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

In the Matter of	)	
	)	
Amendment of Parts 1, 21, 73, 74 and 101 of	)	WT Docket No. 03-66
the Commission's Rules to Facilitate the	)	RM-10586
Provision of Fixed and Mobile Broadband	)	
Access, Educational and Other Advanced	)	
Services in the 2150-2162 and 2500-2690	)	
MHz Bands	)	
	)	WT Docket No. 03-67
Part 1 of the Commission's Rules - Further	)	
Competitive Bidding Procedures	)	
	)	MM Docket No. 97-217
Amendment of Parts 21 and 74 to Enable	)	
Multipoint Distribution Service and the	)	
Instructional Television Fixed Service	)	
Amendment of Parts 21 and 74 to Engage in	)	
Fixed Two-Way Transmissions	)	
	)	WT Docket No. 02-68
Amendment of Parts 21 and 74	)	RM-9718
of the Commission's Rules With Regard to	)	
Licensing in the Multipoint	)	
Distribution Service and in the	)	
Instructional Television Fixed Service for the	)	
Gulf of Mexico		

COMMENTS OF LUCENT TECHNOLOGIES

Lucent Technologies (Lucent) welcomes the opportunity to respond to the Commission's request for comments on the amendment of its Rules to facilitate a broad range of wireless services in the 2500-2690 MHz band. Lucent limits its comments to technical considerations including input on the proposed realignment of the band.

The Commission's spectrum policy has consistently provided the spectrum licensee with flexibility, both in the services provided and the technologies used. This flexibility has served the wireless industry and its subscribers well, as evidenced by the introduction and growth of new, innovative services. Indeed, the Commission has provided such flexibility to holders of licenses in the 2.5 GHz band, expanding the permitted services from point to multipoint video distribution to the currently allowed two-way mobile operations. Although the Commission notes that a majority of licensees in this band are exploring conversion to low power cellularized operations, the Coalition (WCA, NIA,

CTN) argues that the rules adopted by the Commission in 1998 have proven too restrictive to meet the needs of the marketplace in 2002 and beyond.

In fact, the Coalition claims specifically that

> "The current interleaved bandplan, coupled with the current adjacent channel interference protection rules, effectively preclude any licensee from providing broadband service unless consent is received from the licensee of the interleaved channel group."*

Accordingly, to realize the flexibility the Commission intended, and the resultant ability of licensees to provide the desired range of services, it is necessary to realign this band. A realignment is also consistent with the Commission's stated "good neighbor" policy which supports spectrum allocations that minimize the potential for interference between licensees in adjacent spectrum blocks.

A realignment of the band in the arrangement proposed by the Coalition properly segments the band to segregate the distinct types of services that will occupy this frequency space; that is, high site, high power video services and low site, low power cellular type architectures. Also, the realignment of the band in a manner consistent with the Coalition proposal recognizes the needs of Frequency Division Duplex (FDD) technology, currently widely used by CMRS providers.

Specifically, the band plan adequately addresses the key issues of duplex (transmit/receive) frequency spacing and the need for a center gap (separation) between the reverse link (mobile transmit) and forward link (base transmit) spectrum blocks. The need to build duplex filters and local oscillators for both the reverse and forward links that can employ similar design and construction suggests that transmit and receive frequencies should not be spectrally too far apart. System (link) performance (e.g., the use and effectiveness of power control) also benefits if the separation between reverse and forward links is not overly large. It is typically recommended that duplex spacing should be no more than 10% of the allocated channel frequency. Accordingly, if the average channel frequency of the MDS allocation is approximately 2600 MHz, the duplex spacing should not exceed 260 MHz.

Another argument, based on the need to build filters that can effectively isolate transmit and receive energy, and thereby mitigate interference, demands that reverse and forward link frequencies be sufficiently distant from one another. For example, in the IMT-2000 band, the center gap separation is 130 MHz. Although effective operation can be realized with considerably smaller separation, such as the 20 MHz currently used in the PCS band, the close proximity of the reverse and forward links demands the use of filters that are more complex and costly.

The Coalition's proposal satisfies the above requirements. The location of the Lower Band Segment (LBS) and Upper Band Segment (UBS) provides duplex spacing of 120

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* Coalition at 9.

MHz, representing about 4.6% of average channel frequency, well within the recommended 10% limit. Further, the Mid Band Segment (MBS) affords a comfortable center gap of 42 MHz. Importantly, the plan offers adequate spectrum (2 x 66 MHz) to allow the provision of FDD wireless services by several licensees in designated geographic (license) areas.

The 6 MHz guard bands identified at either side of the MBS provide additional isolation between the high power systems designated for use in the MBS and the low site, cellular systems proposed for the LBS and UBS. The Commission asks whether tighter out of band emission limits could serve as an alternative to guard bands. Although such a trade off is theoretically possible, the practical limitations of filter design, which include considerations of size and cost, appear to favor a guard band that would permit the roll off of out of band energy at a reasonable rate. Accordingly, Lucent suggests that the use of guard bands, consistent with the Coalition proposal, is necessary.

Lucent agrees with the Coalition that its band realignment proposal, although consistent with the needs of FDD technology, could also support the deployment of TDD systems. That is, such systems could be used in spectrum blocks identified primarily as paired spectrum for FDD, subject to appropriate adjacent channel interference considerations.

The Commission seeks comment on the Coalition's proposed variable out of band emission limits. Specifically, although the Coalition suggests that licensees assure that emissions into adjacent channels are attenuated by the typical 43 + 10log (P), they state that victim systems should be able to request that the interferer attenuate their signal by an additional 24 dB (i.e., 67 + 10log(P)). As the Commission states, this is not something that has been permitted in its Rules. Although the Commission's Rules often suggest that licensees in adjacent channels can coordinate out of band emission levels, they typically apply to the case where a higher level of out of band emissions can be tolerated. A request to further attenuate emissions, to a level more stringent than the nominal level required in the Rules, would demand that the alleged interferer make significant changes, possibly including the use of different, more complex and costly filters; a reduction in system power, with possible degradation of system capacity and coverage; and/or the use of in-band spectrum as additional guard band, with the resultant loss of useable spectrum.

Lucent understands the Coalition's concern with the potential use of different type of technologies in adjacent channels and the associated need for the control of potential interference. However, Lucent recommends that the Commission move cautiously, and carefully examine the trade off between flexibility (that allows the use of different technologies in adjacent channels) and interference control. Rules that demand the use of variable limits would be difficult, at best, to implement and may impact the value of the affected licenses.

Lucent concurs with the Coalition's suggestion that directions of transmission for FDD operation be specified, and specifically that the LBS be designated for mobile transmit (uplink) and the UBS for base station transmit (downlink). Standardization of this arrangement clearly reduces the equipment complexity and the potential for interference

that would otherwise arise if uplink and downlink in different vendors' systems occupied different bands. Similarly, Lucent also agrees with the Coalition's observation that formal channel pairings that would fix the duplex spacing would be beneficial.

The Commission notes that some respondents have expressed concern relative to the proposed use of unlicensed underlay operations in the 2500-2690 MHz band. Lucent shares these concerns and appreciates the Commission's view that

> "additional measures may be necessary to ensure that unlicensed operations do not cause interference to existing, licensed operations."[*]

The Commission, in its NPRM, implies that such an additional measure may be the use of interference temperature. Although the concept of interference temperature and its use to permit the sharing of licensed spectrum by unlicensed devices may have future potential, the realization of this concept appears far off. Based upon the description in the Spectrum Policy Task Force report, a proper level of interference temperature would be determined from extensive measurements of the noise environment (noise floor) and the determination of the (interference temperature) level above the noise floor that could be tolerated by a given service. The use of interference temperature requires that unlicensed devices be able to measure the noise environment in the band they wish to operate, identify any margin between the interference temperature and the noise level, and transmit only when the margin would allow unlicensed operation without an increase in noise above the interference temperature. Lucent agrees with others who suggest that the technology to support this type of operation has not yet been demonstrated, and that its adaptation and incorporation into the Commission's Rules at this time is premature. Accordingly, the Commission must exercise caution in its consideration of unlicensed underlays.

In summary, Lucent supports the realignment of the 2500-2690 MHz band, and specifically believes that a band plan consistent with that proposed by the Coalition will allow the effective deployment of commonly used FDD technology, and will promote the use of the band, including the deployment of high speed data services. Lucent suggests that adjacent channel out-of-band emissions limits should be well defined and that the proposal to allow adjacent channel licensees to request more stringent emission limits is problematic. Finally, Lucent believes that any consideration of unlicensed underlays in the band must be viewed with caution and, if permitted, effective measures must be in place to protect licensed operations.

Respectfully submitted,

/S/ Robert A. Geilich
Robert A. Geilich
Corporate Counsel
Lucent Technologies Inc.
67 Whippany Road
Whippany, New Jersey 07981

[*] NPRM at para. 144.

(973) 386-7393

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