Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the matter	)	
	)	
Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commissions Rules	)	WT Docket No. 99-168

To: The Commission

PETITION FOR RECONSIDERATION OF ARRAYCOMM, INC.

Respectfully submitted,
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SUMMARY

ArrayComm, Inc. ("ArrayComm" or "Company") is a leader in the development of next generation wireless technology. It is particularly renowned for its development of "smart antennas." In Comments filed in this proceeding, ArrayComm urged the Commission to adopt a regulatory framework that would accommodate the growing demand for high-speed data transmissions. Specifically, ArrayComm recommended the spectrum at issue be allocated on an unpaired basis with emission mask requirements sufficiently stringent to permit the implementation of systems deploying highly-efficient time division duplexing ("TDD") technology. In the First Report and Order in this proceeding, the Commission rejected the recommendations of ArrayComm and other commenters espousing similar views.

In this Petition for Reconsideration ArrayComm respectfully requests that the Commission reconsider its decision to allocate paired spectrum exclusively and reconsider the emission mask requirements established in the First Report and Order.

The Commission should reconsider its decision to allocate paired spectrum exclusively since doing so favors incumbent two-way voice applications over innovative, efficient wireless data services. This bias toward two-way voice service runs counter to the Commission's stated objectives of maximizing the practical flexibility for licensees in the band at issue and promoting innovative uses of spectrum. Because the Commission's decision to allocate paired spectrum favors two-way, frequency division duplexing ("FDD") technology, it impedes implementation by TDD system operators and ultimately inhibits the provision of advanced services to the public.

Paired spectrum allocations have historically been used to provide sufficient separation between transmit and receive frequencies in two-way systems using FDD. This practice, however,

has become spectrally inefficient by comparison with newer, advanced technologies, particularly when used to deliver data transmissions. TDD solves the inefficiency of paired spectrum since it uses the same spectrum for both transmit and receive paths. In light of the tremendous efficiency TDD provides, the Commission should promote its use instead of favoring the less efficient FDD systems.

The Commission did not adequately consider the alternatives to paired spectrum allocation proposed by commenters. Further, the Commission's statement that it is easier to disaggregate spectrum after an auction than to aggregate spectrum during the auction lacks record support and ignores marketplace realities.

The Commission should reconsider its decision regarding emission standards in this band and should adopt a more stringent emission mask to allow for the co-existence of FDD and TDD systems. The fact that the Commission adopted more rigorous emission requirements in respect to adjacent public safety systems, but has declined to do so for the rest of the band, further skews this allocation in favor of FDD systems. For example, If a TDD system is operating in a band adjacent to FDD downlink frequencies which are not subject to adequate out-of-band emission restrictions, there is a high probability that the downlink transmissions of the FDD system will interfere with the reception of the uplink transmissions on the TDD system. If the FCC genuinely desires to "establish an open regulatory framework, with the potential to accommodate both existing and future technologies", it must adopt technical specifications that will permit such an environment to exist, including more stringent emission requirements.

ArrayComm, Inc. ("ArrayComm" or "Company"), pursuant to FCC Rule Section 1.429, petitions for reconsideration of the Commission's First Report and Order in this proceeding, 15 FCC Rcd __, FCC 00-5 (January 7, 2000) ("First Report and Order" or "Order"). In support, the following is shown:

I. ArrayComm's Interest.

1. ArrayComm, a San Jose, California company founded in 1992, is pre-eminent in the development of next generation wireless technology. The company is the world leader in the development and commercial deployment of "smart antennas." Smart antennas, such as ArrayComm's patented IntelliCell® technology, employ spatial signal processing technologies.[1] This technology offers individual carriers, the industry at large and the consuming public important benefits by enhancing propagation, mitigating interference, and reducing the need for spectrum. For individual carriers, it speeds the development of constructing wireless infrastructure, reduces the cost of network build out, and lowers the expense of system operations. The public, in turn, benefits in the form of higher quality service, through improved coverage, enhanced reliability, and decreased cost of service. Ultimately, the broader public interest benefits as a result of improved efficiency, increased productivity and enhanced competition in the wireless industry.

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[1] IntelliCell technology gathers RF information from antenna arrays and employs innovative digital signal processing techniques to dynamically optimize the receive and transmit strategies of a wireless system. By so doing, the system is able to maintain an improved signal quality, dramatically increase its capacity, and expand its coverage, all while achieving significant cost savings compared to existing wireless systems. More information on IntelliCell may be found at ArrayComm's web site at www.arraycomm.com.

2. ArrayComm shares the excitement of the Commission and the wireless industry about the dramatic potential of third-generation ("IMT-2000') wireless systems. Through the deployment of innovative techniques such as ArrayComm's IntelliCell and i-BURST™ technologies[2] and other technological innovations, IMT-2000 wireless has the potential to be as revolutionary as cellular telephone service in expanding our telecommunication options.

3. The spectrum at issue in this proceeding represents the best, nearest-term opportunity for the rapid introduction of low cost IMT-2000 services in this country. Network economics at 750 MHz are far better than at 2 GHz. It is for this reason ArrayComm and others submitted extensive comments in respect to the opportunities it presents for the introduction of advanced technologies, not simply expanding the existing wireless telephone network for which ample spectrum has been made available over the past two decades.

4. Most informed parties acknowledge that spectrally-efficient wireless data transmission, in particular wireless Internet access, is, by far, the fastest growing segment of today's

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[2] i-BURST is a personal broadband wireless access system ArrayComm is developing, which will be able to offer immediate connection Internet access at download speeds of up to 1 Mbps, at costs equivalent or lower than today's fixed land line low-speed service. Although similar speeds are currently available with wireless digital subscriber line ("DSL") service, the cost of that service substantially exceeds the price at which i-BURST may be offered. Moreover, the geographic limitations of DSL service, currently less than 18,000 feet from the telephone company's central office, render the service impractical in non-urban areas.

telecommunications marketplace. Data, not voice, is universally expected to be the predominant wireless application in IMT-2000 services. It is this application which must be accommodated in this and future wireless allocations if the United States expects to maintain its role in the forefront of technological innovations.

5. In its Comments, the Company urged the FCC to adopt a regulatory framework for the band that would facilitate the deployment of cost- and spectrally-efficient, high-speed data transmissions that will bring wireless Internet access to the American public. Specifically, ArrayComm recommended that the spectrum at issue in this proceeding be allocated on an unpaired basis with emission mask requirements sufficiently stringent to allow the coexistence of time division duplexing ("TDD") and frequency division duplexing transmission ("FDD"). *See* Comments of ArrayComm (July 19, 1999). The Company explained that adoption of a traditional, paired spectrum approach with lax emission mask specifications would dramatically reduce the opportunity for providing efficient, interference-free data transmissions, contrary to the FCC's avowed intention to foster more ubiquitous wireless Internet access and to the obvious desires of the American public whose use of the Internet continues to increase at a phenomenal rate.

6. The First Report and Order in this proceeding rejected ArrayComm's recommendations. The Commission acknowledged the arguments of commenters, like the Company, that had urged adoption of smaller, unpaired sub-bands and emission standards intended to facilitate efficient broadband, packet-switched data transmissions, but it nonetheless elected to maintain the status quo. The First Report and Order explained the agency's decision as follows:

> The majority of commenters note, however, that Frequency Division Duplex (FDD), which is the most commonly-used transmission procedure for PCS, cellular and other mobile telephony applications, requires paired spectrum. Pairing of these bands under these

> circumstances will facilitate the auction procedure, by not requiring bidders seeking paired bands to prepare multiple bids. In sum, because paired bands are essential to these technologies, while technologies using unpaired spectrum can operate on paired segments if the segments are large enough, we conclude that the post-auction unpairing of this spectrum creates less of an overall problem for the expeditious activation of these bands than would the need to pursue post-auction pairing, if our rules did not initially establish a paired configuration. Order at ¶ 42.

Putting aside the issue of whether facilitation of the auction process, as a process, should influence the Commission's public interest analysis in adopting its rules, the First Report and Order fails to address a fundamental issue in this proceeding: whether the rules actually provide a technologically-neutral framework in which diverse visions of IMT-2000 services can compete in any meaningful fashion or whether retention of a status quo allocation scheme effectively stacks the deck in favor of incumbent operators providing traditional voice technologies to the detriment of the public's demand for cost-effective, high-speed wireless data capability.

II. The record in this proceeding dictates that the Commission reconsider its decision to allocate paired spectrum exclusively and requires the Commission to tighten the emission mask applicable to transmissions in this band.

7. This proceeding presents a unique opportunity for the Commission to adopt a progressive regulatory framework for the 700 MHz spectrum at issue, one that opens the door to the myriad technological innovations that will drive telecommunications offerings in the 21st century. Unfortunately, the First Report and Order fails to seize this opportunity in two critical respects: the decision to allocate paired spectrum exclusively and adoption of an inadequate emission mask standard. Because these two aspects of the Order will result in an inefficient use of this extremely valuable spectrum, ArrayComm requests the Commission to reconsider its decision on these two issues.

A. The paired spectrum allocation favors FDD-based technologies.

1. The Commission should strive to allocate spectrum in a technologically neutral manner.

8. In fulfilling its unique role of allocating scarce spectrum resources, the Commission should generally strive to facilitate the highest and best use of spectrum. Although the auction process is intended to promote that goal by awarding channels to those who value them most highly, the regulatory framework in which the spectrum is to operate defines even prior to an auction which applications can be implemented efficiently on the channels under consideration. Parties proposing a favored use receive a regulatory advantage; those pursuing an alternative approach labor under a regulatory penalty. A rational allocation scheme will seek to prevent this result for obvious reasons of efficiency. Favoring one use over another defeats the goal of awarding the spectrum to the party that can put it to its highest and best use.

2. The Commission's intent was to allocate the 700 MHz spectrum in a technologically neutral fashion.

9. In the First Report and Order, the Commission plainly strives for regulatory neutrality. Thus, in describing its decision, the Commission indicates its belief that the "10 megahertz segment, consisting of paired 5 megahertz blocks, should prove of interest to parties in the record who desire spectrum to deploy innovative wireless technologies, including high speed Internet access, that do not require as much spectrum [as the 20 megahertz allocation]." Order at ¶ 3. Flexibility of use also was given substantial consideration given the Commission's indications that: (1) "New broadcasting operations that are consistent with our technical rules could also utilize some or all of these blocks;" (2) "we are permitting parties interested in acquiring both licenses in an area to win both in the auction;" and (3) "We also have determined how best to maximize the scope of practical flexibility

afforded licensees in this spectrum consistent with our review of flexible use allocations required by Section 303(y) of the Act." *Id.* If there were any doubt about the Commission's commitment to allowing a marketplace determination of the highest and best use of this spectrum, the First Report and Order put it to rest with the following statement:

> Because the record indicates a wide range of possible technical approaches to serving the expanding demand for wireless services, we have sought to establish an open regulatory framework with the potential to accommodate both existing and future technologies .... By setting the scope of our flexible service rules to enable the most efficient and intensive use of this spectrum, we believe we have fully satisfied our statutory spectrum management responsibilities. Order at ¶ 4.

Unfortunately, contrary to this express determination, the allocation scheme adopted does indeed favor one use of the spectrum over another, as detailed below. For this reason, reconsideration of the First Report and Order in this respect is required.

3. The allocation followed in this proceeding favors established two-way voice applications over spectrally efficient wireless data applications.

10. In allocating the 700 MHz spectrum in the First Report and Order, the Commission seemingly has been persuaded to follow historical precedent rather than promote future opportunities. The paired allocation scheme is not neutral, but is skewed in favor of a two-way **voice** vision of IMT-2000 services and against efficient, high-speed, wireless **data** applications. The allocation of paired spectrum is a holdover from the earliest days of two-way mobile communications. At the time it had a technical predicate. Now, with respect to newer forms of transmission, it not only has little, if any, purpose, but is counterproductive to technological advancement.

11. The historical purpose of paired spectrum allocations is chiefly interference management. It is to provide sufficient separation between the transmit and receive frequencies in a two-way system to avoid receiver desensitization when a radio is operating in duplex mode; in other words, paired allocations prevent the radio from interfering with itself. It is a creature born of poor receiver discrimination, of analog technology, and most importantly of frequency division duplexing. In FDD, the downlink of a two-way radio communication is sent on one frequency with the uplink sent on another. Where the frequencies are adjacent or close to one another, one side of the transmission can interfere with the other if the radio receiver equipment cannot reject (tune out) its own transmit frequency.

12. FDD works for simple voice applications. However, ArrayComm showed in its reply comments in this proceeding that this technique has serious limitations in the area of spectral efficiency. *See* Reply Comments of ArrayComm, Inc., at 5, Table 1 (August 16, 1999). That is illustrated in the following example. In a two-way voice transmission, the amount of information transmitted over the uplink and the downlink are roughly comparable. Yet, separate but equal amounts of spectrum are generally reserved to accommodate the uplink and downlink paths without regard to the actual amount of information transmitted. This virtually assures a substantial degree of spectrum inefficiency because both the uplink frequency and the downlink frequencies are not needed to carry transmissions for much of the available time; logically, half of any paired channel is vacant at least fifty percent of the time, but, more typically, for a substantially greater percentage. Digital multiple access techniques offer meaningful improvements in spectral efficiency by allowing more two-way communications to be conducted over the same amount of spectrum. However, digital transmission is merely the first step in achieving real advances in capacity utilization.

13. TDD solves the inefficiency of paired spectrum. TDD uses the same spectrum for both transmit and receive, i.e., uplink and downlink, paths. Using packet transmissions, the spectrum may be put to virtually continuous use with a resulting substantial increase in system capacity. Receiver interference is avoided, among other reasons, because the radio does not transmit and receive simultaneously. Although the spectrum efficiency of TDD systems for two-way voice is a substantial improvement over existing FDD systems, this technology is overwhelmingly more efficient where high-speed data applications, such as Internet access, are concerned.

14. The very nature of public Internet access is that most transmission capability is required on the downlink side. The uplink path typically consists of user requests for information. Hence although a transmission rate of 56 kbs – provided by standard POTS lines – may be more than sufficient for the uplink side of an Internet access communication, speeds of more than 1 Mbps are desired and required by the public to process and transmit the downlinked information. In the future, even more speed likely will be demanded by the public if it can be provided on a cost-effective basis. Hence, for this and other types of data transport applications, TDD is particularly cost- and spectrum-efficient while FDD is comparatively inefficient.

4. The bias in favor of two-way voice applications undermines the Commission's goals of promoting technological, innovation and making internet access ubiquitous.

15. The Commission recognizes the public benefit the Internet has brought this country, and the role that new technologies will play in making the Internet's availability ubiquitous. In a February 17, 1999, speech setting forth her view of the Commission's priorities for the future, Commissioner Susan Ness stated, "The fifth agenda item is to foster innovation. We will promote

the development and deployment of high-speed Internet connections to all Americans. That means clearing regulatory hurdles so that innovations -- and new markets -- can flourish."[3]

16. The Commission itself recognized the importance of innovative use of spectrum in a recent Policy Statement. There it said, "Our goal is to reduce, wherever we can, regulatory barriers associated with technology experiments because we think that a regulatory climate that encourages technology experiments will make the initial investment into research more attractive."[4] The Commission should consider provision of high-speed data consistent with its stated goal of promoting innovative, new uses of the spectrum.

17. The Commission strives to promote competition in the industry because it ultimately benefits the public. In a July 20, 1999 speech, Chairman William Kennard described the Commission's allowance for flexible use of wireless spectrum as an effort aimed at promoting competition. He explained, "Since the early 1990's, the FCC has given holders of wireless licenses flexibility in their use. This opened the door for wireless Internet access, which is now available in

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[3] Remarks of FCC Commissioner Susan Ness before the Florida Communications Policy Symposium, Tallahassee, FL (February 17, 1999).

[4] *1998 Biennial Regulatory Review - Testing New Technology, Policy Statement*, 14 FCC Rcd 6065 (1999).

dedicated modems or even in wireless phones themselves. We've continued to promote competition by making more spectrum available and doing so without restrictions as to their use."[5]

18. The Internet connects people on an international level and provides communities with unprecedented resources for furthering education, developing business opportunities, and exploring recreational interests. The role of the Internet in the American economy should not be underestimated. Recent projections indicate that in just a few years, Internet commerce will exceed $300 billion.

[5] Remarks by FCC Chairman William E. Kennard Before the Federal Communications Bar, Northern California Chapter, San Francisco (July 20, 1999).

19. With the passage of the Telecommunications Act of 1996, Congress stated its goal of widespread deployment of Advanced Services. Advanced Services have been defined "without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[6] The Commission has stated it is "committed to carrying out Congress's directive to ensure that advanced telecommunications capability is deployed in a reasonable and timely manner to all Americans."[7]

20. The decision to allocate paired spectrum in this proceeding not only fails to ensure the deployment of advanced telecommunications capability in a reasonable and timely manner, but threatens to inhibit the timely introduction of advanced wireless services to the public because it results in favoring existing technologies.

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[6] Telecommunications Act of 1996, Pub.L. 104-104, Title VII, §706(c)(1), February 8, 1996, 110 Stat. 153, reproduced in the notes under 47 U.S.C. § 157.

[7] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion,* 14 FCC Rcd. 2398, 2402, (1999).

21. The essence of the Commission's mistaken conclusion is stated at paragraph 42 of the First Report and Order cite previously:

> we conclude that the post-auction unpairing of this spectrum creates less of an overall problem for the expeditious activation of these bands than would the need to pursue post-auction pairing, if our rules did not initially establish a paired configuration.

22. This represents a policy choice in favor of FDD technology. It is injurious to users who would operate with TDD systems. And it was not necessary. Contrary to the conclusion of the First Report and Order, entities desiring paired spectrum could have been accommodated in a less market-intrusive fashion. In its reply comments ArrayComm suggested the Commission allocate spectrum in several equally-sized blocks of 6 MHz. ArrayComm Reply Comments at 6. Licensees desiring to operate FDD systems could have bid on multiple blocks, separated by other spectrum, thereby achieving paired spectrum on their own without having the Commission mandate it. Likewise, licensees needing non-paired spectrum could have bid solely on the spectrum they needed.

23. By contrast, the approach adopted in the Order fails to provide any meaningful opportunity for those with unpaired spectrum requirements. The Order's assumption that it is easier to disaggregate spectrum after an auction, rather than aggregate spectrum during the auction, lacks record support and ignores an important reality. The Commission requires licensees to pay for the spectrum they acquire at auction. To expect a licensee to buy twice the spectrum needed to implement a business plan, with the expectation that the licensee will be able to resell the surplus for an economically reasonable price, evidences a lack of appreciation for marketplace realities. The bidder would have to obtain at least twice the amount of financing for spectrum acquisition then actually needed, carry the cost of that financing, and then find a buyer for the unneeded spectrum.

24. By contrast, a bidder seeking paired spectrum among unpaired blocks simply faces the auction risk that it would not be successful for the two or more blocks of spectrum it seeks.[8] However, that bidder knows by the end of the auction whether it has been able to satisfy its spectrum needs. It need not carry the cost of excess spectrum or face the possibility that changed market conditions or a scarcity of buyers will hamper its ability to dispose of the unneeded spectrum.

25. It is apparent that the allocation scheme the Commission has chosen in this proceeding, far from being neutral, substantially favors bidders for paired spectrum. As such, it defeats the Congressionally-mandated and Commission-supported policy that spectrum should be awarded to those who would make the highest and best use of it and that the market should make that determination, free from regulatory bias. For these reasons, the Commission should reconsider the First Report and Order and determine to award the spectrum in unpaired blocks.

26. As an alternative, but less economically efficient approach, the Commission could elect a compromise approach, awarding some paired and some unpaired spectrum which is capable

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[8] In this connection, the First Report and Order assumes the need for post-auction pairing if non-paired blocks are auctioned. This is not the case. A rational bidder will seek to acquire paired spectrum at auction by bidding for two blocks of spectrum simultaneously if that is the highest and best use of the spectrum.

of being paired. This would at least ameliorate the impact of technological favoritism in the allocation of spectrum in this proceeding. Should the Commission wish to follow this "compromise" approach, ArrayComm recommends that either the 20 MHz of paired spectrum be separated into two equal blocks of 10 MHz for auction or the 10 MHz of paired spectrum be separated into two equal blocks of 5 MHz for auction. ArrayComm emphasizes this is not its preferred approach, but it is one alternative which would be less discriminatory against advanced technologies such as TDD.

B. Tightening the emission mask is necessary to allow use of the spectrum at issue for TDD applications.

27. A second area requiring reconsideration of the First Report and Order concerns the emission mask for this spectrum. The First Report and Order set the limit for out-of-band emissions of at least 43 + 10 log P outside the licensee's spectrum – except for emissions that fall within the GPS band - but provided additional limitations for emissions into the public safety band of 76 + 10 log P, and 65 + log P db per 6.25 kHz for mobile and portable transmitters into the 764-776 and 794-806 public safety bands.

28. In its reply comments in this proceeding, ArrayComm supported the recommendation of NTIA of an emission mask of -70 dBW per MHz EIRP for wideband emissions.[9] ArrayComm Comments at 9. Other comments proposed similarly more stringent emission masks. *See* First Report and Order at ¶¶ 98-102. By offering more stringent protection only to public safety users, the Commission once again skews the utility of the spectrum at issue, and thus its value, in favor of FDD two-way voice applications.

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[9] The corresponding narrowband limitation would be -80 dBW/700 Hz EIRP.

29. The Commission's imposition of a more stringent emission mask to protect public safety users is an implicit admission that non-public safety users in this band are likely to receive interference from the 43 + log 10 P emission mask the First Report and Order adopts. That interference will be most destructive where it involves dissimilar technologies.

30. For example, FDD systems typically are configured with a relatively high-power downlink (base) on one frequency and a relatively low-power uplink (mobile) utilizing another frequency with a substantial separation between the two, paired frequencies. When all systems in a band, or band pairs, employ similar configurations, this relative disparity in power levels is symmetrical and has no negative impact. TDD systems also use a higher-power downlink than uplink but, unlike an FDD system, the TDD uplink and downlink paths share a single frequency with transmissions alternating in time. If a TDD system is operating in a band adjacent to FDD downlink frequencies which are not subject to adequate out-of-band emission restrictions, there is a high probability that the downlink transmissions of the FDD system will interfere with the reception of the uplink transmissions on the TDD system. A similar problem could arise if a TDD system operates on a frequency adjacent to an FDD uplink band. However, smart antenna technology such as that employed by ArrayComm reduces the total radiated power required by both TDD base stations and subscriber units, thereby demonstrating that a TDD smart antenna system is the optimal "good spectrum neighbor".

31. Out-of-band emission limits that permit coexistence of different technologies in adjacent bands, or distant bands in the case of harmonics, are supported by the comments of many industry and government organizations. *See* First Report and Order at para. 98-102. Besides

promoting innovation and creating a level playing field, such limits are a basic element of any policy for spectrally efficient usage of the prime "mobility spectrum" below 2.5 GHz.

32. Although the First Report and Order explains that it is has balanced the recommendations to adopt a more stringent emission mask standard against the associated costs of doing so with the concomitant impact on the commercial viability of equipment in this band, it nowhere explains the differing standards adopted for protecting public safety licensees versus other users of the band. Instead, again defaulting to historical references, the First Report and Order has merely replicated the emission mask used in other two-way services, notably cellular and PCS. Order at ¶ 100. Those services, however, did not face the potential of supporting materially differing technologies operating in adjacent frequency blocks, as would be the case were FDD and TDD systems to be deployed on this spectrum. Moreover, in actual operation, PCS and cellular systems provide substantially greater protection than the 43 + log 10 P protection mandated here.[10] Thus, imposing a more stringent emission mask would not be a hardship for FDD operators, but would

[10] All major filter manufacturers provide filters that tightly restrict base station emissions in bands such as that used for PCS, providing 10s of dB better out-of-band emissions than those required by the FCC rules. Operators use these filters on base stations in congested areas to prevent their emissions from interfering with the downlinks of other systems operating on adjacent spectrum.

facilitate the co-existence of FDD and TDD systems, thereby allowing the marketplace to determine the appropriate mix of advanced technologies in this band.

III. Conclusion.

33. The 700 MHz spectrum at issue in this proceeding is particularly suited for IMT-2000 applications. While ArrayComm believes the future of IMT-2000 data applications lies with TDD technology, neither its nor any other party's technology selection should dictate the allocation scheme for this band. Instead, the marketplace should be permitted to determine the optimal use of the spectrum, and it will do so if all viable technologies have a meaningful opportunity for deployment. In order to create a level playing field between established FDD and innovative TDD technologies, the Commission should auction 700 MHz spectrum in unpaired blocks, permitting bidders to aggregate spectrum in the bidding process itself. Moreover, the Commission should tighten the emission mask requirement to the level suggested by NTIA, -70 dBW/MHz EIRP for wideband emissions, to accommodate both FDD and TDD uses of the spectrum and promote interference-free operations for all users in the band. With a level playing field, the two technologies, and others, may compete fully, with the ultimate test of which is the superior technology left in the hands of the consuming public.