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

In the Matter of	)	
	)	
	)	
Recommendations Approved By	)	IB Docket No. 04-286
The 2007 World Radiocommunication	)	
Conference	)	

Comments of ArrayComm LLC

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SUMMARY

ArrayComm urges adoption of View B. This position reflects FCC as well as United States' Policy regarding the selection of one technology vs. another. Consistently, the Federal Government has espoused a position of technological neutrality, thereby allowing the marketplace to be the arbiter of which technology or technologies will prevail.

Under View A which is prevalent in Europe, the government influences which technology is favored and tilts the availability of spectrum in that direction. WRC-2000 and its predecessor WARC '92 made large amounts of spectrum available for IMT-2000 systems which are a subset of Broadband Wireless Access (BWA) systems. The United States objected and subsequent events validated its position: Many IMT-2000 systems were abandoned or were never constructed.

Now for WRC-2008 a similar attempt is being attempted to make an additional allocation, 695 MHz to 806 MHz, also available for IMT-2000 systems. This would make 857 MHz, in total, available for such systems. This has the support of View A adherents who argue that the accompanying footnote to this allocation does not mandate that it be followed by the U.S. The very reference, however, has a psychological impact and can retard the new and innovative systems that will inevitably come into being. In fact some of the technical requirements that ITU-R would impose on some IMT-2000 systems by 2020 are already being met by today's BWA systems.

In the absence of compelling reasons that warrant a change of policy, ArrayComm recommends that the United States adhere to its present position, as reflected in View B, of giving system developers broad latitude to seek acceptance in the marketplace, free from governmental interference.

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ArrayComm LLC (hereinafter "ArrayComm") appreciates the opportunity to provide comments on the recommendations from the Federal Communications Commission's (FCC) World Radiocommunications Conference Advisory Committee ("WAC") on the United States' proposals to WRC-07.[1] Specifically, ArrayComm provides comments herein on WRC-07 agenda item 1.4, to consider frequency-related matters for the future development of IMT-2000 and systems beyond IMT-2000 taking into account the results of ITU-R studies in accordance with Resolution 228 (Rev. WRC-03).

In sum, ArrayComm urges the FCC to adopt View B and not View A as the U.S. proposal to WRC-07 for agenda item 1.4. Adoption of View A would represent an unjustified reversal of the U.S.'s long-standing technology neutrality policy, a policy reflected in FCC decisions and consistently promoted by the FCC and other U.S. government agencies internationally. A reversal of this U.S. policy should only be done when compelling circumstances arise, recognizing that the consequences will be felt well beyond the specifics of this issue. The evidence to date does not support such a reversal.

[1] *See* FCC Seeks Comment On Recommendations Approved By The Advisory Committee For The 2007 World Radiocommunication Conference, Public Notice, IB Docket No. 04-286, DA 07-26, (Jan. 9, 2007) ("WAC Public Notice").

I. A Comparison of Views A and B

Informal Working Group 3 (IWG-3) of the FCC's WAC was unable to reach consensus on a single proposal for the United States (U.S.) Administration to consider on Agenda Item 1.4 regarding the current and future identification of spectrum for IMT-2000 and for systems beyond IMT-2000, collectively referred to as "IMT" systems. Instead, it has put forth two alternative proposals, "View A" and "View B," which reflect fundamentally different economic philosophies on the role of governments, at both the collective global and individual domestic levels, in determining how the global telecommunications market should grow.

The key difference between "View A" and "View B" is that View A calls for an enormous swatch of spectrum, 857 MHz in total, to be identified solely for IMT systems.

Such systems are by definition a subset of the broader category of Broadband Wireless Access (BWA) systems, which are currently available or will in the future be available commercially. Having already adopted the approach presented in View A, the ITU-R has established itself, and its Working Party 8F specifically, as a gatekeeper for which of the BWA access systems have priority access to bands identified in the Radio Regulations (RRs) in footnotes 5.388, 5.317A and 5.384A. It is our position that this approach has been tested since WRC-2000 and has only served to depress the wireless marketplace to the detriment of wireless consumers globally.

In contrast, View B would modify existing and any future footnotes related to IMT systems for "IMT and other broadband wireless access systems." In so doing, View B creates equal access to spectrum to all BWA systems, including but not limited to the IMT systems recommended by the ITU-R.

View A also promotes the "command and control" approach traditionally used in Europe and other markets where regulators decide which technologies can be used in specific frequency

bands. In contrast, View B is far more consistent with U.S. policies of technology neutrality that allow telecommunications service providers to decide for themselves which technologies they should deploy. View A represents a model in which conformity, in service to an otherwise abandoned objective of spectrum harmonization, is established by, or, at least, supervised by governments. View B, on the other hand, represents a pro-competition model that facilitates the unimpeded introduction of new and innovative BWA technologies. It allows the BWA marketplace to grow organically with minimal interference by government.

Despite their differences, View A and View B both identify additional spectrum, 695-806 MHz for IMT-2000 via a footnote that has no regulatory status and that contains text that, states *"This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations."* This band has already been identified in the U.S. as spectrum that will be made available for commercial wireless communications following the Digital TV transition.

ArrayComm believes that neither the "View A" nor "View B" proposals are relevant with respect to selection of bands that may become available in the U.S. market, as well as the manner in which spectrum is allocated in the U.S. Fortunately, U.S. policy affords operators complete freedom of choice for the standards and technology they deploy with their licenses. Thus, while in practical terms the impact on US systems may be minimal, ArrayComm believes that View B is a far more flexible and technology neutral proposal than View A, and as such View B is far more consistent with U.S. domestic spectrum policy than View A. ArrayComm sees no advantage in equivocation.

Further, View A would carry forward the current problems created by the IMT-2000 footnotes and would exacerbate the situation by bringing more spectrum under that umbrella. We expect that all U.S. operators would adamantly oppose this proposal if they believed that the

FCC would adhere to the guidance given by the IMT-2000 footnotes. These footnotes, despite the accompanying disclaimers to the contrary, tell spectrum regulators what systems should (and by omission should not) be deployed in specific frequency bands. Moreover, it sets the ITU-R, and specifically ITU-R Working Party 8F, as the gatekeeper with respect to what systems get to compete in the marketplace. Unfortunately, it establishes regulatory priorities that favor incumbent technologies, and consequentially incumbent equipment suppliers, over new technologies and new entrants.

These footnotes are by their very nature anti-competitive. They create a significant barrier to entry for new technologies, impede innovation and discourage investment in new technology development. If the WRC-07 adopts "View A" and adds the 698-806 MHz band to the existing spectrum identified for IMT-2000 a total of 857 MHz of spectrum identified solely for IMT, would be earmarked leaving little for commercial wireless systems that are not within the IMT family of standards.

Finally, ArrayComm supports View B, because it will ensure that that WIMAX technology and other new, innovative BWA systems have equal access to the identified bands as the other technologies that are currently part of IMT-2000. This will in turn allow the international regulatory regime to keep pace with innovations and globally harmonized spectrum for advanced commercial wireless applications.

II. Lessons Learned since WARC'92 and WRC-2000

Administrations around the world, preparing to address the WRC-07 Agenda Item 1.4 should take heed of what was learned after WARC'92 and WRC-2000. Since WARC'92 and WRC-2000, the IMT-2000 "experiment" has demonstrated that the concerns expressed by the

U.S. regarding "identifying" spectrum in the radio regulations for specific systems were valid and over time proved prescient. In its proposal to the WRC-2000[2], the U.S. stated:

> *"Furthermore, the United States believes that it is essential not to tie specific technologies to specific frequency bands. …. IMT-2000 and other advanced communication applications will naturally evolve from existing technologies in response to market demand, allowing current operators and new licensees in existing mobile and mobile-satellite bands to bring advanced services to consumers as rapidly as new technology allows. This approach has the advantage of not artificially tying the rollout of new technology and service to new spectrum as administrations assess their ability to use that spectrum for IMT-2000 and other advanced communication applications. Although ITU plays an invaluable role in facilitating IMT-2000 and other advanced communication applications, it will be administrations, technology developers, equipment manufacturers and service providers that will ultimately decide when to introduce IMT-2000 and other advanced communication applications based on market factors. The United States believes that support for this evolutionary approach in existing mobile bands will likely lead to a more expeditious implementation of IMT-2000 and other advanced communication applications in bands that overlap globally.*

The U.S. proposal to the WRC-2000 rightfully focused on providing operators the flexibility to deploy the technology of their choice in their existing bands to decide, thereby, how they should respond to market demands.

While "identification" in the Radio Regulations has no regulatory status, it sets precedent and has become the ITU's primary instrument for encouraging administrations to allocate spectrum solely for specific standards. An objective retrospective on IMT-2000 must acknowledge the impact its decisions have had on the marketplace.

First, despite having been granted priority access to more than 746 MHz of globally harmonized spectrum bands through the IMT-2000 footnotes, global spectrum harmonization has not been achieved and many of the recommended IMT-2000 systems have proven to be

[2] Addendum 3 of WRC-2000/12-E, "Proposals for the Work of the Conference – Proposals for Terrestrial and Satellite Components of IMT-2000"

unsuccessful. Our research has concluded that more than 50% of the systems recommended by ITU-R have not been commercially successful. Some are being withdrawn from the market (e.g., TDMA-Single Carrier): others have never been deployed commercially (e.g., CDMA-MC 3X, CDMA-MC eV-DV, TD-SCDMA). The spectrum recommended by the ITU-R for TDD-based IMT-2000 systems[3] (i.e., CDMA-TDD and TD-SDMA) has remained fallow in most countries. The notable exception to this, however, is those countries with technology neutral policies that allow non-IMT-2000 BWA systems to be deployed in IMT-2000 bands.

Second, it is ArrayComm's belief that promotion of IMT-2000 contributed to overbidding in European 3G spectrum auctions. The associated debt burden and delayed introduction of UMTS, the European entry for the IMT-2000 family of standards, contributed to the downturn in the telecommunications industry in the years 2001-2002. The wireless industry is only now beginning to recover from that economic downturn. Third, despite the fact that IMT-2000 includes a variety of standards, some administrations have chosen to favor their domestically-developed IMT-2000 standard. Spectrum allocations in Europe discouraged the introduction of standards, other than UMTS. In China, the world's largest wireless market, none of the IMT-2000 systems has been deployed, in part certainly because of the delay in China's IMT-2000 standard, TD-SCDMA, becoming commercially available.

In today's context and in light of our experience since 2000 with the IMT-2000 footnotes, the U.S. should be equally concerned about the uneven playing field between IMT-2000 and other Broadband Wireless Access (BWA) systems because of the regulatory bias created by the IMT-2000 footnotes. Put in context, adoption of View A by WRC-07 would result in a total of 857 MHz of spectrum identified solely for IMT. What would be left for commercial wireless systems that are not within the IMT-2000 family of standards? For all practical purposes,

[3] See Recommendation ITU-R M.1036-1, *"Spectrum considerations for implementation of International Mobile Telecommunications-2000 (IMT-2000) in the bands 1 885-2 025 MHz and 2 110-2 200 MHz"*

nothing! The U.S. market is not immune from the anti-competitive effect that the existing IMT-2000 footnotes create They hinder a fully competitive global market, a market that would ensure the access to the best technology at the lowest price in the U.S. and around the world. The U.S. proposal to the WRC-07 should maintain consistency with domestic policies that have served it well: broad flexibility and global technological neutrality.

Lastly, ArrayComm respectfully requests that the U.S. proposal support the view that spectrum regulators, and, by extension the ITU-R, should NOT: 1) regulate which technologies should be used in the marketplace; 2) allocate spectrum for specific standards and/or technologies that the ITU-R recommends should be used by commercial operators; 3) erect barriers to entry and market impediments for new technologies entering the marketplace; and 4) pick winners and losers. They in turn must allow the marketplace to decide.

III. BWA Systems are within the Scope of Agenda Item 1.4.

There are some who have argued that including BWA in the IMT-2000 footnotes would constitute an expansion of agenda item 1.4. ArrayComm encourages the Commission to reject this. In addressing "the future development of IMT-2000 and systems beyond IMT-2000," the WRC-07 must consider all systems that will have capabilities beyond the IMT-2000 systems. One need only consider the famous "Van Diagram" from ITU-R M.1645 and shown below where systems are mapped onto this chart according to the degree of mobility and the data rates they are capable of supporting. "Systems beyond IMT-2000" are those supporting higher data rates than IMT-2000 systems – i.e., those systems that can be mapped the right side of this chart[4]. All wireless access systems can be mapped to some point in this space. The ITU-R's definition of BWA systems establishes a minimum criterion whereby any wireless access systems supporting data rates higher than the primary rate is considered to be a BWA system, albeit with

[4] Figure 2 is taken from Recommendation ITU-R M.1645, *"Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000."*

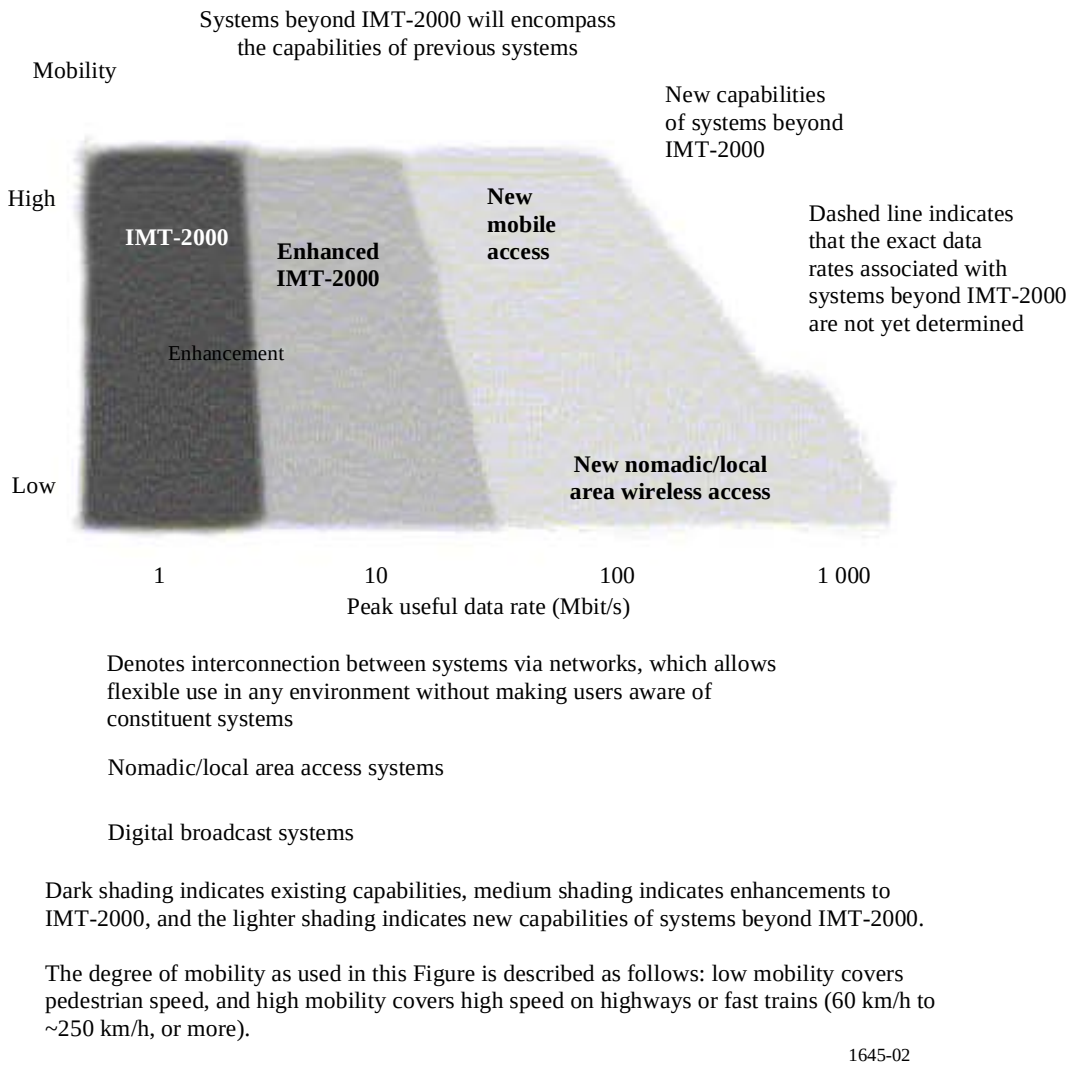
further characterization based on the degree of mobility supported (e.g., Fixed BWA, Nomadic BWA or Mobile BWA)[5]. ITU-R further recognized in Recommendation ITU-R M.[8A-BWA][6] that the existing IMT-2000 systems be considered as providing mobile or nomadic BWA capabilities. From this it is clear that BWA constitutes broad category of systems that by definition must include all "systems beyond IMT-2000" and thus all systems within the scope of agenda item 1.4.

[5] According to Recommendation ITU-R F.1399, *Broadband wireless access* is defined as wireless access in which the connection(s) capabilities are higher than the *primary rate*, which is defined as the transmission bit rate of 1.544 Mbit/s (T1) or 2.048 Mbit/s (E1). *Wireless access* is defined as end-user radio connection(s) to core networks. (NOTE: Recommendation ITU-R F.1399-1, "Vocabulary of Terms for Wireless Access")

[6] Draft New Recommendation ITU-R M.[8A/BWA], "Radio interface standards for broadband wireless access systems, including mobile and nomadic applications, in the mobile service operating below 6 GHz"

FIGURE 2

Illustration of capabilities of IMT-2000 and systems beyond IMT-2000



Dark shading indicates existing capabilities, medium shading indicates enhancements to IMT-2000, and the lighter shading indicates new capabilities of systems beyond IMT-2000.

The degree of mobility as used in this Figure is described as follows: low mobility covers pedestrian speed, and high mobility covers high speed on highways or fast trains (60 km/h to ~250 km/h, or more).

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The ITU-R studies conducted in preparation for this agenda item and reflected in the draft Conference Preparatory Meeting (CPM)[7] Report text took into account the total predicted traffic demand for all forms of wireless access, regardless of the specific technologies used to offer the service. As such, if BWA is not be appropriately addressed under agenda item 1.4, then the spectrum estimates for the IMT-2000 and systems beyond IMT-2000 should be discounted by

[7] CPM07-2/1-E, "*CPM Report on technical, operational and regulatory/procedural matters to be considered by the 2007 World Radiocommunication Conference.*"

the amount of traffic served by the non-IMT-2000 BWA systems. While one can be critical of the many underlying assumptions leading to the spectrum estimates for IMT, it is unquestionable that these estimates are based on the ITU-R's best projection of the total traffic demand for all forms of wireless access systems, regardless of whether they will be recommended for IMT or not.

Lastly, taking a closer look at the assumptions underlying the spectrum estimates in M.2078[8], the methodology on terrestrial spectrum requirement estimation for IMT takes into consideration the new user demand requirements and network deployment. A key factor that determines the total bandwidth requirements is the assumed spectral efficiency of the radio access technology (RAT) groups for the further evolution of IMT-2000 systems, and of the systems beyond IMT-2000. Report ITU-R M.2078 assumes that the spectral efficiency[9] of the pre-IMT-2000 and IMT-2000 systems ranges from .5 to 2 bits/s/Hz/Cell in 2010 and will range from 2 to 4 bits/s/Hz/Cell by 2020. Report M.2078 further predicts that the spectral efficiency of IMT-Advanced systems will range from 2 to 5 bits/s/Hz/Cell in 2010 and from 6 to 10 bits/s/Hz/Cell by 2020. Systems included in ITU-R M.[8A-BWA], which are currently or will soon be commercially available, have spectral efficiencies ranging up to 4 bits/s/Hz/Cell. In other words, the spectrum estimates for FUTURE IMT systems assumed that those systems would have spectral efficiencies then, when in fact the BWA systems of TODAY already meet those levels.

IV. Conclusion

In conclusion, Agenda Item 1.4 of the WRC-07 may provide the last opportunity for the foreseeable future to address these IMT-2000 footnotes and avoid the actual market consequences of having specific bands "identified" in the Radio Regulations for IMT-2000

[8] Report ITU-R M.2078, *"Spectrum requirements for the future development of IMT-2000 and IMT-Advanced"*
[9] *Spectral efficiency* can be measured in either bits/s/Hz or bits/s/Hz/cell.

systems. While “identification” has no regulatory status, it has become the ITU’s instrument for encouraging administrations to allocate spectrum solely for specific standards. We urge the FCC to reject the artificial constraint some wish to impose on agenda item 1.4 and instead promote internationally, the views and policies it has adopted in the U.S. Endorsement of View B as the U.S. proposal to WRC-07 for agenda item 1.4 will help accomplish this goal because it most closely aligns with the U.S. policy of technology neutrality and free market competition.

Consumers around the globe are harmed when competition is stifled. U.S. consumers will suffer with higher prices, poorer performance and slower economic growth when new wireless technologies are impeded from entering the market by IMT-2000 footnotes that recommend older systems over newer ones. The FCC need not say, “I told you so” to the rest of the world. However, it should not shy away from acknowledging that the policies it promoted at WARC’92, and again at WRC-2000, continue to be in the best interests of consumers in the U.S. and around the world. We encourage the U.S. Administration to continue to promote its established policies internationally since they have been borne out to be in the best interest of consumers in the U.S. and around the world.

ArrayComm LLC

February 5, 2007

ArrayComm

ArrayComm is widely acknowledged as the world leader in commercializing multi-antenna signal processing (MAS) software for wireless communications systems (a technology often referred to as "smart antennas" or "MIMO"). ArrayComm's business has been built on a series of implementations of its A-MAS™ software for cellular and BWA industry standards, including W-CDMA, HSPA, WiMAX, GSM, and HC-SDMA.