standard deviations from the mean of the challenging incumbent; targeted new entrants are **boldfaced** and challenged incumbents are *italicized.*

Table 1. (Continued)
Rate of Challenge by Incumbents in Standard Deviations from the Mean of Each Incumbent

	Challenging Incumbents							
Challenged Bidders	**T-Mobile License LLC**	**SpectrumCo LLC**	**Cingular AWS LLC**	**Cricket Licensee (Reauction), Inc.**	**Barat Wireless L.P.**	**Cellco Partnership d/b/a Verizon Wireless**	**Denali Spectrum License LLC**	**MetroPCS AWS LLC**
Blackfoot Telephone Cooperative Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Blue Valley Tele-Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Bluestreak Wireless LLC	0.1141	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
BPS Telephone Company	4.7421	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Breda Telephone Corp.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
C&W Enterprises Inc.	-0.4644	-0.4724	-0.4508	-0.3136	-0.3930	-0.2013	-0.1858	-0.2559
Cable One Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.0413	-0.2013	-0.1858	-0.2559
Cal-Ore Telephone Co.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Carolina Personal Communications Inc.	4.7421	0.6634	0.8402	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Carolina West Wireless Inc	0.8372	-0.1928	0.6084	0.1014	0.9787	-0.2013	-0.1858	0.3157
Cavalier Wireless LLC	0.7905	1.4747	-0.4508	0.5918	-0.0413	1.0418	-0.1858	-0.2559
CCTN Biddng Consortium	-0.4644	1.9074	1.7623	-0.5292	-0.3930	-0.2013	1.4170	0.5606
Cellco Partnership d/b/a Verizon Wireless	1.0232	1.9074	0.5174	1.0723	0.9134	-	-0.1858	-0.2559
Cellular South Licenses Inc.	0.8792	0.3795	1.0680	1.7041	0.0357	-0.2013	-0.1858	0.2484
Centennial Michiana License Company LLC	0.7607	0.0621	-0.4508	-0.2819	-0.3930	-0.2013	-0.1858	1.3516
Central Texas Telephone Investments LP	-0.4644	-0.4724	-0.4508	-0.2664	-0.3930	-0.2013	-0.1858	-0.2559
Central Utah Telephone Company	-0.4644	-0.4724	0.0583	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
CenturyTel Broadband Wireless LLC	0.2689	0.5515	**3.2376**	0.6550	0.9594	1.9324	-0.1858	-0.2559
Chariton Valley Communication Corporation Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Chequamegon Communications Cooperative Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Chester Telephone Company	-0.4644	-0.4724	-0.4508	3.6746	-0.3930	-0.2013	-0.1858	-0.2559
Churchill County Telephone d/b/a CC Communications	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Cincinnati Bell Wireless LLC	0.5369	1.4498	0.5422	0.7643	-0.3930	-0.2013	-0.1858	1.8362
Cingular AWS LLC	1.8524	**2.3318**	-	1.8845	1.7729	1.1035	0.6731	-0.2559
City of Ketchikan dba Ketchikan Public Utilities	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Clay County Rural Telephone Cooperative Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Clinker LLC	-0.4644	-0.4724	-0.4508	**3.6746**	-0.3930	-0.2013	-0.1858	-0.2559
Coleman County Telecommunications LTD	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Command Connect LLC	-0.4644	1.1178	-0.4508	0.9422	-0.3930	**8.8884**	-0.1858	0.1728
Comporium Wireless LLC	2.1389	-0.4724	-0.4508	1.5727	-0.3930	-0.2013	-0.1858	-0.2559
Craw-Kan Telephone Cooperative Inc	-0.4644	-0.4724	1.9053	0.3116	-0.3930	-0.2013	-0.1858	-0.2559
Cricket Licensee (Reauction) Inc	1.4955	1.6524	-0.4508	-	1.4325	0.7204	0.4114	0.9502
Cross Telephone Company	-0.4644	-0.4724	-0.4508	0.3116	**2.3505**	-0.2013	-0.1858	-0.2559
CTC Telcom Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559

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Dakota Wireless Group LLC	-0.4644	-0.4724	0.3571	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Daredevil Commuinications LLC	0.4565	0.9184	**4.4093**	0.5575	0.1669	0.0048	-0.1095	0.3857
Denali Spectrum License LLC	1.0669	**3.5363**	-0.4508	**2.9328**	**2.8346**	**5.1456**	-	**5.2915**
Diller Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	**6.4657**	-0.2013	-0.1858	-0.2559
Dolan Family Holdings LLC	1.9386	1.6245	**3.1242**	1.0877	-0.3930	**2.1294**	**4.1295**	**3.7010**
Ellijay Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
ETCOM LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Farmers Mutual Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Farmers Telecommunications Cooperative Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Fidelity Communications Company	-0.4644	-0.4724	-0.4508	-0.1470	-0.3930	-0.2013	-0.1858	-0.2559
FMTC Wireless Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
FTC Management Group Inc.	-0.4644	1.7992	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Graceba Total Communications Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Grand River Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Granite State Long Distance Inc.	**2.1389**	-0.4724	**2.1311**	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Green Hills Area Cellular Telephone Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Hancock Rural Telephone Corporation	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Hawaiian Telcom Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Heart of Iowa Communications Cooperative	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Hemingford Cooperative Telephone Company	-0.4644	-0.4724	-0.4508	1.5727	0.5215	-0.2013	-0.1858	-0.2559
Hill Country Telephone Cooperative Inc	-0.4644	1.7992	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Horry Telephone Cooperative Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Innovative Communication Corporation	-0.4644	4.0708	-0.4508	-0.1088	-0.3930	-0.2013	-0.1858	-0.2559
Iowa Intelegra Consortium LLC	0.5769	-0.4724	0.5820	-0.5292	**3.0364**	-0.2013	-0.1858	-0.2559
Iowa Telecommunications Services Inc	-0.2474	0.6634	-0.0205	-0.5292	1.3217	-0.2013	-0.1858	-0.2559
James Valley	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Jefferson Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Kingdom Telephone Company	-0.4644	-0.4724	-0.4508	0.8721	-0.3930	-0.2013	-0.1858	-0.2559
KTC AWS Limited Partnership	-0.4644	-0.4724	-0.0536	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
La Ward Cellular Telephone Company Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
LCDW Wireless Limited Partnership	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Leaco Rural Telephone Cooperative Inc	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Ligtel Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
LL License Holdings II LLC	0.0395	0.1139	0.8818	-0.2580	**2.7045**	-0.2013	-0.1858	-0.2559

Table 1. (Continued)
Rate of Challenge by Incumbents in Standard Deviations from the Mean of Each Incumbent

	Challenging Incumbents							
Challenged Bidders	**T-Mobile License LLC**	**SpectrumCo LLC**	**Cingular AWS LLC**	**Cricket Licensee (Reauction), Inc.**	**Barat Wireless L.P.**	**Cellco Partnership d/b/a Verizon Wireless**	**Denali Spectrum License LLC**	**MetroPCS AWS LLC**
Lynch AWS Corporation	1.4881	0.6634	0.1947	-0.0037	1.3217	-0.2013	-0.1858	0.8158
MAC Wireless LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Manti Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
McDonald County Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Mediapolis Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
MetroPCS AWS LLC	**2.3755**	**3.1760**	**3.5394**	1.8275	0.6462	0.7169	1.6841	-
Midwest AWS Limited Partnership	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Mt. Vernon. Net Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
MTA Communications Inc.	0.2794	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	1.4170	-0.2559
MTPCS License Co. LLC	-0.4644	-0.1316	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Muenster Telephone Corp. of Texas	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Mutual Telephone Company	-0.4644	1.0420	-0.4508	-0.5292	**4.1795**	-0.2013	-0.1858	-0.2559
NEIT Wireless LLC	-0.4644	-0.4724	0.2869	-0.5292	**3.5263**	-0.2013	-0.1858	-0.2559
North Dakota Network Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Northeast Missouri Rural Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Northeast Nebraska Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	3.0364	-0.2013	-0.1858	-0.2559
Northern Iowa Communications Partners LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Northwest Missouri Cellular Limited Partnership	2.1389	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
NSIGHTTEL Wireless LLC	0.5273	-0.4724	0.7787	-0.5292	1.5666	-0.2013	-0.1858	-0.2559
NTELOS Inc.	0.4034	**2.5564**	**2.9918**	0.8721	-0.3930	-0.2013	-0.1858	-0.2559
Palmetto Rural Telephone Cooperative Inc.	1.2711	1.0420	**2.9918**	**2.2734**	-0.3930	-0.2013	-0.1858	-0.2559
Panhandle Telecommunication Systems Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Panora Telecommunications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Partnership Wireless LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Paul Bunyan Rural Telephone Cooperative	-0.4644	-0.4724	0.1947	-0.0037	-0.3930	-0.2013	-0.1858	-0.2559
PCS Partners L.P.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Perry-Spencer Rural Telephone Coop. Inc. dba PSC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
PetroCom License Corporation	-0.4644	-0.4724	-0.4508	1.5727	-0.3930	-0.2013	-0.1858	-0.2559
Pine Cellular Phones Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Plains Cooperative Telephone Association Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Plateau Telecommunications Inc.	0.1141	-0.2200	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	0.2204
Public Service Wireless Services Inc.	-0.1751	1.2944	-0.1639	0.1715	-0.3930	-0.2013	-0.1858	-0.2559
Rainbow Telecommunications Association Inc.	-0.4644	-0.4724	-0.4508	**3.6746**	-0.3930	-0.2013	-0.1858	-0.2559

Table 1. (Continued)
Rate of Challenge by Incumbents in Standard Deviations from the Mean of Each Incumbent

	Challenging Incumbents							
Challenged Bidders	**T-Mobile License LLC**	**SpectrumCo LLC**	**Cingular AWS LLC**	**Cricket Licensee (Reauction), Inc.**	**Barat Wireless L.P.**	**Cellco Partnership d/b/a Verizon Wireless**	**Denali Spectrum License LLC**	**MetroPCS AWS LLC**
Red Rock Spectrum Holdings LLC	-0.4644	-0.1633	-0.3103	-0.3290	0.0736	-0.2013	-0.1858	-0.1976
Reservation Telephone Cooperative Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Roberts County Telephone Cooperative Association	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Rodriguez Marcos	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Ropir Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Route 66 Wireless LLC	-0.4644	-0.4724	-0.4508	0.0714	-0.3930	-0.2013	-0.1858	-0.2559
Salina Spavinaw Telephone Co.Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Sandhill Communications LLC	-0.4644	-0.4724	-0.4508	**3.6746**	-0.3930	-0.2013	-0.1858	-0.2559
Shenandoah Mobile Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Shoreline Investments LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
SKT Inc.	-0.4644	-0.4724	0.5820	0.3116	**2.3505**	-0.2013	-0.1858	-0.2559
Smithville Spectrum LLC	-0.4644	-0.4724	-0.4508	0.8721	-0.3930	-0.2013	-0.1858	-0.2559
South #5 RSA Limited Partnership d/b/a Brazos Cell	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
South Slope Cooperative Telephone Company Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Southeastern Indiana Rural Telephone Coop. Inc.	-0.4644	-0.4724	-0.4508	1.5727	-0.3930	-0.2013	-0.1858	-0.2559
Space Data Spectrum Holdings LLC	0.0090	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	0.8341	-0.2559
SpectrumCo LLC	0.8219	-	**2.1615**	1.4985	1.2208	-0.2013	0.4741	1.5260
Spotlight Media Corp	0.2794	0.8257	0.5328	-0.1288	0.2602	-0.2013	-0.1858	-0.2559
St. Cloud Wireless Holdings LLC	**3.4405**	-0.4724	-0.4508	0.5218	-0.3930	-0.2013	-0.1858	-0.2559
Stayton Cooperative Telephone Company	-0.4644	-0.4724	-0.4508	0.5218	-0.3930	-0.2013	-0.1858	-0.2559
Telephone Electronics Coporation	-0.4644	-0.4724	0.1947	0.5218	-0.3930	-0.2013	-0.1858	-0.2559
The Chillicothe Telephone Company	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
The Pioneer Telephone Association Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
The S&T Telephone Cooperative Association Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
The Tri-County Telephone Association Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Three River Telco	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
T-Mobile License LLC	-	0.8324	1.5861	1.2309	1.2208	0.6375	0.3189	1.2274
Triad AWS Inc.	0.8372	1.6960	1.6617	1.0950	1.1658	0.4873	0.5791	1.3029
Tri-Valley Communications LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Union Telephone Company	-0.4644	-0.2748	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
United Telephone Mutual Aid Corp.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
United Wireless Communications Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Van Buren Wireless Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Vermont Telephone Company Inc.	0.0090	0.5372	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559

Table 1. (Continued)
Rate of Challenge by Incumbents in Standard Deviations from the Mean of Each Incumbent

	Challenging Incumbents							
Challenged Bidders	**T-Mobile License LLC**	**SpectrumCo LLC**	**Cingular AWS LLC**	**Cricket Licensee (Reauction), Inc.**	**Barat Wireless L.P.**	**Cellco Partnership d/b/a Verizon Wireless**	**Denali Spectrum License LLC**	**MetroPCS AWS LLC**
Volcano Internet Provider	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
West Carolina Piedmont Bidding Consortium	-0.4644	-0.4724	-0.4508	**2.2734**	-0.3930	-0.2013	-0.1858	-0.2559
West Central Communications LLC	-0.4644	-0.4724	0.5820	0.3116	-0.3930	-0.2013	-0.1858	-0.2559
West Central Telephone Association	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Western New Mexico Telephone Company Inc.	-0.4644	1.7992	**2.1311**	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Wheat State Telephone Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
Wireless DBS LLC	**2.7897**	**3.6449**	**3.9062**	**2.2296**	**2.1790**	**6.4266**	**3.6710**	**4.8345**
Wittenberg Telephone Company	0.4823	-0.4724	1.0984	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
WUE INC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
WWW Broadband LLC	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
XIT Leasing Inc.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559
XIT Telecommunication & Technology Ltd.	-0.4644	-0.4724	-0.4508	-0.5292	-0.3930	-0.2013	-0.1858	-0.2559

Two or more standard deviations from incumbent mean

Targeted New Entrant
Challenged Incumbent

Note that Wireless DBS LLC was challenged by all eight incumbents at a rate higher than two standard deviations from the mean of each incumbent; Atlantic Wireless LP, Antares Holdings LLC, and Dolan Family Holdings LLC were each challenged by four incumbents at a rate higher than two standard deviations from the mean of each incumbent. NTELOS Inc. was challenged by two incumbents at a rate higher than two standard deviations from the mean of each incumbent. No other new entrants were challenged at this rate by this array of incumbents.[9]

[9] Two incumbents, Denali Spectrum Holdings LLC and MetroPCS AWS LLC, were challenged by other incumbents at relatively high rates. This appears to have been a consequence of similarities in underlying bidding profile and an epiphenomenon of the smaller package of licenses each bid on in attempting to block the targeted new entrants.

As Table 2 indicates, a two-tailed t-test revealed that the difference between the rate at which incumbents challenged targeted new entrants and the rate at which they challenged all other bidders was statistically significant for all incumbents except Barat Wireless LP:

Table 2.
Results of Two-Tailed t-Test of Difference Between the Mean Rates of Challenge by Incumbents Against Targeted New Entrants and Against All Other Bidders[10]

	DF	T	P-value
T-Mobile License LLC	165	-4.3272	<0.0001
SpectrumCo LLC	165	-6.7935	<0.0001
Cingular AWS LLC	165	-8.6563	<0.0001
Cellco Partnership d/b/a Verizon Wireless	165	-4.1331	<0.0001
Denali Spectrum License LLC	165	-9.6572	<0.0001
MetroPCS AWS LLC	165	-7.8983	<0.0001
Cricket Licensee (Reauction), Inc.	165	-3.9016	0.0001
Barat Wireless LP	165	-1.4137	0.1593

No similar pattern of concentrated challenges by targeted new entrants was observed in the AWS-1. Table 3 shows the rate of challenge on licenses by targeted new entrants in standard deviations from the mean number of challenges to all bidders by each targeted new entrant[11]:

[10] A two-tailed t-test assesses whether the means of two groups are statistically different from each other. A *p* value of 0.0125 indicates that 1.25 times out of a hundred you would find a statistically significant difference between the means by random chance even if there was none, i.e., a 98.75 percent chance that the significant difference is genuine.

[11] In Table 3 **boldfaced** numbers are rates of challenge two or more standard deviations from the mean of the challenging targeted new entrant; challenged targeted new entrants are **boldfaced** and challenged incumbents are *italicized*.

Table 3.
Rate of Challenge by Targeted New Entrants in Standard Deviations from the Mean of Each Targeted New Entrant

	Challenging New Entrants				
Challenged Bidders	**Antares Holdings LLC**	**Atlantic Wireless LP**	**Dolan Family Holdings LLC**	**NTELOS Inc.**	**Wireless DBS LLC**
18th Street Spectrum, LLC	-0.1598	0.5881	-0.1396	0.6149	-0.2210
3 Rivers Telephone Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
ACS Wireless License Sub, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Advanced Communications Technology, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Agri-Valley Communications	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Alenco Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Allcom Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
American Cellular Corporation	0.2746	0.5114	0.0019	0.2615	-0.0029
Antares Holdings LLC	**-**	**3.8223**	1.1643	-0.1263	0.1140
Arapahoe Telephone Company d/b/a ATC Communication	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
AST Telecom, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Atlantic Seawinds Communications, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Atlantic Wireless LP	1.3154	-	0.1572	0.1449	0.0840
AWS Wireless Inc.	0.3127	0.9278	0.0318	0.0527	0.0621
Aztech Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Barat Wireless LP	0.0019	1.5396	-0.1396	-0.1263	0.6317
Beehive Telephone Company, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
BEK Communications Cooperative	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Bend Cable Communications, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Big Bend Telecom, LTD	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Big River Telephone Company, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Blackfoot Telephone Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Blue Valley Tele-Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Bluestreak Wireless LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
BPS Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Breda Telephone Corp.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
C&W Enterprises Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Cable One Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Cal-Ore Telephone Co.	-0.1598	6.5040	-0.1396	-0.1263	-0.2210
Carolina Personal Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Carolina West Wireless Inc	-0.1598	-0.3220	-0.1396	0.4296	-0.2210
Cavalier Wireless LLC	-0.0503	0.5881	-0.1396	-0.1263	-0.0286
CCTN Biddng Consortium	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Cellco Partnership d/b/a Verizon Wireless	-0.1598	0.6531	0.4399	-0.1263	**2.9056**
Cellular South Licenses, Inc.	-0.1598	0.1046	-0.1396	-0.1263	-0.2210
Centennial Michiana License Company LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Central Texas Telephone Investments, LP	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Central Utah Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
CenturyTel Broadband Wireless LLC	-0.1598	0.0625	-0.1396	-0.1263	-0.2210
Chariton Valley Communication Corporation, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210

Table 3. (Continued)
Rate of Challenge by Targeted New Entrants in Standard Deviations from the Mean of Each Targeted New Entrant

	Challenging New Entrants				
Challenged Bidders	**Antares Holdings LLC**	**Atlantic Wireless LP**	**Dolan Family Holdings LLC**	**NTELOS Inc.**	**Wireless DBS LLC**
Chequamegon Communications Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Chester Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Churchill County Telephone d/b/a CC Communications	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Cincinnati Bell Wireless LLC	-0.1598	1.7783	-0.1396	-0.1263	-0.2210
Cingular AWS LLC	0.8105	**2.1928**	0.3845	0.1929	0.9908
City of Ketchikan dba Ketchikan Public Utilities	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Clay County Rural Telephone Cooperative, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Clinker LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Coleman County Telecommunications, LTD	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Command Connect LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Comporium Wireless, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Craw-Kan Telephone Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Cricket Licensee (Reauction) Inc	0.5301	1.6245	0.0918	0.0428	0.5280
Cross Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
CTC Telcom, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Dakota Wireless Group LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Daredevil Commuinications LLC	0.3484	0.5138	-0.1396	-0.0507	-0.2210
Denali Spectrum License LLC	*1.0959*	*1.6856*	***3.4399***	*-0.1263*	***5.8483***
Diller Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Dolan Family Holdings LLC	**2.3033**	1.2532	-	-0.1263	**4.1082**
Ellijay Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
ETCOM, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Farmers Mutual Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Farmers Telecommunications Cooperative, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Fidelity Communications Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
FMTC Wireless, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
FTC Management Group, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Graceba Total Communications Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Grand River Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Granite State Long Distance, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Green Hills Area Cellular Telephone, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Hancock Rural Telephone Corporation	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Hawaiian Telcom Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Heart of Iowa Communications Cooperative	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Hemingford Cooperative Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Hill Country Telephone Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210

Table 3. (Continued)
Rate of Challenge by Targeted New Entrants in Standard Deviations from the Mean of Each Targeted New Entrant

	Challenging New Entrants				
Challenged Bidders	**Antares Holdings LLC**	**Atlantic Wireless LP**	**Dolan Family Holdings LLC**	**NTELOS Inc.**	**Wireless DBS LLC**
Horry Telephone Cooperative, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Innovative Communication Corporation	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Iowa Intelegra Consortium LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Iowa Telecommunications Services Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
James Valley	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Jefferson Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Kingdom Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
KTC AWS Limited Partnership	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
La Ward Cellular Telephone Company, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
LCDW Wireless Limited Partnership	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Leaco Rural Telephone Cooperative Inc	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Ligtel Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
LL License Holdings II, LLC	-0.1598	-0.1019	-0.1396	-0.1263	-0.2210
Lynch AWS Corporation	-0.1598	1.3845	-0.1396	-0.1263	-0.2210
MAC Wireless, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Manti Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
McDonald County Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Mediapolis Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
MetroPCS AWS, LLC	1.6191	1.8499	0.9668	-0.1263	**2.4793**
Midwest AWS Limited Partnership	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Mt. Vernon. Net, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
MTA Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	1.1190
MTPCS License Co., LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Muenster Telephone Corp. of Texas	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Mutual Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
NEIT Wireless, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
North Dakota Network Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Northeast Missouri Rural Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Northeast Nebraska Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Northern Iowa Communications Partners, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Northwest Missouri Cellular Limited Partnership	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
NSIGHTTEL Wireless, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
NTELOS Inc.	-0.1598	**4.2286**	-0.1396	-	-0.2210
Palmetto Rural Telephone Cooperative, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Panhandle Telecommunication Systems, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Panora Telecommunications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Partnership Wireless LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Paul Bunyan Rural Telephone Cooperative	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210

Table 3. (Continued)
Rate of Challenge by Targeted New Entrants in Standard Deviations from the Mean of Each Targeted New Entrant

	Challenging New Entrants				
Challenged Bidders	**Antares Holdings LLC**	**Atlantic Wireless LP**	**Dolan Family Holdings LLC**	**NTELOS Inc.**	**Wireless DBS LLC**
PCS Partners, LP	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Perry-Spencer Rural Telephone Coop., Inc. dba PSC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
PetroCom License Corporation	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Pine Cellular Phones, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Plains Cooperative Telephone Association, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Plateau Telecommunications, Inc.	-0.1598	0.0572	-0.1396	-0.1263	-0.2210
Public Service Wireless Services, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Rainbow Telecommunications Association, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Red Rock Spectrum Holdings, LLC	-0.1598	-0.2756	-0.1396	-0.1263	-0.2210
Reservation Telephone Cooperative, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Roberts County Telephone Cooperative Association	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Rodriguez, Marcos	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Ropir Communications, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Route 66 Wireless, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Salina Spavinaw Telephone Co.Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Sandhill Communications, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Shenandoah Mobile Company	-0.1598	-0.3220	-0.1396	**6.5449**	-0.2210
Shoreline Investments LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
SKT, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Smithville Spectrum, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
South #5 RSA Limited Partnership d/b/a Brazos Cell	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
South Slope Cooperative Telephone Company, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Southeastern Indiana Rural Telephone Coop., Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Space Data Spectrum Holdings, LLC	-0.1598	-0.3220	-0.1396	-0.1263	**2.3371**
SpectrumCo LLC	0.6773	1.9533	0.1467	-0.0391	0.8457
Spotlight Media Corp	0.3484	0.6531	-0.1396	0.4031	0.6723
St. Cloud Wireless Holdings, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Stayton Cooperative Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Telephone Electronics Coporation	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
The Chillicothe Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
The Pioneer Telephone Association, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
The S&T Telephone Cooperative Association, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
The Tri-County Telephone Association, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Three River Telco	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
T-Mobile License LLC	0.4311	1.1896	0.3657	-0.0109	0.6553

Table 3. (Continued)
Rate of Challenge by Targeted New Entrants in Standard Deviations from the Mean of Each Targeted New Entrant

	Challenging New Entrants				
Challenged Bidders	**Antares Holdings LLC**	**Atlantic Wireless LP**	**Dolan Family Holdings LLC**	**NTELOS Inc.**	**Wireless DBS LLC**
Triad AWS, Inc.	1.0531	**2.0050**	0.1370	-0.1263	0.4185
Tri-Valley Communications, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Union Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
United Telephone Mutual Aid Corp.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
United Wireless Communications Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Van Buren Wireless, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Vermont Telephone Company, Inc.	**2.2120**	0.4364	-0.1396	-0.1263	-0.2210
Volcano Internet Provider	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
West Carolina Piedmont Bidding Consortium	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
West Central Communications LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
West Central Telephone Association	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Western New Mexico Telephone Company, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Wheat State Telephone, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
Wireless DBS LLC	0.1737	0.5312	**2.1423**	-0.1263	-
Wittenberg Telephone Company	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
WUE INC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
WWW Broadband, LLC	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
XIT Leasing, Inc.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210
XIT Telecommunication & Technology, Ltd.	-0.1598	-0.3220	-0.1396	-0.1263	-0.2210

Challenged Targeted New Entrant
Challenged Incumbent

One targeted new entrant, Dolan Family Holdings LLC, was challenged by two other targeted new entrants – Antares Holdings LLC and Wireless DBS LLC – at a rate higher than two standard deviations from the mean of those new entrants. Atlantic Wireless LP also came into conflict with two other targeted new entrants – Antares Holdings LLC and NTELOS Inc. Only one incumbent, Denali Spectrum License LLC, was challenged by two targeted new entrants – Antares Holdings LLC and Wireless DBS LLC -- at a rate higher than two standard deviations from the mean of those new entrants. None of these

cases were statistically significant. The lack of parity to the incumbents in concentrated challenges by targeted new entrants militates against the incumbent challenges being solely the consequences of similar underlying bidding strategy of the bidders involved.

II. Examination of the Bidding Profiles of Targeted New Entrants Discloses the Exclusionary Bidding Strategy of Major Incumbents.

It may certainly be argued that the challenges of the incumbents to the targeted new entrants is simply an epiphenomenon of the fact that the spectrum at issue was highly sought by all bidders. This is not, in fact, true, since the bidding on the relevant spectrum involved in the main only incumbents and targeted new entrants. Furthermore, this argument seems to miss the point: most highly-prized licenses in the AWS-1 auction were highly-prized precisely because they offered complementarities to any bidder seeking national footprint or seeking to block others from attaining that footprint. In order to determine exactly what underlies the pattern of concentrated challenges by incumbents it is necessary to examine the bidding profiles of the targeted new entrants in some detail.

A. Antares Holdings LLC.

Table 4 presents the bidding profile of Antares Holdings LLC:

Table 4.
Bidding Profile of Antares Holdings LLC

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
No. of Licenses Sought	6	15	6	1	0	0	28
States/Areas Covered	DC, DE, MA, MD, NH, NJ, NY, PA, RI, VA, VT, WV	CT, DC, DE, FL, IA, IL, IN, MA, MD, MN, MO, NH, NJ, NY, PA, RI, TX, VA, VT, WI, WV	CT, MA, NH, NJ, NY, RI	PR, USVI	-	-	-

Table 4. (Continued)
Bidding Profile of Antares Holdings LLC

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
Population of Coverage Area	27,347,178	90,548,766	8,244,935	3,917,222	0	0	130,058,101
Challenging Incumbents (No. of Licenses Challenged)	Cingular AWS LLC (3), Cricket License (Reauction) Inc. (4), MetroPCS AWS LLC (3), SpectrumCo LLC (6), T-Mobile License LLC (3)	Barat Wireless LP (1), Cingular AWS LLC (14), Cricket License (Reauction) Inc. (11), Denali Spectrum License LLC (2), MetroPCS AWS LLC (7), SpectrumCo LLC (13),T-Mobile License LLC (7)	Cricket License (Reauction) Inc. (2), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (6)	Cingular AWS LLC (1)	-	-	-
States/Areas Covered by Challenged Licenses	DC, DE, MA, MD, NH, NJ, NY, PA, RI, VA, VT WV	CT, DC, DE, FL, IA, IL, IN, MA, MD, MN, MO, NH, NJ, NY, PA, RI, TX, VA, VT, WI, WV	CT, MA, NH, NJ, NY, RI	PR, USVI	-	-	-
Population of Coverage Area of Challemnged Licenses	27,347,178	90,548,766	8,244,935	3,917,222	-	-	130,058,101

Antares Holdings LLC aimed at creating a base in the eastern half of the U.S. and Texas with a combination of six BEA B Block and fifteen C Block licenses, six CMA A Block licenses, and one REAG D Block license, covering nineteen states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands with a coverage population of 130,058,101. Antares Holdings LLC is owned by a major investor in Northcoast Communications LLC, which held a PCS footprint roughly covering the same area as the licenses sought in the AWS-1 auction. Fifty of these PCS licenses were sold to Verizon for $750,000,000 in 2003. Acquistion of the AWS licenses would have recreated a

strong regional base in an area where Northcoast had dominated as a PCS provider and from which to acquire national AWS footprint in future auctions. Five incumbents challenged for the BEA B Block licenses, seven for the C Block licences, and four for the CMA A Block licenses. One incumbent challenged for the REAG D Block license. SpectrumCo LLC acquired the six BEA B Block Licenses. Cingular AWS LLC acquired six of the BEA C Block licenses, SpectrumCo LLC three, Crick Licensee (Reauction) Inc. two, T-Mobile License LLC one, and non-incumbents Vermont Telephone Company Inc., American Cellular Corporation, and Daredevil Communications LLC one each. Cingular AWS LLC acquired the REAG D Block license. A number of incumbents did not persevere on these licenses beyond the withdrawal of Antares Holdings LLC and other non-incumbents which were not seeking the same footprint went largely unchallenged. The appearance of a concerted effort by incumbents to block Antares Holdings LLC is difficult to avoid.

B. Atlantic Wireless LP.

Table 5 provides the bidding profile of Atlantic Wireless LP:

Table5.
Bidding Profile of Atlantic Wireless LP

	BEA		**CMA**	**REAG**			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
No. of Licenses Sought	34	48	39	0	1	1	123

Table5. (Continued)
Bidding Profile of Atlantic Wireless LP

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
States/Areas Covered	AZ, CA, CO, DE, FL, HI, ID, IL, IN, KS, KY, MA, MD, ME, MI, MO, NC, NE, NH, NM, NV, NY, OH, OR, PA, RI, SC, TX, UT, VA, VT, WA, WI, WV	AL, AR, AZ, CA, CO, DC, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NV, OH, OK, OR, PA, RI, SC, TN, TX, UT, VA, VT, WA, WI, WV	AR, CA, CO, CT, FL, GA, HI, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NH, NJ, NV, OH, OR, PA, RI, TN, TX, UT, VA, WA, WI	-	HI	Northeast	-
Population of Coverage Area	72,544,094	161,946,246	89,491,506	-	1,211,537	50,058,090	375,251,473
Challenging Incumbents (No. of Licenses Challenged)	Barat Wireless LP (6), Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (18), Cricket Licensee (Reauction) Inc. (20), MetroPCS AWS LLC (4), SpectrumCo LLC (32), T-Mobile License LLC (5)	Barat Wireless LP (6), Cingular AWS LLC (35), Cricket Licensee (Reauction) Inc. (24), Denali Spectrum Holdings LLC (2), MetroPCS AWS LLC (10), SpectrumCo LLC (48), T-Mobile License LLC (20)	Barat Wireless LP (6), Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (25), Cricket Licensee (Reauction) Inc. (29), Denali Spectrum Holdings LLC (2), MetroPCS AWS LLC (7), SpectrumCo LLC (9), T-Mobile License LLC (39)	-	T-Mobile License LLC (1)	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), Denali Spectrum Holdings LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	-
States/Areas Covered by Challenged Licenses	AZ, CA, CO, DE, FL, HI, ID, IL, IN, KS, KY, MA, MD, ME, MI, MO, NC, NE, NH, NM, NV, NY, OH, OR, PA, RI, SC, TX, UT, VA, VT, WA, WI, WV	AL, AR, AZ, CA, CO, DC, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NV, OH, OK, OR, PA, RI, SC, TN, TX, UT, VA, VT, WA, WI, WV	AR, CA, CO, CT, FL, GA, HI, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NH, NJ, NV, OH, OR, PA, RI, TN, TX, UT, VA, WA, WI	-	HI	Northeast	-

Table5. (Continued)
Bidding Profile of Atlantic Wireless LP

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
Population of Coverage Area of Challemnged Licenses	72,544,094	161,946,246	89,491,506	-	1,211,537	50,058,090	375,251,473

Atlantic Wireless LP sought 34 BEA B Block licenses, forty-eight C Block licenses, thirty-nine CMA A Block licenses, one REG E Block license and one REAG F Block license, covering forty-three states, the District of Columbia, and the northeast region with a covered population of 375,251,473. Atlantic Wireless L.P. is primarily owned by Charles C. Townsend, founder of Aloha Partners L.P. which dominated two earlier lower700 MHz band auctions with seventy-seven 700 MHz licenses (auction 44) and eighty-nine 700 MHz licenses (auction 49), owning 12MHz of spectrum covering sixty percent of the United States -- including all of the top 10 markets -- and eighty-four percent of the population in the top 40 markets. Atlantic Wireless was a major contender for establishing a national AWS footprint. Seven incumbents challenged for the BEA B and C Block licenses, eight for the CMA A Block licenses, one for the REAG E Block license, and seven for the REAG F Block license. Atlantic Wireless LP obtained two BEA B Block licenses. SpectrumCo LLC obtained twenty-four BEA B Block licenses, Barat Wireless LP, Cellco Partnership d/b/a Verizon Wireless, Cingular AWS LLC, Cricket Licensee (Reauction) Inc., and non-incumbents American Cellular Corporation and Cavalier Wireless LLC one each. Atlantic Wireless secured twelve BEA C Block licenses. Cingular AWS LLC obtained 13 BEA C Block licenses, Cricket Licensee (Reauction) Inc. nine, T-Mobile License LLC five, SpectrumCO LLC three, MetroPCS

AWS LLC two, and non-incumbents Cavalier Wireless LLC, Cincinnati Bell Wireless LLC, Daredevil Communications LLC, and Lynch AWS Corporation one each. Atlantic Wireless LP won one CMA A Block license. T-Mobile License LLC secured seventeen CMA A Block Licenses, Cricket Licensee (Reauction) Inc. eight, Cingular AWS LLC five, Barat Wireless LP one, and non-incumbents AWS Wireless Inc. six and Cincinnati Bell Wireless LLC one. T-Mobile License LLC and Cellco Partnership d/b/a Verizon Wireless obtained the REAG E and F Block licenses respectively. The swarm of incumbents to challenge Atlantic Wireless LP for all but the REAG E Block license, the failure of many incumbents to persevere when Atlantic Wireless LP ceased bidding on a license, and the acquisition of portions of this spectrum by non-incumbents who did not present a threatening profile argue strongly for incumbent behavior being an attempt to block acquisition of a national AWS footprint by Atlantic Wireless LP. Atlantic Wireless LP did manage to salvage a more restricted position in the face of this onslaught than did Wireless DBS LLC, despite Wireless DBS LLC's better capitalization; this is likely a consequence of Atlantic Wireless LP's more aggressive bidding strategy and willingness to engage in retaliatory bidding.

C. Dolan Family Holdings LLC.

Table 6 provides the bidding profile for Dolan Family Holdings LLC:

Table 6.
Bidding Profile of Dolan Family Holdings LLC

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
No. of Licenses Sought	1	1	8	1	1	1	13
States/Areas Covered	CT, NJ, NY, MA, PA, VT	CT, NJ, NY, MA, PA, VT	CT, NJ, NY	Northeast	Northeast	Northeast	-

Table 6. (Continued)
Bidding Profile of Dolan Family Holdings LLC

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
Population of Coverage Area	25,712,577	25,712,577	19,658,795	50,058,090	50,058,090	50,058,090	221,258,219
Challenging Incumbents (No. of Licenses Challenged)	Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), Denali Spectrum License LLC (1), SpectrumCo LLC (1)	Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), Denali Spectrum License LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	Cingular AWS LLC (4), Cricket Licensee (Reauction) Inc. (2), Denali Spectrum License LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (8)	Cingular AWS LLC (1), Denali Spectrum License LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	Cingular AWS LLC (1), Denali Spectrum License LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1)	-
States/Areas Covered by Challenged Licenses	CT, NJ, NY, MA, PA, VT	CT, NJ, NY, MA, PA, VT	CT, NJ, NY	Northeast	Northeast	Northeast	-
Population of Coverage Area of Challenged Licenses	25,712,577	25,712,577	19,658,795	50,058,090	50,058,090	50,058,090	221,258,219

Dolan Family Holdings LLC aimed at creating a regional base in the northeast with a combination of eight CMA A Block licenses and one each of the BEA B and C Block and the REAG D, E, and F Block licenses, covering six states and the northeast region with a coverage population of 221,258,219. The licenses sought by Dolan Family Holdings LLC represented a strategy of acquiring dominance in the most potentially lucrative region to create a base from which to seek a future national footprint, since the principal stakeholders in Dolan Family Holdings LLC also control Cablevision, the dominant cable provider in New York City. At every turn it was faced by a swarm of concentrated challenges by incumbents: total of four incumbents for the one BEA B

Block license, five for the one BEA C Block license, six for the CMA A Block licenses, five for the REAG D and E Block licenses, and two for the REAG F Block license. SpectrumCo LLC took the BEA B Block license, MetroPCS AWS the BEA C Block license. T-Mobile License LLC took four of the CMA A Block licenses and Cingular AWS LLC one, while non-incumbents American Cellular Corporation took two and AWS Wireless Inc. took one, respectively. MetroPCS AWS LLC took the REAG D Block license, T-Mobile License LLC took the E Block, and Verizon Wireless the F Block. The majority of incumbents did not persevere on these licenses beyond the withdrawal of Dolan Family Holdings LLC and other non-incumbents which were not seeking the same footprint went largely unchallenged. It is difficult to see how these patterns are explainable as anything but a successful, systematic attempt to block Dolan Family Holdings LLC.

D. NTELOS Inc.

Table 7 provides the bidding profile of NTELOS Inc.:

Table 7.
Bidding Profile of NTELOS Inc.

	BEA		**CMA**	**REAG**			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
No. of Licenses Sought	0	3	15	0	0	0	18
States/Areas Covered	-	KY, NC, OH, VA, WV	KY, NC, OH, VA, WV	-	-	-	-
Population of Coverage Area	-	4,368,260	4,816,268	-	-	-	9,184,528
Challenging Incumbents (No. of Licenses Challenged)	-	Cingular AWS LLC (2), Cricket Licensee (Reauction) Inc. (1), SpectrumCo LLC (2)	Cingular AWS LLC (4), Cricket Licensee (Reauction) Inc. (3), T-Mobile License LLC (3)	-	-	-	-

Table 7. (Continued)
Bidding Profile of NTELOS Inc.

	BEA		CMA	REAG			
	B Block	C Block	A Block	D Block	E Block	F Block	Total
States/Areas Covered by Challenged Licenses	-	NC, VA	NC, VA	-	-	-	-
Population of Coverage Area of Challemnged Licenses	-	3,168,887	2,637,570	-	-	-	5,806,457

NTELOS Inc. is a classic example of a bidder with the bad luck to be in the wrong place at the wrong time. NTELOS Inc. aimed at constructing a Virginia-based network with overlap into neighboring states: three BEA C Block licenses and fifteen CMA A Block licenses, covering Virginia and parts of four other states with a coverage population of 9,184,528. NTELOS Inc. was challenged by three incumbents for two of the BEA C Block licenses and by three incumbents for four of the CMA C Block licenses. Cingular AWS LLC and Cricket Licensee (Reauction) Inc. each obtained one BEA C Block license, as did non-incumbent AWS Wireless Inc. Cingular AWS LLC obtained two CMA A Block licenses and Cricket Licensee (Reauction) Inc. one, while non-incumbents American Cellular Corporation and AWS Wireless Inc. took four and one, respectively. NTELOS Inc. successfully obtained seven CMA A Block licenses. The challenging incumbents persevered to victory and NTELOS was faced by several better capitalized non-incumbents. It was simply NTELOS Inc.'s misfortune that its bidding profile intersected those of several incumbents. There is no evidence of a systematic blocking pattern in this case.

E. Wireless DBS LLC.

Table 8 provides the bidding profile of Wireless DBS LLC:

Table 8.
Bidding Profile of Wireless DBS LLC

	BEA		CMA	REAG			
	B Block	**C Block**	**A Block**	**D Block**	**E Block**	**F Block**	**Total**
No. of Licenses Sought	1	1	5	8	8	8	31
States/Areas Covered	CA, CT, MA, NJ, NY, PA, VT	CT, MA, NJ, NY, PA, VT	CA, DC, IL, MD, NY, NJ, PA, VA	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	-
Population of Coverage Area	34,824,383	25,712,577	69,648,766	281,421,906	281,421,906	281,421,906	974,451,444
Challenging Incumbents (No. of Licenses Challenged)	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), Denali Spectrum Holdings LLC (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1)	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1)	Cingular AWS LLC (5), Cricket licensee (Reauction) Inc. (5), Denali Spectrum Holdings LLC (2), MetroPCS AWS LLC (3), SpectrumCo LLC (5), T-Mobile License LLC (5)	Barat Wireless LP (2), Cingular AWS LLC (6), Cricket Licensee (Reauction) Inc. (3), Denali Spectrum Holdings LLC (2), MetroPCS AWS LLC (6), SpectrumCo LLC (7), T-Mobile License LLC (6)	Barat Wireless LP (2), Cingular AWS LLC (6), Cricket Licensee (Reauction) Inc. (5), Denali Spectrum Holdings LLC (3), MetroPCS AWS LLC (5), SpectrumCo LLC (7), T-Mobile License LLC (8)	Barat Wireless LP (2), Cingular AWS LLC (7), Cricket Licensee (Reauction) Inc. (6), Denali Spectrum Holdings LLC (3), MetroPCS AWS LLC (2), SpectrumCo LLC (7), T-Mobile License LLC (7)	-
States/Areas Covered by Challenged Licenses	CA, CT, MA, NJ, NY, PA, VT	CT, MA, NJ, NY, PA, VT	CA, DC, IL, MD, NY, NJ, PA, VA	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	Northeast, Southeast, Great Lakes, Mississippi Valley, Central, West, Alaska, Hawaii	-
Population of Coverage Area of Challemnged Licenses	34,824,383	25,712,577	69,648,766	281,421,906	281,421,906	281,421,906	974,451,444

Wireless DBS LLC presented the most complete attempt of any new entrant to establish a national AWS footprint, bidding on a BEA B Block license, a BEA C Block license, five CMA A Block licenses, and eight licenses in each of the REAG D, E, and F Blocks, covering ten states and eight regions with a coverage population of 974,451,444. An alliance of the two principal providers of DBS television, Wireless DBS LLC sought to gain the terrestrial assets necessary for a national AWS system. This attempt met with the strongest and most concentrated blocking attempt by the incumbents, as a round-by-round case study describes below. SpectrumCo LLC obtained the BEA B Block license and MetroPCS AWS LLC the C Block license. T-Mobile License LLC obtained three CMA A Block licenses and Cricket Licensee (Reauction) Inc. two. T-Mobile License LLC and MetroPCS AWS LLC obtained two REAG D Block licenses each, Cingular AWS LLC, Denali Spectrum Holdings LLC, SpectrumCo LLC, and non-incumbent Spotlight Media Corp. each one. T-Mobile License LLC won four REAG E Block licenses, Barat Wireless LP, Cingular AWS LLC, Cricket Licensee (Reauction) Inc., and non-incumbent American Cellular Corporation one each. Cellco Partnership d/b/a Verizon Wireless acquired four REAG F Block licenses, T-Mobile License LLC three, and non-incumbent MTA Communications Inc. one. The pattern of incumbent challenges, failure of many incumbents to persevere after Wireless DBS LLC ceased bidding, and the success of less well-capitalized non-incumbents who did not possess Wireless DBS LLC's threatening national footprint profile all militate for this case being a successful blocking action against a targeted new entrant. Wireless DBS LLC was routed by concerted incumbent action.

III. Effects of the Major Incumbents' Exclusionary Strategy.

The effects of this exclusionary strategy were striking, as Table 5 discloses:

Table 9.
Comparison of Incumbents to Targeted Non-Incumbent in the AWS-1 Auction

Incumbents	**Total No. of Licenses Bid On**	**% of Licenses Bid On PWB**	**Round of Last Bid**	**Upfront Payment (in $million)**
Barat Wireless, L.P.	66	25.76%	128	80.00
Cellco Partnership d/b/a Verizon Wireless	21	61.90%	135	383.34
Cingular AWS, LLC	209	22.97%	114	500.00
Cricket Licensee (Reauction), Inc.	263	37.64%	115	255.00
Denali Spectrum License LLC	17	5.88%	109	50.00
MetroPCS AWS, LLC	66	12.12%	108	200.00
SpectrumCo LLC	225	60.89%	121	637.71
T-Mobile License LLC	289	41.52%	149	583.52
Mean	144.50	33.59%	122.38	336.20
Targeted Non-Incumbents				
Antares Holdings, LLC	28	0.00%	30	21.00
Atlantic Wireless, L.P.	123	12.20%	97	52.00
Dolan Family Holdings, LLC	13	0.00%	20	149.98
NTELOS Inc.	18	38.89%	104	2.66
Wireless DBS LLC	32	0.00%	11	972.55
Mean	42.8	10.22%	52.4	239.64

Incumbents who targeted new entrants did more than three times better on average at acquiring sought licenses than the targeted new entrants and they were able to persist in the auction on average more than twice as long than the targeted new entrants. Three of the new entrants -- Antares Holdings LLC, Dolan Family Holdings LLC, and Wireless DBS LLC – were excluded entirely from acquiring spectrum.

The case of Wireless DBS LLC is particularly telling because it implies that initial capitalization of any particular new entrant can be defeated by a "piling on" effect. Even an initial capitalization of $972,550,00. can be swamped when firms whose combined initial capitalization totals $2,256,230,000. systematically challenge every bid. It is hardly surprising that Wireless DBS LLC withdrew after the eleventh round.

Even more interesting is the fact that the major incumbents were apparently willing to pay a significant premium for engaging in the blocking bidding strategy: on average they paid 2.5 times more for the spectrum which they acquired than bidders who did not engage in this strategy. The difference in means between the dollars/MHz/pop price paid by major incumbents and all other bidders was statistically significant ($t = 4.812$, $p < 0.0001$).

This strategy adopted by major incumbents in the AWS-1 auction confirms Simon Wilkie's contention that

> [S]tandard FCC spectrum auctions, such as the recent AWS auction, strongly favor local geographic incumbent bidders and disfavor bidders with a national footprint business plan and actively discourage out-of-region competition. This likely means that new entrants, who will need such strategies in order to effectively compete with incumbent wireless providers, are disadvantaged by the auction design.[12]

IV. Exactly How the Major Incumbents Excluded Wireless DBS: A Case Study

Table 10 shows the strategic plan of Wireless DBS LLC for acquiring a national AWS footprint and exactly how it was blocked by major incumbents:

[12] Simon Wilkie, "Spectrum Auctions Are Not a Panacea: Theory and Evidence of Anti-Competitive and Rent-Seeking Behavior in FCC Rulemakings and Auction Design," WT Docket No. 07-16, April 26, 2007, 42.

Table 10.
Wireless DBS LLC's National AWS Footprint and How Incumbents Blocked It

License	Market Name	Round of First Bid	Round of Last Bid	No. of Bids	Challenging Incumbents (Round of Entry)	Ultimate Winner of License (Round PWB)
AW-REA001-F	Northeast	1	9	9	Cingular AWS LLC (1), MetroPCS AWS, LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1), Cricket Licensee (Reauction) Inc. (4), Cellco Partnership d/b/a Verizon Wireless (9)	Cellco Partnership d/b/a Verizon Wireless (16)
AW-REA002-F	Southeast	1	10	10	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS, LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1), Cricket Licensee (Reauction) Inc. (4)	Cellco Partnership d/b/a Verizon Wireless (14)
AW-REA003-F	Great Lakes	1	11	9	Barat Wireless LP (1), Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS, LLC (1), Cricket Licensee (Reauction) Inc. (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	Cellco Partnership d/b/a Verizon Wireless (14)
AW-REA004-F	Mississippi Valley	1	11	9	Barat Wireless LP (1), Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS, LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1), Cricket Licensee (Reauction) Inc. (4)	Cellco Partnership d/b/a Verizon Wireless (14)
AW-REA005-F	Central	1	11	10	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1), Cricket Licensee (Reauction) Inc. (3)	T-Mobile License LLC (15)
AW-REA006-F	West	1	9	8	Cellco Partnership d/b/a Verizon Wireless (1), Cingular AWS LLC (1), Cricket Licensee (Reauction) Inc. (1), MetroPCS AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	T-Mobile License LLC (15)

Table 10. (Continued)

Wireless DBS LLC's National AWS Footprint and How Incumbents Blocked It

License	Market Name	Round of First Bid	Round of Last Bid	No. of Bids	Challenging Incumbents (Round of Entry)	Ultimate Winner of License (Round PWB)
AW-REA007-F	Alaska	1	2	2	-	MTA Communications, Inc. (119)
AW-REA008-F	Hawaii	1	2	2	Cingular AWS LLC (1), SpectrumCo LLC (1), T-Mobile License LLC (1)	T-Mobile License LLC (108)
AW-REA001-D	Northeast	1	11	7	SpectrumCo LLC (1), Cingular AWS LLC (9), MetroPCS AWS, LLC (9), T-Mobile License LLC (10)	MetroPCS AWS, LLC (18)
AW-REA002-D	Southeast	1	7	5	Cricket Licensee (Reauction) Inc. (1), MetroPCS AWS, LLC (1), SpectrumCo LLC (1)	T-Mobile License LLC (15)
AW-REA003-D	Great Lakes	1	8	6	MetroPCS AWS, LLC (1), SpectrumCo LLC (1), Barat Wireless LP (4), Cricket Licensee (Reauction) Inc. (10)	Denali Spectrum License, LLC (20)
AW-REA004-D	Mississippi Valley	1	8	6	MetroPCS AWS, LLC (1), SpectrumCo LLC (1), Cingular AWS, LLC (4), Barat Wireless LP (8)	T-Mobile License LLC (15)
AW-REA005-D	Central	1	8	6	MetroPCS AWS, LLC (1), SpectrumCo LLC (1), Cingular AWS LLC (10)	Cingular AWS LLC (12)
AW-REA006-D	West	1	8	5	SpectrumCo LLC (1), MetroPCS AWS LLC (6), Cingular AWS, LLC (9)	MetroPCS AWS LLC (14)
AW-REA007-D	Alaska	1	2	2	-	Spotlight Media Corp (147)
AW-REA008-D	Hawaii	1	2	2	SpectrumCo LLC (1)	SpectrumCo LLC (97)
AW-REA001-E	Northeast	1	11	7	T-Mobile License LLC (1), Cingular AWS LLC (9), MetroPCS AWS LLC (9), SpectrumCo LLC (9)	T-Mobile License LLC (17)
AW-REA002-E	Southeast	1	10	6	Cricket Licensee (Reauction) Inc. (1), T-Mobile License LLC (1), Cingular AWS, LLC (9), SpectrumCo LLC (11)	T-Mobile License LLC (19)

Table 10. (Continued)

Wireless DBS LLC's National AWS Footprint and How Incumbents Blocked It

License	Market Name	Round of First Bid	Round of Last Bid	No. of Bids	Challenging Incumbents (Round of Entry)	Ultimate Winner of License (Round PWB)
AW-REA003-E	Great Lakes	1	10	6	T-Mobile License LLC (1), Cricket Licensee (Reauction) Inc. (3), MetroPCS AWS, LLC (6), Barat Wireless LP (8), SpectrumCo LLC (11)	T-Mobile License LLC (19)
AW-REA004-E	Mississippi Valley	1	10	5	T-Mobile License LLC (1), Barat Wireless LP (8), Cricket Licensee (Reauction) Inc. (10)	Barat Wireless, L.P. (16)
AW-REA007-E	Alaska	1	2	2	-	American Cellular Corporation (152)
AW-REA008-E	Hawaii	1	2	2	T-Mobile License LLC (1), Cingular AWS LLC (8)	T-Mobile License LLC (117)
AW-CMA001-A	New York-Newark, NY-NJ	1	11	5	T-Mobile License LLC (1), Cingular AWS LLC (11)	T-Mobile License LLC (23)
AW-CMA003-A	Chicago, IL	4	4	1	T-Mobile License LLC (1)	T-Mobile License LLC (51)
AW-CMA004-A	Philadelphia, PA	4	4	1	T-Mobile License LLC (1)	Cricket Licensee (Reauction), Inc. (48)
AW-CMA007-A	San Francisco-Oakland, CA	10	10	1	T-Mobile License LLC (1)	T-Mobile License LLC (26)
AW-CMA008-A	Washington, DC-MD-VA	4	4	1	T-Mobile License LLC (1)	Cricket Licensee (Reauction), Inc. (38)
AW-BEA010-B	NYC-Long Is. NY-NJ-CT-PA-MA-VT	5	10	2	Cingular AWS LLC (5), MetroPCS AWS LLC (10), SpectrumCo LLC (11)	SpectrumCo (20)
AW-BEA010-C	NYC-Long Is. NY-NJ-CT-PA-MA-VT	7	10	2	Cingular AWS LLC (3)	MetroPCS AWS, LLC (41)

Wireless DBS LLC's strategy to obtain national AWS footprint initially concentrated on the REAG licenses, particularly the F block. However, immediately a threateningly consistent pattern of challenges from the major incumbents emerged from the first round: in two F blocks (AW-REA003-F – Great Lakes and AW-REA006-F -- West) it received six challenges in the first round, in another (AW-REA004-F – Mississippi Valley) five, in three others (AW-REA001-F -- Northeast, AW-REA002-F --

Southeast, and AW-REA005-F -- Central) four, and in another (AW-REA008-F -- Hawaii) three.[13] On four of these F block licenses additional pile-on challenges by other major incumbents took place in later rounds. These developments led to a decision to suspend bidding on two F block licenses in the ninth round (AW-REA001-F – Northeast and AW-REA006-F -- West) and one F block license in the tenth round (AW-REA002-F -- Southeast).

The strong challenges to acquisition of REAG F block licenses also occasioned two fundamental readjustments of Wireless DBS LLC's strategy, trying to accumulate necessary backup spectrum in the CMA blocks in the northeast, southeast, central, and western regions and BEA C and D block licenses in the northeast in the event that its REAG strategy were to fail. While Wireless DBS LLC bid on AW-CMA001-A (New York-Newark) from the first round, in the fourth round it bid on AW-CMA003-A (Chicago), AW-CMA004-A (Philadelphia), and AW-CMA008-A (Washington, DC-MD-VA), and was met by strong challenge from T-Mobile License LLC in each. In round ten, Wireless DBS attempted to break out of the stranglehold to its acquisition of an F block license in the west by bidding on AW-CMA007-A (San Francisco-Oakland); again it was met by T-Mobile. The attempts on AW-BEA010-B (NYC-Long Is. NY-NJ-CT-PA-MA-VT) in the fifth round and AW-BEA010-C (NYC-Long Is. NY-NJ-CT-PA-MA-VT) in the seventh round were equally abortive, resulting in withdrawal after the tenth round from both in the face of opposition from Cingular AWS LLC, MetroPCS AWS, LLC, SpectrumCo LLC and Cingular AWS LLC alone, respectively.

[13] Alaska is anomalous in that Wireless DBS LLC made very little effort to acquire any of the REAG license blocks there. As in Hawaii, which is slightly less anomalous, Wireless DBS LLC made no bids on any Alaskan license after the second round. This probably reflects a decision to suspend bidding until the situation of licenses in the lower forty-eight states was resolved.

In the REAG D and E blocks different, but equally threatening patterns quickly emerged:

• Confrontation by one or more major incumbents in the first round, followed by pile-on of several additional major incumbents from the fourth to eleventh rounds (AW-REA001-D, AW-REA003-D, AW-REA004-D, AW-REA005-D, AW-REA006-D, AW-REA001-E, AW-REA002-E, AW-REA003-E, AW-REA004-E, AW-REA005-E, and AW-REA006-E, and AW-REA008-E). At no point in bidding on these licenses did Wireless DBS LLC face less than three incumbents, except Hawaii, where it faced two.

• On AW-REA001-D (Northeast) and AW-REA002-D (Southeast) Wireless DBS LLC faced the REAG F block pattern: multiple initial challenges from major incumbents.

By the seventh to tenth rounds it was apparent that Wireless DBS LLC was effectively blocked from acquiring the REAG D and E block licenses necessary for a national footprint. By the eleventh round this was equally apparent for the REAG F block licenses. Wireless DBS LLC perforce withdrew from the auction after the eleventh round.

There are a set of tantalizing patterns of incumbent behavior in the REAG D and E blocks which suggests that more than tacit collusion may have been involved. SpectrumCo bid entered in the first round against Wireless DBS 56.33% of the time when it entered. T-Mobile License entered in the first round 75.00% of the time when it entered . MetroPCS AWS LLC entered in the sixth or ninth rounds 66.67% of the time when it entered. Barat Wireless LP entered in the eighth round 75.00% of the time when it entered. Cingular AWS LLC entered in the ninth or tenth round 75.00% of the time when it entered. These patterns are not maintained in the bidding of these incumbents on

licenses on which Wireless DBS LLC did not bid and it is difficult to see a strategic reason for this pattern to hold in the REAG D, E, and F blocks on which Wireless DBS LLC bid except as a blocking hierarchy: SpectrumCo LLC and T-Mobile were the early round blockers, MetroPCS AWS LLC and Barat Wireless LP were the mid-to-late round reinforcements, and Cingular AWS LLC was the late round reinforcement. It is difficult to see how this pattern emerged by chance.

The incumbents were remarkably blithe about which incumbent ultimately acquired the licenses. Verizon, which was the least significant blocker of targeted new entrants, did quite well. The ultimate allocation generally continued the pattern of incumbents securing spectrum in geographic regions in which they were already hegemonic and avoiding competition within those regional hegemonies. Furthermore, a strong pattern emerged in which the majority of incumbents ceased to pursue the licenses they were challenging once it became apparent that Wireless DBS LLC had dropped out. Table 11 displays these findings for the vital REAG F Block:

Table 11.
Patterns of Bidding by Incumbents Prior to and Post Wireless DBS LLC Withdrawal from Bidding on REAG F Block Spectrum

		AW-REA001-F	AW-REA002-F	AW-REA003-F	AW-REA004-F	AW-REA005-F	AW-REA006-F	Percent of Licenses Bid On
Round of PWB		16	14	14	14	15	15	-
Barat Wireless LP	**Prior**	0	0	6	7	0	0	33%
	Post	0	0	0	0	0	0	0%
Cellco Partnership d/b/a Verizon Wireless	**Prior**	1	6	8	6	10	8	100%
	Post	4	3	3	2	2	2	100%

Table 11. (Continued)
Patterns of Bidding by Incumbents Prior to and Post Wireless DBS LLC Withdrawal from Bidding on REAG F Block Spectrum

		AW-REA001-F	AW-REA002-F	AW-REA003-F	AW-REA004-F	AW-REA005-F	AW-REA006-F	Percent of Licenses Bid On
Cingular AWS LLC	**Prior**	7	6	9	2	8	7	100%
	Post	0	0	2	0	0	0	17%
Cricket Licensee (Reauction) Inc.	**Prior**	7	7	7	4	6	6	100%
	Post	0	1	3	0	1	0	50%
Denali Spectrum License LLC	**Prior**	5	1	0	0	0	2	50%
	Post	0	0	0	0	0	0	0%
MetroPCS AWS LLC	**Prior**	7	0	0	0	0	5	33%
	Post	0	0	0	0	0	0	0%
SpectrumCo LLC	**Prior**	9	9	9	7	7	8	100%
	Post	0	0	1	0	0	0	17%
T- Mobile License LLC	**Prior**	7	8	7	7	7	6	100%
	Post	3	3	3	2	3	3	100%

Only Verizon and T-Mobile routinely persevered to the end for the REAG F Block. The remainder routinely ceased bidding on these crucial licenses immediately after Wireless DBS LLC had withdrawn. This suggests that the bidding prior to Wireless DBS' withdrawal was less "competition" for these licenses than strategic blocking to prevent Wireless DBS LLC from acquiring them.

V. Conclusions.

Careful examination of the evidence from the AWS-1 auction leads to a number of salient conclusions:

- There was a concerted effort by major incumbents to target those new entrants which harbingered significant potential competitive broadband threat if (1) they acquired national AWS footprint in the AWS-1 auction or (2) they acquired a strong regional or multi-regional base from which they could acquire national footprint in future auctions.

• Such targeted new entrants were met with a strategy of blocking bidding, i.e., coalitions of multiple major incumbents which bid for the purpose of denying licenses to the new entrant rather than acquiring the licenses for themselves. A majority of the major incumbents ceased bidding on such licenses after the targeted new entrant ceased bidding.

• The strategy of blocking bidding was extremely successful. Of the four targeted new entrants against whom blocking bidding was deployed only one managed to obtain any spectrum in the auction. A less competitive market resulted from the AWS-1 auction.

• Major incumbents found the strategy of blocking bidding to deny targeted new entrants sufficiently useful to be willing to pay a significant premium for it: they paid on average 2.5 times more for the spectrum they obtained than bidders who did not use this strategy.

• Blocking bidding was possible only because incumbents were able to identify the licenses which targeted new entrants sought in the auction. If anonymous bidding had been used, this strategy would not have been available.

• The incumbents were wrong; their opponents were right.

VI. Recommendations for Future Auctions.

Blocking bidding depends entirely on the ability of incumbents to identify those licenses on which new entrants are bidding: the only way in which blocking bidding strategies can be prevented is adoption of strict anonymous bidding rules. If it is the FCC's intention that the allocation of licenses should result in markets which are genuinely competitive and from which new entrants are not excluded because they cannot

acquire adequate footprint, then it has little other alternative. Package biding schemes and increasing the size of licenses cannot diminish blocking bidding as the evidence of the AWS REAG F Block demonstrates, since even relatively large license sizes exhibited blocking bidding. The fundamental problem is incumbents knowing whom to target, and this remains a problem for the 700 MHz and other future auctions in the absence of anonymous bidding.