Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:	)	
	)	
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 Ghz For Mobile and Fixed Service to Support The Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems	)	ET Docket No. 00-258
	)	
Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000; Review of Spectrum and Regulatory Requirements for IMT-2000	)	RM-9920
	)	
Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/ 2670-2690 MHz Frequency Bands for the Mobile-Satellite Service	)	RM-9911

To the Commission:

EXECUTIVE SUMMARY

The Commission's well-established **technology-neutral** approach should be maintained with regards to 3G spectrum allocations. It is necessary to allocate **both paired and unpaired spectrum** to provide an equal opportunity for the deployment of TDD-based as well as of FDD-based technologies. Comments and suggestions from companies such as AT&T, Nortel, and others, advocating the exclusive allocation of paired spectrum, are attempts to create barriers to open market competition as well as intended to stifle the development and deployment of new and innovative technologies.

The **data-intensive** applications and services that **will drive tomorrow's wireless markets** will be drastically different from today's telephony/circuit-switched services. It is therefore imperative for the Commission to **not** give undue importance to backwards

compatibility issues or to incumbent technologies as advocated in their comments by companies such as Qualcomm. Following their comments would negatively impact the US consumer and serve to deter new entrants as well as slow the proliferation of new and innovative technologies.

Well-substantiated comments by companies such as Qwest Wireless, Siemens, ArrayComm, and others, well known for their innovative technologies, **strengthen** our **case** about the benefits of **TDD-based technologies**. However, the arguments of companies such as Lucent, Nortel Networks, and AT&T and associations such as the TIA, opposing the allocation of unpaired spectrum, are unsubstantiated and do not consider the broader issues of supporting innovative development for a broader set of wireless technologies. These companies fail to mention or realize, that their efforts to prohibit the allocation of unpaired licensed spectrum for 3G advanced wireless services would prevent the US from more effectively competing with the rest of the World over the long term.

The main point we would like to stress is that new technologies already under development **have the potential to revolutionize** traditional telephony/circuit-switched networks concepts. Failure to provide proper regulations and 3G spectrum allocations conducive to supporting innovation and competition is guaranteed to restrict crucial developments in break through technologies.

To summarize our key view points:

1. Large companies and trade organizations naturally use their influence to leverage the market in favor of their interests. Unfortunately the impact is that small companies are unable to bring exciting new innovations to the market as incumbents defend their markets by building higher barriers to entry for new small companies.

2. As US history has shown, nearly all, new break-through technologies have typically come from small companies striving for more innovative solutions.
3. Many small and highly innovative companies today, like LinkAir Communications, are working on innovative break-through technologies to improve the spectral efficiency of TDD based wireless systems.
4. These new TDD based wireless systems will require new unpaired licensed frequency bands so that these break-through technologies can be shared with service providers and consumers of advanced wireless services.
5. IMT-2000 has allocated unpaired licensed frequency bands in order to support TDD-based technologies, recognizing the benefits of these technologies. Not allocating unpaired spectrum would put the US at risk of lagging behind other regions.
6. Backwards compatibility for the network is not needed since affordable multimode handsets and other new solutions can be realized today with today's advanced technologies. Therefore, TDD and FDD based wireless networks can co-exist in the same markets.

We finally conclude by proposing a spectrum allocation plan:

1. Allocating the 1710-1755 MHz band to be paired with the 1805-1850 MHz band, as proposed by Siemens, and mentioned in Option 2 of NPRM
2. Allocating portions of the 1755-1805 MHz spectrum to be set aside as unpaired frequency bands as advocated by Motorola
3. Allocating portions of the 2110-2150 MHz spectrum and 2160-2165 MHz spectrum to be set aside as unpaired frequency bands as proposed by Siemens

We sincerely appreciate the Commissioner's time, effort and support in identifying and allocating additional 3G licensed unpaired frequency bands for the upcoming 3G spectrum auctions.

LinkAir Communications Reply to Comments

Introduction

We appreciate the opportunity to respond to comments presented by other organizations regarding the Notice of Proposed Rule Making ("NPRM"), where the FCC explores *"the possible use of frequency bands below 3 GHz to support the introduction of new advanced wireless services, including third generation ("3G") as well as future generations of wireless*

LinkAir Communications, Inc. is a wireless telecommunications startup company developing new and innovative wireless technologies in Santa Clara, California. Our technology, called Large Area Synchronized Code Division Multiple Access (LAS-CDMA) has the potential to improve the spectral efficiency of paired frequency bands and unpaired frequency band-based wireless telecommunications systems.

However, our technology can specifically provide the key to unlock the full potential of TDD-based wireless telecommunications systems by allowing more simple system designs for networks and terminals, which ultimately translates into higher performing, lower cost services and products for consumers.

The Importance of a Technology Neutral Approach

The FCC's flexible approach to standards and the policy of not mandating a particular type of technology have proven their benefit many times as an effective way of fostering new and innovative technologies. The technology neutral approach is essential to promoting competition, innovation and economic growth in a fast changing environment.

The FCC's neutral position with regards to technology in fact drew wide support from the industry. AT&T Wireless, Cingular Wireless, Sprint, Qwest Wireless, and France Telecom Mobile Orange and most of the major equipment manufacturers, including Lucent Technologies, Siemens and Ericsson, have expressed firm agreement with the FCC's technology neutral position in their comments to the NPRM.

For example, AT&T Wireless states that *"A critical aspect of this flexibility is the ability of providers to choose the radio interface standard that best suits their particular situation."* Also in support of the FCC's technology neutral position, Lucent further states that *as the spectrum is allocated in a technology-neutral manner, the Commission's allocation decisions in this proceeding should not be negatively impacted by future standards development."* implying that the technology-neutral approach is necessary for accommodating new technologies.

An additional comment from AT&T reiterates its support of technology neutrality. *"Although AT&T provided examples above of the services it anticipates providing in a 3G environment, rapidly evolving wireless technology and consumer demand will likely expand that list as 3G deployment occurs. It is therefore essential that the Commission not attempt to dictate the course of the market. […] A critical aspect of this flexibility is the ability of providers to choose the radio interface standard that best suits their particular situations."*(p. 8 of AT&T comments)

We conclude this section with Lucent's comments, *"…it should be anticipated that market demand will grow, requirements will change, technology will continue to advance, and that radio systems deployed in the new spectrum allocated for advanced wireless services will evolve. Therefore, Lucent urges the Commission to maintain its current policy of technological-*

neutrality, thereby providing operators with the maximum flexibility to determine the optimal use of the available spectrum."

Pursuing Technology-Neutrality through Equal Support of Innovations

We would like to point out that maintaining neutrality in the matter of new advanced wireless services spectrum allocation will require specific actions on the part of the FCC. As we will show further on in this document, there are several new wireless technologies that are better suited to meet the needs of service providers deploying advanced wireless services than the technologies based on older standards. New systems, such as Time Division Duplex (TDD) based wireless systems require a different way of allocating spectrum; unpaired frequency bands rather than paired frequency bands. These wireless technologies based on a TDD concept, combined with recent state of the art developments, have the potential for unlocking vast benefits for future wireless services.

There is clear evidence that the decisive factor for operators in choosing whether or not to deploy a TDD based system will be whether or not unpaired spectrum is allocated. AT&T Wireless statement clearly indicates that they would not consider deploying a TDD based wireless system if the spectrum allocation were not appropriate. *"…TDD systems can cause significant interference to existing FDD systems, resulting in a noticeable deterioration in the FDD systems' operating range. To overcome these problems, a fairly wide guard band would be required. Accordingly, AT&T recommends that allocation or identifications for TDD not be made at this time."* (p. 9 of AT&T comments)

Ironically, while AT&T claims to support the technology neutrality stance of the FCC, AT&T clearly is attempting to restrict the development and deployment of TDD based wireless systems for 3G advanced wireless services.

Deployment of TDD based wireless systems in paired frequency bands

Although a TDD based wireless system could potentially be deployed in paired spectrum, we concur with comments that state it would be possible but only at a significant disadvantage to advanced wireless service providers choosing to do so. It is therefore not reasonable to assume that TDD based wireless systems would be deployed in a paired spectrum allocation.

The Commissioner's should recognize the allocation of 3G spectrum impacts the innovative development of new wireless systems not requiring paired spectrum

While several organizations have encouraged the FCC to adopt a technology-neutral position, the same ones have provided many negatively oriented comments based on unbalanced technical statements to discourage the Commissioners from adopting a spectrum allocation plan that would enable other wireless systems to compete on a level playing field.

In order to remain consistent with its technology neutrality stance, the FCC should therefore adopt an equitable and balanced attitude in allocating paired and unpaired spectrum. Failure to apply this principle will undoubtedly place a significant unfair disadvantage on a whole family of technologies. Not allocating any unpaired spectrum is equivalent to mandating that no TDD-based technologies be deployed.

3G is not 2G – New Services Require New Technologies

Characteristics of Advanced Wireless Services and the Technological impact

"Now with the exponential growth of the Internet, an additional allocation of spectrum is likely necessary to support anticipated demand for consumer mobile data services." NPRM, par. 12. *"Perhaps the largest area for growth is in the provision of mobile data services, which is*

being fueled by advances in mobile handset technology. Many new handsets, through the use of technologies such as Wireless Application Protocol ("WAP") and Bluetooth™, and through advances in operating system design, are now capable of sending and receiving email and browsing the Internet. These are a wide array of ***non-voice*** *information services ranging from paging/messaging to vehicle tracking from satellites to wireless Internet connections and electronic mail via telephone handset, portable computers or Personal Digital Assistants ("PDAs")."* NPRM, par. 15. *"Many commenters to the CTIA Petition asserted the need for additional spectrum to facilitate the introduction of advanced wireless systems. Some noted the expected* ***growth of mobile data services worldwide****, especially for Internet capabiliby,* ***as the basis for additional spectrum.****"* NPRM, par. 26.

The justification for new spectrum for advanced wireless services and applications (such as so called 3G services) lies clearly with the deployment of totally new non-voice services to the consumer. For that reason, Third Generation wireless should not be seen as a technology upgrade but as a significantly different new class of services requiring unique technological solutions that are different than 2G systems.

While current cellular and PCS networks with their current spectrum allocations are adequate to serve the wireless voice traffic in the foreseeable future, new advanced wireless services as envisioned in the NPRM (*"toll-quality voice, high-speed data including Internet and other multimedia applications, and full-motion video"* NPRM, par. 28) will require new technology and spectrum in order to enable delivery of these services in a cost effective manner.

The key factors that should be considered in order to create an environment that supports the innovative development of new wireless technologies are:

1. **Data applications:** Efficient support of wireless data services, including all types of Quality of Service (e.g. ensured quality, best effort quality, …). As discussed above, telephony oriented services cannot be considered the dominant service in advanced wireless systems. Instead a multitude of data applications will form the bulk of traffic in these future 3G systems. We expect that there will be no predominant single "killer application" in these 3G systems; the main goal will be to provide *connectivity and access to information"*.
2. **Enhanced spectral efficiency:** this is an essential requirement for the delivery of cost-effective mass deployment of wireless services as well as for the optimal use of scarce spectrum resource. LinkAir Communications applauds the FCC's effort in ensuring that spectral efficiency is given such a high priority. LinkAir Communications is a wireless technology company based in Santa Clara and is solely focused on improving the spectral efficiency of wireless systems. LinkAir Communications is not alone in this respect; spectral efficiency is clearly an issue that impacts consumers, operators, equipment vendors and innovators.
3. **Convergence:** Convergence with other telecommunication and information technology trends: most current and past wireless systems have been designed as "legacy" telecommunication systems. More precisely, most, if not all of the 1G and 2G systems have been built around a circuit switched, voice-centric concept, with a primary focus on backward compatibility. The last few years have seen the emergence and very fast progression of data centric telecommunication systems, at the forefront of which is the Internet. It is imperative that future wireless systems be designed and built around this fundamentally new concept to the wireless industry. We also note that by in large, the

IMT-2000 standards have also been designed with backward compatibility and voice centric concepts at their core.

4. **Flexibility to leverage technological evolution:** In setting the rules for usage of spectrum for the next generation of wireless technology, it is of the utmost importance to adopt a forward-looking attitude in considering technological aspects. In particular, rules should not be drafted based on short-term limitations introduced by current technologies. Many new exciting developments are indeed taking place in the industry. For example, LinkAir Communications believes that new coding techniques in spread spectrum code division multiple access systems offer the promise of greatly superior performance for wireless systems.

Legacy system requirements should not prohibit or restrict the deployment of new technologies

While backwards compatibility is an important factor for incumbent operators and vendors, in order to save cost for the deployment of new equipment for their network, it should be kept in mind that future wireless services such as the ones envisioned for so-called Third Generation wireless services will differ radically from the voice centric and circuit switched oriented paradigm representative of current and legacy systems (so-called 2G and 1G).

Some organizations who have provided comments to this NPRM are interested in preserving their investment, stifling innovation by building higher barriers to entry in this market. But the need to constantly enhance and develop new systems to meet future market demands far exceeds the short-term benefit of preserving compatibility with previous generations of technology.

IMT-2000 standards constitute a framework for advanced wireless services, but new technologies are currently being developed that far exceed the capabilities of these standards. IMT-2000 standards were in fact developed with a restrictive focus on now defunct circuit/voice paradigm and completely missed the opportunity to leverage the use of fast developing packet-based architectures and protocols such as the Internet Protocol (IP).

Once again, not only should the FCC adopt a neutral attitude and allow deployment of any technology but also it should encourage the development of new and innovative systems by creating a 3G spectrum landscape that will provide fertile soil for the growth of new technologies.

Clarifying the Facts of TDD Based Wireless Systems

Siemens comments that *"…,the main demand for high bit rate unsymmetrical services is expected in the hot spots covered by micro and pico cells. … For operation in such an environment TDD is better suitable than FDD. Unfortunately there is not enough spectrum allocated for TDD up to now."* (p. 13 of Siemens comments) Qwest Wireless comments, *"TDD, for example, allows operators to maximally leverage their spectrum resources when providing asymmetric services, and TDD air interfaces enhance the efficiency gains of smart antennas. TDD and similar technologies also provide the Commission additional flexibility in allocating spectrum."* (p. 4 of Qwest comments).

Some comments explicitly or implicitly carry a recommendation to not allocate unpaired spectrum, thereby potentially barring a whole class of technologies, namely TDD, from being deployed. These negative comments usually focus on attempting to prove that TDD based systems are not spectrally efficient and have no benefit or are subject to many limitations. We

note that these views usually correspond to either a misunderstanding of the state-of-the-art TDD based wireless systems, or a judgment based on relatively old technologies. We also note that these comments originate by mostly "incumbent " companies either operators or vendors – with large interests in legacy voice networks. It could even be argued that only TDD-based systems make sense for advanced wireless systems, given the preponderance of asymmetric traffic that will undoubtedly circulate over those systems.

Extensive industry support for allocating unpaired frequency bands

LinkAir Communications is not alone in advocating the FCC create a spectrum allocation plan that permits a fair and reasonable deployment of TDD based systems.

ArrayComm states that, *"While TDD can be used to transmit voice communications in a spectrally efficient manner, its efficiency for data use is unparalleled."* In addition, *"Although TDD systems handle voice traffic effectively, they shine when the communications are asymmetrical, particularly where data is involved. Large scale systems such as DECT and PHS use TDD; virtually all wireless LAN technologies employ TDD, as do some LMDS technologies."*

Siemens points out that, *"If FDD should be used for serving applications with asymmetrical ratio between forward and reverse link it's spectrum efficiency is worse than the efficiency of TDD."*

QWEST states that *TDD "allows operators to maximally leverage their spectrum resources when providing asymmetric services"*

Even the strongest critics of TDD based systems concede that there are applications in which TDD systems are appropriate and effective at providing valuable advanced wireless services. Lucent states that: *"TDD applications might include alternative access for telephony*

and/or the provision of higher data rates in a densely populated area, where the desired area of coverage is small. Operators might therefore consider a mix of FDD and TDD systems, dependent upon traffic density, the services demanded, and the relative costs."

As Siemens, Lucent and Arraycomm have shown, TDD based systems have inherent characteristics that permit TDD based systems to manage highly asymmetric traffic whereas FDD based systems will ultimately require asymmetric paired frequency bands, which current standards do not yet support. TDD-based systems enable service providers the flexibility to provide valuable advanced wireless services in a spectrally efficient, cost effective manner with a high quality of services for their customers.

TDD based wireless systems already commercially deliver 3G advanced wireless services

TDD technologies have been deployed in large-scale environments as proven by the example of Personal Handyphone System (PHS). PHS, which is based on TDD, is extensively deployed in Asia. It provides ubiquitous indoor and outdoor coverage and currently supports data rates of 64 kbps with 128 kbps services being rolled out by some operators later this year. We note that this level of service exceeds that anticipated of initial 3G deployments.

PHS had more than nine million subscribers worldwide at the end of last year, with more than thirty-seven million forecast for the end of 2002. Given that the only system in existence that is providing third-generation services on a wide-area basis today is a TDD system it is inappropriate to claim that TDD is not suitable for wide-area delivery of third-generation services.

TDD based wireless systems are recognized as an international standard and technologies appropriate for delivering 3G advanced wireless services

IMT-2000 standards support FDD and TDD based systems deployed in unpaired spectrum bands. These standards, such as the TD-SCDMA proposal or the UTRA TDD standard are first steps toward efficient wireless data systems.

Asymmetric traffic is a characteristic of successful deployments of 3G Advanced Wireless Services

Lucent states that "*While current advanced wireless data services, such as wireless Internet access, may become increasingly more asymmetric, it is expected that voice traffic, which is typically symmetric, will continue to constitute a significant percentage of overall network traffic. In addition, future potential high bit rate advanced wireless data services, such as video conferencing or image transferring, may likely require symmetric operation or may have asymmetric properties opposite those related to current wireless Internet access.*" (Lucent comments, page 4)

Most analysts agree that wireless data traffic will quickly exceed the volume of traffic generated by voice and telephony type communications over wireless systems. This trend is in fact a critical metric in measuring the successful deployment of Advanced Wireless Services because these services are a critical element in justifying the business case for developing and deploying new technologies in a near saturated wireless telephony centric market. Since TDD systems have intrinsic benefits for spectrally efficiently supporting asymmetric traffic, it follows that TDD systems will result in a more efficient use of spectrum than FDD systems for future wireless applications and services.

The rate of deployment for European wireless systems in the unpaired frequency bands should not be used as an indicator of future US deployments

On page six of their comments, Lucent states: *"Although licenses for 3G services in some European countries include unpaired spectrum together with paired spectrum, such allocations may result in spectrum that remains unused if the licensee has no plans for the use of TDD systems. It would appear more efficient, therefore, to allocate paired spectrum and permit the licensee the flexibility to deploy TDD systems if they desired."*

Such a proposal fundamentally favors FDD systems since any operator planning to deploy a TDD system would have to buy several times more spectrum (2x15 MHz paired vs. 10 MHz unpaired, for example) than they commercially need in order to provide their particular Advanced Wireless Service.

Rather than prohibiting the allocation of 3G unpaired frequency bands, we propose that a more reasonable approach would be to allocate independent and unbundled licensed frequency bands for paired spectrum and unpaired spectrum, unlike the bundled paired and unpaired frequency auctions that took place in Europe. This would satisfy the needs of operators solely interested in either paired frequency bands or unpaired frequency band licenses.

Appropriate out-of-band emissions rules would need to be created to allow the different technologies to co-exist on neighboring bands. Other commenters have added their voices to supporting allocating unpaired spectrum, including both Siemens and Cingular mentioning that the 2110-2150, 2160-2165 band *"may be particularly well-suited for TDD systems"* (page 27 of Cingular comments).

Every type of wireless system has unique resolvable complexities

On page seven of their comments, Lucent states: *"Further, interference between TDD systems can also be problematic as the time synchronization required for intersystem coordination between TDD systems is complex."*

The time synchronization required for intersystem coordination between TDD systems is done by using GPS receivers at the base stations or using other time synchronization methods. A meaningful set of out-of-band emissions rules can also serve to solve this issue.

We were also surprised to see TIA adopt a non-neutral technological attitude in its response on the subject of spectrum pairing options (section B, page 7).

We wonder how much of these comments reflect the consensus of TIA member companies and how much technical discussion has taken place to reach those detailed technical conclusions, most of which are in error. For example, one comment states that *"A further problem is that asymmetric capacity allocation, typically involving more downlink slots than uplink slots immediately implies reduced service capabilities (lower data rates) for all users in the uplink"*. By definition of asymmetric traffic, more capacity (i.e. data rates) is required on the uplink when compared to the downlink. There is therefore no validity to the point that service capabilities will be reduced.

FDD and TDD systems can each provide 3G Advanced Wireless Services

TIA claims that FDD systems do not suffer from *"… any of the drawbacks of TDD systems"* and *"FDD-based systems can accommodate all service combinations that a TDD system supports" and that "TDD thus offers no inherent advantages over a FDD system in terms of*

TIA in fact does not provide any information as to how a FDD system can cope with asymmetric traffic in an efficient manner (i.e. without making wasteful usage of spectrum). FDD systems cannot economically or spectrally efficiently support anticipated market scenarios of asymmetric traffic over the long term without an asymmetric paired band allocation.

TDD based wireless systems are well suited to support the asymmetric traffic anticipated in delivering Advanced Wireless Services

While we agree with the TIA that the amount of asymmetric traffic is difficult to predict we cannot agree with their opinion that TDD is not suited to address this issue. FDD systems have a limited ability to address asymmetric traffic. This limitation is constrained by the size of the frequency band, usually the forward link in FDD systems. As a consequence the reverse link is under-utilized.

In TDD systems, the forward and reverse link share the same frequency band and as a result, TDD systems have an inherent ability to more effectively manage asymmetric traffic by dynamically modifying the allocation of forward and reverse link data. Unlike FDD systems, if there is highly asymmetric traffic, similar to Internet usage patterns TDD systems can be designed to avoid under utilizing the reverse link.

As Lucent and the TIA have both pointed out, asymmetric frequency band allocation is not supported by international standards. Clearly FDD systems have no technological solution to efficiently manage highly asymmetric traffic, which avoids utilizing the reverse link frequency band, without ultimately requiring asymmetric frequency paired band allocation.

Recent developments in TDD based systems permit more spectral efficiency

We believe that highly spectrally efficient TDD based systems can be developed with state of the art technologies which can perform as well as, if not more effectively, than FDD systems (i.e. macro-cells and vehicular mobility) under fair, reasonable and relevant assumptions and benchmarks.

For example, spread spectrum CDMA systems using enhanced spreading and randomizing codes can reduce inter-cell interference and allow large-scale deployment of TDD systems. With

this advanced coding technology, TDD-based systems can provide equivalent performance to FDD-based systems with respect to coverage and mobility, but also TDD-based systems can exceed the performance of FDD-based systems in supporting wireless data services.

TDD based wireless systems are inherently more flexible in nature because it is much easier to manage time slots than to reconfigure spectrum allocation. This means that TDD-based systems may support any ratio of asymmetry, including symmetric traffic such as voice or 2-way video.

Spectrum allocation proposal

We appreciate the complexities and the challenge the FCC faces in identifying spectrum for reallocation to support the deployment of 3G Advanced Wireless Services. To aid the FCC in this task, we would like to provide a spectrum allocation proposal and express our support for the series of spectrum allocation proposals from Siemens and elements from Motorola's.

Allocate the 1710-1755 Mhz spectrum to be paired with the 1805-1850 Mhz spectrum

As Siemens stated in their comments, *"This band is designated by the ITU for IMT-2000 and is available in region 2 and in many countries around the world. Cost effective global roaming will be possible through the introduction of dual-band terminals using this band and the original IMT-2000 core bands at 2Ghz."*

In addition, we encourage the FCC to extend it's support for this proposal and to continue it's technology neutrality policy by allowing the use of any technology in this paired frequency bands.

Allocate portions of the 1755-1805 Mhz spectrum for unpaired frequency bands

As Motorola has suggested in its comments: *"To the extent that additional spectrum from the 1780-1800 MHz band can be made available for non-government uses, this proposed band plan would allocate that spectrum* ***for time division duplex technologies****. In order to avoid sharing issues between TDD and FDD systems, it is recommended that TDD uses in that spectrum be limited to low power devices (indoor) similar to the User PCS allocation at 1910-1930 MHz or, otherwise appropriate guard bands must be implemented."* Page 25.

Allocate portions of the 2110-2150 and 2160-2165 Mhz spectrum for unpaired frequency bands

"Siemens proposes to the FCC to allocate the bands 2110-2150 and 2160-2165 MHz for New Advanced Wireless Services, i.e. IMT-2000 services. This band should be used for TDD applications in order to enable high data rate and highly asymmetric applications in densely populated urban areas."

Allocate portions of the 2500-2690 Mhz spectrum for unpaired frequency bands

"Siemens proposes to the FCC to allocated all available parts of the 2500-2690 MHz band for new advanced wireless services i.e. IMT-2000 services. Spectrum available in this band should be reserved for TDD applications in order to enable high data rates and highly asymmetric applications in densely populated areas."

"It should be noted that the most popular bitrates in ADSL are 768/128 kbits/s. This proves the highly asymmetric nature of Internet/Intranet access."

Conclusion

It is not our intention to persuade the FCC to take a biased position with respect to technologies however we merely intend to balance the views expressed by other participants, in this comment process.

As LinkAir and other companies have pointed out, FDD and TDD based systems are essentially equally spectrally efficient and each have merits as well as disadvantages under certain conditions. We believe that TDD based wireless systems have several unique merits which enable service providers operators to provide 3G Advanced Wireless Services at least as effectively, if not more effectively than FDD based systems.

Based on the merits we discussed, we request the FCC Commissioner's to allocate some of the 3G spectrum as unpaired frequency bands for use by technologies such as TDD based wireless systems.

Thank you for your time and consideration.

Respectfully submitted,

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