Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	ET Docket No. 00-258
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems	)	
	)	RM-9920
Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000: Review of Spectrum and Regulatory Requirements for IMT-2000	)	

COMMENTS OF NORTEL NETWORKS INC.

Stephen L. Goodman
Halprin, Temple, Goodman & Maher
555 12th Street, N.W. Suite 950, North Tower
Washington, D.C. 20004
(202) 371-9100
Attorneys for Nortel Networks Inc.

Of Counsel:

John G. Lamb, Jr.
Nortel Networks Inc.
2100 Lakeside Boulevard
Richardson, Texas 75081-1599

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SUMMARY

Nortel Networks urges the Commission to allocate additional spectrum below 3 GHz that can be used for Third Generation (3G) mobile applications. The continuing growth in demand for advanced wireless services supports the conclusion of WRC-2000 Resolution 223 that there will be a need for significant additional spectrum. Nortel Networks suggests a phased approach to 3G spectrum allocation, with 90 MHz of spectrum to be allocated immediately, and additional allocations to occur after a review completed by the First Quarter of 2003.

Nortel Networks believes that for the first step of this phased approach the Commission should adopt "Option 2" of the NPRM, and allocate the 1710-1755 MHz and 1805-1850 MHz bands for 3G services. Such an allocation meets the technical requirements for 3G services, including support for FDD transmissions and a minimum of 10 MHz paired bands for each service operator. Allocation of these bands will also facilitate global harmonization, which will lower costs and support roaming (without the need to rely on the still unproved software defined radio technology).

Nortel Networks does not believe the Commission should adopt the NPRM's "Option 3," which would entail allocating spectrum in the 2500-2690 MHz bands. Such an allocation would disrupt the business plans of the incumbent licensees. These service providers (as well as manufacturers) have developed and begun to implement changes to their operations in response to the Commission's recent determination to allow two-way digital fixed services in this band, and an abrupt change in policy would seriously hamper these efforts to enhance advanced services competition.

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COMMENTS OF NORTEL NETWORKS INC.

Nortel Networks Inc. ("Nortel Networks") hereby comments on the Commission's Notice of Proposed Rulemaking concerning the allocation of spectrum that could be used for Third Generation wireless systems.[1] In the *3G NPRM*, the Commission seeks input on the amount and timing of spectrum necessary to support third generation wireless services, and also suggests specific bands that could be allocated. As discussed below, Nortel Networks supports a phased approach to the allocation of additional spectrum, and believes that the record firmly supports the eventual need for at least 160 MHz of additional

[1] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, ET Docket No. 00-258, FCC 00-455, released January 5, 2001 ("*3G NPRM*").

spectrum for third generation wireless services. Nortel Networks also believes that the Commission's "Option 2" spectrum pairing proposal[2] is the most appropriate allocation for the first phase of that process. Nortel Networks does not believe, however, that the public interest would be served by the re-allocation at this time of the 2.5 GHz band for 3G purposes as suggested in "Option 3" of the *3G NPRM*.

Nortel Networks is highly interested in this proceeding and well qualified to address the various issues raised in the *3G NPRM*. Nortel Networks was an active participant in the WRC proceedings to assess 3G spectrum issues, and is also actively involved in the ongoing standards development activities in conjunction with the implementation of 3G services and technologies. Nortel Networks is one of the leading suppliers of 3G technologies. In the fourth quarter of 2000 alone, Nortel Networks announced major 3G contract awards collectively estimated at a value of more than $1.25 billion.

Nortel Networks, a world leader in technology, provides solutions for both wireline and wireless telecommunications service providers. Nortel Networks is the leading supplier, in more than 100 countries, of digital telecommunications systems to businesses, universities, local, state and federal governments, the telecommunications industry, and other institutions. The company employs more than 38,000 people in the United States in manufacturing plants, research and development centers, and in marketing, sales and service offices across the country. Nortel Networks is heavily involved in the development of wireless solutions to meet present and future mobile and fixed communications needs using a full range of technologies and standards.

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[2] *3G NPRM* at ¶ 68.

With that background in mind, Nortel Networks now turns to some of the specific technical questions raised in the *Further Notice*.

Spectrum Requirements

As an initial matter, the Commission seeks input on the amount of additional spectrum that will be required to meet projected 3G service needs.[3] Nortel Networks concurs with the Commission that the Internet, mobile data and continued expansion of voice communications will be major drivers pushing the need for additional spectrum. These applications, and the concomitant need for additional spectrum, are already manifesting themselves in the rapid growth of "data" traffic being carried by cellular and PCS carriers. Nortel Networks anticipates continued rapid growth in demand as even more new applications and cheaper, more sophisticated mobile digital devices become available.

This projected increase in spectrum demand to support these services underpins Nortel Networks' continuing support for WRC-2000 Resolution 223, which recommends the allocation of 160 MHz of additional spectrum for Third Generation Wireless Systems through 2010. That recommendation represents the consensus developed after significant research, analysis and discussion among the technical experts. Thus, Nortel Networks urges the Commission to make available an additional 160 MHz of spectrum below 3 GHz to meet 3G needs. As discussed below, however, Nortel Networks does not believe it is necessary to allocate the full 160 MHz at once. Nortel Networks supports a phased approach that would immediately allocate 90 MHz of additional spectrum, with the balance to be allocated subsequently, based on a review of actual developments. Such an

[3] *3G NPRM* at ¶¶ 26-29.

approach would better match the timing of supply and demand, and would also facilitate an orderly transition for the incumbent operators in the various bands at issue here.

Spectrum Characteristics

The *3G NPRM* also seeks comment on the size of the spectrum blocks and other similar technical considerations that will impact the frequencies that will best support these advanced mobile services.[4] In this regard, too, Nortel Networks believes the Commission can rely upon the significant work that has already been undertaken in the international fora considering these issues. Nortel Networks supports the 3G radio interfaces that have been adopted in ITU-R in conjunction with IMT-2000 services. These interfaces use a variety of channel bandwidths, but all could easily fit within 5 MHz channel modularity. Consequently, Nortel Networks suggests a minimum block size per operator of 20 MHz, consisting of corresponding 10 MHz paired blocks. Such an allocation would allow mobile carriers the freedom to offer a wide variety of 3G services. In contrast, smaller blocks of spectrum could constrain operators from providing some of the high-speed services consumers will demand.

Nortel Networks also believes it is important that the spectrum be released in paired blocks with sufficient frequency separation to allow frequency division duplex ("FDD") operations. Although time division duplex ("TDD") operations would eliminate the need for separated, paired channels, the suitability, reliability and efficiency of TDD operations for 3G services remains unproved. Allocating paired 10 MHz blocks will

[4] *3G NPRM* at ¶¶ 28-29.

preserve the operators' option of using either TDD or FDD formats, and thus avoid "stranded" spectrum.

Finally, Nortel Networks believes it is essential that the Commission allocate the 3G spectrum in relatively large blocks, rather than using numerous small "slivers" of bandwidth. If large blocks of spectrum are released (*e.g.*, two paired 45 MHz blocks), then Nortel Networks believes that cost impacts of the block structure will be minimal and base station transceiver costs will be acceptable. In contrast, if small blocks of spectrum are released (*e.g.* two paired 5 MHz blocks), then the probable need for guardbands and/or special block filters may significantly impact deployment cost. The necessity for guardbands and/or special block filters would also adversely affect the services that could be implemented in the isolated blocks. In addition, if several small blocks of spectrum are released with different duplex spacing, this will increase the cost of base stations and handsets, due to the reduced size of the market and increased complexity.

Recommended Allocations

In light of these technical parameters, Nortel Networks fully supports the allocation of symmetrical blocks from the 1710-1755 MHz band and the 1755-1850 MHz band consistent with the Commission's "Option 2" in the *3G NPRM*.[5] Specifically, Nortel Networks urges the Commission immediately to allocate two 45MHz blocks -- 1710-1755 MHz paired with 1805-1850 MHz. As the first phase of what would ultimately be 160 MHz of additional spectrum for 3G services, these 90 MHz of

[5] *3G NPRM* at ¶ 68.

bandwidth best accommodates the technical, economic and operational needs for 3G services.

Allocation of these bands in the United States would align 3G spectrum in this country with the 1.8 GHz band plan used by 2G mobile systems in operation in many other parts of the world, including Europe. Such an overlap would simplify the design of equipment for the global mobile market and facilitate 3G harmonization by enhancing the incentives for regulators in Europe and the rest of the world to allow these frequencies to be used eventually for 3G services. The harmonization in turn will also allow manufacturers (and hence consumers) to enjoy the full advantage of scale economies derived from producing equipment for a global marketplace. In addition, the overlap with 1.8 GHz based services will allow manufacturers to take advantage of the research and development work that has already occurred in connection with designing mobile services equipment that operates in these bands. Thus, allocation of the 1710-1755 MHz and 1805-1850 MHz bands would provide numerous advantages, particularly compared to some of the other bands under consideration.

Nortel Networks has serious concerns with Option 3 of the *3G NPRM*.[6] Under this alternative, the Commission would make available for 3G services the 2110-2150 MHz and 2160-2165 MHz bands paired with spectrum in the 2500-2690 MHz band. The downside to this proposal is that it would require the segmentation of the 2500-2690 MHz band, and the relocation of a large number of stations from the incumbent service providers. As the Commission acknowledged in its interim report assessing this band for

[6] *3G NPRM* at ¶ 69.

3G services: "Any band segmentation option would entail widespread relocation of a large number of stations regardless of the segmentation option chosen."[7]

In a relatively recent decision, the Commission enhanced the flexibility and robustness of this band by permitting two-way digital transmissions.[8] In response to that change, licensees have developed, and begun to implement, changes to their operations. Likewise, manufacturers, such as Nortel Networks, have developed equipment capable of providing advanced fixed wireless services in these bands so as to meet the operators' and end users' needs. An abrupt change as would result from Option 3 would negate much of the work that has already occurred, and would seriously disrupt the business plans of the incumbent licensees. Nortel Networks believes that as a result of these adverse consequences from Option 3, that approach would ill serve the public interest, particularly because another, superior alternative is available – Option 2.

With regard to other spectrum for 3G services, Nortel Networks believes that PCS spectrum can also be used for these advanced services. However, Nortel Networks observes that use of these bands was already assumed in the technical study groups and WRC deliberative processes leading up to the conclusion that there is a need for 160 MHz of *additional* spectrum for 3G services. Thus, the Commission should not rely on PCS spectrum to meet these identified needs.

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[7] *Spectrum Study of the 2500-2690 Band, The potential for accommodating Third Generation Mobile Systems* at p. 60 .

[8] *Two-Way MMDS Order,*13 FCC Rcd 19112 (1998), *recon.,* 14 FCC Rcd 12764 (1999), *further recon.*, FCC 00-244 (released July 21, 2000).

Phased Allocations

For the technical and economic reasons described above, Nortel Networks urges the Commission to adopt Option 2 and rapidly make the 1710-1755 MHz and 1805-1850 MHz bands available for 3G services. Nortel Networks recommends that the Commission take this action as the initial step of a phased approach to spectrum allocations for 3G implementation. Nortel Networks believes that such a phased approach contains numerous benefits, including matching spectrum availability with the expected growth in demand and providing an opportunity for a thorough review of progress before additional steps are taken.

Under the timetable suggested by Nortel Networks, Option 2 would constitute the initial step of a scheduled implementation. By quickly allocating these two 45 MHz blocks of spectrum, the 1710-1755 MHz and 1805-1850 MHz bands should be available for auction on or before September 30, 2002. This timetable will allow for substantial band clearing by mid-2003, which will avoid hindering the expected widespread operational rollout of 3G services in that timeframe. Thus, the initial allocation would match the expected surge in demand with new capacity.

Phase Two would entail a Commission review of actual market developments, and with the availability of more accurate information, the adoption of an appropriate spectrum allocation time line. Nortel Networks believes this review and time line should be completed around the First Quarter of 2003. At that point, the Commission would be in a position to assess the accuracy of the WRC-2000 determination that 160 MHz of

additional spectrum would be necessary for 3G services, and allocate additional spectrum accordingly.

This phased approach to allocating spectrum is consistent with Commission actions in the past. In the case of cellular service, for example, the Commission held some spectrum in reserve, and made that additional spectrum available later, after confirming that the projected demand materialized.[9] Nortel Networks believes that a similar process should be employed here. If the demand projections prove to be overly optimistic, there would not be large amounts of "stranded" spectrum. Conversely, if the demand exceeds expectations, the Commission would be well positioned to allocate sufficient additional bandwidth on a timely basis.

Another advantage of using a scheduled review is that it will allow the Commission to determine whether expected technological enhancements, such as Software Defined Radio ("SDR") technology, materialize as expected. SDR technology promises frequency agility and dynamic reconfiguration of radio transmitters and receivers to enhance spectrum utilization and efficiency. However, Nortel Networks urges caution in presently relying on advanced technology to fulfill the need for the additional 70 MHz of spectrum beyond the initial 90 MHz advocated by Nortel Networks in Phase One.

The proposed Phase Two review will allow the Commission to assess the development of technology and its impact on the economics and attractiveness of 3G services, and factor that analysis into the need for additional 3G spectrum.

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[9] *In the Matter of Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems*, 2 FCC Rcd 1825 (1986).

Global Consistency: Economies of Scale/Roaming

As a manufacturer operating around the world, Nortel Networks is well aware of the principles of economies of scale that can be achieved by harmonization of RF bands internationally. Assuming carriers deploy similar services, development costs for both software and hardware, along with associated maintenance costs, will be lower in direct proportion to the degree of uniformity among bandplans. There are significant benefits to suppliers to be able to use common design, common components, and ideally common products to address global markets. If terminals and base stations for the U.S. market require significant differences, this is likely to raise costs and delay availability, undermining the Commission's objective of ensuring the United States has a globally competitive wireless infrastructure.

Nortel Networks believes that one of the critical attributes of 3G is the ability to support global roaming for these advanced services.[10] Nortel believes that worldwide use, penetration, coverage and capability of mobile services are still rapidly expanding as demonstrated by the recent 2G and 3G spectrum auctions. Such increased demand should logically extend to consumer desire for global roaming. The differing standards and bandplans adopted in different countries to date have significantly inhibited the availability of terminals capable of global roaming. As a result, the global roaming market has not yet developed to a significant degree. Nortel Networks expects, however, that significant growth of global roaming will result from increasing mobility of the workforce and universal availability of services offered by 3G technology.

[10] *3G NPRM* at ¶ 24.

While global roaming can most easily be achieved by common spectrum allocations worldwide, global harmonized spectrum allocations may be difficult to achieve. Different sets of incumbents in various countries could make it difficult to allocate an identical set of large blocks of spectrum for 3G services. Moreover, as noted above, the Commission cannot simply rely on yet unproved advanced technologies to facilitate the use of widely different spectrum blocks.

An alternative solution, which is potentially more viable, is to have a small set of unified bandplans worldwide. Under this approach, a multimode handset can provide worldwide roaming in the following scenarios:

- subscribers staying within one country would use terminals operating in one of the bandplans
- subscribers who visit other countries could have a terminal designed to operate across a small set of bandplans[11]

The WRC-2000 recommendations facilitate such roaming by encouraging countries to allocate 3G spectrum within a relatively small number of bands. Nortel Networks believes that Option 2 advocated above would also support such a global roaming approach, because it harmonizes allocations between the United States and Europe, and thus creates a "critical mass" that will provide other countries with strong incentives to make at least parts of those bands available for 3G, and thereby enjoy the benefits of scale economies and global roaming.

[11] Nortel Networks observes that today 2G-system triple mode handsets are available (single handsets compatible with 800 MHz analog cellular, 800 MHz CDMA cellular and 1900 MHz CDMA PCS, along with single handsets compatible with 900 MHz GSM, 1800 MHz GSM and 1900 MHz GSM). Thus, this approach does not depend on the commercial viability of SDR technology.

Conclusion

Nortel Networks applauds the Commission's efforts to allocate additional spectrum for 3G services in a timely manner. As detailed in these initial comments, Nortel Networks believes that the best way to meet this goal is the immediate allocation of the 1710-1755 MHz and 1805-1850 MHz bands for 3G services, along with a scheduled review by the First Quarter of 2003 to determine the amount and timing for further allocations. Nortel Networks believes that such a phased approach will best serve the public interest.

Respectfully submitted,

/s/

Stephen L. Goodman
Halprin, Temple, Goodman & Maher
555 12th Street, N.W. Suite 950, North Tower
Washington, D.C. 20004
(202) 371-9100
Attorneys for Nortel Networks Inc.

Of Counsel:

John G. Lamb, Jr.
Nortel Networks Inc.
2100 Lakeside Boulevard
Richardson, Texas 75081-1599

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