

October 20, 1998

Magalie Roman Salas  
Secretary  
Federal Communications Commission  
1919 M Street, NW 20554

*In Re: Designation of the 2110-2150 MHz Band for Broadband PCS Services:  
Petition for Rule Making submitted by the Wireless Communications Division of  
the Telecommunications Industry Association.*

Dear Ms. Salas:

On October 9, 1998, the Wireless Communications Division of the Telecommunications Industry Association submitted a Petition for Rule Making in the above-captioned matter. That petition contained a number of typographical and reformatting errors that have been corrected in the attached document. Thus, please substitute the original version of the TIA petition with attached version. To be clear, the only changes contained in this revised version are typographical and reformatting corrections.

Please call me at (703) 907-7700 should you have any questions on this matter.

Sincerely,

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Eric J. Schimmel  
Vice President  
Telecommunications Industry Association  
2500 Wilson Blvd.  
Suite 300  
Arlington, VA 22201

CC: Richard Engleman  
Julius Knapp

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of )  
 )  
Designation of the 2110-2150 MHz ) RM-\_\_\_\_\_  
Band for Broadband PCS Services )

TO: The Commission

Petition for Rule Making  
Submitted by the Wireless Communications Division  
Telecommunications Industry Association

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**1. Introduction and Background**

The Wireless Communications Division (“WCD”) of the Telecommunications Industry Association (“TIA”), pursuant to Section 1.401 of the Rules and Regulations of

the Federal Communications Commission (“FCC” or “Commission”), respectfully submits this Petition for Rule Making seeking to have the Commission designate the spectrum from 2110-2150 MHz for broadband PCS services.

The TIA is the principal industry association representing telecommunications equipment manufacturers, including manufacturers of terrestrial mobile radio equipment.<sup>1</sup>

The Balanced Budget Act of 1997 directs the FCC to auction 55 MHz of spectrum in the 2 GHz band. Specifically, the conference report says:

The conference agreement adopts with clarifying amendments the House provision requiring the Commission to allocate an additional 55 MHz of spectrum for assignment to licensees using competitive bidding under section 309(j) of the Communications Act. Specifically, under the conference agreement, 40 MHz in the 2110 to 2150 MHz band, and 15 MHz in the 1990 to 2110 MHz band, are identified for assignment by competitive bidding.<sup>2</sup>

The International Telecommunication Union (“ITU”), at the 1992 World Radio Conference (“WRC”) allocated spectrum bands for Future Public Land Mobile Telecommunications Services (“FPLMTS”). These bands are 1885-2025 MHz, and 2110-2200 MHz (including the satellite allocations). These are the bands currently being targeted around the world for International Mobile Telecommunications-2000 (“IMT-2000”) services, the successor appellation for FPLMTS and often referred to as Third Generation, or “3G”, services. More precisely, the 1920-1980 MHz and 2110-2170 MHz bands have been allocated for the terrestrial component of IMT-2000. Figure 1 shows allocations in the regions of the world most active in IMT-2000 issues.

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<sup>1</sup> This petition reflects only the views of members of the TIA Wireless Communications Division. Moreover, these comments do not necessarily reflect the views of other divisions, other committees, or other members of TIA.

<sup>2</sup> H.R. Conf. Rpt. 105-217, Pub. L. 105-33, 105th Cong., 1 Sess. (July 30, 1997) at 574.

# 3G Spectrum

All Frequencies in MHz

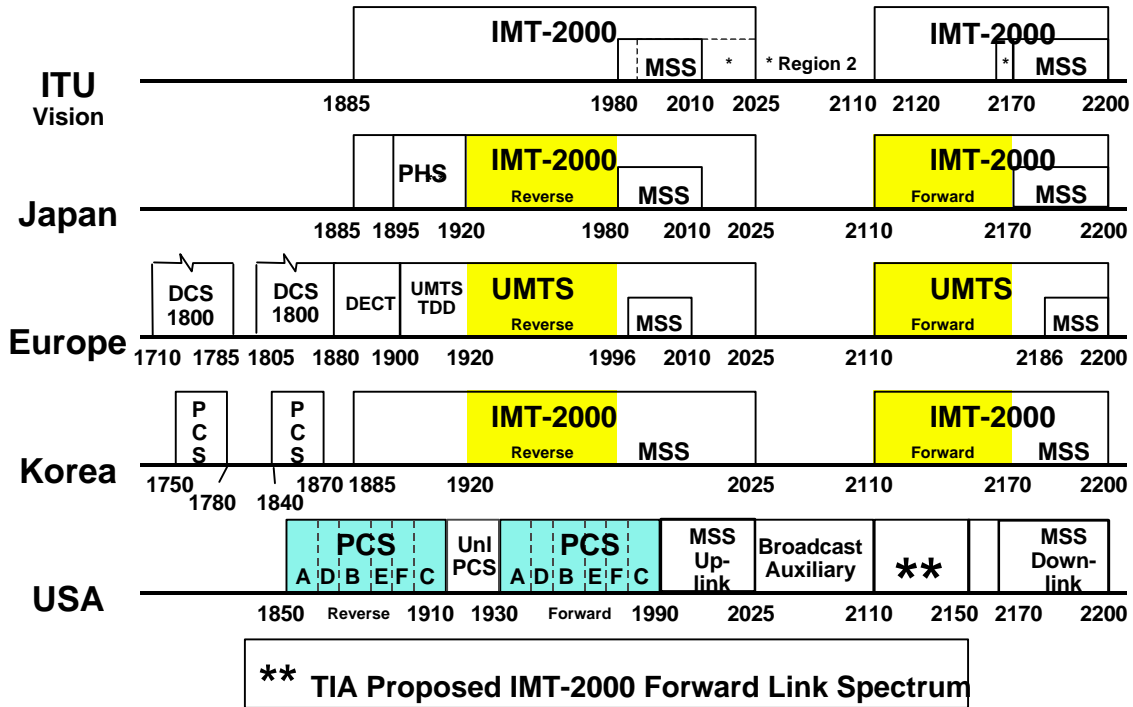


Figure 1

The lower portion of the ITU allocation for IMT-2000 (1885-2025 MHz) overlaps with part of the Personal Communications Services (“PCS”) allocation in the US. The US bandplan uses the 1850-1910 MHz band and the 1930-1990 MHz band for PCS. Therefore, it is not possible for the US to parallel exactly the ITU’s IMT-2000 allocations. Unfortunately, as Figure 1 shows, other major markets have followed the ITU plan. However, the allocation in the US of the 2110-2150 MHz band, which aligns with the upper IMT-2000 allocation, to a service envisioned in most 3G scenarios would be a large step towards aligning the US spectrum plan with that of the rest of the globe. This would

help US operators to provide those services by giving them, and their subscribers, access to manufacturers developing products for a global market, and by simplifying their ability to offer global roaming to their customers.

The WCD therefore proposes that the FCC designate the 2110-2150 MHz spectrum for broadband PCS services. Per the mandate of Congress, as discussed in Section 5, below, licenses for use of the spectrum would be distributed by auction. Auction rules would, however, limit participation to operators who intend to deploy systems that will deliver 3G services to consumers. In the discussions following, the WCD recognizes that while it has anticipated some of the concerns of operators in addition to the perspective of the manufacturing sector, the Commission should seek direct operator input on these topics. Also, there will be additional issues of prime importance which are not directly addressed here. One such issue will be the timing of such auctions since the bidders and users for spectrum (and the bearers of the associated expenses) will be the operators and not the manufacturers. The timing for use of the spectrum will depend on service deployment schedules which is the prerogative of operators/service providers and will depend on such factors as market demand for particular services. Additionally, deployment of services will also depend on completion of the IMT2000 standards, and completion of technology development for infrastructure and terminal equipment. Technology development for the manufacturers can be simplified if the spectrum designations (including those to be determined through WRC 2000) are known well in advance. These factors are the primary concerns that should determine spectrum policy rather than short term needs for Federal budget balancing.

## **2. This designation is in the interests of US industry**

### **2.1. Next generation PCS technologies will require wider bandwidths**

Since implementation of the US PCS bandplan effectively means that the “U.S. has already licensed Third Generation Mobile Service providers”<sup>3</sup>, it will likely be left to these providers to deploy the technologies which will deliver 3G services to the US consumer. Those services will range from the current 2G offerings such as toll-quality voice and short messaging to more sophisticated high-speed switched data and video services. Most cellular and PCS service providers and manufacturers envision an evolution of subscriber and infrastructure technology to fulfill these new broadband service models.

The rapid convergence of centralized circuit-switched telecommunication and distributed packet-switched data communication networks will play a key role in defining the applications that will run on these 3G networks. Many of these applications will deliver corporate intranet or public Internet data to mobile or nomadic consumers and, therefore, they will be inherently asymmetric in terms of bandwidth requirements. While mobile-to-base (“uplink”) requests are likely to be short and require less bandwidth, base-to-mobile (“downlink”) transmissions are likely to be large data transfers requiring more bandwidth.

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<sup>3</sup>See Richard Engleman, FCC/OET Tutorial “Third Generation Mobile Systems: Around the World with IMT-2000”, May 12, 1998.

The natural evolution of current 2G systems and technologies to 3G capabilities is likely to require increased downlink capacity. The 2110-2150 MHz band should be designated to allow augmentation of the downlink spectrum currently available to cellular and PCS operators. For example, in a PCS migration example, relatively short requests for data in the 1850-1910 MHz band will result in data flows which will place severe demands on the capacity of the 1930-1990 MHz band. This designation to alleviate congestion will be necessary as current licensees are going to upgrade their systems to deliver 3G services.

## **2.2. Spectrum misalignment is detrimental to US manufacturers**

Spurred by the activity in the ITU, manufacturers around the world are developing technologies that will satisfy the ITU definition of IMT-2000, including the aforementioned spectrum allocations. As they do this, they anticipate leveraging their research and development investments across a global marketplace. As demonstrated below, the radio frequency (“RF”) subsystem will have the largest impact on whether or not IMT-2000 terminal devices can, in fact, take advantage of this global market.

The elements which are required in order to create a complete IMT-2000 subscriber device are the RF subsystem and the signal processing and call processing functions. Historically, the call processing and baseband signal processing functions have been implemented in programmable digital logic circuitry. Digital circuits have rapidly advanced to lower cost, lower power, and smaller designs. These trends are expected to continue. Well before 2002, general-purpose digital signal processors will be available which will operate near one volt with speeds exceeding 200 MHz (approximately 400

MIPS for dual-ALU<sup>4</sup> processors) and consuming only 0.1 mW/MHz. On the other hand, RF processing has not seen similar rapid advances and is not expected to advance in the future as rapidly as the digital solutions. Therefore, changing the RF subsystem to accommodate multiple bands will be a significant effort for manufacturers. With much of the rest of the world in agreement on a spectrum plan for IMT-2000, it is incumbent upon the FCC to align the US, as much as possible, with that international agreement. Because of the PCS bandplan, complete alignment will not be possible. However, even the partial alignment of 2110-2150 MHz for broadband wireless systems vastly improves the possibility of producing equipment that is capable of providing advanced telecommunications services in both the US wireless and IMT-2000 bandplans.

### **3. This designation is in the interest of the US consumer**

As mentioned previously, the spectrum in which the IMT-2000 devices will operate dictates the makeup of the RF subsystem of the devices. The RF components are not undergoing the type of rapid advances being seen by the digital subsystems. This means that, without common or nearly common spectrum allocations around the world, consumers will pay a penalty in size, weight, and performance of subscriber terminals because of the RF components.

IMT-2000 systems are currently being designed to handle a large class of terminal devices ranging from voice-only phones to full motion video devices. Not only have current users of cellular phones become accustomed to small, low cost, long standby and

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<sup>4</sup> Arithmetic and Logic Unit.



talk time phones, but the market's expectation is that the low tier IMT-2000 devices designed for voice-only phone operation will not be significantly larger, more expensive or have poorer operational characteristics than today's cellular phones. Also, the higher tier devices capable of full motion video or services that require high data rates are not envisioned to be vastly larger than existing cellular or PCS phones. As described above, it is the RF components in the devices which will be critical to manufacturers' capabilities to satisfy these customer expectations. Because of the advances in the digital components relative to the RF, the RF processing section will significantly impact the IMT-2000 terminal in terms of its size and cost. If a single device needs to cover multiple frequency bands, the solution is likely to be that of current multi-band cellular phones, which duplicate receiver front end processing and some of the transmitter processing.

Duplication of equipment leads to larger, heavier, more expensive devices. Thus, separate allocations for different services will clearly have a detrimental impact on the size, cost and power consumption of terminals that will be required to span multiple bands. These factors directly affect the marketability of these products in the U.S., where manufacturers and consumers share a common goal of rapid market acceptance in order to reduce costs and increase services. An optimum spectrum allocation strategy to accomplish this would be enough continuous spectrum for all envisioned service classes. If regional or national allocations are necessary, these should be as close to the international allocations as possible.

In addition to improved economies of scale which benefit the consumer through access to more competition and lower prices, a worldwide alignment of spectrum improves the opportunity to provide subscriber units which can roam on systems

throughout the world. IMT-2000 subscriber units operating in the rest of the world will already be capable of operation in the 2110-2150 MHz band, as well as in the downlink part of the US PCS spectrum (1930-1990 MHz). If the designation proposed here is accepted, the expansion of the capability of such phones to cover the US PCS uplink band (1850-1910 MHz) would be all that would be required to create a subscriber unit with the RF capability of global roaming.

#### **4. Such an designation is justified on technological grounds**

As emphasized above, even partial alignment of the US 3G spectrum with that of the rest of the world will be essential for both US manufacturers and consumers to benefit from worldwide economies of scale, and to enable global roaming. In addition, the most likely application scenarios for IMT-2000 also advocate for the proposed designation.

It is extremely difficult, if not impossible, to predict what applications will drive the demand for advanced, mobile, wireless services. The best that can be done is to design a flexible, scalable system which can adapt to any needs. However, it is reasonable to look to the current drivers of growth in telecommunications and anticipate that they will be significant for wireless systems in the future. It is undeniable that the Internet has had a profound effect on growth in the information technology and telecommunications industries. There is a demand for high speed (and therefore higher bandwidth) connections being driven by private consumers' and businesses' desires to access information on the Internet. Much of this traffic is asymmetric in nature. That is, a small information request sent to an information server (requiring little bandwidth) results in a large amount of data

being sent from the server to the subscriber (requiring more bandwidth for acceptable speeds.)

Third generation systems anticipate the convergence of the telecommunication and data communication networks. Users expect that many of the applications on these networks will be delivering Internet or intranet data to a mobile subscriber. Therefore, it is reasonable to assume that asymmetric applications will be a key element of the 3G offerings. Coupling this with the fact that it is existing PCS and cellular operators who likely will be providing 3G services in the US lends more technical support to the requested designation. Those operators currently have symmetric uplink and downlink spectrum. Designating the 2110-2150 MHz band to enable additional downlink capacity for these operators would be useful to provide for the anticipated offerings.

## **5. Proposed 2110-2150 MHz auction rules**

For all of the above reasons, the WCD believes that it is wise public policy to designate the 2110-2150 MHz band specifically for the deployment of broadband systems which will deliver 3G services. An auction tailored for this purpose is consistent with the FCC's responsibility as manager of the nation's spectrum resource. Because, although though the use of auctions as a mechanism for assigning spectrum licenses can expeditiously and efficiently put the spectrum into the hands of the user who values it the most, it is our observation that auctions in which the FCC provides guidance as to the intended use of the spectrum produce the most favorable results in terms of spectrum usage and revenue.

The FCC is well situated, both in terms of its own expertise and by its ability to create a public record, to determine the most appropriate types of systems for a particular portion of the spectrum. The Commission is able to evaluate a broad variety of factors, including technical ones (e.g. mobile applications require lower frequency allocations) as well as prevailing market conditions (e.g. the market is ripe for wireless alternative in the local loop.) When the FCC has exercised this responsibility and tailored the auction accordingly, bidding for the spectrum is brisk and there is valid reason for optimism that the spectrum will be well used to serve the public. Examples are the original PCS auctions, the SMR auction, and the on-going auctions at 220 MHz.

On the other hand, when the Commission allows the auction to define the services so that it becomes an allocation rather than an assignment process (so called “maximum flexibility”), the auctions have been less successful. Here we are thinking of the WCS auction, and the recently postponed GWCS auction. Manufacturers will develop competitive products for viable, competitive services. We do not want the Commission to choose a particular standard for the 2110-2150 MHz band. IN fact, based on existing cellular and PCS systems operating in the US, several systems using different standards appears inevitable. We do, however, urge the Commission to designate the spectrum for a particular use, as was done for PCS.

In summarizing it’s views about tailoring the auction process, the WCD could not agree more with Commissioner Ness who recently stated:

Auctions, however, are not a substitute for the allocation process. In other words, we should not -- indeed, we must not -- back away from our fundamental duty to allocate and reallocate spectrum in broad categories in accordance with the public interest.

This is so for both policy as well as pragmatic reasons. The value to the public of certain uses of the spectrum does not always translate into pure economic terms.

For example, we need to ensure that adequate spectrum is available for public safety purposes, for unlicensed – that is, Part 15 -- uses, for the amateur service, and for experimental and scientific purposes. None of these needs would be met if auctions displaced judgment in the spectrum allocation process.

Indeed, all of these spectrum uses serve the public interest. They are fundamentally different and merit different rules and allocation strategies. One size does not fit all.

A final point about spectrum allocations. Government also needs to retain the ability to readjust allocations on a large scale to reflect broad changes in international allocations, technological developments, and fundamental shifts in demand.<sup>5</sup>

Once the band is designated for deployment of third generation broadband PCS systems, licenses to use the spectrum would, of course, be assigned by competitive bidding. The WCD proposes that such an auction be structured in the following way:

**5.1. Eligibility should be limited to current PCS and cellular system operators, and auction winners must deploy systems with “3G” capabilities**

The purpose of this designation would be, as we have stated, to improve the ability of U.S. manufacturers, operators, and consumers to participate in the world market for 3G products by aligning U.S. spectrum with worldwide IMT-2000 spectrum allocations. As “3G” has become almost synonymous with the ITU’s definition of IMT-2000, we propose

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<sup>5</sup> Remarks by Commissioner Susan Ness Before PCIA's PCS '98, Orlando, FL, September 23, 1998

that licensees in this new band must offer a service which matches the ITU's definition of IMT-2000 for at least one of the targeted environments.

In the view of the WCD, it is primarily the current PCS and cellular license holders who have the proper assets in terms of experience and infrastructure that can be leveraged to provide a range of viable 3G services in the US. Therefore, eligibility for participation in the auction should be limited to these operators, in order to limit unproductive, speculative bidding. Such an auction will give these *de facto* 3G operators the opportunity successfully to offer the promised advanced telecommunications capability to the American people.

### **5.2. The spectrum auction should consider current geographical rules.**

Because this spectrum should be used only to enhance the downlink capacity of the cellular and PCS systems as they migrate to 3G, the provisions of the auction should be consistent with the geographical authorizations of existing cellular and PCS licensees.

### **5.3. The existing spectrum cap on operators should be raised, or removed.**

Under the Commission's current spectrum cap:

No licensee in the broad band PCS, cellular, or SMR services (including all parties under common control) regulated as CMRS (see § 20.9) shall have an attributable interest in a total of more than 45 MHz of licensed broadband PCS, cellular and SMR spectrum regulated as CMRS with significant overlap in any geographic area.<sup>6</sup>

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<sup>6</sup> 47 C.F.R. § 20.6

The expectation of migrating current cellular and PCS systems to 3G systems, to meet consumer demand for these services, is not compatible with this spectrum cap. As the cap is no longer appropriate, it should be removed.

**5.4. The 2 GHz MSS operators and successful 2110-2150 MHz auction winners will bear the costs for relocation of the 2110-2150 MHz Fixed Service licensees**

In the Further Notice of Proposed Rulemaking as part of the 2 GHz Mobile Satellite Service (“MSS”) proceeding<sup>7</sup> the FCC addressed the issue of the relocation of the existing 2110-2130 MHz and 2165-2200 MHz band services. The First Report and Order encourages sharing between the fixed service (FS) and MSS at 2165-2200 MHz<sup>8</sup> and, where this is possible, no relocation was required. When sharing was not possible, relocation to bands above 5 GHz was ordered. According to this Report and Order:

“In our Emerging Technologies proceeding, however, we reallocated the 1850-1990, 2110-2150, and 2160-2200 MHz bands from FS to emerging technologies, a total of 220 megahertz. We made a total of 2,480 megahertz of spectrum available for relocated FS licensees in the 4, 6, 10, and 11 GHz bands. Even though some of the higher-frequency spectrum is shared with other services, we believe that there is enough spectrum in those bands to accommodate relocation of the incumbents of 220 megahertz of spectrum, including the existing 2110-2130 MHz and 2165-2200 MHz FS licensees.”<sup>9</sup>

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<sup>7</sup> See Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, ET Docket No. 95-18, FCC 97-93.

<sup>8</sup> 2 GHz MSS proceeding at ¶ 42.

<sup>9</sup> 2 GHz MSS proceeding at ¶ 15.

In general, the Further Notice of Proposed Rule Making proposed to follow the policies established for Emerging Technologies.<sup>10</sup> A period of voluntary negotiations is followed by a period of mandatory negotiation. If a mutually agreeable solution is not found, the Emerging Technologies provider can request mandatory relocation of the FS licensee in which he will (1) guarantee payment of all costs of relocating the incumbent to a comparable facility; (2) complete all activities necessary for placing the new facilities into operation, including engineering and frequency coordination; and (3) build and test the new FS or alternative system.

Since the 2110-2130 MHz spectrum (of interest in this proceeding) is currently paired with 2160-2180 MHz spectrum, relocations should be paid for by both the PCS entities who have an interest in the 2110-2130 MHz band, and the MSS entities who have an interest in the 2165-2200 MHz band.<sup>11</sup> In addition, all service providers who use this spectrum, not just the initial licensees, must bear part of the relocation costs. The FCC must design a compensation system under which multiple IMT-2000 providers can allocate the costs of relocation between them, and under which future providers who would have otherwise been required to pay for relocation could compensate earlier providers.

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<sup>10</sup> 2 GHz MSS proceeding at ¶ 74.

<sup>11</sup> See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, Third Report and Order and Memorandum Opinion and Order, ET Docket No. 92-9, 8 FCC Rcd. 6589 (1993).



**5.5. The Broadcast Auxiliary Service (“BAS”) should be restricted to the 2025-2110 MHz band.**

As part of the 2 GHz MSS proceeding the Commission declared that they did “not believe that this is the appropriate proceeding to determine whether or when BAS should convert to digital format in conjunction with the development of digital television.”<sup>12</sup> The WCD believes that the time has come for the Commission to mandate a transition to more efficient technologies. As other bands undergo a refarming process<sup>13</sup>, and as the television broadcasters undergo a transition to digital broadcasting, it is inappropriate to allow this spectrum to be encumbered by outdated technologies.

**6. Conclusion**

The stated public policy goal of making advanced telecommunications services available to the American people on a reasonable and timely basis<sup>14</sup> can be advanced by wise spectrum management decisions. Designating the 2110-2150 MHz band for 3G

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<sup>12</sup> 2 GHz MSS proceeding at ¶ 32.

<sup>13</sup> See “Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them; and Examination of Exclusivity and Frequency Assignments Policies of the Private Land Mobile Services”, PR Docket No. 92-235.

<sup>14</sup> See 47 U.S.C. § 706(a).

types of broadband PCS services will not only make U.S. technology more available to the rest of the world, but will, more importantly, put the economies of scale available in a worldwide market to work for American consumers.

Respectfully submitted,

Wireless Communications Division,  
Telecommunications Industry Association

By: \_\_\_\_\_  
Jesse Russell, Chairman

By: \_\_\_\_\_  
Eric J. Schimmel, Vice President

Telecommunications Industry Association  
2500 Wilson Blvd.  
Suite 300  
Arlington, VA 22201  
703-907-7700

October 20, 1998