INTEROPERABILITY AND SPECTRUM EFFICIENCY

Achieving a Competitive Outcome in the US Wireless Market

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Executive Summary

The Lower 700 MHz band should not be exempted from the FCC's longstanding commitment to promoting interoperability of mobile user equipment

In its March 2012 *Notice of Proposed Rulemaking* ("NPRM") in WT Docket No. 12-69, *Promoting Interoperability in the 700 MHz Commercial Spectrum*, the FCC explains that the purpose of the NPRM is "to promote interoperability in the Lower 700 MHz band and to encourage the efficient use of spectrum," noting that "[t]he Commission has a longstanding interest in promoting the interoperability of mobile user equipment in a variety of contexts as a means to promote the widest possible deployment of mobile services, ensure the most efficient use of spectrum, and protect and promote competition."

The "Lower 700 MHz" band includes three 12 MHz blocks of paired spectrum, designated as Blocks A, B, and C – used for two-way wireless services – and two 6 MHz blocks of unpaired spectrum, designated as Blocks D and E – used for downlink-only or broadcast-type transmissions. Wireless handsets that are capable of operating in any of the three Lower 700 MHz Blocks A, B and C are designated as Band Class 12 devices. Certain wireless carriers (principally AT&T) holding B and C Block licenses contend that the proximity of the A Block to DTV Channel 51 and to the E Block create unacceptable interference in the A Block, and that such interference will bleed into the B and C Blocks when equipment capable of operating on all three Blocks is used. They claim that limiting handsets to only the B and C Blocks eliminates such interference. Advocates of this position petitioned the 3GPP standards body to create Band Class 17 that allows for operation on only Blocks B and C. Band Class 17 handsets cannot operate in the A Block, and AT&T does not permit the use of Band Class 12 handsets on its network. The A Block licensees argue that the claimed interference affecting the A Block from the adjacent DTV and broadcast spectrum, if and to the extent it actually exists, does not justify AT&T's policy of denying interoperability with Band Class 12 handsets, and ask the Commission to require full interoperability among all Lower 700 MHz devices.

Notwithstanding any actual substance to these technical contentions, *AT&T's insistence upon restricting its network to Band Class 17 handsets and denying roamer access to users with Band*

Class 12 handsets indisputably enhances AT&T's competitive position in the market while effectively blocking rival carriers from offering customers a serious alternative to AT&T in this sector. AT&T's solution to the alleged "interference" problem – lopping off the A Block – undermines competitors and competition in the wireless 4G data market and is antithetical to its own stated concerns about spectrum exhaust. Interoperability is more than just a technical matter. The economic and competitive issues surrounding the Lower 700 MHz band affect the entire wireless ecosystem. AT&T and Verizon enjoy significant competitive advantages over their smaller wireless competitors resulting from their affiliation with the two largest incumbent wireline carriers, their early access to spectrum, and their monopsony power in the handset market, all of which, severally and in combination, assure their continued dominance in the US wireless market over the long run. And as wireless evolves from voice to 4G LTE broadband data, AT&T's and Verizon's incumbency advantages confront smaller wireless carriers with daunting challenges, many of which can be overcome by strict enforcement by the FCC of handset interoperability requirements and safeguards.

The FCC will need to decide how best to reconcile the seemingly conflicting goals of achieving a competitive market while also assuring optimum spectrum and operational efficiency. Given the dominant positions of AT&T and Verizon, it seems unlikely, absent Commission intervention, that the marketplace will resolve the issues of interoperability in a manner or time frame capable of providing smaller competitors with the nationwide roaming they require to compete.

In resolving technical objections of the type being raised here with respect to handset interoperability, the FCC's approach has been to address them directly, and not to accept such concerns as obstacles to competitive entry and innovation

This report does not directly address the various technical issues associated with handset interoperability as raised by several parties and in the NPRM. We would note, however, that this is hardly the only instance where AT&T has advanced a claim of "interference" or other putative technical harm that has resulted in significant delays in the introduction of competitive alternatives to the services that AT&T provided. When the FCC was seeking to introduce competition into the customer premises equipment (CPE) market, AT&T had claimed that the direct interconnection of customer-provided CPE would engender serious harm to its network. With respect to the introduction of long distance competition, AT&T had told the FCC that "the authorization of such proposals would result in harmful electrical interference to existing common carrier routes, inefficient and under-utilization of scarce common carrier facilities, to the detriment of the general public." The FCC has consistently found AT&T's past technical objections to be meritless or easily overcome without harm to the network, and has consistently rejected AT&T's preferred solution – blocking competitive entry outright. Even if it is determined that the claimed interference in the Lower 700 MHz band is present in a limited number of markets, it is critical that the Commission look beyond the walled garden Band Class 17 approach being advocated by AT&T, which effectively blocks other wireless carriers from

roaming on the AT&T Lower 700 MHz spectrum and from launching their own services in the A Block. The FCC needs to address those technical concerns having merit without compromising the Commission's longstanding commitment to assuring competition and innovation in the telecommunications market.

The consumer and competitive benefits of handset interoperability easily outweigh the level of costs being claimed by opponents

The FCC has always faced a balancing act when it comes to weighing the costs and benefits of regulatory initiatives. The Commission has frequently determined that the benefits of policies aimed at promoting competition, spurring innovation, and achieving lower prices for consumers, clearly outweigh their costs. In such cases, the Commission has acted to impose a regulatory solution where marketplace forces would not by themselves be capable of producing, or be expected to achieve, the desired outcome, and to provide mechanisms to address any cost burden that the prescription might impose. In the proceedings implementing wireless local number portability – a matter with numerous parallels to the issue of handset interoperability – the Commission looked beyond the claims of adverse financial impact by carriers to evaluate the true magnitude of the actual costs involved, and to assess the far greater benefits to consumers and competition stemming from the policy. The Commission now faces similar claims that the costs of interoperability are too enormous to overlook and that imposing such costs in order to achieve mandatory interoperability is not justified. Yet AT&T's own claims as to the costs of interoperability – even if true – would amount to only 0.5% of aggregate AT&T Mobility revenues if spread over three years – averaging just 27 cents per subscriber per month. If the FCC applies the same analysis here as it did in the case of number portability, it will conclude that the competitive benefits of interoperability – data roaming, increased competition, lower barriers to switching carriers, innovation and lower prices – easily outweigh these minimal costs.

As the nation's two largest carriers, AT&T and Verizon have little to gain – and much to lose – from the increased competition that would result from handset interoperability, making the prospect of an industry agreement highly unlikely

As the two largest US wireless carriers, AT&T and Verizon have little incentive to voluntarily agree to common technical standards capable of supporting broad interoperability across multiple wireless carriers. In the NPRM, the Commission expresses a strong preference for a market-based, voluntary solution for achieving handset interoperability rather than one that is dependent upon regulatory intervention and prescription. While such a result is theoretically possible, it is not likely to arise in highly concentrated markets presently dominated by one or two very large firms whose smaller rivals are not capable of presenting a serious competitive challenge. In such a market, the large incumbents have little to gain, and perhaps a lot to lose, by subscribing to standards that would enable their customers to easily switch to other service providers. Given the dispute being addressed by the NPRM, no industry consensus on common handset standards and interoperability is likely to arise on its own.

AT&T and Verizon have "nationwide" spectrum coverage and vast cash resources to acquire more as necessary, limiting their need to enter into roaming agreements with other carriers. Whether one measures size in terms of geography or population covered, by dollar value, or by any other standard, AT&T and Verizon each possess holdings of electromagnetic spectrum that dwarf those of all other US carriers. As of year-end 2011, AT&T valued its spectrum holdings at $51-billion; Verizon valued its spectrum licenses at some $73-billion. On a MHz-POP basis, AT&T and Verizon together hold a majority of the spectrum bands most widely used to provide wireless data services. By contrast, smaller carriers have relatively small holdings across the same bands.

Smaller carriers face many competitive challenges, including paying more for key inputs such as handsets

Not only are AT&T and Verizon the largest providers of wireless services, they are also the largest US purchasers of wireless handsets. As a consequence, they have the unique ability to dictate terms to handset manufacturers, to secure significant cost advantages, to arrange for exclusive deals, and to exercise design controls that are not available to smaller carriers. In economics, a *monopsony* is said to exist when there are a limited number of buyers for a good or service, and some of these buyers, by virtue of their size and clout, hold market power over the suppliers of the affected goods and services. Wireless devices are sold by their manufacturers not to individual consumers but to the wireless carriers for resale. As such, the carriers comprise the bulk of the direct demand for handsets, and AT&T and Verizon, with a combined nationwide market share of over 65%, easily purchase more handsets than all other carriers combined. Smaller carriers lack the power to negotiate favorable pricing with handset manufacturers even for devices that are identical to those being purchased by AT&T and/or Verizon. And if smaller carriers are also required to utilize handsets supporting different configurations than their larger rivals, the small carriers will be subject to even higher unit prices due to what will necessarily be smaller production volumes and the correspondingly lower manufacturing efficiencies than those associated with the large volumes being produced to satisfy the demands of AT&T and Verizon.

The Commission has long understood the importance of roaming to competition in the wireless industry

Telecommunications is a *network-based* industry subject to *network effects* where the value of the service increases exponentially with the number of points served. Smaller networks can overcome this disadvantage by interconnecting with larger networks, and accessing and incorporating components of the larger network, in effect offering its customers the same connectivity and extensive coverage as that being offered by its much larger rivals. A small carrier's economic ability to invest in its own infrastructure will be significantly enhanced if it – or its customers – are able to economically gain access to the larger network than if such access is denied or priced at an uneconomic level. Indeed, if access to the larger network is denied, the economic

value of the smaller competitor's owned facilities may well decrease to the point where it is no longer viable and would be forced out of the market altogether, diminishing competition.

For *mobile* telecommunications services, network effects arise not just from the aggregate number of members with whom connectivity may be established, but also from the number of physical locations at which a customer may gain access to the mobile service. *Roaming* enables customers of one network to access and seamlessly utilize the services of other networks. Without roaming, a small, geographically limited network would be unable to compete with larger, more geographically extensive networks with respect to the *coverage area* – the territory from which the wireless service could be utilized. Stated more generally, the revenues available from any given customer are influenced by the specific demand offered by that customer together with the aggregate connectivity that the carrier is able to offer to that customer.

There is near universal agreement that spectrum resources must be used efficiently and be fully deployed, which calls for full handset interoperability across the Lower 700 MHz band

AT&T and Verizon each possess wireless networks with near-ubiquitous coverage and an established customer base of a size sufficient to enable them to achieve maximum scale and scope economies. Smaller carriers possess none of these advantages. In the case of wireless service, entrants are required to obtain spectrum licenses covering a defined geographic area as well as a defined frequency band within that geographic area. Spectrum is the *real estate* of virtually all wireless enterprises, from two-way common carrier services through radio and television broadcasting. Allocation of spectrum is – and has pretty much always been – a government function. While theoretically open to any who wish to participate, experience has demonstrated that government spectrum auctions have contributed to greater, not less, concentration in the US wireless market *precisely because the largest carriers are able to pay the most for the spectrum that becomes available.*

The finite supply of spectrum creates an insurmountable barrier to entry and expansion and, absent regulatory intervention, permits the largest spectrum holders to extract economic rents for its use. Reliance upon marketplace forces or an "industry solution" to the question of handset interoperability in the Lower 700 MHz band would be seriously misplaced. Indeed, the large carriers derive relatively little benefit from roaming agreements with smaller rivals. From the perspective of the two largest carriers, handset interoperability, with or without mandatory data roaming, would enhance the competitiveness of rival (smaller) carriers by affording them the ability to offer their customers geographic coverage comparable to that offered by AT&T and Verizon. And to the extent that AT&T and Verizon customers possess Lower 700 MHz devices that are compatible with rival carrier networks offering (from the customer's perspective) fully comparable geographic coverage, interoperability would reduce customer switching costs and thus enhance the potential for increased churn by making it easier for customers to migrate to rival providers.

Conversely, the lack of handset interoperability that would allow customers of smaller carriers to roam on the nationwide carriers' networks permits AT&T and Verizon to differentiate their service in terms of coverage from that of smaller carriers having far less extensive facilities-based networks, and in so doing make their services far more attractive – and far more valuable – than anything that small and regional carriers would be able to offer. Thus, the large carriers gain little, and could potentially lose much, by voluntarily agreeing to full handset interoperability in the Lower 700 MHz band. There is thus little to compel the market to voluntarily arrive at an "industry solution" that would result in full handset interoperability. The broad public benefits associated with handset interoperability have long been recognized by the FCC, and dwarf whatever marginal costs or other "disadvantages" that might arise were AT&T required to support Band Class 12 devices and to phase out its use of Band Class 17 as soon as existing supplies are exhausted.

Roaming – and thus interoperability – remains critical as the industry transitions to a data-centric business model

Roaming does not diminish in importance as the wireless industry transitions from a voice to a data oriented service platform. Interoperability of handsets across multiple technically compatible networks is critical to the continued market viability of small and regional carriers in that it permits them to offer their customers the same type of broad geographic reach that facilities-based "national" carriers are able to offer via their own network assets. While full handset interoperability across technologically compatible networks is a *necessary* condition to enable broad geographic roaming outside of the home carrier's own facilities-based footprint, it is not by itself sufficient to assure that such roaming will be possible.

In its 2011 order mandating CMRS data roaming among facilities-based carriers, the FCC recognized that roaming requirements for the growing market for wireless broadband data services would benefit consumers and the industry while facilitating public policy goals, just as did the longstanding roaming requirements the Commission put into place for wireless voice services beginning in 1981. Yet in the face of otherwise unanimous industry support, resistence to mandatory data roaming requirements by carriers with national facilities-based networks demonstrates that they have little or no incentive to enter into roaming agreements that are commercially viable for the smaller carriers, and also confirms that AT&T and Verizon may actually have a strong financial incentive to resist entering into such agreements with competitors.

The FCC should promote spectrum efficiency, competition, and broadband availability by requiring handset interoperability

The presence of hard-and-fast supply constraints on the availability of a key input required for the provision of wireless services – electromagnetic spectrum – confronts the FCC with the task of navigating among the often conflicting goals of maximizing spectrum efficiency, provid-

ing affordable and robust wireless broadband nationwide, maintaining effective competition at a level sufficient to discipline the ability of holders of the limited spectrum resources to extract economic rents from customers and from the economy generally, and limiting regulatory intervention to only those areas in which marketplace forces cannot be relied upon to produce a competitive outcome. One such area where regulatory intervention is required is mandating full wireless device interoperability across all technically compatible networks.

The Commission needs to view AT&T's technical arguments with a good deal of skepticism and, in any event, weigh their importance against the detrimental impact upon competition in the wireless broadband market. Mandatory device interoperability and data roaming on a commercially viable basis represent the means by which the putatively conflicting goals of spectrum efficiency *and* vigorous competition can be reconciled and implemented in support of the broader public interest.

INTEROPERABILITY AND SPECTRUM EFFICIENCY: Achieving a Competitive Outcome in the US Wireless Market

Lee L. Selwyn and Colin B. Weir

I. Introduction: The "Spectrum Crisis" vs. the "Spectrum Gap"

This report has been prepared by Economics and Technology, Inc. ("ETI") at the request of US Cellular to address certain economic and regulatory policy issues raised by the Federal Communications Commission ("FCC" or "Commission") in its March 2012 *Notice of Proposed Rulemaking* ("NPRM") in WT Docket No. 12-69, *Promoting Interoperability in the 700 MHZ Commercial Spectrum*.[1] The FCC explains that the purpose of the NPRM is "to promote interoperability in the Lower 700 MHz band and to encourage the efficient use of spectrum,"[2] noting that "[t]he Commission has a longstanding interest in promoting the interoperability of mobile user equipment in a variety of contexts as a means to promote the widest possible deployment of mobile services, ensure the most efficient use of spectrum, and protect and promote competition."[3]

The Lower 700 MHZ Band

At issue here are the technical properties of wireless handsets[4] intended for use at frequencies in the so-called "Lower 700 MHz band spectrum," 48 megahertz of commercial spectrum in the 698-746 MHz band. As shown in the following diagram, the "Lower 700 MHz" band includes

1. *In the Matter of Promoting Interoperability in the 700 MHZ Commercial Spectrum*, WT Docket No. 12-69, *Notice of Proposed Rulemaking*, Rel. March 21, 2012 ("NPRM")

2. *Id.*, at para. 5.

3. *Id.*, at fn. 5.

4. The term "handset" as used here refers to a wireless device capable of sending a receiving digital data transmissions in the 700 MHz band. Such devices may be "smartphones" that support both digital voice as well as digital data, or "data cards" that, when connected to a user's laptop, tablet or other stand-alone computer, enable two-way data communication via the wireless carrier's network. In today's environment, prior to large-scale carrier deployment of Voice over LTE ("VOLTE"), for devices capable of both voice and data transmissions, only the data transmission uses the 700 MHz band spectrum. The digital voice transmissions may operate in any of several other spectrum bands, such as 850 MHz, 1700 MHz, 1900 MHz, or 2100 MHz.

three 12 MHz blocks of paired spectrum, designated as the Lower 700 MHz A, B and C Blocks, and two 6 MHz blocks of unpaired spectrum, designated as the Lower 700 MHz D and E Blocks.[5] The three "paired" blocks (Lower A, B and C) each consist of two separate 6 MHz components, one of which is used for the "uplink" – transmissions from the handset to the transceiver site ("cell site") and the other for the "downlink" transmission from the cell site to the handset. The two blocks of unpaired spectrum (D and E) are likely to be used for downlink-only or broadcast-type transmissions. Wireless handsets that are capable of operating in any of the three Lower 700 MHz Blocks A, B and C are designated by 3GPP as Band Class 12 devices.[6]

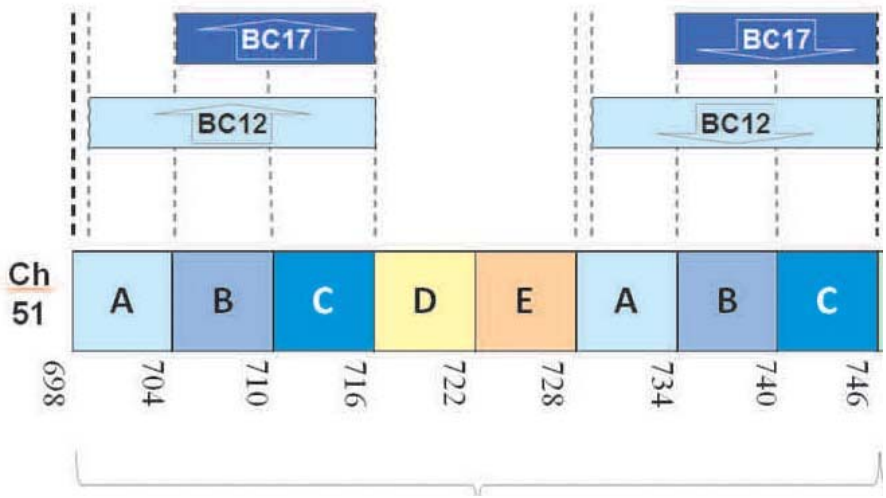

Figure 1. The Lower 700 MHz band. Source: *NPRM*, at para. 6.

The uplink portion of the A Block (698-704 MHz) is adjacent to digital television (DTV) Channel 51 (692-698 MHz), and the downlink portion of the A Block (728-734 MHz) is adjacent to the E Block, which may be used for downlink or broadcast transmissions, albeit at somewhat lower power levels than those authorized for DTV Channel 51. Certain carriers (principally AT&T) holding B and C Block licenses contend that the proximity of the A Block to Channel 51 and to the E Block create unacceptable interference with two-way wireless data transmissions in the A Block, and that such interference carries over into the B and C Blocks if the handsets provided to customers – those meeting Band Class 12 specifications – are capable of operating across all three Lower 700 MHz Blocks – A, B and C.[7] They claim that by confining handsets to

5. *NPRM*, at para. 7.

6. *Id.*, at para. 10.

7. See, e.g., Comments of AT&T Services, Inc., filed June 1, 2012 ("AT&T Opening Comment"), at 7 and 28 *et seq.*

the B and C Blocks only, such Channel 51 interference can be eliminated.[8] In April 2008, Motorola presented a paper to the 3GPP suggesting the need for Band Class 17. Shortly thereafter, AT&T submitted a position paper supporting this alternate standard that allows for operation on only Blocks B and C.[9] Handsets operating on this alternate standard are defined as 3GPP Band Class 17, and cannot operate in the A Block. And although Band Class 12 devices are physically capable of operating in all three of the Lower 700 MHz two-way blocks (A, B and C), AT&T does not permit the use of Band Class 12 handsets on its network because, according to AT&T, "Band 17 devices have a much greater ability to filter out interference caused by Channel 51 intermodulation and high-powered E Block transmissions."[10]

Holders of A Block licenses, however, argue that by restricting their customers' access to the B and C blocks only, the B and C Block licensees' customers are precluded from roaming on A Block licensee networks, and by refusing to allow use of Band Class 12 handsets capable of supporting all three Lower 700 MHz paired blocks (A, B and C) onto the B and C Block licensees' networks, customers of A Block licensees are precluded from roaming onto any network that does not support A Block frequencies.[11] The A Block licensees argue that the claimed interference affecting the A Block from the adjacent DTV and broadcast spectrum, if and to the extent it actually exists, does not justify AT&T's policy of denying interoperability to Band Class 12 handsets, and ask the Commission to require full interoperability among all Lower 700 MHz devices.[12]

The handset interoperability dispute

Notwithstanding any actual substance to these technical contentions, *AT&T's insistence upon restricting its network to Band Class 17 handsets and denying roamer access to users with Band Class 12 handsets indisputably enhances AT&T's competitive position in the market while effectively blocking rival carriers from offering customers a serious alternative to AT&T in this sector.* AT&T has adopted a solution to the alleged "interference" problem that undermines competitors and competition in the wireless 4G data market. Whatever technical merit AT&T's claims may have – if any – the Commission should pursue and implement a solution that does not limit the full interoperability of mobile devices in the Lower 700 MHz band.

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8. *Id.,* at 2.

9. *See*, *Ex-Parte* presentation of Vulcan Wireless in RM-11592, filed July 27, 2011 ("Vulcan *ex parte*").

10. AT&T Opening Comment, at 28.

11. See, e.g, Comments of United States Cellular Corp., filed June 1, 2012, at 8-16.

12. *Id.*, at 6 *et seq.*

The issue of interoperability is more than just a technical question. The economic and competitive issues surrounding the lower 700 MHz A Block affect the entire wireless ecosystem. The demand for wireless data services is growing faster than the rate at which additional spectrum can be put online. It is important from a national policy perspective to make the most efficient use of all available spectrum, especially spectrum with such favorable propagation characteristics as those at issue here. Stranding a whole band block of available advanced spectrum would be a waste of a precious national resource.

AT&T now claims, in effect, that carriers buying lower 700 MHz A Block spectrum should have exercised some amount of *caveat emptor*, and that such purchasers were on notice that Band Class 17 would exclude A Block frequencies.[13] This buyer beware claim is, however, a total red herring. FCC Auction 73, in which the bulk of the Lower 700 MHz spectrum was sold, took place between January 24 and March 18, 2008.[14] As discussed above, Motorola did not submit its proposal for the creation of Band Class 17 until April 2008, i.e., a month *after* the close of Auction 73, and AT&T's support for the Band Class 17 proposal did not surface until some three months following the close of the auction. The adoption of the Band Class 17 specification by 3GPP did not occur until September 2008, i.e., *some six months after the close of the Lower 700 MHz Auction*.[15] In its June 1 Opening Comment, AT&T cites a DC Circuit ruling holding that "an agency cannot, in fairness, radically change the terms of an auction after the fact."[16] In this instance, the *idea* of a Band Class 17 specification and the resulting loss of interoperability among Lower 700 MHz handsets, let alone the 3GPP's ultimate adoption of this proposal, *did not occur until well after the close of the Lower 700 MHz auction.* The FCC should uphold and require the technical standards that were in place at the time of the auction: full interoperability across Lower 700 MHz Bands A, B and C supported by Band Class 12 handsets.

Interoperability is also an issue of competitive balance. Without full access to the Lower 700 MHz band, smaller carriers who have invested hundreds of millions of dollars in this spectrum will be unable to provide the competitive checks and balances that this Commission has expressly relied upon as support for its policy of forbearance from wireless industry regulation.[17]

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13. AT&T Opening Comment, at 8-9.

14. http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73

15. Vulcan *ex parte*.

16. AT&T Opening Comment, at 9, citing *U.S. Airwaves, Inc. v. FCC*, 232 F.3d 227, 235 (D.C. Cir. 2000).

17. *In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act Regulatory Treatment of Mobile Services*; GN Docket No. 93-252; *Second Report and Order*; 9 FCC Rcd 1411 (1994).

As we discuss in detail below, the two largest wireless carriers, AT&T and Verizon, enjoy significant competitive advantages over their smaller competitors. Many of these incumbency advantages are uniquely attributable to their affiliation with the two largest incumbent wireline carriers, their early access to spectrum, and their monopsony power in the handset market, all of which, severally and in combination, assure their continued dominance in the US wireless market over the long run. And as wireless evolves from voice to 4G LTE broadband data, these incumbency advantages confront smaller wireless carriers with daunting challenges, many of which can be overcome by strict enforcement by the FCC of handset interoperability requirements and safeguards.

The FCC will need to decide how best to reconcile the seemingly conflicting goals of achieving a competitive market while also assuring optimum spectrum and operational efficiency. Given the advantageous position of AT&T and Verizon, it seems unlikely, absent Commission intervention, that the marketplace will resolve the issues of interoperability in a manner or timeframe capable of providing smaller competitors with the nationwide roaming they require to compete.

II. The FCC's longstanding approach to resolving technical objections works to promote competition and innovation

AT&T has a history of advancing unwarranted claims of interference and harms to its network

We do not in this report address the technical issues associated with the alleged "interference" purportedly affecting the Lower 700 MHz A Block, nor do we address the claim, being advanced by AT&T, that the use of a Band Class 12 handset even on a network that has no Band A spectrum could somehow infect the carrier's B and C Block performance. We would note, however, that this is hardly the only instance where AT&T has advanced a claim of "interference" or other putative technical harm in the context of FCC efforts to open markets to competitive entry. Even if it is determined that the presence of Channel 51 and/or Lower 700 E Block do create some degree of interference in the Lower 700 MHz A block in a limited number of markets, it is critical that the Commission pursue a far less draconian solution than the walled garden Band Class 17 approach being advocated by AT&T, whose effect is to prevent customers of other wireless carriers from utilizing the AT&T Lower 700 MHz spectrum.

The "harm to the network" claim.

For most of its first century, AT&T operating companies prohibited customers from interconnecting their own customer premises equipment (CPE) to the AT&T network. The

policy applied to all customers – residential and business. Residential and small business customers were required to rent all of their handsets – primary and extensions – from the local Bell company; larger business customers were similarly required to rent multiline and private branch exchange (PBX) telephone systems and associated handsets from the telephone company. These rental arrangements were applied on a "pay forever" basis – as long as the customer continued to subscribe for telephone service, monthly rental payments were imposed for all associated CPE; customers could not purchase their CPE in lieu of "pay forever" rental payments. The absolute prohibition against the attachment of customer-owned CPE to the AT&T network enabled AT&T to maintain an absolute monopoly in the CPE market. AT&T was steadfast in its efforts to resist any attempt to modify that *status quo*.

Describing such customer-provided devices pejoratively as "foreign attachments," AT&T repeatedly admonished that their use would result in "harm to the network."

> The telephone companies point out that the design of the entire telephone network has been governed by the systems concept. That is to say, the network as a whole is regarded as a single system with the effect of every part on each of the other billions of parts being calculated before it is introduced into the system. If this is not done, so goes the theory, the introduction of single disruptive piece could have an ever widening effect on every other piece in the system and ultimately impair or even destroy the efficacy of the whole. For this reason the telephone companies contend that they must control every element of the system if they are to accept responsibility for its operation.[18]

This "harm to the network" principle was applied to various types of "attachments," including two devices that were the subject of protracted litigation before the FCC and the federal courts – the "Hush-a-Phone" and the "Carterphone."

The Hush-a-Phone was described as "a cup-like device ... which snaps on to a telephone instrument ... [that] is designed to permit the speaker to confine his voice within the enclosure formed by the device so that it is not heard by persons in the speaker's vicinity, thereby providing privacy of conversation and office quiet [and] is also designed to improve telephone reception in noisy locations by keeping surrounding noises out of the telephone transmitter and thus out of the telephone circuit."[19] Because AT&T *owned* those telephone handsets, it viewed the Hush-a-Phone as a "foreign attachment" whose presence could wreak serious damage to AT&T's property.

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18. *Use of the Carterphone Device in Message Toll Telephone Service*; *Thomas F. Carter and Carter Electronics Corp., Dallas, Tex., Complainants, v. American Telephone & Telegraph Co., Associated Bell System Cos., Southwestern Bell Telephone Co., and General Telephone Co. Of The Southwest, Defendants*, FCC Docket Nos. 16942; 17073 FCC 67D-47, 13 F.C.C.2d 430; 1967 FCC LEXIS 1871, issued August 30, 1967 (*"Carterphone Hearing Report")*, at para. 15.

19. *Hush-a-phone Corp. v. FCC*, No. 13175, 99 U.S. App. D.C. 190; 238 F.2d 266; 1956 U.S. App. LEXIS 4023 (1956), at 2 and fn. 2, citing Commission's brief, p. 2.

The same "harm" theory was also applied to another device known as the "Carterphone" that could be used to acoustically and inductively patch a telephone call into a two-way radio system.

> The initiating caller first contacts the base station operator of the private radio system where the Carterphone is located, either by radio or telephone, as the case may be. The operator then contacts the called party, again using either the radio system or telephone connection as may be appropriate. When both parties are ready the operator places his telephone handset into a cradle on the Carterphone which has been designed to receive it. A voice control circuit in the Carterphone switches the radio transmitter on when the party using the telephone is speaking, and when the telephone party stops talking returns the radio to a receiving condition.
>
> If the conversation is initiated by the telephone user, his voice is transmitted in the usual manner to the telephone handset resting in the Carterphone cradle. What is received in the earpiece of the handset is, of course, a series of electrical charges which generate inevitably an electrical field extending beyond the physical confines of the handset. This field is used to induce an electrical field in the appropriate elements of the Carterphone which amplifies it and keys the radio transmitter to broadcast it in the form of a radio signal. Upon receipt at the mobile unit the radio signal is then transformed to voice reproduction in the usual manner. Thus, the connection which transmits the telephone user's voice into the radio system is made inductively and does not involve any wire-to-wire connection.[20]

Whatever (dubious) merit such "harm to the network" contentions may have had, in the end the FCC determined them to be subordinate to the broader benefits of introducing competition into the CPE market. In its landmark *Carterphone* decision,[21] the FCC rescinded the outright prohibition of "foreign attachments" such as non-telco terminal equipment to the public telephone network. But it did not reject AT&T's persistent "harms" concerns, at least not at first. In the *Carterphone* ruling, the FCC directed AT&T to strike the unlawful portions of its tariffs and permitted carriers to "submit new tariffs which will protect the telephone system against harmful devices, and may specify technical standards if they wish."[22] In response, AT&T filed tariffs permitting such interconnection, but required that it be accomplished via a so-called "Protective Connecting Arrangement" ("PCA") which the customer was required to rent from the local telephone company.[23] In theory, the purpose of the PCA was to somehow

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20. *Carterphone Hearing Report*, at paras. 6-7.

21. See *Use of the Carterphone Device in Message Toll Telephone Service*, 13 FCC2d 420 (1968).

22. *Id.*, at 426.

23. *See*, e.g., *Proposals for new or revised classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*, Docket No. 19528, 56 F.C.C.2d 593, October 1975, ("*Terminal Equipment Registration Order*") at para. 9.

"protect" the Bell System network.[24] However, in many cases, *the monthly rental payment to the telephone company for a PCA actually exceeded the monthly rental for the telco-owned CPE that was being replaced*.[25] In 1975 and 1976, the FCC eliminated the PCA requirement and established an "equipment certification program" applicable to all CPE, whether telco- or customer-owned.[26] "Certified" CPE could then be directly connected to the AT&T network without the use of a PCA.[27]

The FCC's action in *Carterphone* was to address the "harms" arguments directly. At the outset, the PCA requirement was inserted as a means for protecting the public network from "harm;" ultimately, that requirement was replaced by certification of all CPE, both telco- and customer-owned. Thus, the FCC responded to AT&T's "harm to the network" argument by adopting administrative processes for preventing any such "harm" that did not foreclose entry and competition into the CPE market.

Following up on the FCC's *Carterphone* ruling, in 1971 Litton Systems, Inc. began offering business PBX telephone systems in competition with those being provided under tariff on a rent-only basis by AT&T and other local telephone companies. As required by the post-*Carterphone* PCA tariffs, Litton or its customers were required to interconnect these PBXs with the AT&T network using PCAs, rented from AT&T's operating subsidiaries. In 1974, Litton withdrew from the PBX business, and in an antitrust action brought against AT&T in 1976, Litton claimed, as recounted in the Second Circuit's 1983 ruling denying AT&T's appeal and affirming the district court jury's decision, that

> This device – called an "interface device" by Litton and a "protective connecting arrangement" (PCA) by AT&T – was used in lieu of a system of "certification standards." These standards would have regulated, as they indeed now do regulate, the kind of equipment that can be connected with the AT&T system to ensure interconnection compatibility. Under the AT&T tariff, however, Litton had to pay for the privilege, so to speak, of connecting to the system with a "black-box" of AT&T's devising. The tariff was eventually rejected by the FCC in favor of certification standards, and Litton's principal argument before the jury and to the district court was that AT&T's bad faith opposition to certification standards drove Litton out of the

24. *Id.*, at para. 21.

25. For example, in the early 1970s, local Bell companies typically charged $1.00 or $1.25 per month for a standard black extension phone. The typical rate for a PCA was $6.00. *See*, e.g., *In the Matter of Implications of the Telephone Industry's Primary Instrument Concept*, CC Docket No. 78-36, 68 F.C.C.2d 1157, July 1978, at para A.19a.

26. See, *Terminal Equipment Registration Order*.

27. See, *In the Matter of Proposal for new or revised classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*; Docket No. 19528; *First Report and Order* 56 F.C.C.2d 593 (1975); *Second Report and Order* 58 F.C.C.2d 736 (1976).

> telephone terminal equipment market in the interim period between the filing and the ultimate rejection of the [PCA] tariff While our recounting of the facts will disclose many other complexities, pro and con, of Litton's case, certainly a crucial factor is the FCC's ultimate finding that the interface device was not needed to protect the AT&T network from harm. Various network users had long purchased equipment from AT&T's competitors, using it without an interface with "no demonstration of ... harm" to the AT&T network. The gist of Litton's case and the jury's findings is that the interface device was unnecessary and uneconomical and that AT&T at all times knew this was so, and that despite clear prior indications from the FCC that the tariff would be set aside as unreasonable and destructive of competition, AT&T nevertheless proposed and fought to maintain the tariff -- all in bad faith in order to exclude competition in the terminal equipment market.[28]

In affirming the lower court ruling, the Second Circuit was unpursuaded by AT&T's justification for the PCA requirement, and summarized AT&T's position as follows:

> The PBX Committee [a federal advisory committee formed by the FCC in 1971 composed of representatives of various interested parties including AT&T to study the feasibility of interconnection without the PCA requirement] submitted its final report shortly after the Joint Board convened in 1972. The report included a model certification program based on a "barrier PBX system" that would incorporate protective circuitry obviating the need for a PCA. But by this time, after "lengthy internal debate," AT&T decided to oppose certification standards as an unnecessary substitute for the PCA requirement. Mr. John deButts, then AT&T Chairman, announced this position in a speech before the National Association of Regulatory Utility Commissioners (NARUC) in late September of 1973. DeButts stated in his speech that the nationwide switching network was "too valuable a resource to risk a perhaps irreversible threat to its performance that would ensue from fragmentation of responsibility for that performance." Shortly thereafter, AT&T formally opposed the certification standard approach by filing comments in the FCC rulemaking proceedings. That this opposition to certification standards was undertaken in bad faith was a principal special finding of the jury on which the verdict against AT&T turned.[29]

In a footnote, the Court provided the following quotation from the cited AT&T Comment:

> The public interest ... will inevitably be impaired by the duplication of facilities and the division of responsibility that will ensue from further interconnection in an industry where compatibility of components and precise coordination of process are crucial. Interconnection has had an adverse impact on the innovative process in the telephone

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28. *Litton Systems, Inc., et al. v. AT&T et al.,* Nos. 81-7598, 81-7766, 81-7776, 81-7778, 81-7856, Nos. 1323-26, 1344 , US Court of Appeals for the Second Circuit, 700 F.2d 785, 789-790; 1983 U.S. App. LEXIS 30791, February 3, 1983 ("*Litton*"), citations omitted.

29. *Id.*, at 796-797, citations omitted.

> industry and the impact of certification would be even more detrimental. ... Any program of certification would, in our view, inevitably lead to the uncontrolled connection of customer-provided equipment to the telecommunications network. The ability to allocate responsibility for network performance would perforce be destroyed.[30]

Thus, finally putting a lie to the "harm to the network" claim, the appellate court upheld the district court jury's conclusion that the PCA was unnecessary and that AT&T had acted in bad faith in opposing a certification program that would replace it. In the end, the $91,990,000 jury award, representing both PCA rental payments as well as lost Litton profits, which was then trebled by the district court,[31] was affirmed on appeal.

"Interference" and "loss of efficiency" claims

More than four decades ago, AT&T advanced virtually the same type of "interference" arguments as those at issue here in opposing efforts by MCI and Datran to provide intercity private line services that would compete with what had been, up to then, a wholly monopolized market controlled by AT&T alone. The FCC summarized AT&T's contentions as follows:[32]

> AT&T states that applications of the type filed by the MCI carriers and others cannot be regarded as an isolated experiment, but rather necessitate a Commission determination of "basic and important policy questions regarding future development of common carrier communications services throughout the United States." In connection with MCl-New York West's applications, AT&T summarizes its position as follows:
>
> MCI-NY West's proposal and others like it confront the Commission with basic policy questions regarding the future development of common carrier communications services. They would offer to serve only limited segments of business users in certain selected cities, without concern for the deleterious impact this might have on the other business and residential users who are subscribers of the existing common carriers. Such proposals, if granted, would seriously undermine the policy of uniform interstate rates and dilute or delay the benefits that economies of scale would otherwise make available to the general telephone-using public. Moreover, the authorization of such proposals

30. *Id*., fn. 10, citing AT&T Comments in *Proposals for New or Revised Classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*, 35 F.C.C.2d 539, 542 (1972).

31. *Id.*, at 802.

32. *Establishment of Policies and Procedures for Consideration of Application to Provide Specialized Common Carrier Services in the Domestic Public Point-to-point Microwave Radio Service and Proposed Amendments to Parts 21, 43, and 61 of the Commission's Rules*, FCC Docket No. 18920, *First Report and Order*, Rel. June 3, 1971, FCC71-547 ("*Specialized Common Carrier Order*"), 29 FCC 2d 870, 876, at para. 12. Recon. denied, 31 FCC 2nd 1106 (1971). Aff'd sub nom. *Washington Utilities & Transportation Commission v. FCC*, 513 F. 2d 1142 (9th Cir. 1975).

> would result in harmful electrical interference to existing common carrier routes, inefficient and under-utilization of scarce common carrier facilities, to the detriment of the general public. ... Existing common carrier facilities are more than adequate to meet the public need and the existing carriers stand ready to serve any additional need which may be found to exist in the future.

And with respect to the Datran proposal for a nationwide switched digital network for data transmission, the Commission characterized AT&T's opposition as follows:

> AT&T raises a number of questions which it asserts require hearing. These concern alleged uneconomic duplication of common carrier facilities, impact on nationwide uniform rates, social costs (such as a less efficient total communications network, a requirement for additional Bell System stand-by capacity, intensified congestion of the radio spectrum), the basis for regulating or controlling competition between Datran and established carriers, the extent of public demand for services which is not, or will not be, met by existing carriers, comparative costs and frequency usages, and the technical and economic feasibility of Datran's proposal. AT&T also asserts that Datran's proposal would cause harmful interference to some stations of the Bell System companies, as well as additional cases of potential interference to full development of already established Bell System routes. AT&T takes the position that construction of Datran's proposed system would be more costly than expansion of existing Bell System routes by an equivalent number of circuits, that a grant might lead to the adoption of route pricing by the established carriers and cause an increase in rates to the general public, and that the need alleged by Datran would be better met within its time frame by the Bell System's "evolutionary approach."[33]

In rejecting these arguments, the FCC viewed the potential dynamic gains from competition – innovation, efficiency, investment – as more than sufficient to overcome short-term static losses in market segments capable of supporting more than a single provider, concluding that the salutary effects of competition would outweigh the potential losses in scale of production:

> While there may be some overlap between the services proposed by the applicants and the present offerings of the established carriers, we find sufficient warrant for the staff's conclusion that the applicants are seeking primarily to develop new services and markets, as well as to tap latent, but undeveloped submarkets for existing services, so that the effect of new entry may well be to expand the size of the total communications markets. To be sure, the established carriers now provide data transmission and private line services. However, the services proposed by the applicants have technical and service features significantly different from those of the established carriers. As the staff notes, the existing communications network of the Bell System was established to meet the requirements of the voice transmission market where consumer demands are generally similar and economies of scale may be achieved. ...

33. *Id.*, at para. 13.

> However, data and other specialized users may require not only a different application of communications technology, but also have service requirements that are heterogeneous in character. ... [These include] service features designed to meet the special requirements of data transmission users, e.g., lower costs, end-to-end compatibility, rapid connection, high reliability, simultaneous two-way transmission, a wide selection of switched speed offering, a low incidence of network busy conditions, interconnection flexibility for user-provided facilities, asymmetry, etc. ... To the extent that customers may be attracted by any or all of these or other features ... *it is a reasonable conclusion that the effect of new entry would be expansion of the total communications market.* Moreover, competition within the market for specialized services should motivate innovations or modifications in the service offerings and/or facilities by all carriers serving that market and thus produce even greater growth rates in total specialized traffic than the growth rates projected in the context of the existing industry structure.[34]

Competition in the interstate long-haul market was initially limited to non-switched private line services, but following a 1976 FCC ruling blocking MCI's attempt to offer a competing switched long distance service known as Execunet,[35] the DC Circuit Court in 1977 directed the FCC to authorize switched services entry as well.[36] However, entrants into the switched long distance market were initially required to utilize ordinary business exchange service access lines for origination and termination of calls from and to AT&T local service subscribers. It took nearly a decade after *Execunet* – and an antitrust consent decree entered into by AT&T and the United States Department of Justice – before competing long distance carriers were afforded interconnection arrangements comparable to those long established for AT&T's own long distance operations. In the 1982 Consent Decree that settled the 1974 US antitrust suit against AT&T, the to-be divested Bell operating companies were required to provide competing long distance carriers with "equal access" to their local exchange networks comparable (at least in terms of functionality) to that being provided to AT&T itself.[37] The cutover to "equal access" began around 1984, but it was not until roughly 1989 that full equal access/dialing parity had been implemented throughout all BOC exchanges.

AT&T and its (by then former) BOC subsidiaries persisted in raising technical challenges to other policy initiatives aimed at eliminating a variety of incumbency advantages being enjoyed by these companies. 800 number portability and local number portability are good examples.

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34. *Id.*, at paras. 69, 70. 29 FCC 2nd 906-7. References omitted, emphasis supplied.

35. *In the Matter of MCI Telecommunications Corporation Investigation into the lawfulness of Tariff FCC No. 1 insofar as it purports to offer Execunet service*, Docket No. 20640, 60 F.C.C.2d 25, July 1976, ("*Execunet Order*").

36. *MCI Telecommunications Corp., et al v. FCC*, 561 F.2d 365; 182 U.S. App. D.C. 367; 1977 U.S. App. LEXIS 12256; 41 Rad. Reg. 2d (P & F) 191 (1977).

37. *United States v American Tel. & Tel. Co.*, 552 F. Supp. 131. 226,227 (D.D.C 1982) ("*Modification of Final Judgement*" or "*MFJ*"), *aff'd sub nom.* Maryland v. United States. 460 U.S. 1001 (1983).

When initially proposed, these initiatives were also heavily resisted by AT&T (in the case of 800 number portability) and by the divested former AT&T operating companies (in the case of LNP). For example, in 1995 – the year before the 1996 congressional legislation that *mandated* the implementation of LNP, then-Bell Atlantic (now a part of Verizon) told the FCC that it:

> ... should not mandate development and implementation of any long-term number portability solution until such time as it is economically reasonable, technically feasible and the benefits derived exceed the costs involved. Some proposed solutions do not appear to meet all of the requirements for a viable long-term solution. Implementation of other more promising solutions would require significant network modifications and database development, involving significant investment, expense, dedication of resources, and time. Imposing the substantial costs of these solutions on carriers and consumers would be imprudent and against the public interest, absent clear and convincing evidence of widespread public demand for portability and that the absence of portability significantly impedes local competition.[38]

Notably, in those same *Comments*, Bell Atlantic also stressed the importance of assuring full interoperability across the entire nationwide PSTN:

> Deployment of different, and perhaps inconsistent, long term number portability solutions across the country would harm interstate telecommunications services. At a minimum, certain uniform standards are required to ensure the continued interoperability of networks, such as a uniform addressing or routing scheme, a standard signaling method, and standard interfaces for any national database that may be required.
>
> A national solution also would likely prove less costly if significant network modifications are required for implementation. *Vendors can minimize development costs and expedite implementation schedules if they are seeking to meet a common set of requirements. Moreover, uniform national deployment requirements would generate increased volume for equipment orders, which in turn should permit vendors to lower prices.*[39]

The Court in *Hush-a-Phone* recognized early on the transparency of AT&T's concerns regarding "technical harm," noting the strong competitive advantage inuring to AT&T by virtue of its absolute resistance to any CPE interconnection:

> The Commission also recognizes as an advantage of the Hush-A-Phone that it makes for a quiet line. But it excludes this advantage from consideration because "telephone users may obtain from the defendant companies 'push-to-listen' and 'push-to-talk' switches which may be used to exclude noise from circuits."

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38. *In the Matter of Telephone Number Portability*, CC Docket No 95-116, RM 8535, *Comments of Bell Atlantic*, September 12, 1995, at 8-9.

39. *Id.*, at 9-10, emphasis supplied.

> The mere fact that the telephone companies can provide a rival device would seem to be a poor reason for disregarding Hush-A-Phone's value in assuring a quiet line. The Commission's approach is well calculated to raise those very questions under the antitrust laws which petitioners [Hush-a-Phone *et al*.] seek here to raise, but which, in view of our decision, we do not reach. It also tends to raise another question which we do not reach, namely, the reasonableness of a tariff which places control over petitioners' business in the hands of intervenors [AT&T and USITA] in the first instance. A system whereby intervenors may market equipment until such time as the Commission orders a halt, while petitioners may not market competitive equipment until the Commission gives them an authorization, seems inherently unfair.[40]

The FCC needs to address those technical concerns having merit without compromising the Commission's longstanding commitment to assuring competition and innovation in the telecommunications market.

In addressing the various technical objections that had been raised in the past by AT&T, the FCC has consistently – and properly – directed its efforts toward overcoming the specific technical objections rather than simply abandoning the entire policy initiative as it had been urged to do. Whatever merit AT&T's current arguments regarding the "interference" purportedly plaguing the Lower 700 MHz A block might have, they need to be evaluated in the context of this decades-long pattern of AT&T raising one technical roadblock after another. And if the current "interference" claims have merit, the Commission needs to resolve them not by foreclosing or frustrating competition or foregoing the spectrum efficiencies that will result from handset interoperability and commercially viable data roaming, but by dealing with and resolving the technical issues directly. This approach has served well in the past, and it should provide a template for addressing and resolving the current handset interoperability debate.

III. The FCC's longstanding approach to dealing with financial objections works to promote competition and innovation

The latest suite of large carrier contentions – that a mandatory handset interoperability requirement will impose enormous costs upon wireless carriers and their customers – even if true, is not a basis for rejecting this important pro-competitive policy

The large carriers and certain handset manufacturers seeking to maintain the *status quo* with respect to full handset interoperability in the Lower 700 MHz band present a variety of technical objections that, they claim, support the continued use of Band Class 17 devices and network

40. *Hush-a-Phone*, at para. 9.

access restrictions on Band Class 12 units notwithstanding the resulting incompatibility with the Lower 700 MHz A Block. A central and persistent theme of these various purported technical objections can be boiled down to the *cost* that opponents claim will be required to overcome the problem, and not that the problem is insurmountable as a technical matter. For example, AT&T notes that "[a]s handset manufacturers, chipset makers, and industry trade associations all warned when the Commission previously sought comment on the A Block licensees' proposal, adopting the proposal would inevitably strand investment, delay innovation, and raise costs."[41] If forced to adopt Band Class 12 handsets for use on its network, AT&T complains that it "would be forced to deploy additional cell sites in areas experiencing the greatest interference, but even if the harms from interference required only a small percentage increase in the number of cell sites nationwide, such mitigation costs could easily exceed $1 billion."[42] AT&T admonishes that "there is no justification for singling out AT&T and forcing its customers to suffer inferior service and increased costs merely to pay for an illusory benefit to its A Block competitors."[43] Elaborating on this point, AT&T's expert David R. Wolter reports that

> the main technique for mitigating interference would be to add base stations and re-optimize existing ones, and those are complex and expensive processes. Base stations are very costly to build and operate. If interference mitigation required AT&T to increase the number of its base stations by only one to two percent, that would represent hundreds of millions or even billions of dollars in incremental capital investment and hundreds of millions of dollars more in incremental annual operating costs.[44]

The Commission has in the past overcome cost-related objections to pro-competitive policies.

This is hardly the first time that these types of arguments – centering upon costs and various other putative technical impediments – have been put forward by AT&T and Verizon in opposing FCC initiatives aimed at promoting and facilitating competitive entry and growth. A particularly good recent example of these companies' use of such tactics can be found in their strenuous opposition to the extension of local number portability (LNP) to wireless carriers. LNP makes it possible for customers to change service providers without also having to change their telephone number. Forcing a customer to get a new telephone number in order to change service providers creates a "switching cost" and as such reduces or perhaps even blocks many customers' willingness to shop among competing providers for the best deal. Indeed, in enacting the 1996 *Telecommunications Act*, Congress placed sufficient importance upon LNP that it hard-

41. AT&T Opening Comment, at 7.

42. *Id.*, at 8.

43. *Id.*, at 8-9.

44. *Id.*, Declaration of David R. Wolter, at 17.

wired the requirement into both the overall local competition sections of the *Act* – Sections 251/252 – as well as in the Section 271(c)(2)(B) "competitive checklist" required to be satisfied as a condition for Bell company reentry into the long distance market.

The *96 Act* defines "number portability" as "the ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers without impairment of quality, reliability, or convenience when switching from one telecommunications carrier to another."[45] It imposes upon all local exchange carriers "[t]he duty to provide, to the extent technically feasible, number portability in accordance with requirements prescribed by the Commission."[46] And Congress further directed that "[t]he cost of establishing ... number portability shall be borne by all telecommunications carriers on a competitively neutral basis as determined by the Commission."[47]

As in the debate over interoperability, some wireless carriers – particularly AT&T and Verizon – objected strenuously to this requirement and were vociferous in their opposition, citing seemingly insurmountable technical obstacles, enormous costs, and dubious benefits. However, the Commission determined that the LNP requirement applied both to wireline and wireless carriers.[48]

From the outset, the FCC acknowledged that LNP did in fact present cost concerns for the industry, but did not scrap plans for the policy simply because costs were involved in its implementation. Instead, the Commission accommodated the carriers' concerns while realizing that the industry-wide benefits of LNP far outweighed any costs:

> Although telecommunications carriers, both incumbents and new entrants, must incur costs to implement number portability, the long-term benefits that will follow as number portability gives consumers more competitive options outweighs these costs. As the Commission has stated:
>
> > The ability of end users to retain their telephone numbers when changing service providers gives customers flexibility in the quality, price, and variety of telecommunications services they can choose to purchase. Number portability promotes competition between telecommunications service providers by, among other things, allowing customers to respond to price and service changes without changing their telephone numbers. The resulting competition will benefit all users of telecommuni-

45. 47 U.S.C.§153(46).

46. 47 U.S.C. §251(b)(2).

47. 47 U.S.C. §252(e)(2).

48. *In the Matter of Telephone Number Portability*, CC Docket 95-116, *First Report and Order and Further Notice of Proposed Rulemaking*, Released July 2, 1996 (*"LNP First Report and Order"*), at paras. 152-153.

> cations services. Indeed, competition should foster lower local telephone prices and, consequently, stimulate demand for telecommunications services and increase economic growth.[49]

Nevertheless, while Congress and the FCC saw LNP as a means for increasing competition for wireless services, AT&T and Verizon persisted in efforts to delay and block its implementation despite the Congressional mandate. The FCC summarized – and dismissed – the various technical and financial objections that the large wireless carriers had put forth:

> The majority of CMRS carriers submitting comments support Verizon's request for permanent forbearance. They agree with Verizon that the benefits of requiring wireless carriers to implement LNP do not outweigh the costs associated with implementing LNP. For example, Cingular claims that implementation of LNP will involve enormous costs and will not provide wireless subscribers with better rates, coverage, or service quality. AT&T Wireless argues that permanent forbearance from the LNP requirements is appropriate because portability has not been necessary for the development of competition in the wireless industry and will not be needed to promote further competition.[50]

> The Commission also found that the competitive reasons that lead the Commission to require wireless LNP remain valid today and that there are sufficient competitive and consumer benefits in terms of innovative service offerings, higher quality services, and lower prices to justify the cost of implementing LNP in the near future.[51]

The FCC has always been required to perform a balancing act when it comes to weighing the costs and benefits of various regulatory initiatives. The Commission has frequently determined that the benefits of policies aimed at promoting competition, spurring innovation, and achieving lower prices for consumers, clearly outweigh their costs. In such cases, the Commission has acted to impose a regulatory solution where marketplace forces would not by themselves be capable of producing, or be expected to achieve, the desired outcome, and to provide mechanisms to address any cost burden that the prescription might impose. For example, to pay for wireline LNP, the Commission authorized incumbent LECs to recover such costs over a five-year period through a small end user surcharge.[52] As to wireless number portability, the Commission stated that:

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49. *In the Matter of Telephone Number Portability*, CC Docket No. 95-116, *Third Report and Order*, Released: May 12, 1998, ("*LNP Third Report and Order*") at para. 4, citing *LNP First Report and Order,* at para. 30.

50. *In the Matter of Verizon Wireless's Petition for Partial Forbearance from the Commercial Mobile Radio Services Number Portability Obligation And Telephone Number Portability*, WT Docket No. 01-184, CC Docket No. 95-116, *Memorandum Opinion and Order*, Released July 26, 2002, emphasis supplied, citations omitted.

51. FCC Press Release: "FCC Extends Wireless Local Number Portability Deadline by 1 Year to November 24, 2003" July 16, 2002.

52. *LNP Third Report and Order*, at paras 135 *et seq.*

> We are not persuaded that the costs of LNP will outweigh the benefits consumers will experience from the ability to switch carriers while retaining the same number. Although supporters of Verizon's petition argue that the costs associated with LNP will be significant, other parties have submitted evidence indicating that the relative cost of implementing LNP will be low. For example, using Cingular's estimate that it will have on-going annual costs associated with LNP of $50 million, ASCENT notes that this cost would be spread across a subscriber base of roughly 30 million subscribers, resulting in a per-subscriber monthly assessment of 10 to 20 cents.[53]

The Commission authorized CMRS carriers and other service providers not subject to rate regulation to recover the costs of implementing number portability in any lawful manner.[54]

There are, in fact, striking parallels between LNP and the handset interoperability issue now before the Commission. Both promote competition by lowering switching costs and in so doing reduce customer inertia when considering the selection of a new carrier. The FCC has itself recognized this linkage between wireless local number portability ("WLNP") and handset interoperability when, in the very first LNP rulemaking initiated just months after the *96 Act* was signed into law, the Commission held that:

> Service provider portability between cellular, broadband PCS, and covered SMR providers is important because customers of those carriers, like customers of wireline providers, cannot now change carriers without also changing their telephone numbers. While we recognize that customers may need to purchase new equipment when switching among such CMRS providers, the inability of customers to keep their telephone numbers when switching carriers also hinders the successful entrance of new service providers into the cellular, broadband PCS, and SMR markets. We believe, therefore, that service provider portability, by eliminating one major disincentive to switch carriers, will ameliorate customers' disincentive to switch carriers if they must purchase new equipment. We believe service provider portability will promote competition between existing cellular carriers, as well as facilitate the viable entry of new providers of innovative service offerings, such as PCS and covered SMR providers.[55]

The FCC did not find the various technical and cost-related objections to wireless number portability to have been persuasive, and should, for the same reasons, now dismiss the similar arguments being advanced in opposition to handset interoperability in the Lower 700 MHz band.

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53. *Id.*, at para. 29.

54. *Id.*, at para. 136.

55. *LNP First Report and Order*, at para. 157.

Estimates of the costs of handset interoperability, like earlier claims as to the costs of wireless number portability, are still quite small when compared with the substantial consumer and competitive benefits that interoperability will bring about.

The FCC now faces claims that the costs of interoperability are too enormous to overlook and that imposing such costs for the sake of achieving mandatory interoperability is not justified. Just as in the LNP debate, AT&T has raised the specter of "enormous costs" of "hundreds of millions or even billions." While "hundreds of millions or even billions of dollars" may, at a superficial level, appear to be a large sum of money, when considered in the context of the overall level of AT&T Mobility revenue and earnings, its impact both upon the company and upon its customers actually borders on the inconsequential.

In 2011, AT&T reported wireless segment revenue of $62.3-billion and wireless segment earnings of $15.2-billion.[56] A one-time outlay of $1-billion, when spread over, say, a three-year time frame,[57] would amount to only about 0.5% of aggregate AT&T Mobility revenues. Put differently, the cost could be recovered by a surcharge of only about 27 cents on the average subscriber's monthly bill over that three-year recovery period. By comparison, the typical monthly "surcharge" currently being applied by AT&T for such things as the "Federal Universal Service Charge," the "Regulatory Cost Recovery Charge," the "9-1-1 Service Fee," and applicable state and local taxes falls in the range of about $5.00 or more, depending upon local sales and other tax rates and fees.

The magnitude of any surcharge that might be required to pay for handset interoperability – which we have estimated at no more than about 27 cents if spread over three years – is directly comparable to the surcharges that had been authorized and imposed for wireline and wireless LNP. While interoperability may generate some measurable costs, the competitive benefits – data roaming, increased competition, lower barriers to switching carriers, innovation and lower prices – all easily outweigh these costs.

The lessons of the LNP debate are directly germane to the present matter. Opponents of wireless number portability had also portrayed the costs as enormous and the benefits as dubious or insignificant. The Commission found the contrary to be true in both instances – costs had been exaggerated, and when spread over the carriers' entire customer base were barely noticeable or consequential, while the benefits of reduced switching costs would promote

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56. AT&T Inc. 2011 10-K Annual Report filed with the US Securities and Exchange Commission on February 24, 2012 (Exhibit 13, Reported Segments).

57. The FCC had specified a five-year time frame for recovery of ILEC LNP costs, and that same period would not be unreasonable for recovery of costs incident to accommodating handset interoperability. However, and to be conservative, we use a three-year period for this illustration in recognition of the relatively short life cycle of wireless handsets and the likelihood that most existing non-interoperable (i.e., Band Class 17) devices would have been replaced in the normal course of business over a three-year period.

competition and reduce prices to consumers. The same analysis – and the same conclusion – applies with equal force to the matter of handset interoperability.

IV. The state of competition in the US wireless market

AT&T and Verizon have little incentive to voluntarily agree to common technical standards capable of supporting broad interoperability across multiple carriers.

In the *NPRM*, the Commission expresses a strong preference for a market-based, voluntary solution for achieving handset interoperability rather than one that is dependent upon regulatory intervention and prescription.[58] Such a result is possible, as long as all – or at least most – of the market participants are individually benefitted by industry-wide adoption of common, interoperability standards. This can sometimes happen in certain network-based industries in which "two-sided markets" are present. A good example of such a result can be found in the Betamax/VHS format rivalry that arose in the early days of consumer videocassette recorders (VCRs). The lack of standardization and interoperability between the two formats did not benefit any of the industry participants. Consumers held off purchasing VCRs due to the uncertainty as to which format would ultimately prevail. Content producers (of prerecorded tapes) were forced to offer both formats, and retailers were forced to carry both on their shelves. Ultimately, as VHS began to dominate, content producers stopped offering Beta format tapes, which caused the demand for Betamax machines to drop off, which caused more content producers to discontinue publishing in the Beta format. This death spiral continued until all Betamax production ceased.

This type of result is not likely to arise in highly concentrated markets dominated by a small number of very large firms whose smaller rivals are not capable of presenting a serious competitive challenge. In such a market, the large incumbents have little to gain, and perhaps a lot to lose, by subscribing to standards that would enable their customers to easily switch to other service providers. Indeed, the smaller firms' very ability to compete against the industry behemoths is strengthened by such standards, and is decidedly undermined in their absence. The US wireless services industry is a particularly good example of such a highly concentrated market in which no industry consensus on common handset standards and interoperability is likely to arise on its own.

As the two largest US wireless carriers, AT&T Mobility and Verizon Wireless have long enjoyed several key competitive advantages over their far smaller rivals. First, AT&T and Verizon have realized enormous ongoing benefits as affiliates of Regional Bell Operating Companies ("RBOCs"). The very first cellular spectrum licenses awarded by the FCC dating

58. *NPRM*, at para. 49.

back to the mid-1980s involved a so-called "wireline set-aside," whereby incumbent wireline telephone companies were allocated half of the 850 MHz spectrum that had been assigned to cellular on a largely noncompetitive basis and at no cost. Wireline carriers with large and geographically extensive operating footprints – principally the former Bell System companies that now comprise the principal ILEC operating areas served by AT&T and Verizon – were thus able to quickly – and costlessly – amass large contiguous wireless operating territories that formed the basis for what are now national in scope. Although also ultimately awarded at no cost to the recipient, so-called "nonwireline" competitor licenses were hotly contested, and the resolution of the assignment of these licenses resulted in several years' delay prior to being awarded, creating a substantial "head start" advantage for the wireline licensees. RBOC entities had the financial resources to support the investment required to build out their wireless affiliates' networks, typically at lower capital costs than were available to nonwireline startups. A 1986 ruling by the Federal District Court overseeing the 1984 break-up of the former Bell System authorized the RBOCs to acquire "out-of-region" nonwireline (designated as the cellular "A Block," not to be confused with the Lower 700 MHz A Block at issue here) 850 MHz licenses,[59] affording the RBOC wireless affiliates collectively the ability to quickly come to dominate the provision of cellular service nationwide.

All wireless carriers require backhaul facilities – most of which are obtained from the ILEC serving the local area – to interconnect individual cell sites with the carriers' networks. For the wireless operations of AT&T and Verizon, the vast majority of these backhaul facilities are provided by either AT&T or Verizon, within each's respective wireline footprint. CMRS providers lacking such extensive ILEC affiliations are heavily dependent upon ILEC facilities for backhaul – Sprint, for example, advised the FCC in 2007 that 97% of all of its DS1s, and 88.4% of all of its DS3s, were purchased from the incumbent LEC[60] – and have long contended that the RBOCs' pricing of their "special access" services being used for backhaul are excessive and unreasonable,[61] effectively allowing AT&T and Verizon to increase their rival wireless carriers' costs.[62] Even AT&T itself, prior to its merger with SBC at a time when it, too, was utterly dependent upon ILECs for special access connections to both its wireline and wireless networks, complained that "[T]he Bells' special access rates are grossly excessive and unlawful

59. *U.S. v. Western Electric Co.*, Civil Action No. 82-0192, slip op. at 7 (D.D.C. February 26, 1986)

60. *In the Matter of Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25, *AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, RM-10593, Comments of Sprint Nextel Corporation, August 8, 2007, at 30.

61. *Id.*, at 2.

62. *Id.*, at 6.

and are becoming more so."[63] Cable MSOs have been making some inroads into the backhaul market, but the Bells still overwhelmingly dominate this sector.

The succession of mergers and transfers of wireless licenses between and among the RBOCs over the 1996-2006 period enabled what are today AT&T and Verizon to consolidate their respective wireless operations into geographically extensive national networks that dwarf all other wireless carriers' operations, including those of the other two "national" networks – Sprint and T-Mobile. AT&T and Verizon benefit from their nationwide spectrum holdings and facilities-based coverage in ways that no rival can hope to match – including spectrum efficiencies, limits on the need for extensive roaming agreements, and access to numerous large enterprise customers that insist upon dealing with a single nationwide service provider.

Due to their smaller scale of operation, lack of choice, and switching costs, smaller carriers cannot provide the degree of competitive price discipline to larger carriers that the FCC relies upon as obviating the need for price regulation of the larger carriers.

In their 2011 submission to the FCC in support of their then-proposed merger, AT&T Mobility and T-Mobile USA had claimed that by combining their respective networks, spectrum, and other assets, the two carriers would realize a number of efficiencies and associated cost savings that would not arise were the two firms to continue their separate existence:

> [The merger] will create immense network and spectrum synergies that will alleviate the capacity constraints that the applicants would otherwise be left to address, far less efficiently and effectively, on their own. It will thereby increase capacity, enhance efficiency in the use of scarce spectrum resources, and significantly improve quality of service. This expanded capacity will benefit not only the applicants and their customers, but consumers in general.[64]

AT&T and T-Mobile had asserted that by combining and pooling their two separate networks, they would be able to eliminate a duplicative control channel and in so doing "free up an additional 4.8 to 10 MHz of spectrum in each market where AT&T and T-Mobile USA offer GSM service ..., greatly improving the combined company's flexibility to meet capacity and performance challenges," thus enabling the combined company to reallocate the spectrum currently required for that then-redundant control channel to voice and/or data "payload"

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63. AT&T Corp. *Petition for Rulemaking To Reform Regulation of Incumbent Local Exchange Carrier Rates For Interstate Special Access Services*, RM No. 10593, October 15, 2002, at 7.

64. *In the Matter of Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations*, WT Docket No. 11-65, Merger Application, *Description of Transaction, Public Interest Showing, and Related Demonstrations*, April 21, 2011 ("*AT&T/T-Mobile Merger Application*"), at 18.

transport.[65] They claimed that, by combining the smaller blocks of spectrum held separately by each of the two carriers into a single larger pool of voice and/or data channels, the call-carrying capacity of the pooled spectrum would be significantly greater than if the separate frequency blocks continued to exist in isolation from one another. This "channel pooling" would, they argued, "allow more customers to be served per MHz of spectrum deployed, providing a substantial capacity boost even in areas where both companies' networks are heavily loaded."[66]

They also contended that by "optimiz[ing] the spectrum allocation in areas where one company's network and spectrum are underutilized relative to the other's, ... improvements in both performance and capacity in those areas" could be achieved.[67] They represented that these efficiencies would allow the merged entity "to accelerate the shift of spectrum from less spectrally efficient to more spectrally efficient network technologies (i.e., GSM to UMTS and UMTS to LTE)."[68] These operational and efficiency benefits, the two companies claimed, would "alleviat[e] the applicants' capacity constraints and thereby generat[e] greater output and more competitive prices" overall.[69]

Of course, to whatever extent such claims had merit, the rivals of an even smaller size, scale, and scope than a post-merger AT&T/T-Mobile would have been placed at an even greater cost and operational disadvantage, making them even less able to offer a serious competitive challenge to the two industry giants. And even though the FCC had rejected the AT&T/T-Mobile merger effort, AT&T and Verizon are today each at least double the size of the next closest rival (Sprint) and more than three times the size of the number four carrier, T-Mobile. AT&T thus has effectively conceded that, other than Verizon, there does not presently exist any rival wireless entity capable of offering a serious competitive threat or challenge to AT&T's and Verizon's dominance of the US wireless market.

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65. *AT&T/T-Mobile Merger Application*, Declaration of William M. Hogg, April 21, 2011, at para. 12.

66. *Id.*

67. *Id.*

68. *Id.*, at para. 13.

69. *AT&T/T-Mobile Merger Application*, at 14.

AT&T and Verizon have "nationwide" spectrum coverage and vast cash resources to acquire more as necessary, limiting their need to enter into roaming agreements with other carriers

In its most recent (2011) *Fifteenth Report on CMRS Competition*, the FCC has noted that

> Because access to spectrum is necessary for the provision of mobile wireless service, the different spectrum holdings of major providers potentially affect their ability to compete effectively. These spectrum holdings include licenses obtained when the spectrum was first licensed for mobile services, such as through the original Cellular assignments or through the auction process (e.g., PCS, AWS, or 700 MHz spectrum), as well as spectrum obtained through various secondary market transactions.[70]

Whether one measures size in terms of geography or population covered, by dollar value, or by any other standard, AT&T and Verizon each possess holdings of electromagnetic spectrum that dwarf those of all other US carriers. As of year-end 2011, AT&T valued its spectrum holdings at $51-billion.[71] Verizon valued its spectrum licenses at some $73-billion.[72] On a MHz-POP basis,[73] the two largest US wireless carriers hold a majority of the spectrum bands most widely used to provide wireless data services, as summarized in Table 1 below. By contrast, smaller carriers have relatively small holdings across the same bands.

As RBOC affiliates, the companies that today constitute AT&T Mobility and Verizon Wireless were the beneficiaries of the original wireline carrier B-Block cellular set-aside (indeed, Table 1 shows that they have gone on to control some 91% of those original 850 MHz spectrum licenses). These B-Block wireline carrier assignments were often either uncontested or settled very quickly, while competitors vied for portions of the non-wireline A-block cellular spectrum for years, which also provided them with a huge first-mover advantage, allowing for these networks to be established years before the arrival of operational competing networks.

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70. *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 Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 10-133 (Terminated), Fifteenth Report, Released June 27, 2011, ("CMRS Report") at para 286.

71. AT&T Inc. 2011 10-K Annual Report filed with the US Securities and Exchange Commission on February 24, 2012 (Exhibit 13, Consolidated Balance Sheets).

72. Verizon Communications, Inc. 2011 10-K Annual Report filed with the US Securities and Exchange Commission on February 24, 2012 (Exhibit 13, Consolidated Balance Sheets).

73. The megahertz-POP, or "MHz-POP" is a measure of the coverage of a spectrum license. The FCC defines a MHz-POP as "the amount of spectrum in a given license or set of frequencies multiplied by the population covered by the geographic area of the spectrum license. For example, the MHz-POPs of a 20 megahertz license covering a geographic area with a population of 1,000 would be 20,000." June 27, 2011 *CMRS Report* at footnote 19.

These free set-aside licenses, coupled with the first-mover advantage, have provided an ongoing and continual competitive edge enjoyed solely by AT&T and Verizon.[74]

Table 1

AT&T and Verizon Hold a Majority of the Spectrum Suitable for the Provision of Data Services (expressed on a MHz-POP Basis)

Carrier / Spectrum	700 MHZ	Cellular (850 MHZ)	PCS (1.9GHz)	AWS (1.7/2.1 GHz)
AT&T/VZ holdings	67.2 %	91.3%	41.2%	22.8%
Sprint	0.0%	0.0%	26.8%	0.0%
T-Mobile	0.0%	0.0%	19.5%	27.4%
US Cellular/King Street	2.8%	4.4%	1.8%	2.1%
MetroPCS	0.5%	0.0%	2.6%	9.2%
Leap	0.0%	0.0%	2.2%	8.7%

Source: *FCC, Fifteenth CMRS Report*, June 27, 2011, at Table 27.

Not only do AT&T and Verizon already control large swaths of the available spectrum, they are able to acquire large portions of any new spectrum that becomes available at public auction or through private sales, by virtue of their already dominant position in the industry and the resulting economic benefits derived therefrom. In both 2010 and 2011, AT&T generated more than $15-billion in wireless segment earnings (before taxes). AT&T generates so much cash that, even after its capital expenditures and spectrum purchases, the company returns $10-billion annually to shareholders through quarterly dividend payments. Verizon benefits from an even rosier financial situation. At Verizon, in both 2010 and 2011, pre-tax segment earnings exceeded $18-billion.

74. The B-Block wireline set-aside licenses were available to any franchised wireline local exchange carrier (the term "Incumbent Local Exchange Carrier" did not emerge until the 1996 *Telecommunications Act*) and many small Independent Telephone Companies were eligible to receive one or more such licenses either on an uncontested basis (if no other ILEC served the designated MSA or RSA) or to compete for (and ultimately to settle for a share of) the wireline block where two or more ILECs provided service in parts of the designated cellular market area (CMA). The seven regional Bell Operating Companies ("RBOCs") extant at that time, together eith GTE, garnered the overwhelming majority of the MSA licenses, mostly on an uncontested basis. Their subsequent purchases of out-of-region nonwireline A-Block licenses, followed by multiple mergers and license transfers, enabled the two surviving RBOCs – AT&T and Verizon – to accumulate broad near-nationwide coverage, most heavily concentrated in the largest urban and most smaller metropolitan areas. AT&T's wireless footprint consists of licenses originally awarded to or acquired by Southwestern Bell, Ameritech, BellSouth, and SNET; Verizon inherited the former holdings of NYNEX, Bell Atlantic, GTE, US West and Pacific Telesis, and most recently, those of Alltel. For the most part, wireline set-aside licenses that were awarded to, and that are still held by, the non-Bell/non-GTE ILECs were confined to a few smaller MSAs and RSAs. These entities currently serve smaller, regional markets, and are utterly dependent upon roaming agreements with one of the national carriers as the means for offering their customers access to coverage areas comparable to those of AT&T and Verizon.

Although the wireless services industry began by offering regional service plans, consumers both big and small now demand nationwide coverage and pricing. There are only two ways to provide large scale coverage across the US: own and operate spectrum holdings across the bulk of the country (as do AT&T and Verizon), or enter into so-called roaming agreements with other carriers to create a patchwork of networks that seamlessly allow subscribers to access wireless services in most locations (the strategy being pursued by most regional and rural carriers). Because spectrum is a limited and expensive resource, AT&T and Verizon have a huge competitive advantage over other carriers precisely because they already have spectrum covering a huge portion of the US population, and possess the resources to easily outbid rivals in spectrum auctions and in so doing prevent the other carriers from ever acquiring a comparable spectrum portfolio. Although AT&T and Verizon do enter into some roaming agreements with other carriers, their incentive to do so is limited because they themselves already provide service in most areas. So small carriers whose own spectrum holdings are confined to a few geographic areas are critically dependent upon roaming agreements for a substantial majority of the coverage they offer their customers. By contrast, AT&T and Verizon face no such need.

AT&T and Verizon gain economies of scope from their wireline RBOC affiliates.

Although the wireless business is critically dependent upon access to spectrum for radio transmission, wireless services rely equally upon wireline backhaul facilities to carry traffic from cell towers back to the switching centers, and onward. These wireline backhaul facilities are essential for the operation of a wireless network. However, in most cell-site locations, they are currently available from only the local wireline service provider, and carry prices that are consistent with the local wireline carrier's monopoly status in the special access backhaul market. The demand for backhaul capacity has grown considerably in the last few years as increased use of smartphones and other Internet-capable devices, coupled with increased wireless network data speeds and bandwidth offerings, have increased the need for high quality, high capacity backhaul at nearly every cell cite.

In 2008, the FCC discontinued the requirement that large ILECs, which include all of the BOC affiliates of AT&T and Verizon, provide financial results and other operational data in the FCC's "ARMIS" data reporting system.[75] With that data, it had been possible to assess the full extent to which special access rates were being set in excess of the underlying cost of these services. The pre-2008 ARMIS data that is still available, however, demonstrates the presence of persistent and escalating rates of return being generated from special access services. The last

75. *In the Matter of Petition of Qwest Corporation for Forbearance from Enforcement of the Commission's ARMIS and 492A Reporting Requirements Pursuant to 47 U.S.C. § 160(c)*, WC Docket No. 07-204; *Petition of Verizon for Forbearance Under 47 U.S.C. § 160(c) From Enforcement of Certain of the Commission's Recordkeeping and Reporting Requirements*, WC Docket No. 07-273; *Memorandum Opinion and Order*, 23 FCC Rcd 18483 (2008).

available FCC data show triple-digit rates of return for the wireline ILEC facilities commonly used for backhaul.[76] In its latest report on wireless competition, the FCC notes that:

> Backhaul costs currently constitute a significant portion of a mobile wireless operator's network operating expense. and the demand for backhaul capacity is increasing. In light of the growing need for backhaul, cost-efficient access to adequate backhaul will be a key factor in promoting robust competition in the wireless marketplace.[77]

Here AT&T and Verizon enjoy a unique and substantial competitive advantage over their rivals. Most backhaul services are provided by the ILEC serving the geographic area in which the cell site and MTSO are located, which in most cases is owned by either AT&T or Verizon. Given that the two largest wireless companies are affiliates of the two largest RBOCs, the consequences of the persistent overpricing of special access backhaul facilities by the ILEC to its own wireless affiliate arise primarily in the form of an intracorporate transfer whose effect on the "bottom line" of the parent is somewhere between minimal and zero. And because AT&T and Verizon are of roughly equal size, the overpriced purchases made by each to the other's ILEC affiliates roughly cancel each other out. However, by overpricing backhaul, the two RBOCs are able to increase the backhaul costs of rival wireless carriers over what would prevail were special access rates set on the basis of cost.

AT&T and Verizon also benefit from horizontal integration with their wireline RBOC affiliates.

Complementing their advantages in the backhaul market is the benefit that AT&T and Verizon each realize from horizontal integration of wireless with another complementary consumer market in which they also enjoy a dominant position. Both AT&T and Verizon offer their customers "one-stop shopping" plans that effectively bundle wireline and wireless services into a single package, and customers who subscribe to multiple services from the same provider can obtain a discount relative to the separate prices of the individual services. These package deals often include either cash discounts off of the total price of the underlying services and/or calling features that lower the effective price of the service.[78]

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76. Federal Communications Commission, ARMIS Report 43-04, Access Report: Table I, YE 2007. Available at http://www.fcc.gov/wcb/eafs/

77. *CMRS Report*, at para. 322.

78. *See*, e.g., "AT&T Offers its Largest Monthly Bundle Discount to AT&T Wireless Customers that Add U-verse TV," April 18, 2011. http://www.att.com/gen/press-room?pid=19716&cdvn=news&newsarticleid=31824 (accessed June 28, 2012).

AT&T and Verizon have access to important customer groups that are not available to smaller carriers.

While regional carriers may be more than satisfactory for individual consumers and small or regional business users, their lack of a nationwide network limits the small carriers' ability to successfully market their services to the largest national enterprise customers, some of whom spend tens of millions of dollars annually on wireless services. These large customers fall into three groups: federal government agencies and state agencies in large states like California, Texas, and Florida; enterprise/corporate users; and wholesale/MVNO service providers and resellers. These customers, though distinct in some ways, often share a key attribute – they all require broad and disparate geographic coverage. With offices and users spread all over the US, these large customers have a strong preference for dealing with a "single source" provider so as to avoid having to cobble together coverage from a patchwork of regional networks.

These customer groups all make large volume commitments, and often buy handsets in bulk. This means that this market segment can drive profitability (by lowering per-user marketing costs) and expand the range of available, cost-effective, wireless handsets and devices by allowing the carrier, through its large customers, to commit to ever larger orders from device manufacturers. Being foreclosed from this market is a significant obstacle to regional carriers, and a major advantage to AT&T and Verizon.

Spectrum efficiencies top the list of scale economies uniquely available to AT&T and Verizon.

In its failed attempt to acquire T-Mobile, AT&T made it abundantly clear that increasing spectrum holdings and pooling spectrum into large blocks allow for more efficient use of spectrum than where the same total amount of spectrum is split up among multiple carriers (AT&T and T-Mobile in that case), even though the same amount of spectrum would be used. AT&T highlighted this point numerous times in its public interest statement supporting the proposed merger. For example, AT&T notes that:

> In wireless communications, two providers with complementary spectrum and common technologies can achieve an analogous benefit by serving all of their customers over a single set of shared network resources. In particular, any given caller is significantly more likely to find a vacant channel when a larger number of channels are pooled together. This means in turn that, in every market where the parties' networks overlap, the combined company will be able to serve more customers (i.e., carry more traffic) over the same amount of spectrum than they had independently served before. This is yet another way in which the combined company's network will exceed the sum of its parts, creating the functional equivalent of new spectrum.[79]

79. *AT&T/T-Mobile Merger Application* at 37, citations omitted.

Even though its proposed merger with T-Mobile has been abandoned,[80] AT&T nonetheless persists in reiterating these same arguments regarding spectrum efficiency. In a recent speech, AT&T CEO Randall Stephenson commented on such spectrum efficiency gains, suggesting that "[t]he more competitors you have, the less efficient the allocation of spectrum will be."[81]

These claims highlight the fact that AT&T and Verizon, with their vast spectrum holdings, have an advantage over smaller regional carriers whose spectrum portfolios are far more limited. AT&T and Verizon can provide more and greater service over their large pools of spectrum than can smaller carriers within each of their respective smaller fractional spectrum blocks. This reality further highlights a fallacy in AT&T's campaign against interoperability: If more spectrum produces more efficient results, companies operating in the Lower 700 MHz band should be enthusiastic about utilizing the entirety of the A, B and C blocks, which will produce a more efficient outcome for all carriers operating across all three blocks.

AT&T has once again set out several policy recommendations that would provide for additional wireless spectrum and spectrum efficiency overall. In a June 10, 2012 *Wall Street Journal* op-ed column, Stephenson noted that "[t]he demand for mobile data is now roughly doubling every year. Smartphones use 30 times more data than the cellphones they replaced. Meanwhile, the supply of spectrum supporting mobile devices has remained the same since 2008." He warned that "[i]f we are to meet our government's expressed goal of providing high-speed wireless services to 98% of all Americans by 2016, we need to better align national policies with national priorities." To that end, AT&T urged immediate adoption of three specific policy initiatives – (1) "[r]equire spectrum holders to put the airwaves to work;" (2) "[q]uickly get spectrum where consumers need it most;" and (3) "[e]stablish a national model for the local approval process that's required when wireless carriers need to build new mobile infrastructure.[82]

All three of these recommendations are, of course, worth pursuing, notwithstanding their obvious financial benefit to AT&T. But conspicuously omitted from AT&T's list are two national spectrum policy requirements that would significantly improve spectrum efficiency and afford better customer access to spectrum, as well as benefitting all wireless carriers other than the two largest. From AT&T's standpoint, however, these omitted policy initiatives – *full handset interoperability* and *unrestricted data roaming on a commercially viable basis across all technically compatible networks* – would disserve its own financial self-interest. (As we discuss below, AT&T and Verizon are alone in opposing the FCC's efforts to require nationwide

80. AT&T Inc., 8-K Report ("T-Mobile Termination") filed with the US Securities and Exchange Commission on December 19, 2011.

81. Ethan Smith, "AT&T Chief Says Blocked Deal Will Cost Consumers" *The Wall Street Journal*, Technology, May 2, 2012.

82. Randall Stephenson, "Spectrum and the Wireless Revolution," *The Wall Street Journal*, Opinion, June 10, 2012.

mobile data roaming). By these omissions and by its stance on interoperability and data roaming generally, AT&T raises concerns over the likelihood of an industry solution to interoperability.

AT&T and Verizon exercise market power in the US wireless market, raising competitive concerns and highlighting the lack of real competition in the industry.

AT&T and Verizon rest comfortably in their position of US market dominance in part because they confront no realistic threat of further competitive entry as long as the critical input – spectrum – remains in scarce and finite supply. Indeed, wireless services are characterized by very high barriers to entry, i.e., new competitors face substantial hurdles and risk to joining the market, and are thus unlikely to do so. Because there is little competitive threat to either AT&T's or Verizon's current market presence – and indeed even the existing competitors have had little impact in providing competitive discipline to the two largest US carriers – they will be less inclined to voluntarily enter into agreements where the primary beneficiaries thereof would be their competitors.

Wireless broadband data is generally transmitted over different frequencies than voice, and as such there may be instances where a particular carrier has voice-capable spectrum but no 4G spectrum in a particular geographic market. Full functionality of an Internet-capable smartphone necessarily requires access to both the voice and the data spectrum bands, and if data-capable spectrum is not available in a given market area, that will diminish the economic value of the carrier's voice spectrum to the extent that customers migrate to other providers that are able to serve both aspects of the customer's needs. Thus, in looking at the distribution of spectrum holdings among individual carriers, the more geographically limited 4G spectrum may be controlling even if the carrier has the ability to offer, either on its own facilities or via roaming, more geographically expansive voice coverage.

Besides spectrum, other barriers to entry and to expansion by existing small and regional carriers include the high costs of capital associated with marketplace risk, high capital requirements to build out a facilities-based network, local and federal permitting required to deploy network infrastructure, and lengthy construction and build-out times. All of these make it nearly impossible either for new entrants or existing providers to present any sort of serious nationwide competitive threat to the dominant positions of AT&T and Verizon, because even if smaller carriers were able to overcome these barriers at some point, the technological and competitive landscape will have changed so dramatically by the time any new facilities can be up and running that their effect may still fall far short of meeting the then-extant functionalities being demanded by the marketplace. While companies like US Cellular, Metro PCS and Leap are contemplating how to orchestrate 4G LTE rollouts (a task that is made all the more difficult by the lack of handset interoperability), AT&T and Verizon have a two-year (and counting) head start. This sort of "last-mover" disadvantage means that by the time a small carrier is actually

offering service in the Lower 700 MHz band, AT&T and Verizon will have already captured substantial portions of the market.

V. AT&T and Verizon exercise monopsony market power in their purchases of wireless handsets and devices

As the largest handset purchasers in the US, AT&T and Verizon have the unique ability to secure significant cost advantages, exclusive deals, and to exercise design control that are not available to smaller carriers.

In economics, a *monopsony* is said to exist when there are a limited number of buyers for a good or service, and some of these buyers, by virtue of their size and clout, hold market power over the suppliers of the affected goods and services.[83] These situations occur infrequently, but the wireless carrier/handset manufacturer relationship is a textbook example of monopsony power. In the US, wireless devices are sold by their manufacturers not to individual consumers but to the wireless carriers for resale. As such, the carriers comprise the bulk of the direct demand for handsets, and AT&T and Verizon, with their combined nationwide market share of over 65%, easily purchase more handsets than all other carriers combined.

Although the carriers do not publicly report the volume of their handset purchases, they do report information on customer additions in their financial reports, and gross additions provide a conservative surrogate for handset purchase volumes.[84] These volume purchases afford the larger carriers with considerable market power *vis-à-vis* handset manufacturers, which can be used both to demand customer features and specifications as well as to pressure the manufacturers for the lowest possible wholesale handset prices. By contrast, smaller carriers lack the monopsony market power to negotiate "most favored nation" pricing with handset manufacturers even for devices that are identical to those being purchased by AT&T and Verizon. However, if smaller carriers are also required to utilize handsets supporting spectrum block configurations that differ from those being ordered by their larger rivals, the small carriers will be subject to even higher unit prices due to what will necessarily be smaller production volumes and the

83. Strictly, the term "monopsony" applies when there is only *one* buyer; when there are a small number of buyers, they are said to constitute an "oligopsony." Much as a firm can exercise monopoly power even when there are competitors in the market, so to can one or more firms exercise monopsony power in an oligopsony. See, e.g, Mansfield, Edwin *Microeconomics: Theory and Application, 3rd Edition,* W.W. Norton & Company, 1972, at 367.

84. "Gross additions" represents the total number of new (inbound) customers added during the period, the vast majority of which are provided by the carrier with a new handset or data card. However, new handsets or data cards are also furnished to *existing* customers who upgrade their service, renew their contract, or simply purchase a new device when their previous one has been lost or broken. Thus, the aggregate volume of handset devices being purchased by a carrier will likely be considerably greater than the number of "gross additions" reported in its 10-K.

correspondingly lower manufacturing efficiencies than those associated with the large volumes being produced to satisfy the demands of AT&T and Verizon. The stark difference in the volume of handset purchases by AT&T and Verizon *vis-à-vis* those of their smaller rivals can be readily demonstrated by comparing the gross additions for AT&T and Verizon with that same statistic for several smaller carriers, as summarized in Table 2 below:

Table 2

Gross Additions
as estimated from carrier financial reports[85]
for year ending December 31, 2011

Carrier	Gross additions
Verizon	22,813,000
AT&T	23,869,000
Sprint	20,619,000
T-Mobile	13,985,000
MetroPCS	4,910,000
US Cellular	875,000

The signs of monopsony are also its symptoms. Major purchasers lock in exclusive deals, dictate terms and conditions to their suppliers, and often crowd out competitors that need unfettered access to the handset market in order to compete.

AT&T and Verizon are able to lock-in "exclusive" deals with handset manufacturers.

It is a common practice in the wireless industry for carriers to lock-in exclusive deals with handset manufactures. An exclusive handset arrangement is one in which a handset manufacturer or vendor agrees to sell a particular handset model to only one wireless service provider, usually for a specified period of time. These agreements may also involve sharing financial commitments and sharing market risks, with the manufacturer typically assuming some research and development commitments and the provider typically assuming some marketing and minimum volume commitments. The FCC has found some limited data on the nature of such agreements:

85. Where they were not reported directly, gross additions were estimated as follows: Customers x Monthly Churn Rate x 12 + Net Additions (Losses).

> There is some data available on the prevalence and duration of [exclusive handset agreements (EHA)] , although confidentiality clauses in EHAs have restricted the availability of certain data. First, EHAs are often employed in the *launch of innovative handsets that are on the technological frontier, e.g., smartphones*. Second, the duration of EHAs, although typically private contractual information, appears to have ranged from six months or less to a few years or more.[86]

Currently, AT&T is advertising its exclusive arrangement to sell the Nokia Lumia 900, a Windows OS device. Despite the fact that this handset is make-or-break to Nokia,[87] AT&T has prevented its rivals from gaining access to the device that AT&T is so proud to put on the front page of its website. Nokia identifies the principle risk factor of its Windows phone:

> Our strategy for Nokia products with Windows Phone may not enable us to achieve in a timely manner the necessary scale, product breadth, geographical reach and localization to be sufficiently competitive in the smartphone market.[88]

And yet while Nokia realizes the importance of product scale, reaching as many customers as possible, and expanding geographic reach, it appears to have gone along with AT&T's insistence upon exclusivity with respect to Nokia's premier 4G handset.

Verizon has struck similar deals with Motorola, which has recently launched a whole new line of "Droid" phones running the Google Android operating system. Verizon has had the exclusive rights to sell the Droid RAZR device. Motorola makes it perfectly clear just how important its relationship with Verizon is in this filing with the SEC:

> During 2011, approximately 19% of our net revenues were from Verizon Communications Inc. (including Verizon Wireless) ("Verizon"). It may be difficult to replace or find new large customers, *especially with increasing concentration in the U.S. where there are a limited number of carriers*. If any significant customer, particularly Verizon or Sprint or other large customers, such as Comcast, stopped doing business with us, or significantly reduced the level of business they do with us, it could impact our ability to service other customers using similar technology and our financial results could be negatively impacted.[89]

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86. *CMRS Report*, at paras. 341-342, emphasis supplied.

87. Nokia Corp., Form 20-F filed with the US Securities and Exchange Commission on March 8, 2012, at 13 and 56.

88. *Id.*, at 13.

89. Motorola Mobility Holdings, Inc., 10-K Annual Report Filed with the US Securities and Exchange Commission on February 17, 2011, emphasis supplied.

Verizon's Chief Technology Officer, Tony Melone, made Verizon's stance on this issue perfectly clear: "We will drive our OEMs to build for our network specifications [....] We are not going to ask them to invest in and increase our cost to do something we don't need. AT&T will do the same thing."[90]

By locking down exclusive deals to sell the most popular handsets, and forcing handset manufacturers to make devices as they specify, AT&T and Verizon force other carriers to offer second tier devices, hampering competition.

The lack of standardized and uniform handset specifications in the Lower 700 MHz band places small carriers at a significant disadvantage *vis-à-vis* AT&T and Verizon in their dealing with handset manufacturers

Competitors face challenges far beyond AT&T's and Verizon's powerful relationship with handset manufacturers. Not only do these competitors lack the negotiating power to obtain the most favorable handsets and prices, they face losing economies of scale of manufacture when ordering only the smaller quantities required by regional carriers. This lack of purchasing power can even cause trouble high up into the supply chain, where shortages of component parts may force manufacturers to commit limited resources to the most popular handsets ordered by the largest carriers.

Differing technical specifications may preclude smaller carriers from the most popular smartphones, even where no exclusive deal is in place.

As it now stands, the current Lower 700 MHz divide between Band Class 12 and Band Class 17 devices would require differing technical specifications for end user devices, even though Band Class 12 encompasses the full range of spectrum included in Band Class 17. Because AT&T has already rolled out Band Class 17 devices, any smaller carrier needing access to the Lower 700 MHz A Block spectrum will need to have devices made to the different technical specifications required for Band Class 12. This respecification will necessarily increase the cost of some handsets and limit the availability of others, but not necessarily because Band Class 12 specifications are inherently more costly to produce. Rather, the higher per-unit cost may simply be the result of the smaller volume of such units relative to that for Band Class 17 that will be ordered and produced. The full range of 4G LTE "smartphones" on the market today is simply not available to smaller carriers if they are forced to purchase devices with technical specifications different from those being purchased by AT&T and Verizon.

90. "Verizon CTO: 4G LTE international roaming is coming" Marguerite Reardon, June 7, 2012. Available at http://news.cnet.com/8301-1035_3-57449099-94/verizon-cto-4g-lte-international-roaming-is-coming/ (accessed July 6, 2012.)

While it is hardly surprising – or even improper – that smaller purchasers will likely pay more per unit than larger purchasers, the disparity is no doubt compounded by the lack of standardization in the equipment specification due to the absence of an interoperability requirement. If large and small carriers all purchased the same handsets, small carriers would still benefit from the productive efficiencies resulting from the large volume of units being produced even if they are not able to negotiate prices as low as those available to the higher volume purchasers. However, to the extent that the larger carriers' handset specifications are not compatible with the requirements of smaller carriers, the smaller carriers are forced to purchase handsets that will necessarily be produced in smaller quantities, denying them at least some of the benefits of mass production that are associated with the large carrier orders. The FCC has, in fact, long recognized the relationship between wireless handset production levels and manufacturing efficiency. As the Commission observed in 1981:

> Nationwide compatibility is also likely to increase the number of manufacturers providing the cellular equipment. This price and product competition should benefit the consumer through lower equipment costs and greater equipment selection. ...[91]

Table 3

The Wide Variation in the Range
of 4G LTE Devices Currently Being Offered by the Various Carriers

Carrier	4G LTE Phones	4G LTE Tablets	4G LTE Data Only	Total 4G LTE Devices
Verizon	12	6	6	24
AT&T	8	3	2	13
Sprint	3	0	1	4
Metro PCS	3	0	0	3
US Cellular	1	1	1	3
T-Mobile	0	0	0	0
Leap	0	0	0	0
Centennial	0	0	0	0
Cincinnati Bell	0	0	0	0

Source: Carrier Websites as of May 25, 2012.

91. *In the Matter of An Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems*, CC Docket No. 79-318, *Report and Order*, FCC 81-161, Rel. May 4, 1981 ("1981 AMPS Order"), at para. 79.

Table 3 summarizes the number of different 4G LTE devices currently being offered by both AT&T and Verizon, and by various small and regional carriers. As can be seen, AT&T and Verizon have access to a much broader range of devices than their smaller competitors.

The issue of technical specification goes beyond the requisite chipsets and radios needed for smaller carriers to adapt Band Class 17 devices for use on Band Class 12. Carriers in the US are able to – and do – use their monopsony power to dictate functional changes to handset manufacturers. In the US, carriers have long required manufacturers to "lock" a phone to a particular carrier's network.[92] These "locks" take multiple forms, each making it more difficult to adapt a phone for use on a competitors network. First, there is a literal software lock on the handset that only allows the device to activate on one carriers network.[93] Often called a SIM-lock or handset lock, these restrictions limit a user's ability to take a device to another network, even if it was technologically compatible. Companies like AT&T and Verizon also demand that handset manufacturers customize the OS on handsets both to be branded with carrier logos, sounds, and other trademarks, and to only allow the use of features permitted by the carrier.[94] These carrier-dictated restrictions mean that repurposing a handset model for use on another carrier's network requires both hardware and software modifications, further increasing the costs of smaller carriers looking to acquire advanced devices. These restrictions also make it harder for smaller carriers to attract customers away from AT&T or Verizon, as the user will likely require a new device in order to take service from the new carrier.

Beyond the technical issues, difficulties with smaller carrier efforts to negotiate with handset manufacturers are compounded when small regional carriers are forced to specify handset configurations different from those being ordered by the larger carriers, both due to the lack of negotiating power on the part of the smaller carriers coupled with the loss of scale of manufacture when only the smaller quantities required by the regional carriers are involved.

The experience with Sprint's acquisition of Nextel is instructive here. Once the network of choice for business professionals, offering unparalleled push-to-talk features and best-in-class devices, Nextel operated on the iDEN air interface, which differed substantially from the PCS/CDMA interface used by Sprint. When the two companies merged in 2005, Sprint was the number three wireless carrier in the US (by subscribers) and Nextel number five just behind T-Mobile. Following Sprint's difficulties in integrating the two networks, Nextel customers slowly migrated off of the old iDEN network over to Sprint's CDMA network and to other carriers. Sprint still operates the aging iDEN network, but has just announced that it will cease providing

92. See discussion in *CMRS Report*, at para 255.

93. *Id.*

94. Comparing US carrier handset "manuals" with the original device manufacturer's manual for an unrestricted model highlights many of these hampered features.

all iDEN services after June 2013.[95] Notably, Sprint still has some 6.25-million iDEN subscribers, of which 4.28-million are postpaid and 1.96-million are prepaid, and reports that for 2011 the iDEN service platform generated some $3.7-billion in total revenue.[96] One can assume that Sprint's decision to put $3.7-billion in revenue at risk suggests that the small remaining iDEN customer base cannot be supported profitably, that repurposing the ESMR[97] spectrum to some alternate use (e.g., 4G) will produce more revenue than whatever may be lost from the elimination of iDEN or, more likely, some combination of the two.

The FCC reports that as of June 2010, handset manufacturers offered some 152 smartphone models for sale in the US, 150 of which work on either GSM, CDMA or both types of networks, while only *two* smartphone models function on the iDEN network. The available Nextel iDEN handset selection has dwindled to almost nothing, even losing long-time iDEN partner Motorola, *despite the fact that Sprint has remained the number three carrier in the US.* Because the iDEN air interface requires different technical specifications, and the potential order volume is so small, handset manufacturers opt not to make many, or any, iDEN handsets. Small carriers requesting small production runs of Band Class 12 handsets will likely face the same difficulty in obtaining a wide range of the latest and most advanced phones.

Shortages of component parts may make it difficult to produce small production runs of Band Class 12 devices.

Handset manufacturers may also find it difficult or impossible to source parts to manufacture anything but the most popular handsets. For example, the bulk of the components used to manufacture high resolution, touch screen displays have been dedicated to the production of Apple iPhones and iPads, and Samsung handsets, making it very difficult for competing manufacturers to produce devices with advanced displays.[98] Of course, these competitors can research and develop new technologies, but given that current device cycles range from 6 months to one year, any delay in sourcing parts means that a competitor is essentially sitting on the sidelines for one or more production cycles. If major popular device releases are incompatible with the networks of smaller carriers, it may actually be impossible for manufacturers to obtain the necessary parts to produce compatible handsets at any price.

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95. "Sprint to cease service on its iDEN network as early as June 30, 2013; Company continues to facilitate migration of iDEN customers to Sprint Direct Connect Service," Sprint Press Release, May 29, 2012, available at http://newsroom.sprint.com/article_display.cfm?article_id=2296 (Accessed May 30, 2012).

96. Sprint Nextel Corp., 2011 10-K Annual Report Filed with the US Securities and Exchange Commission on February 27, 2012, at 34.

97. *Enhanced Specialized Mobile Radio ("ESMR")* spectrum in the 800 MHz band.

98. See, e.g., "Can Apple corner the display market?" http://tech.fortune.cnn.com/2011/02/01/can-apple-corner-the-display-market/ (accessed May 23, 2012)

VI. Interoperability levels the playing field

Telecommunications is a *network-based* industry. Network-based industries exhibit unique economic properties – *network effects* – that influence both the demand for and the supply of its services.[99] With respect to *demand*, the economic value of a network to its users – which directly influences how much users are prepared to pay for its services – increases exponentially with the number of points served. As shown in the diagrams in Figure 2, the number of potential point-to-point connections that can be created on a network increases exponentially with the number of individual "nodes" on the network. For example, only one possible point-to-point connection can be created on a network serving only two nodes (A-B). A network with three nodes can support three different point-to-point connections (A-B, A-C and B-C); a network with four nodes can support six different point-to-point connections (A-B, A-C, A-D, B-C, B-D and C-D), and so on. This relationship between the potential number of point-to-point connections (C) and the number of locations served by the network (n) can be stated as:

$$C = n(n-1) / 2$$

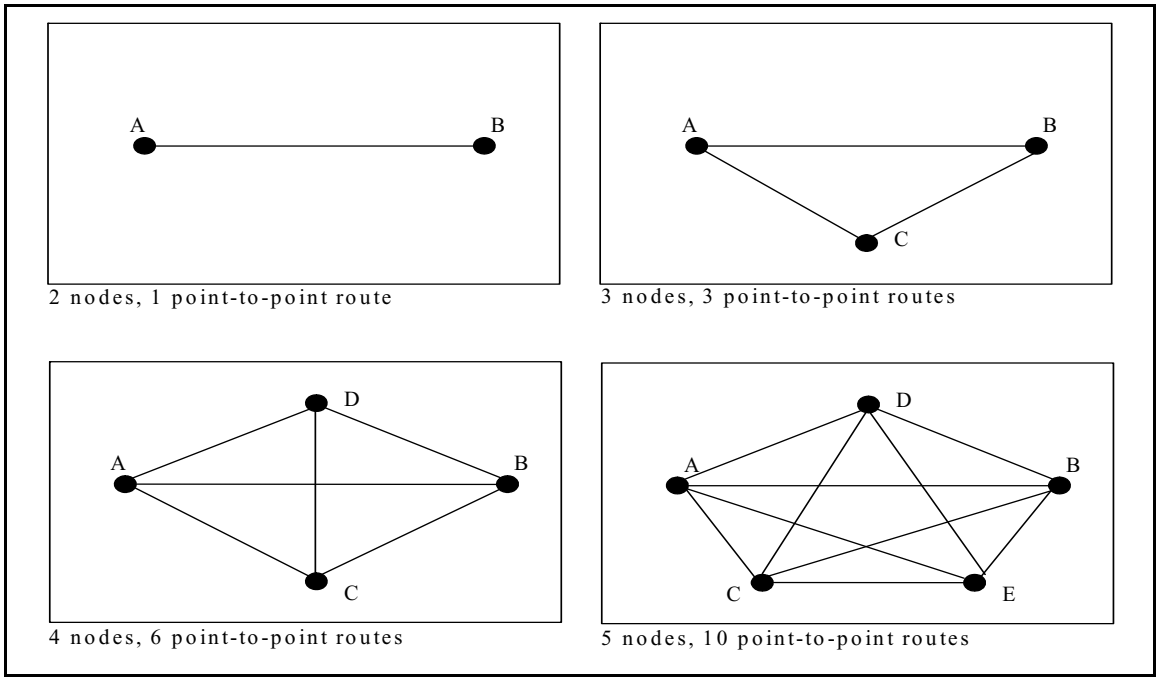

Figure 2. The number of potential point-to-point connections that can be created on a network increases exponentially with the number of individual "nodes" on the network.

99. Michael I. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. Econ. Persp., Spring 1994, at 93, 96; see also, Nicholas Economides, *Public Policy in Network Industries*, NYU Law & Econ. Res. Paper No. 06-49, at 4 (Sept. 2006), available at http://ssrn.com/abstract=936469.

Table 4 below demonstrates this relationship between the number of points served and the number of possible two-point connections for hypothetical networks of various sizes. A more valuable network – one that reaches more locations – has exponentially greater revenue opportunities and can attract more customers and command higher unit prices than a small network with limited connectivity.

Table 4

Network Externalities Grow Exponentially as the Number of On-Net Nodes Increases

Number of On-net buildings (n)	Possible Point-to-Point Connections ($n(n–1)/2$
2	1
3	2
4	6
5	10
10	45
100	4,950
1,000	499,500
10,000	49,995,000

This competitive disadvantage inherent in relatively small networks can, however, be entirely overcome if the small network is able to access and incorporate components of the larger network, in effect offering its customers the same connectivity and extensiveness as that being offered by its much larger rival. Thus, all else equal, when a competing carrier is able to augment its own facilities with additional facilities owned by a larger rival, the value of its own facilities is increased because it is able to offer its customers greater connectivity *at each of its owned service points*. By increasing the value of – and hence the revenue potentially available at – each owned service point, the business case for deployment of owned facilities is improved, stimulating greater facilities investment on the part of the smaller network. Put differently, a small carrier's economic ability to invest in its own infrastructure will be significantly enhanced if it – or its customers – are able to economically gain access to the larger network than if such access is denied or priced at an uneconomic level. The small carrier will invest more capital and serve more locations with access to the larger network than in its absence. Indeed, if access to the larger network is denied, the economic value of the smaller competitor's owned facilities

may well decrease to the point where it is no longer viable and would be forced out of the market altogether.[100]

For *mobile* telecommunications services, network effects arise not just from the aggregate number of members with whom connectivity may be established, but also from the number of physical locations at which a customer may gain access to the mobile service. *Roaming* enables customers of one network to access and seamlessly utilize the services of other networks. Without roaming, a small, geographically limited network would be unable to compete with larger, more geographically extensive networks with respect to the *coverage area* – the territory from which the wireless service could be utilized. Stated more generally, the revenues available from any given customer are influenced by the specific demand offered by that customer together with the aggregate connectivity that the carrier is able to offer to that customer. These are generally referred to as "demand-side network effects." Not all network-based industries exhibit demand-side effects. For example, in the case of water, natural gas, and electric power distribution networks, the customer's sole concern is with *delivery* rather than with *connectivity*. In the case of telecom, connectivity to the rest of its network (and, for that matter, to the rest of the world) is the key driver of value, without which the physical telecom access link at each individual location would be essentially worthless. Importantly, though, even where demand-side effects are minimal or non-existent, the presence of "supply-side network effects" – economies of scale and scope – are present in most, or even all, network industries, creating efficiencies that confer significant cost advantages to larger, more extensive networks.

Factors affecting costs

Construction of network infrastructure involves extremely high fixed costs and minimal volume- or usage-sensitive costs. Supply- or cost-related network effects arise due to the extensive economies of scale and scope extant in the construction and operation of telecommunications networks.

- *Economies of scale* arise due to the combined effects of high fixed costs and low volume-sensitive costs. The average cost per unit of traffic – i.e., the total cost of a facility (fixed plus variable) spread over the traffic carried thereon – decreases as the total volume of traffic increases. All else equal, the cost per unit of traffic on a network that carries large volumes

100. The physical presence of a competing carrier in a given building presents a competitive challenge to the incumbent only to the extent that the entrant is able to provide customers in that building with the connectivity they require between that building and other sites. Incumbent carriers with ubiquitous networks can almost always provide the required connectivity precisely because they serve virtually every building within their overall footprint. Where a carrier owns facilities to only a small fraction of the potential locations at which such connectivity might be required, it can compete with the ubiquitous incumbent only to the extent that it can obtain access to those locations where it does not have its own facilities deployed.

of traffic will be less than the cost per unit of traffic on a network that supports a more limited volume of traffic.

- *Economies of scope* arise because a more extensive network (in terms of the total number of points served) will typically carry more traffic across each link in its network than one with fewer points served. This network effect can be seen in the following diagram (Figure 3). In the case of the two-point network that connects points T and U, the only traffic that can be carried across the T-U link is traffic that originates at one of these points (T or U) and terminates at the other. In the larger network, the same T-U link can carry, in addition to the T-U traffic, traffic between V and U, between W and U, between X and U, between T and Y, between T and Z, between V and Y, and between V and Z. In fact, each individual link on this network is capable of carrying traffic between multiple pairs of points.

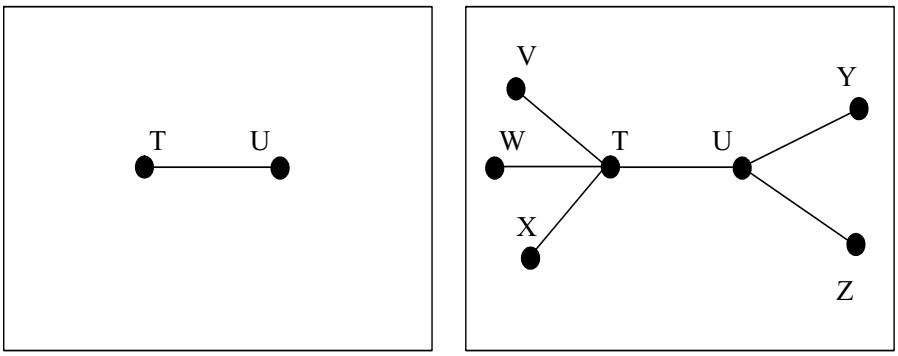

Figure 3. A more extensive network (in terms of the total number of points served) will typically carry more traffic across each link in its network than one with fewer points.

The business case applicable to any individual network link is thus critically dependent upon the overall connectivity of the complete network. The business case for construction of the link between T and U is far more difficult to make in the 2-point network than in the 7-point network.[101]

101. Airline "hubs" are a manifestation of this network effect. Without the connectivity available at an airline hub, individual flights will generally carry only traffic that originates and terminates at the two endpoints. By introducing the ability to change planes at the hub, each flight segment will carry *both* the end-to-end demand on that segment, as well as the demand between the non-hub end of the segment to all other endpoints served out of the hub, thus significantly increasing the traffic load on each flight segment. See, Lee L. Selwyn, "Assessing Market Power and Competition in the Telecommunications Industry: Toward an Empirical Foundation for Regulatory Reform," *Federal Communications Law Journal*, v. 40, no. 2, April 1988, at 202-206.

All else equal, a given block of spectrum is more valuable to a large carrier which, at auction, has both the financial resources and business case to outbid smaller rivals.

The two largest US wireless carriers – AT&T and Verizon – possess networks with near-ubiquitous coverage and an established customer base of a size sufficient to enable them to achieve maximum scale and scope economies. Smaller carriers possess none of these advantages. This same type of disparity has long been recognized in the case of *wireline* services. In its process of implementing the federal *Telecommunications Act of 1996* to facilitate market entry by competitive wireline carriers, the FCC observed that:

> Congress addressed these problems in the 1996 Act by mandating that the most significant economic impediments to efficient entry into the monopolized local market must be removed. The incumbent LECs have economies of density, connectivity, and scale; traditionally, these have been viewed as creating a natural monopoly. As we pointed out in the NPRM, *the local competition provisions of the Act require that these economies be shared with entrants*. We believe they should be shared in a way that permits the incumbent LECs to maintain operating efficiency to further fair competition, and to enable the entrants to share the economic benefits of that efficiency in the form of cost-based prices.[102]

The *1996 Act* nominally eliminated all legal and many economic barriers to competitive entry by wireline carriers, and sought to facilitate such entry by affording entrants the opportunity and ability to utilize the preexisting incumbent carrier infrastructure to supplement and augment their own facilities deployment. In the case of *wireless* service providers, one formidable legal barrier to entry remains fully entrenched – access to spectrum.

Unlike wireline entrants, wireless entrants are required to purchase – either from the government or in an aftermarket transaction with another service provider – spectrum licenses covering a defined geographic area as well as defined frequency band within that geographic area. Entry into the wireless service market is constrained by the legal requirement that the entrant obtain a license for use of specified electromagnetic spectrum within a specified geographic area. Spectrum is the *real estate* of virtually all wireless enterprises, from two-way common carrier services through radio and television broadcasting. Allocation of spectrum is – and has pretty much always been – a government function. Initially awarded through processes that generally involved no or negligible charge to the recipients, Congress in 1993 authorized the FCC to license CMRS spectrum via auction,[103] whereby blocks of spectrum are "sold" by the government to the highest bidder, albeit subject to varying conditions and constraints on the purchaser and on the bidding process itself. Since the first spectrum auction took place in 1994,

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102. *In the Matter of Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, *First Report and Order*, 11 FCC Rcd 15499, 15508 (1996). Emphasis supplied.

103. *Omnibus Budget Reconciliation Act of 1993*, Title VI.

CMRS providers have paid more than $70-billion to the government for spectrum.[104] And, while theoretically open to any who wish to participate, experience has demonstrated that spectrum auctions have contributed to greater, not less, concentration in the US wireless market *precisely because the largest carriers are able to pay the most for the spectrum that becomes available.* It should have come as no surprise that, of the 14.8 billion MHz-POPs of licensed spectrum that were sold in Auction 73, the largest 700 MHz auction (and excluding the unpaired D Block), AT&T had purchased 2.1-billion MHz-POPs, representing some 14% of the total being auctioned, and Verizon had purchased 8.5-billion MHz-POPs, roughly 57% of the total. Taken together, AT&T and Verizon accounted for 81% – i.e., for more than four-fifths – of the 700 MHZ spectrum being auctioned.[105]

In a competitive spectrum auction, economic theory teaches that the price that is ultimately paid by the successful bidder will be equal to the opportunity cost of spectrum, which is its value *in its best alternative use*. Spectrum will be valued by each potential purchaser based upon that purchaser's assessment of the stream of profit that can be derived from its use. A competitive auction process should, in theory, sort out this "best alternative use," since the potential purchaser who ascribes the highest value to it should be willing to bid higher than any other participant. All else equal, if firm A anticipates realizing more revenue and/or sustaining lower cost from a given block of spectrum than firm B, firm A will place a greater value on the block of spectrum and, in an auction, will outbid firm B. All else equal, the two largest incumbents will each anticipate more revenues, lower costs, and higher profit from a given block of spectrum than will any smaller wireless carrier. In an auction that is open to all carriers – large and small – and that places no limits on the aggregate amount of spectrum that will be available to any one carrier – AT&T and Verizon will thus be able to buy all or most of what is being offered and, in so doing, will succeed in limiting the ability to smaller and regional carriers to compete.

A major portion of a wireless carrier's costs are fixed and sunk and, on a per-unit basis, large carriers necessarily confront lower costs than small and regional providers. Even if, once built, all carriers confront comparable network costs, those already offering service in a geographic market will have already incurred these costs while would-be entrants will be confronting them *for the first time*. The large incumbent carriers that, prior to an auction, already have a presence in a given geographic market, already control in-place extensive network infrastructures, sales, marketing, support and back-office capabilities, and established customer bases. For an entrant not presently active in a given geographic market, network investments will need to be made, sales, marketing, support and back-office capabilities will need to be acquired. As such, the

104. FCC Auction Results, available at http://wireless.fcc.gov/auctions/default.htm?job=auctions_all (accessed June 29, 2012).

105. Coleman Bazelon, "Too many goals: Problems with the 700 MHz auction," *Information Economics and Policy* 21 (2009) 115, at fn. 2.

incremental profit available to an incumbent will invariably be far greater, all else equal, than the total profit available to an entrant as a result of their respective exploitation of a given quantity of spectrum bandwidth. In an auction where entrants are forced to bid against incumbents, if the incumbent wants the contested spectrum, the entrant will always be out-bid and its attempt at entry will be blocked.

The recent remark by AT&T CEO Randall Stephenson that "[t]he more competitors you have, the less efficient the allocation of spectrum will be" is consistent with this market reality – but eliminating competition as AT&T suggests is by no means the only way to capture those spectrum efficiencies that are available to the largest carriers. Despite its superficial appeal, the idea of encouraging increased market concentration and consolidation is directly at odds with long-standing US telecommunications policy, ignores key market dynamics, and is far more likely to yield a highly inefficient – and costly – outcome for US consumers, the US wireless industry and the US economy as a whole.

- It considers only limited *static efficiencies* available to the largest carriers through more intense use of their existing network and organizational infrastructure while ignoring the *dynamic efficiencies* stimulated by the increased competition that would result through entry and expansion of additional service providers.

- It incorrectly ascribes "value" to spectrum based upon the largest carriers' static efficiencies (higher short-term revenues, lower short-term costs) when in reality a substantial portion of AT&T's and Verizon's profits arise not from their inherent efficiency, but rather through exploitation of their substantial market power.

- It fails to recognize that a large carrier facing limited competition in a given geographic market may ascribe substantial value to purchasing spectrum simply to *block entry* by one or more rival carriers *even if it has no immediate need or use for the additional spectrum itself*.

Any one – or all – of these conditions will provide incumbents with both the incentive and the financial ability to out-bid virtually any entrant in any auction that fails to account for these market dynamics. Such an auction will not, however, assure the "best alternative use" for the spectrum. In fact, it is far more likely to have precisely the opposite effect.

The economic theory at play here is decidedly more complex than the trivial "highest bid assures the best alternative use" notion. The award of spectrum (by whatever process) to a CMRS provider consists of two separate and distinct elements:

(1) The right to provide wireless service over the specific frequency range within the specified geographic footprint; and

(2) the assurance of absolute protection from further competitive entry strictly enforced by the police power of the federal government.

Accordingly, the economic value of any particular block of spectrum – upon which potential bidders in an auction will base their financial offers – arises from two principal sources:

(1) The stream of earnings that are available from services that may be provided utilizing the acquired spectrum when priced at competitive market levels; and

(2) The additional supracompetitive profits that may be realized as a result of the protection from additional competitive entry that the government provides to the purchasers of spectrum by virtue of the government's absolute control of the resource.

The finite supply of spectrum creates an insurmountable barrier to entry and expansion and, absent regulatory intervention, permits the largest spectrum holders to extract economic rents for its use.

In his seminal work on barriers to entry,[106] Joe Bain (1956) notes that

> ... the advantages of established sellers in an industry over potential entrant sellers, these advantages being reflected in the extent to which established sellers can persistently raise prices above a competitive level without attracting new firms to enter the market.[107]

Once the spectrum auction (or other spectrum allocation process) has been completed and the spectrum rights have been assigned, further entry is effectively precluded and, while spectrum licenses may be transferred in after-market transactions, such transfers do not alter or increase the aggregate *supply* of spectrum capacity available to carriers in the market. Thus, in acquiring spectrum either through a government auction or through a subsequent after-market transaction, what the established service provider receives for the price paid consists of both the means to generate a stream of earnings through the provision and sale of wireless services *and* the absolute protection provided by the government against additional entry, thus assuring the continuation of the incumbents' ability to "persistently raise prices above a competitive level without attracting new firms to enter the market."

While the relative importance of each of these two separate sources of value cannot be readily quantified, economic theory would hold that most, if not all, of such value arises not from the services that may be offered through the use of the spectrum, but rather from the government's commitment to protect the purchaser from further entry. Supply constraints, even

106. Joe Bain, *Barriers to New Competition*, Harvard University Press, 1956.

107. *Id*. at 3.

in what might otherwise be perfectly competitive markets, create the potential for the incumbents to indefinitely maintain prices and profits at supracompetitive levels. This seemingly paradoxical outcome in markets even with large numbers of firms no one of which possesses market power was first explained some two hundred years ago by British economist David Ricardo, who posited that the source of persistent supracompetitive prices and profits in a market with many incumbents was the existence of one or more inputs in limited supply.

Ricardo applied this theory primarily to land, but it is generally applicable to any input whose supply is fixed or otherwise heavily constrained, such as spectrum. Economic theory holds that in a perfectly competitive market – i.e., a market with many firms all producing the same homogeneous product and no one of which has market power, with ease of entry and exit and perfect information – prices will be bid down to cost and economic profit will be zero. However, even in such markets, where the supply of an essential input is limited or constrained, non-zero economic profit could result. Suppose that there are exactly 1,000 acres of land capable of producing a particularly desirable wine grape, and that the ownership of this land is divided up among 1,000 one-acre vineyards. Although no single producer would be capable of unilaterally raising its price above the market level, if the total demand for the grapes (and/or for the wine that they produce) exceeds the productive capacity of the 1,000 acres, the market price of the grapes will be bid up (due to its limited supply) resulting in economic profit to the producers. Ricardo attributed this result not to the production of the grapes (which remain subject to perfect competition), but to the fact that the limited supply of land conferred economic value to the *land* itself, and the economic profit inuring to the producers of the grape represented the *economic rent* on their land rather than on the produce derived therefrom. The land's value would be the present value of the stream of rents that will be generated by the sale of the grapes. If the ownership of the land were separated from the operation of the vineyards, the entirety of the economic rent would flow to the landowners, not to the grape growers.

Government franchises, whether exclusive or simply limited as to their supply, often take on values well in excess of zero and, if permitted to be traded in arm's length transactions, will command prices that reflect the present value of the economic rents that they are capable of producing. Where the number of firms is large such that no single firm has market power, the entirety of the economic rent can be attributed to the excess of market demand (for grapes) over the available supply (of land). The notion that the price that is ultimately paid by the successful bidder will be equal to its value in its best alternative use *would be true only if none of the potential users of such spectrum possess market power*. When the number of firms is small and individual firms have market power, the principal element of the "value of spectrum" to each of the incumbent firms is the *protection from further entry* that the government commits to enforce.

In the classic Ricardian model, the input (land in his case) is limited in quantity, but its ownership is highly dispersed among numerous producers no one of which possesses market power *vis-à-vis* the market as a whole. The situation becomes considerably more complex when the number of producers (owners of the supply-limited input) is small. In this case, each of the

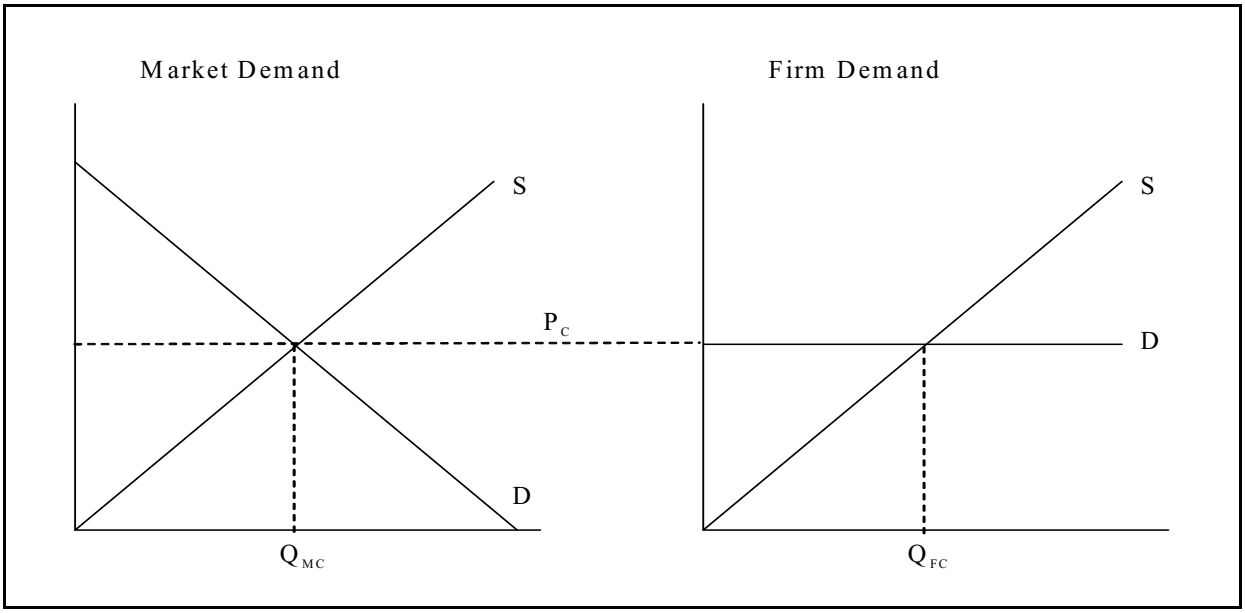

Figure 4. At price P_C, market output of Q_{MC} will be produced. Each firm will produce Q_{FC} units at the market price P_C.

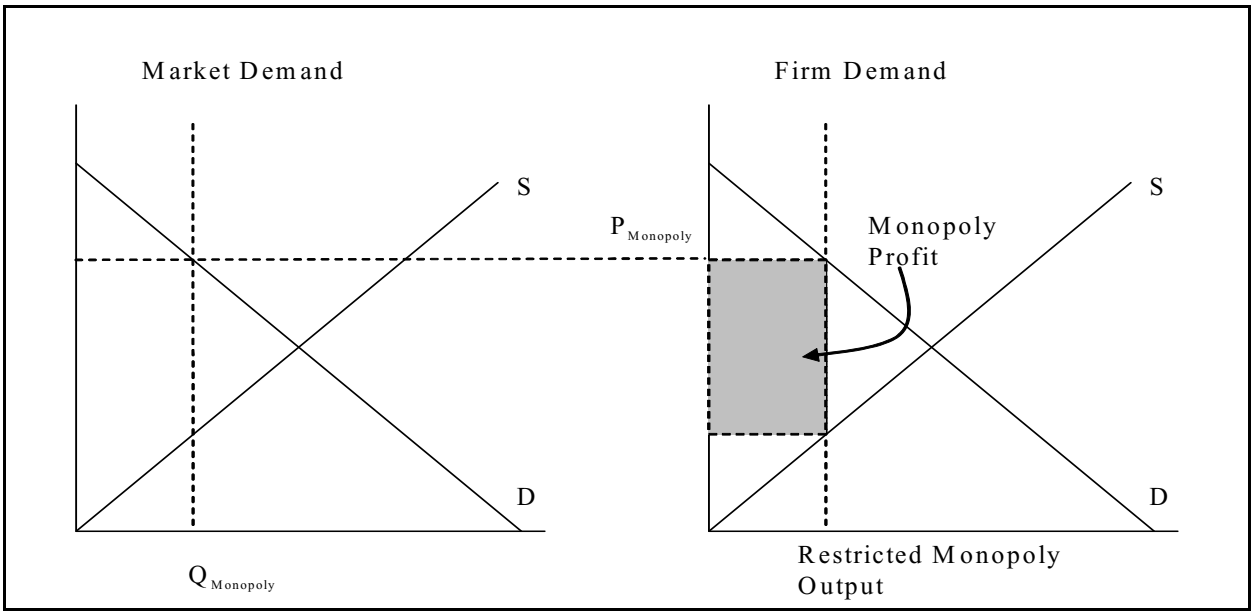

Figure 5. In the case of a monopoly, the market and firm demand are the same, and the profit-maximizing monopoly will set price above average cost and produce a smaller quantity than under competitive conditions, while earning supracompetitive profit on the sales it makes.

smaller number of) individual firms has market power and is able to restrict supply and set and maintain price above the "competitive level." Expressed in technical terms, in a perfectly

competitive market with large numbers of firms (including the Ricardian market with 1,000 firms as discussed above), each firm is able to sell all of its output at the market price and none at all at any price above the market price. Each firm thus confronts a perfectly elastic (i.e., horizontal) firm demand curve, even if (as is necessarily the case) the market demand has finite price-elasticity and is downward-sloping (see Figure 4). In such markets, the aggregate market quantity occurs at the point where price equals marginal cost – a condition of maximum efficiency for the economy as a whole. In markets with a small number of firms, the firm demand confronting an individual producer is downward sloping and the gap between firm demand and market demand becomes narrower as the number of firms decreases, ultimately converging where the number of firms is equal to one (i.e., a monopoly). All else equal, the smaller the number of firms in a market, the greater the difference between price (average revenue) and average cost, and hence the greater the level of supracompetitive profit that the incumbents will be able to sustain (see Figure 5).

Return, for a moment, to the 1,000 acre vineyard situation. In the Ricardo model, aggregate demand for grapes exceeds the aggregate quantity of grapes that can be supplied from the limited amount of land, pushing up the market price and producing economic rent for the land owners (Figure 6). Suppose that it was discovered that another 1,000 acres of adjacent land could also produce the same grapes of the same quality, and each of the 1,000 owners was afforded the opportunity to purchase one additional acre from the new supply. However, if the expanded quantity of grapes that could now be supplied from the 2,000 acres exceeds demand, all 2,000 acres would no longer command any economic rent, and the price of the grapes would decrease accordingly (essentially the situation portrayed in Figure 4). But what if the original 1,000 acres

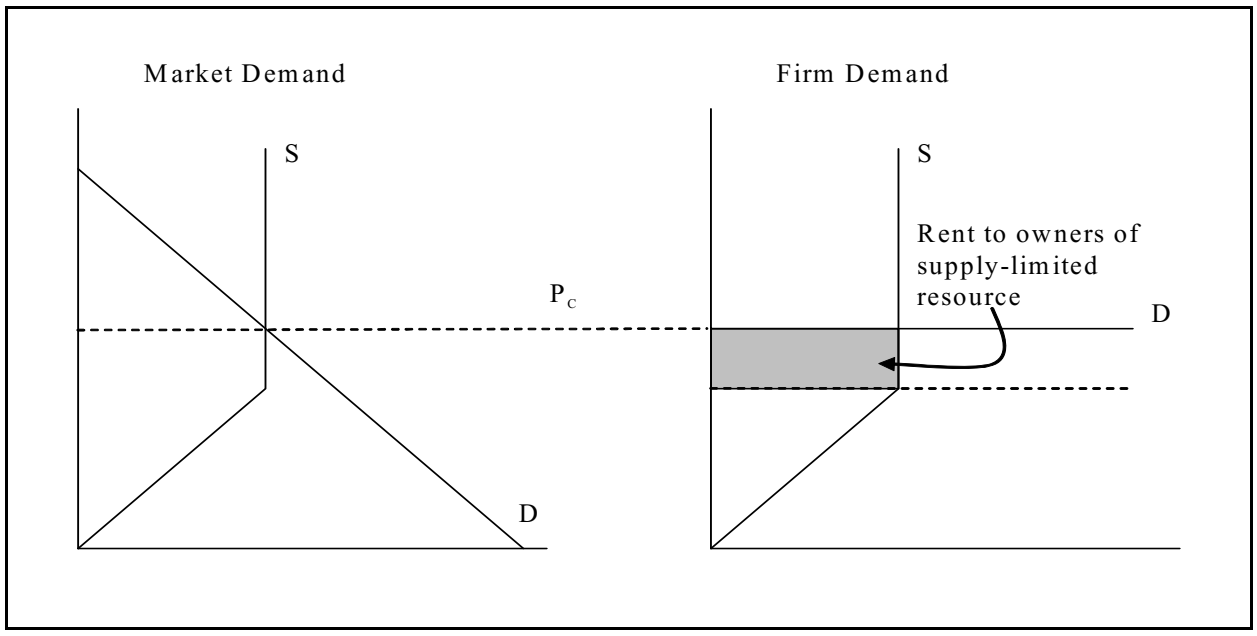

Figure 6. Fully competitive market with fixed supply of one key input results in economic rent to the owners of that fixed input.

as well as the additional 1,000 acres were owned by one or by a handful of large firms, rather than by 1,000 small producers? Could the supracompetitive price be maintained even if the total amount of land is more than sufficient to satisfy the market demand for grapes? The answer is yes, because the one or few owners could themselves create scarcity of supply by limiting their output of grapes and, indeed, would find it in their interest to do so as a means of maximizing their profits (see Figure 7.)

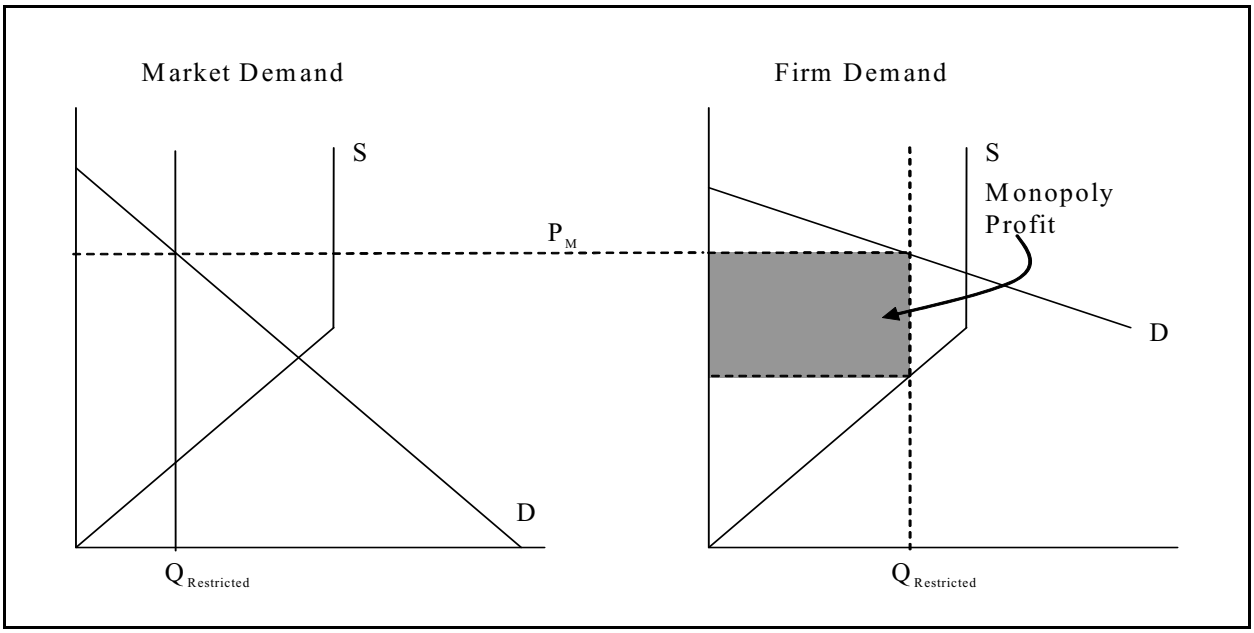

Figure 7. Oligopolistic market with a fixed supply of one key input, where the profit-maximizing output level is not being constrained by that input, but falls below the competitive level due to the oligopolistic firms' exercise of market power.

Turning now to spectrum, AT&T's suggestion that "[t]he more competitors you have, the less efficient the allocation of spectrum will be" relies primarily upon the presence of order significant economies of scale in the production of wireless services and the notion of "Minimum Efficient Scale" ("MES") – the minimum share of the total market that a firm would need in to operate at a level of maximum efficiency.[108] The ability of the few large firms, in the future being envisioned by AT&T, to operate at the minimum cost of production – i.e., to achieve maximum *allocative efficiency* – will be beneficial to the overall economy only to the extent that the resulting *productive efficiency* is actually flowed through to the rest of the economy. But that won't happen because the smaller, less efficient firms will be incapable of achieving a cost level comparable to that being achieved by the largest firms and will thus be unable to constrain the market leaders' exercise of market power.

108. Case, Fair and Oster, *Principles of Microeconomics, 9th Edition*, Prentice Hall 2009, at 186-187.

If the total demand for wireless service can be satisfied by the available spectrum, then the persistence of an above-zero market value for spectrum implies that the (small number of) incumbent firms are relying upon the government-guaranteed *protection from entry* as the means for sustaining supracompetitive prices. Hence, the factor controlling the value of the spectrum is *not* its inherent ability to produce and to generate revenue from wireless services, but rather arises from the government-provided protection from entry. Absent the threat of entry and any regulatory constraints on the prices that may be charged for the wireless service, the relatively small number of owners will be able to dictate prices and control output so as to maintain those prices above the competitive level.

Recall, however, that the *firm demand* and *market demand* diverge as the number of firms increases (Figure 8), ultimately reaching the theoretical perfectly competitive result as the limit. As such, the ability of the small number of firms to restrict output and set price in excess of the competitive level is diminished as the number of firms increases. By increasing the number of firms that are capable of competing at a national level, allocative efficiency will be increased by limiting the ability of the (then increased number of) providers to set prices in excess of cost.

Contrary to the notion being advanced by AT&T, competition and spectrum efficiency can coexist *if carriers with spectrum are required to make their spectrum and the efficiencies inuring to them from their large scale of operations available to rival CMRS providers, large and small alike, and to customers of those rival carriers*. Mandatory interoperability for all wireless devices across all compatible networks will go a long way toward realizing that outcome.

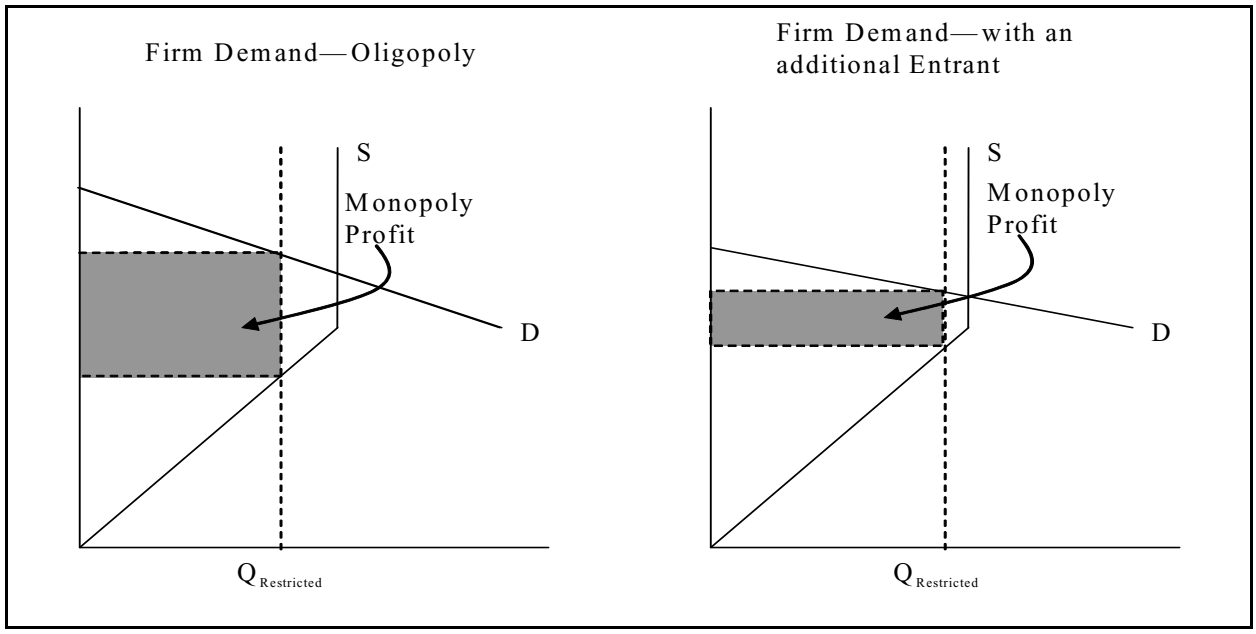

Figure 8. As additional firms enter the market, the *firm demand* becomes more price-elastic, reducing the extent to which the profit-maximizing price is set in excess of the competitive level and reducing the amount of monopoly profit to each firm.

Market forces cannot be relied upon to achieve handset interoperability.

In the NPRM, the Commission asks for comment as to the ability of the marketplace to achieve full handset interoperability in the absence of regulatory prescription or mandate – what the Commission refers to as an "industry solution:"

> We think that an industry solution to the question of interoperability in the Lower 700 MHz band would be preferable because such a solution allows the market greater flexibility in responding to evolving consumer needs and dynamic and fast-paced technological developments. At the same time, we recognize that if the industry fails to move timely toward interoperability once interference concerns are adequately addressed (by regulatory action or otherwise), additional regulatory steps might be appropriate to further the public interest. The Commission staff will remain vigilant in monitoring the state of interoperability in the Lower 700 MHz band to ensure that the industry is making sufficient progress. ... In the event that such steps are warranted, we seek comment on whether it would be necessary to mandate interoperability in the Lower 700 MHz band or whether there are other, flexible regulatory measures that we should consider.[109]

Reliance upon marketplace forces or an "industry solution" to the question of handset interoperability in the Lower 700 MHz band would be seriously misplaced. Indeed, the large carriers derive little or no benefit from affording their customers the ability to utilize the customers' wireless devices on rival networks, or from facilitating the ability of customers of those rival carriers to access and utilize the large carriers' networks. Because AT&T and Verizon own geographically extensive facilities-based networks, the potential incremental coverage available to them (and to their customers) via roaming is small. This can readily be seen by examining the on-net 4G coverage being offered by AT&T and Verizon, as shown in Figure 9 below.[110]

AT&T offers 4G LTE service in a number of markets and is aggressively expanding its existing 4G LTE coverage. According to a March 12, 2012 press release, AT&T is currently serving 28 markets with network infrastructure and mobile devices deployed on Lower 700 MHz B and C Block frequencies.[111] AT&T is also in the process of expanding its 4G LTE service to 12 new markets in the wake of its new Band Class 17 4G iPad launch. US Cellular is the only other provider currently offering 4G LTE service in the Lower 700 MHz band. There are many gaps in AT&T's 4G coverage that could, in principle, be filled by other providers offering 4G LTE service, *provided that AT&T afforded its customers the ability to roam on other networks*. In most cases, where AT&T cannot offer 4G service, it can typically serve its customers by

109. *NPRM*, at para. 49, citations omitted.

110. http://www.phonearena.com/news/Verizon-AT-T-4G-LTE-coverage-maps-truth-comes-in-comparison_id28208.

111. http://www.prnewswire.com/news-releases/att-4g-lte-coming-soon-to-cleveland-142280625.html.

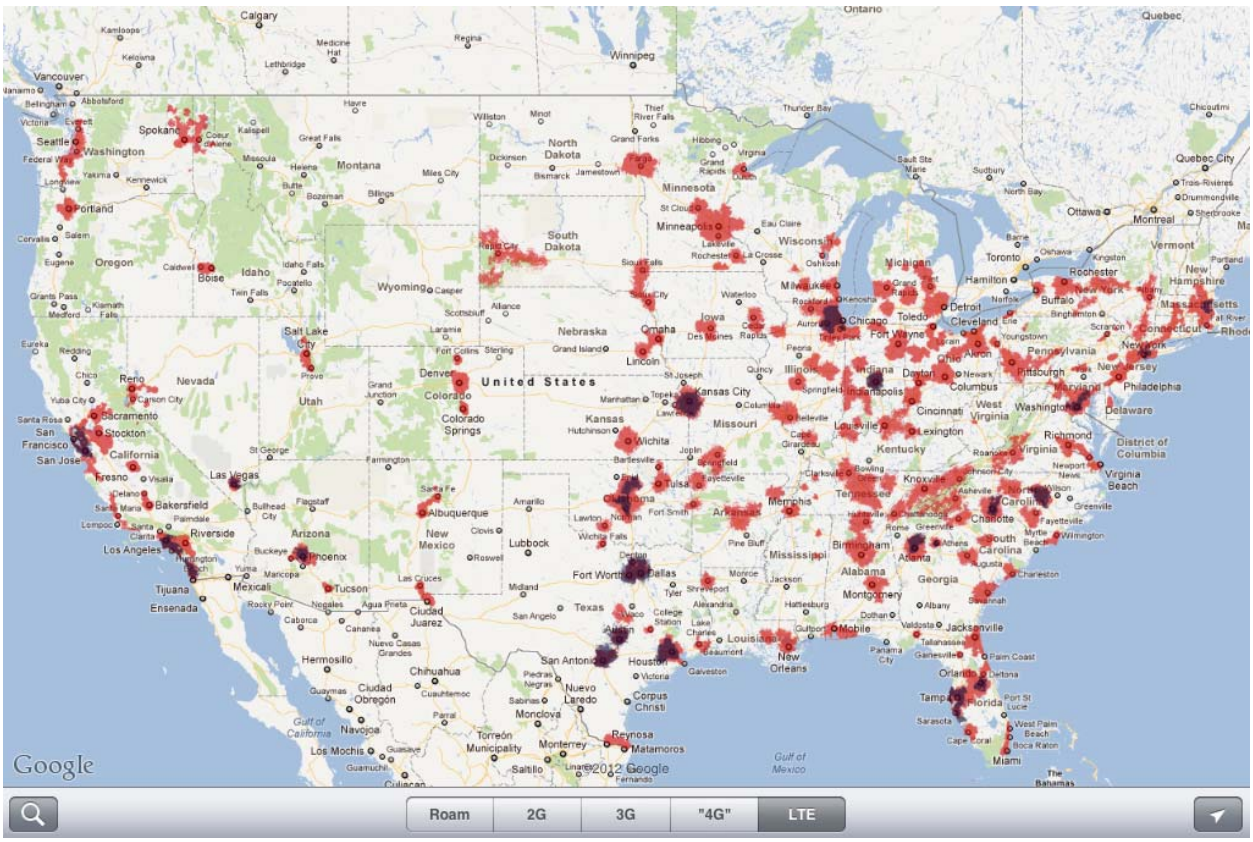

Figure 9. AT&T and Verizon 4G coverage in the 700 MHZ band (AT&T shown in blue, Verizon in red).

simply having them default to AT&T 3G service rather than permit the customer to roam onto a competing (4G-capable) network. AT&T is only capable of providing such duplicative coverage precisely because of its broad national 3G footprint, a condition that is not shared by its smaller, more regionally-oriented rivals, who are unable to offer comparably broad geographic coverage to their customers without the ability to roam on other networks.

From the perspective of the two largest carriers, handset interoperability, with or without mandatory data roaming, would enhance the competitiveness of rival (smaller) carriers by affording them the ability to offer their customers geographic coverage comparable to that offered by AT&T and Verizon. And to the extent that customers of AT&T and Verizon possess 700 MHz devices that are compatible with rival carrier networks offering (from the customer's perspective) fully comparable geographic coverage, interoperability would reduce customer switching costs and thus enhance the potential for increased churn by making it easier for customers to migrate to rival providers.

Conversely, the lack of handset interoperability that would allow customers of smaller carriers to roam on the AT&T and/or Verizon networks permits the large nationwide service

Figure 10. US Cellular 4G LTE Coverage.

providers to differentiate their service in terms of coverage from that of smaller carriers having far less extensive facilities-based networks, and in so doing make their services far more attractive – and far more valuable – than anything that small and regional carriers would be able to offer. Thus, the large carriers gain little, and could potentially lose much, by voluntarily agreeing to full interoperability in the 700 MHz band. As such, there is little to compel the market to voluntarily arrive at an "industry solution" that would result in full handset interoperability in the Lower 700 MHz band.

VII. The 1993 recision of the universal compatibility requirement was made for the purpose of spurring innovation, not to create competitive advantage for dominant carriers

As the second decade of commercial cellular services began, the industry initiated the transition from the analog AMPS architecture to one in which the voice signals were transmitted in digital format. The FCC had adopted – and had mandated – full adherence by all CMRS providers to the AMPS protocol. But several alternate digital transmission paradigms were being developed, and rather than dictate the adoption of any one of them in the absence of any actual market experience, the Commission concluded – correctly as it turned out – that marketplace experience would do a better job of sorting out the competing digital technologies. Additionally, by not locking in any one format from among those that existed in 1993, the FCC saw this *laissez-faire* approach as stimulating innovation, development and investment in new wireless technologies going forward.

> We recognize that detailed technical standards for the provision of PCS could provide certain benefits. In the Notice, for example, *we stated that roaming and interoperability are two important features of PCS* and that such features could be fostered through adoption of technical standards. Many commenting parties agree with this observation and have suggested that a universal personal telephone number and the ability to make and receive calls from virtually any location are key concepts. These parties also have suggested that technical standards for PCS should be developed. At the same time, most parties recognize *that PCS is at a nascent stage in its development and that imposition of a rigid technical framework at this time may stifle the introduction of important new technology*. We agree, and find that the flexible approach toward PCS standards that we are adopting is the most appropriate approach.[112]

This departure from the Commission's preexisting interoperability/compatibility policy was thus predicated upon these two key determinations: (1) that PCS is at a nascent stage in its development, and (2) that imposition of a rigid technical framework at this time may stifle the introduction of important new technology. Importantly, the Commission did not subordinate the importance it had long ascribed to interoperability across multiple carrier networks; rather, it determined that its adoption of PCS license areas that were considerably larger than the individual MSAs/RSAs it had adopted for AMPS would still assure broad geographic coverage and nationwide roaming:

> We further believe that our decision to provide for at least some large regional PCS licensing and to permit aggregation of PCS service areas and licenses will foster the technical capability for wide area roaming and interoperability. As noted above, we

112. *In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314; RM-7140, RM-7175, RM-7618, FCC 93-451, 8 FCC Rcd 7700; 1993 FCC LEXIS 6517; 73 Rad. Reg. 2d (P & F) 1477 (1993), at para. 137, emphasis supplied.

> recognize that several industry technical and standards groups are addressing matters relating to technical standards for PCS both domestically and internationally. We continue to encourage the efforts of these groups *and urge them to consider ways of ensuring that PCS users, service providers, and equipment manufacturers can incorporate roaming, interoperability and other important features in the most efficient and least costly manner*. While we do not believe it necessary to prescribe standards *at this time*, we will closely monitor the efforts of industry standards-setting bodies *to ensure that consumers and all PCS providers benefit from interoperability and seamless roaming capabilities of PCS systems*.[113]

This "flexible approach" that the FCC had adopted, when read in the context of the other objectives stated in these paragraphs ("ensuring that PCS users, service providers, and equipment manufacturers can incorporate roaming, interoperability and other important features in the most efficient and least costly manner") would not support interoperability limitations of the type arising from AT&T's adoption of Band Class 17 handset specifications. Allowing the concurrent use of mutually incompatible technical standards was clearly done for the purpose of spurring innovation and competition across alternative digital platforms (i.e., CDMA, TDMA, iDen, GSM, etc.) and to promote the introduction of new standards in the future. It was not done for the purpose of permitting carriers to limit competitor and customer access to networks that were otherwise compatible. The overarching goal of "ensur[ing] that consumers and all PCS providers benefit from interoperability and seamless roaming capabilities of PCS systems" was never compromised nor subordinated, and remains to this day a key element of FCC wireless telecommunications policy.

Even so, today's PCS market is no longer "at a nascent stage in its development." FCC estimates put the number of "wireless connections" in the US at 290.7-million as of the end of 2009.[114] Moreover, the market has sorted out some of the initially competing standards – TDMA is long gone, and iDEN is close behind. On the wireless data side, the FCC estimates that as of the end of 2009 there were some 115.7-million mobile wireless devices capable of sending or receiving data at speeds above 200 kbps[115] and about 55.8-million subscribers with data plans for full Internet access.[116] The two principal digital voice platforms – CDMA and GSM – are supported by Verizon and AT&T, respectively, the two largest CMRS carriers. Although there are competiting 3G data standards, LTE has become the uniform standard for 4G data services. All of the major wireless carriers have built, or have announced intentions to build 4G LTE networks (including Sprint, which formerly championed the alternate WiMAX standard). The "competition" at this point – to whatever extent it exists – is between *carriers*, not protocols, and

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113. *Id.*, at para. 138, emphasis supplied.

114. *CMRS Report*, at para. 160, Table 14.

115. *Id.*, at Table C-5.

116. *Id.*

among the various smartphone platforms – primarily Apple's iPhone, google's Android, Microsoft's Windows Phone, and RIM's Blackberry.

AT&T's refusal to provide its customers with handsets that are capable of accessing A Block in the Lower 700 MHz band, and its denial of roaming access to customers of other carriers who, by virtue of their having acquired A Block spectrum, are forced to adopt the Band Class 12 handset specification, are thus directly at odds with the stated goal of "ensuring that PCS users, service providers, and equipment manufacturers can incorporate roaming, interoperability and other important features in the most efficient and least costly manner." There is no legitimate "competition" as between Band Class 12 and Band Class 17 handsets; the existence of both in the market is a consequence of the state of the wireless *service* market and the decision by the dominant provider in the Lower 700 MHz band to block handset interoperability *vis-à-vis* smaller carriers that utilize what are otherwise fully compatible transmission protocols.

The rationale being advanced by AT&T in support of its policies – higher handset costs (to AT&T), shorter battery life, heavier handsets – seem to be entirely speculative and unsupported. But even if any of these claims had validity, the effect would likely be marginal or immeasurably small at best. On the other hand, the elimination of Band Class 17 and the incorporation of the demand for those units into the Band Class 12 production would necessarily result in larger production runs (because these would now be satisfying the combined demands of AT&T and other Lower 700 MHz block providers), which would likely be more than sufficient to overcome any nominal cost differential between the two specifications.

In any event, the benefits of interoperability, long recognized by the FCC, would dwarf whatever marginal costs or other "disadvantages" that might arise were AT&T required to support Band Class 12 devices and to phase out its use of Band Class 17 as soon as existing supplies are exhausted.

VIII. Regional carriers would be unable to compete in the long run without the ability to offer nationwide roaming

The US wireless market currently consists of two "national" facilities-based carriers (AT&T and Verizon) each with networks providing broad, near-ubiquitous coverage, two other "national" facilities-based carriers (Sprint and T-Mobile) also offering broad geographic reach, but somewhat more reliant upon other providers to fill in gaps in their geographic coverage, and several other smaller and regional facilities-based carriers, as well as resellers, all of which rely heavily upon one or more facilities-based carriers in order to offer their respective customers geographic coverage roughly comparable to that of AT&T and Verizon. The presence of small and regional wireless carriers is, for all practical purposes, the primary source of what little competitive pressure AT&T and Verizon actually confront. Interoperability of handset devices across multiple technically compatible networks is critical to the continued market viability of

small and regional carriers in that it permits them to offer their customers the same type of broad geographic reach that facilities-based "national" carriers are able to offer via their own network assets. While full handset interoperability across technologically compatible networks is a *necessary* condition to enable broad geographic roaming outside of the home carrier's own facilities-based footprint, it is not by itself sufficient to assure that such roaming will be possible. To the extent that the carriers with broad=based geographically extensive networks resist efforts by small and regional carriers to offer their customers seamless nationwide 4G LTE data roaming, some affirmative regulatory involvement will be required.

The FCC had established universal roaming as a key policy objective from the very beginning of cellular, and viewed interoperability as key to achieving this goal.

The first mobile telephone service was introduced by AT&T in the St. Louis area in 1946. The original system operated on a 150 MHz radio band and calls were placed by an operator through a "push-to-talk" button.[117] The success of this introduction lead AT&T to introduce the service elsewhere, and user interest grew rapidly.[118] As demand for mobile services increased, the limited number of channels available within each service area created congestion problems and introduced interference in the system. Thus, the need for more efficient use of the radio frequency spectrum, as well as for increased capacity, grew in importance. Indeed, Bell Labs had been conducting research on these problems since at least 1945, when specific experiments on mobile systems started.[119]

Bell Labs' solution – almost from the outset – was cellular. In fact, the "cellular concept and the realization that small cells with spectrum re-use could increase traffic capacity" was introduced by D. H. Ring of Bell Laboratories in an unpublished work in 1947.[120] The research that commenced during this period essentially lead to today's cellular technology. This was an evolutionary process, during which the fundamental technological advancements necessary to establish the cellular system were developed. Improvements in mobile communications resulting from Bell Labs research were also attributable to advancements in electronic switching technology, which afforded the means to connect the many small cells within each channel, which allowed for greater traffic capacity.[121] Work at Bell Labs on the "cellular" concept

117. "Telephone Service for St. Louis Vehicles", *Bell Laboratories Record*, Vol. 24, Jul. 1946, pp. 267-268.

118. See, e.g., "Mobile Telephone Help Meet Emergency in Pennsylvania Fire", *Bell Laboratories Record*, Vol. 24, Dec. 1946, p. 471.

119. Jakes, William C. ed., *Microwave Mobile Communications*, John Wiley & Sons, 1974, p. 1.

120. *See* Young, W.R. "Introduction, Background and Objectives", *The Bell System Technical Journal*, Vol. 58, Jan. 1979, at 8.

121. *Id.*

continued for several decades. In 1971, in response to an FCC request, AT&T produced and submitted a report to the Commission, *High Capacity Mobile Telephone System – Technical Report.* In 1975, AT&T asked the FCC for authority to begin tests in Chicago for a new cellular telephone system. In March of 1977, the FCC authorized AT&T to go forward with the Chicago trial, and commercial cellular service in Chicago was initiated in 1983.

In its 1981 *AMPS Order*, the FCC initiated the process of licensing Commercial Mobile Radio Service (CMRS) carriers to operate cellular systems utilizing the AT&T Advanced Mobile Phone Service ("AMPS") technology in the 800 MHz band. Two licenses were to be issued in each of 306 Metropolitan Statistical Areas (MSAs) and Rural Service Areas (RSAs).[122] The licensing process began in June 1982 when applications were received for the top-30 MSAs, and continued well into the 1990s when the last of the RSA licenses were awarded. Despite – perhaps *because* of – this extremely granular approach to licensing, the FCC was explicit in its 1981 *AMPS Order* as to the requirement for full interoperability across systems and frequency blocks, and its expectation that nationwide roaming across multiple systems would be an important factor in the development of cellular:

> Throughout the cellular proceeding an essential objective has been for cellular service to be designed to achieve nationwide compatibility. In this regard, we expressly stated that a cellular subscriber traveling outside of his or her local service area should be able to communicate over a cellular system in another city. ...[123]

The FCC thus understood the importance of handset compatibility across all carrier networks, and took explicit steps aimed at assuring that this condition would be satisfied by all licensees.

- All handsets were required to be capable of operating on both the "A" and "B" frequency blocks[124]

- The same AMPS protocol was mandated for all "A" (nonwireline) and "B" (wireline) licensees as a condition of their operation, and for all handset manufacturers as a condition for type acceptance of their products:

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122. *In the Matter of An Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the C ommission's Rules Relative to Cellular Communications Systems*, CC Docket No. 79-318, 89 F.C.C.2d 58, released March 3, 1982 ("*Cellular Reconsideration Order*"); *In the Matter of Amendment of the Commission's Rules for Rural Cellular Service*, CC Docket No. 85-388 RM 5167, released July 18, 1986 ("*Rural Cellular Order*").

123. *1981 AMPS Order,* at para. 79.

124. *Id.*, at para. 93.

> ... we are adopting the EIA working paper as a compatibility specifications standard with certain modifications. We shall require all mobile, portable, and base stations, at this time, to conform to the compatibility specifications adopted in this proceeding.[125]
>
> Footnote 80: Conformity to the compatibility specifications adopted by the Commission shall be required for type acceptance of a mobile or portable unit for use in the 800 MHz band under Part 22. Conformity to the compatibility specifications for base station equipment shall be required of all applicants for regular authorization.[126]

As discussed above, the B-block licences were often issued to the sole incumbent wireline provider on an uncontested basis while issuance of A-block licenses were slowed by Commission hearings and legal challenges. As a result, B-block wireline licensees had a "headstart" advantage of anywhere from one to three years. Wireless phone services were subject to state PUC regulation at that time, and a number of "head start" proceedings were initiated by the A-block carrier at the state level in an effort to limit the adverse impact of the wireline licensee's head start. One of the most frequently sought mitigation measures was a so-called "home roaming" capability, whereby the A-block licensee would be able to commence marketing its service to retail customers, provide them with a handset and assign a telephone number to it, and until the A-block system became operational, give its customers the ability to roam on the B-block licensee's system.

A number of A-block licensees urged the FCC to impose a mandatory "A/B switch" requirement on all handsets so that customers who had purchased handsets from the B-block carrier could easily switch them to default to the A-block carrier in the event that the customer elected to switch service providers once the A-block carrier's system became operational. The B-block carriers, who were in most cases monopoly providers or who had held a dominant market share due to the A-block licensees late arrival, opposed this requirement. Although the FCC declined to require the A/B switch,[127] the basis for its decision was that it saw minimal competitive benefit at that time, inasmuch as a customer switching to a different carrier would be required to get a new phone number (number portability did not exist in the 1980s) such that the unit would require reprogramming by a technician. In the process, the technician could also change the default frequency block from "B" to "A". Notably, the Commission expressly relied on the fact that the handsets were in any event all required to be capable of accessing all of the 800 MHz "A" and "B" channels.[128]

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125. *Id.*, at para. 93, citations omitted.

126. *Id.*, at fn. 80.

127. *Amendment of Part 22 of the Commission's Rules Relative to the Domestic Public Cellular Radio Telecommunications Service*, CC Docket No. 85-25, RM-4735, 1985 FCC LEXIS 2447, released October 11, 1985 ("*A/B Switch Order*").

128. *Id.*, at footnote 1.

In conditioning the issuance of AMPS licenses on the requirement that handsets be capable of accessing all cellular channels in both frequency blocks, the FCC stated that "With respect to mobile stations, all units must be capable of operating at least over the entire 40 MHz of spectrum (i.e., 666 channels). This is necessary in order to insure full coverage in all markets and compatibility on a nationwide basis."[129] Thus the FCC had no illusions as to the ability of the marketplace to achieve this outcome.

Smaller, regional carriers face a long term threat if reasonable roaming agreements cannot be reached, or are foreclosed by the lack of interoperability. In its 2011 order mandating CMRS data roaming among facilities based carriers,[130] the FCC recognized that roaming requirements for the growing market for wireless broadband data services would benefit consumers and the industry while facilitating public policy goals, just as the longstanding requirements the Commission put into place for wireless voice services beginning in 1981.

> Widespread availability of data roaming capability will allow consumers with mobile data plans to remain connected when they travel outside their own provider's network coverage areas by using another provider's network, and thus promote connectivity for and nationwide access to mobile data services such as e-mail and wireless broadband Internet access. The rule we adopt today also serves the public interest by promoting investment in and deployment of mobile broadband networks, consistent with the recommendations of the National Broadband Plan. The deployment of mobile data networks is essential to achieve the goal of making broadband connectivity available everywhere in the United States, and the availability of data roaming will help ensure the viability of new wireless data network deployments and thus promote the development of competitive facilities-based service offerings for the benefit of consumers. Today's actions will therefore advance our goal of ensuring that all Americans have access to competitive broadband mobile data services.[131]

The overwhelming majority of commenters in that proceeding supported adoption of data roaming requirements and, indeed, the only ones to oppose mandatory data roaming were AT&T and Verizon.[132]

In the face of otherwise unanimous industry support, resistence to mandatory data roaming requirements by these large carriers with national facilities-based networks demonstrate that

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129. *1981 AMPS Order*, at para. 26.

130. *In the Matter of Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers and Other Providers of Mobile Data Services*, WT Docket No. 05-265, *Second Report and Order,* released April 7, 2011 ("*Data Roaming Order*").

131. *Id.*

132. *Id.*

AT&T and Verizon have little or no incentive to enter into roaming agreements that are economically viable for the smaller carriers, and also confirms that AT&T and Verizon may actually have a strong financial and anticompetitive incentive to resist entering into such agreements with competitors. Having lost the argument over mandatory data roaming agreements, AT&T now seems to be attempting an end-run around the FCC's rules–AT&T will not be required enter into data roaming agreements if its competitors are forced to use incompatible handsets. Handset interoperability requirements are necessary to foster the development of nationwide broadband data roaming, and given AT&T and Verizon's staunch opposition to both data roaming and handset interoperability, marketplace forces cannot be relied upon to produce the "competitive result" of any sort of voluntary national intersystem roaming.

IX. Policy options for spectrum efficiency and a competitive market outcome

The AT&T suggestion that competition and spectrum efficiency are incompatible goals is hardly a new or novel argument on AT&T's part. As we noted earlier, AT&T was making almost identical "harm," "interference" and "efficiency" claims dating at least as far back as the 1950s in its repeated – and ultimately unsuccessful – attempts to block regulatory initiatives aimed at opening the CPE, interexchange services, and other telecommunications markets to competitive entry. Whatever merit the FCC may have found in any of these claims, they were in the end not sufficiently compelling as to justify continuation of the no-entry, exclusive monopoly regime that AT&T was seeking to retain. And, to whatever extent the FCC may have found merit in such claims, its solution was to adopt regulatory/ministerial measures designed to address and overcome the problem, and not to permit the putative problem to preclude competitive entry. The current AT&T contention as to the purported tension between spectrum efficiency and competition, to whatever extent it may have any validity, once again confronts the FCC with the same policy challenge that AT&T raised more than four decades ago. As does the Lower 700 MHz Block A "interference" contentions.

Concurrent with the legislation that authorized the FCC to conduct auctions for the sale of spectrum to CMRS providers, Congress also transferred regulatory authority over wireless prices ("rates charged") from state PUCs to the FCC.[133] The FCC, in turn, determined that the increase in the number of wireless providers that would occur with the introduction of PCS would obviate the need for price and earnings regulation, and so the FCC determined that it would forbear for regulating rates and earnings of CMRS carriers.

133. 47 U.S.C. §332(c)(3), as added by the *Omnibus Budget Reconciliation Act of 1993*.

Although the first round of PCS spectrum was sold through auctions, restrictions were placed on the amount of spectrum that any individual carrier could own in a given wireless market.[134] Those restrictions were subsequently relaxed, and following a series of consolidations,[135] by 2005 the number of national US wireless carriers had decreased to only four. The 2011 attempt by AT&T to acquire T-Mobile would have reduced that number to three, an outcome that was, in part, a basis for much of the opposition to the transaction, including in particular the legal challenge initiated by the US Department of Justice.[136] In November of 2011, AT&T and T-Mobile announced that the merger plan was being withdrawn. And while the FCC itself was never given an opportunity to formally weigh-in on the matter, shortly after the AT&T announcement, the FCC Staff (including engineers, lawyers, economists and industry experts) issued an extensive report in which it concluded that the "... Applicants have failed to meet their burden of demonstrating that the competitive harms that would result from the proposed transaction are outweighed by the claimed benefits. Staff thus finds, as has DOJ, that the proposed transaction would likely lead to a substantial lessening of competition in violation of the Clayton Act."[137] AT&T has, of course, persisted in arguing that its inability to proceed with the T-Mobile merger is largely responsible for the current spectrum crisis and that competition is incompatible with spectrum efficiency.

AT&T's argument in this regard – like its challenge to the 1971 effort by MCI to gain authority to offer competitive private line services[138] – is at bottom premised upon the loss of static efficiency without any recognition as to the potentially greater dynamic efficiency gains

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134. *In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act; Regulatory Treatment of Mobile Services Amendment of Part 90 of the Commission's Rules To Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band Amendment of Parts 2 and 90 of the Commission's Rules To Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and 935-940 MHz Band Allotted to the Specialized Mobile Radio Pool*; GN Docket No. 93-252; PR Docket No. 93-144; PR Docket No. 89-553; Third Report and Order, 9 FCC Rcd 7988 (1994).

135. In 2005, Sprint merged with Nextel, and in 2004 Cingular merged with AT&T Wireless, which had been spun off by AT&T Corp. in 2000. Earlier, the merger of Bell Atlantic and GTE into what became Verizon brought about the integration of Bell Atlantic Mobile, NYNEX Mobile Communications and GTE Mobilnet. Cingular had been formed in 2000 by the merger of the SBC, Ameritech and BellSouth Mobility wireless operations; Pacific Telesis' wireless operations were spun off in 1994 as AirTouch, which were merged with (then US West's) New Vector wireless affiliate, then (in 1999) acquired by Vodaphone, which then (in 2000) merged its US operations into Verizon Wireless. Verizon Wireless also acquired regional wireless carrier Alltel, which had itself absorbed other regional carriers, Western Wireless and Midwest Wireless.

136. *United States of America v. AT&T Inc. et al*; case 1:11-cv-01560, *Complaint*, filed August 31, 2011 ("*DOJ Complaint*").

137. *In the Matter of Applications of AT&T Inc. and Deutsche Telekom AG For Consent To Assign or Transfer Control of Licenses and Authorizations*, WT Docket No. 11-65, FCC Staff Analysis and Findings, filed November 30, 2012.

138. *Specialized Common Carrier Order*, paras. 12-13.

arising from an active competitive market. To the extent it has not already done so, the Commission will ultimately need to evaluate AT&T's claims as to the loss of spectrum efficiency against the long-term dynamic efficiencies that can result from vibrant competition in a market driven by rapid technological innovation. But if the potential loss of spectrum efficiency would, as AT&T now contends, require that the Commission accept an overall increase in market concentration, it is then confronted with some difficult policy choices:

(1) *Continue to rely solely upon marketplace forces to sort out winners and losers*. Under this strategy, the more efficient – i.e., the very largest – carriers will ultimately succeed in forcing smaller and less efficient providers out of the market, resulting in an unregulated duopoly or, taken to its logical extreme (per AT&T),[139] an unregulated monopoly.

(2) *Declare the wireless market to be a "natural monopoly.*" This approach would, in essence, accept the AT&T thesis and initiate a policy under which one or perhaps two – but no more than two – licensees would be authorized to provide service and, as franchised monopolies, would once again be subject to some form of price and earnings regulation, although perhaps under a more modern regime that incorporates efficiency incentives rather than a reinstatement of a pure rate-of-return regulation (RORR) environment.

    This approach might well achieve maximum spectrum efficiency in the short term, but would sacrifice the dynamic efficiencies that only competition can bring about – i.e., innovation, choice of features and services, best practices, etc. – and would put the Commission in the position of having to pick the "winner" among competing technologies and production strategies at the time that the franchise is to be awarded.

(3) Adopt a process whereby the spectrum efficiencies that are only available to the largest carriers – AT&T and Verizon – can be transferred to smaller rivals by adopting policies and promulgating regulatory requirements designed to ensure that spectrum efficiencies and other economies of scale that are uniquely enjoyed only by the two dominant carriers are made available to smaller rivals.

This would not be the first time such an approach was pursued. When the *Telecommunications Act of 1996*[140] (TA96) was enacted, Congress was attempting to address the enormous gaps in the scale of operations and network assets as between "incumbent" local exchange carriers (ILECs) and new entrants into the local telecommunications market ("CLECs"), and was also seeking to minimize the incumbents' head start advantage by enabling entrants to utilize the incumbents' existing networks to jump-start their own competitive entry. Included in TA96 were explicit requirements that incumbents make certain network resources available at cost-

139. *Supra.*, fn. 81.

140. *Telecommunications Act of 1996*, P. L. 104-104.

based rates to entrants, and that the former would permit and provide interconnection between their embedded networks and those just entering the local service market. TA96 barred state regulators from restricting competitive entry in the local telephone market, but beyond merely making local competition *possible* as a legal matter, the legislation included a number of measures designed specifically to *facilitate and encourage* entry with the expectation that increased competition and reduced regulation would work to "secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies."[141]

Critics of the TA96 approach had contended that by affording entrants the opportunity to utilize the incumbents' networks rather than build out their own from scratch, the legislation's impact was to reduce, rather than to stimulate, competitive investment. We need not debate that particular question here. In the case of wireless, however, spectrum is a fixed and finite resource, and if the potential loss of spectrum efficiency would require that the Commission accept an overall increase in market concentration as AT&T now contends, the survival of competition requires that smaller carriers be afforded – and assured – full access to this finite resource on a commercially viable basis.

The parallels between the economic conditions then extant in local wireline exchange service market when TA96 was enacted and the spectrum-related conditions that today confront the wireless market are striking. But unlike the situation surrounding efforts to introduce and facilitate competitive entry into *wireline* telecom where entry barriers, while formidable, were not absolute, in the case of wireless a key input – spectrum – is in finite supply. Yet contrary to AT&T's claim, competition and spectrum efficiency are not necessarily incompatible so long as a means can be found to provide *all* wireless service providers – large and small – with access to pooled spectrum resources rather than to a balkanized arrangement of separate, isolated, and in many instances non-interoperable spectrum blocks.

The development of a new spectrum access paradigm necessarily requires a long-term solution that cannot be implemented in the context of this proceeding. But mandating full interoperability of all handsets and devices capable of operating in the Lower 700 MHz band, and policies that, like TA96 Secs. 251/252 in the wireline world, assure small wireless carriers full and economic roaming access to the spectrum resources of AT&T and Verizon, would represent a major step in the right direction. The broad efficiency gains and expanded competition in the provision of wireless data services that will result from mandatory interoperability will easily outweigh any "costs" that may properly be attributed to the alleged "interference" claims advanced by the large carriers.

141. *Id.*, Preamble.

X. Conclusion

The presence of hard-and-fast supply constraints on the availability of a key input required for the provision of wireless services – electromagnetic spectrum – confronts the FCC with the task of navigating among the often conflicting goals of maximizing spectrum efficiency, providing affordable and robust wireless broadband nationwide, maintaining effective competition at a level sufficient to discipline the ability of holders of the limited spectrum resources to extract economic rents from customers and from the economy generally, and limiting regulatory intervention to only those areas in which marketplace forces cannot be relied upon to produce a competitive outcome. One such area where regulatory intervention is required is mandating full wireless device interoperability across all technically compatible networks. As we have shown in this report, there is an enormous disparity in the size, scope and scale of operations of the two largest wireless carriers *vis-à-vis* small and regional providers. The largest carriers gain little from interoperability which, were it to arise, could actually weaken their own formidable competitive edge. Under these circumstances, the possibility of a voluntary "industry solution" is a good deal closer to science fiction than to any reality.

Indeed, AT&T's frequently articulated position – that spectrum efficiency requires that the number of competitors in the US wireless market be *reduced*, not increased – suggests that any "industry solution" that might arise in the absence of affirmative regulatory prescription will necessarily lead to the outcome that AT&T candidly admits it wants – less competition overall. And while we do not offer an opinion as to the specific merit of any of AT&T's "interference" contentions with respect to the use of Band Class 12 devices on its network, there is no question that such actions have an anticompetitive impact upon the marketplace.

The Commission thus needs to view AT&T's technical arguments with a good deal of skepticism and, in any event, weigh their importance, if any, against the detrimental impact upon competition in the wireless broadband market. Mandatory device interoperability and data roaming on a commercially viable basis represent the means by which the putatively conflicting goals of spectrum efficiency *and* vigorous competition can be reconciled and implemented in support of the broader public interest.

APPENDIX

AUTHOR QUALIFICATIONS

Statement of Qualifications

LEE L. SELWYN

Dr. Lee L. Selwyn has been actively involved in the telecommunications field for more than forty years, and is an internationally recognized authority on telecommunications regulation, economics and public policy. Dr. Selwyn founded the firm of Economics and Technology, Inc. in 1972, and has served as its President since that date. He received his Ph.D. degree from the Alfred P. Sloan School of Management at the Massachusetts Institute of Technology. He also holds a Master of Science degree in Industrial Management from MIT and a Bachelor of Arts degree with honors in Economics from Queens College of the City University of New York.

Dr. Selwyn has testified as an expert on rate design, service cost analysis, form of regulation, and other telecommunications policy issues in telecommunications regulatory proceedings before some forty state commissions, the Federal Communications Commission and the Canadian Radio-television and Telecommunications Commission, among others. He has appeared as a witness on behalf of commercial organizations, non-profit institutions, as well as local, state and federal government authorities responsible for telecommunications regulation and consumer advocacy.

He has served or is now serving as a consultant to numerous state utilities commissions including those in Arizona, Minnesota, Kansas, Kentucky, the District of Columbia, Connecticut, California, Delaware, Maine, Massachusetts, New Hampshire, Vermont, New Mexico, Wisconsin and Washington State, the Office of Telecommunications Policy (Executive Office of the President), the National Telecommunications and Information Administration, the Federal Communications Commission, the Canadian Radio-television and Telecommunications Commission, the United Kingdom Office of Telecommunications, and the Secretaria de Comunicaciones y Transportes of the Republic of Mexico. He has also served as an advisor on telecommunications regulatory matters to the International Communications Association and the Ad Hoc Telecommunications Users Committee, as well as to a number of major corporate telecommunications users, information services providers, competitive local exchange carriers, interexchange carriers, wireless services providers, and specialized access services carriers.

Dr. Selwyn has presented testimony as an invited witness before the U.S. House of Representatives Subcommittee on Telecommunications, Consumer Protection and Finance and before the U.S. Senate Judiciary Committee, on subjects dealing with restructuring and deregulation of portions of the telecommunications industry.

In 1970, he was awarded a Post-Doctoral Research Grant in Public Utility Economics under a program sponsored by the American Telephone and Telegraph Company, to conduct research on the economic effects of telephone rate structures upon the computer time sharing industry. This work was conducted at Harvard University's Program on Technology and Society, where he was appointed as a Research Associate. Dr. Selwyn was also a member of the faculty at the College of Business Administration at Boston University from 1968 until 1973, where he taught courses in economics, finance and management information systems.

Dr. Selwyn has been an invited speaker at numerous seminars and conferences on telecommunications regulation and policy, including meetings and workshops sponsored by the National Telecommunications and Information Administration, the National Association of Regulatory Utility Commissioners, the U.S. General Services Administration, the Institute of Public Utilities at Michigan State University, the National Regulatory Research Institute, the Harvard University Program on Information Resources Policy, the Columbia University Institute for Tele-Information, the Massachusetts Institute of Technology Alfred P. Sloan School of Management, the National Association of State Utility Consumer Advocates (NASUCA), the National Conference of Regulatory Attorneys, as well as at numerous conferences and workshops sponsored by individual regulatory agencies. Dr. Selwyn is an elected Town Meeting Member for the Town of Brookline, Massachusetts, and serves on the Town's Advisory and Finance Committee and its Subcommittee on Planning and Regulation.

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Statement of Qualifications

COLIN B. WEIR

Colin B. Weir is Vice President at Economics and Technology, Inc. Mr. Weir conducts economic, statistical, and regulatory research and analysis, with a primary focus on the telecommunications industry. Mr. Weir's work involves econometric and statistical analysis, multiple linear regression, statistical sampling, micro- and macroeconomic modeling and other economic analysis. Such analysis often involves analysis of databases, call detail records, and other voluminous business records. Mr. Weir is familiar with common statistical and econometric software packages such as STATA and SHAZAM. Mr. Weir assists with analysis of economic, statistical and other evidence; and preparation for depositions, trial and oral examinations. Mr. Weir has provided expert testimony before federal and state courts, the FCC, and state commissions, and has contributed research and analysis to numerous ETI publications and testimony at the state, federal, and international levels.

Mr. Weir's telecom experience includes work on a variety of issues, including: economic harm and damage calculation; Early Termination Fees (ETFs); wireless handset locking practices; determination of Federal Excise Tax burden; ISP-bound traffic studies; Area Code splits and numbering policy; Federal Universal Service; pricing and regulation of Unbundled Network Elements; analysis of special access rates-of-return and pricing trends, and development of a macroeconomic analysis quantifying the economic impact upon the US economy and job markets of overpricing special access services; wireless pricing; and wireline telecommunications tariff and contract pricing.

Mr. Weir has conducted research and analysis in numerous regulatory and litigation matters on behalf of carrier, government and individual clients, including AT&T, MTS Allstream (Canada), Broadview Networks, Cavalier Communications, Nuvox Inc., O1 Communications, Pac-West Telecomm, Inc., tw telecom inc., XO Communications, Western Wireless, The US Department of Justice, Office of the Attorney General of Illinois, Thomas*et al* (class action litigation, Superior Court, County of Alameda), Ayyad *et al* (class action litigation, Superior Court, County of Alameda), and White *et al* (class action litigation, Superior Court, County of Alameda).

Mr. Weir has researched pricing and discount rates in enterprise voice and data services contracts, maintained an extensive database of such rates, and has contributed to network priceouts and rate benchmark analyses. Additionally, Mr. Weir is responsible for the maintenance of ETI's comprehensive databases of interstate and international interexchange carrier and local telephone company tariffs. He has substantial experience with industry data resources.

Mr. Weir holds an MBA with honors from Northeastern University. He also holds a Bachelor of Arts degree *cum laude* in Business Economics from The College of Wooster.

Publications and Testimony of Colin B. Weir

Mr. Weir has co-authored the following:

Regulation, Investment and Jobs: How Regulation of Wholesale Markets Can Stimulate Private Sector Broadband Investment and Create Jobs (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of Cbeyond, Inc., Covad Communications Company, Integra Telecom, Inc., PAETEC Holding Corp, and tw telecom inc., February 2010.

Revisiting Us Broadband Policy: How Re-regulation of Wholesale Services Will Encourage Investment and Stimulate Competition and Innovation in Enterprise Broadband Markets , (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of MTS Allstream, February 2010.

Longstanding Regulatory Tools Confirm BOC Market Power: A Defense of ARMIS (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of the AdHoc Telecommunications Users Committee, January 2010.

Choosing Broadband Competition over Unconstrained Incumbent Market Power: A Response to Bell and TELUS (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of MTS Allstream, April 2009.

The Role of Regulation in a Competitive Telecom Environment: How Smart Regulation of Essential Wholesale Facilities Stimulates Investment and Promotes Competition (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of MTS Allstream, March 2009.

Special Access Overpricing and the US Economy: How Unchecked RBOC Market Power is Costing US Jobs and Impairing US Competitiveness (with Lee L. Selwyn, Susan M. Gately, and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of the AdHoc Telecommunications Users Committee, August 2007.

The AWS Spectrum Auction: A One-Time Opportunity to Introduce Real Competition for Wireless Services in Canada (with Lee L. Selwyn and Helen E. Golding) Economics and Technology, Inc., prepared on behalf of MTS Allstream, June 2007.

Comparison of Wireless Service Price Levels in the US and Canada (with Lee L. Selwyn) Economics and Technology, Inc., prepared on behalf of MTS Allstream, May 2007.

Hold the Phone! Debunking the Myth of Intermodal Alternatives for Business Telecom Users In New York (with Susan M. Gately and Lee L. Selwyn) Economics and Technology, Inc., prepared for the UNE-L CLEC Coalition, August 2005.

Mr. Weir has submitted the following testimony:

United States District Court, Southern District of New York, *Bursor & Fisher P.A., v. Federal Communications Commission***,** Case No. 1:11-cv-05457-LAK, on behalf of Bursor & Fisher P.A., Declaration filed August 17, 2011.

United States District Court, District of New Jersey, *In Re: Sprint Premium Data Plan Marketing and Sales Practices Litigation,* Master Case No. 10-6334 (SDW) MDL No. 2228**,** on behalf of Thornton, Davis, & Fein, P.A., Declaration filed August 11, 2011.

United States District Court, Northern District of California, *Patrick Hendricks, on behalf of himself and all others similarly situated, Plaintiffs, v. AT&T Mobility LLC, Defendant*, Case No. C11-00409, Class Action Complaint, on behalf of Bursor & Fisher, P.A., Declaration filed August 7, 2011.

Federal Communications Commission, *In the Matter of Applications of AT&T Inc. & Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations*, WT Docket No. 11-65, on behalf of Butch Watson, Declaration filed June 20, 2011.

California Public Utilities Commission, *Pacific Bell Telephone Company d/b/a AT&T California (U1001C) Complainant, vs. O1 Communication, Inc. (U 6065 C), Defendant*, Case No. C.08-03-001, on behalf of the O1 Communications, Inc., Reply Testimony filed November 6, 2009; Oral testimony and cross examination on November 16, 2009.

Superior Court of California, County of Alameda, *James Thomas, on behalf of themselves, the general public, and all those similarly situated, Plaintiffs, v. Global Vision Products, Inc., Anthony Imbriolo, Derrike Cope, David L. Gordon, Powertel Technologies, Inc., Craig Dix, Henry Edelson and Robert Debenedictis, Defendants,* Case No. RG03-091195, on behalf of the Law Offices Of Scott A. Bursor, Oral testimony and cross examination on November 9, 2009.

United States District Court, District of New Jersey, *Judy Larson, Barry Hall, Joe Milliron, Tessie Robb, and Willie Davis, individually and on behalf of all others similarly situated, v. AT&T Mobility LLC f/k/a Cingular Wireless LLC and Sprint Nextel Corporation and Sprint Spectrum L.P. d/b/a Sprint Nextel and Nextel Finance Company, Civ. Act. No. 07-5325 (JLL)*, on behalf of PinilisHalpern, LLP and Law Offices of Scott A. Bursor, Declaration filed *under seal* October 19, 2009.

California Public Utilities Commission, *Pacific Bell Telephone Company d/b/a AT&T California (U1001C) Complainant, vs. Pac-West Telecomm, Inc. (U 5266 C), Defendant*, Case No. C.08-09-017, on behalf of the Pac-West Telecomm, Inc., Rebuttal Testimony filed May 1, 2009.

Illinois Commerce Commission, Illinois Bell Telephone Company Annual Rate Filing for Non-Competitive Services Under an Alternative Form of Regulation, Ill. C. C. Docket No. 08-0249, on behalf of the People of the State of Illinois, Declaration filed May 2, 2008.

Federal Communications Commission, Qwest Petition for Forbearance Under 47 U.S.C. §160(c) From Title II and *Computer Inquiry Rules* with Respect to Broadband Services, Petition of AT&T Inc, For Forbearance Under 47 U.S.C. §160(c) From Title II and *Computer Inquiry Rules* with Respect to Broadband Services, Petition of BellSouth Corporation For Forbearance Under 47 U.S.C. §160(c) From Title II and *Computer Inquiry Rules* with Respect to Broadband Services, Petition of the Embarq Local Operating Companies for Forbearance Under 47 U.S.C. §160(c) From Application of *Computer Inquiry* and certain Title II Common Carriage Requirements; WC Docket Nos. 06-125 and 06-147, on behalf of the AdHoc Telecommunications Users Committee, Declaration filed October 9, 2007.

Superior Court of California, County of Alameda, *James Thomas, on behalf of themselves, the general public, and all those similarly situated, Plaintiffs, v. Global Vision Products, Inc., Anthony Imbriolo, Derrike Cope, David L. Gordon, Powertel Technologies, Inc., Craig Dix, Henry Edelson and Robert Debenedictis, Defendants,* Case No. RG03-091195, on behalf of the Law Offices Of Scott A. Bursor, Declaration filed January 5, 2007; Deposition on November 13, 2007; Oral testimony and cross-examination on December 19, 2007; Oral testimony on January 9, 2008.

Mr. Weir has contributed research and analysis to numerous additional ETI publications and testimony at the state, federal, and international levels.