Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

COMMENTS OF HARDIN AND ASSOCIATES, INC.

Hardin and Associates, Inc. ("Hardin"), hereby submits its comments in response to the Commission's *Notice of Proposed Rulemaking* ("*NPRM*") in the captioned matter.[1] Hardin has provided engineering consulting, licensing and business services to the MDS, MMDS and ITFS communities for over 14 years. Hardin is intimately knowledgeable on the application of the Commission's current rules and has been involved in all of the major rulemakings affecting MDS, MMDS and ITFS over the past eight years.[2] Hardin

[1] *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, 18 FCC 6722 (2003)("*NPRM*").

[2] Hardin was technical consultant to the coalition of operators who filed petitions with the Commission resulting in the Use of Digital Modulation by Multipoint Distribution and Instructional Television Fixed Service Stations, *Declaratory Ruling and Order*, 11 FCC Rcd 18,839 (1996) and Amendment of Parts 21

is also an active member of the Wireless Communications Association International, Inc. ("WCA"), and contributed to the white paper submitted by the Coalition through the WCA Engineering Committee.

1) CHANGES TO THE 2500-2690 MHZ BAND PLAN

Hardin supports the Coalition proposed band plan, believing the Coalition proposal (1) significantly improves the ability of individual licensees to create operational systems by immediately providing sufficient contiguous spectrum and deinterleaving of the band, (2) provides the maximum flexibility to operators in the selection of either TDD or FDD technologies for their applications while minimizing the required guardbands between band segments, (3) maintains a reasonable portion of the band for potential use by high power video stations and maintains the existing channel frequencies for ease of transition, (4) maintains the current amount of spectrum received by each licensee and (5) provides immediate definition of the new frequency location for each licensee, independent of the technology selection by any licensee.

a) Creation of Contiguous Spectrum

One of, if not the, most difficult issues for licensees and operators to overcome has been the issue of amassing sufficient contiguous spectrum to create a viable operating system without dependence on other licensees. The current interleaving of channels coupled with a requirement to provide 0 dB of adjacent channel protection to other licensees has created a system whereby the cooperation of at least two or more licensees

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and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions, MM Docket No. 97-217, *Report and Order*, 13 FCC Rcd 19,112 (1998), *recon.*, 14 FC Rcd 12,764 (1999), *further recon.*, 15 FCC Rcd 14,566 (2000).

is necessary to move forward in a market. Licensees can hold each other hostage or hold a system operator hostage using the interleaving and interference protection requirements.

Even though channel swapping seems a possible solution to the interleaving issue, very few operators or licensees have been able to capitalize on this ability. There are two issues that severely limit the effectiveness of channel swapping. First, channel swapping is still a voluntary action for a licensee. Therefore, difficult licensees can still prevent others from moving freely within the spectrum. Second, even willing licensees are very careful to insure the new spectral locations resulting from the swap do not decrease the potential coverage area of their channels based on interference from adjacent markets. The co-channel interference environment at the new spectral location may be quite different from the existing environment. Because ITFS channels were licensed on a first come, first served basis and were required to protect any existing stations in the process, the interference environment from channel group to channel group can be significantly different. In fact, the interference environments may be so different as to totally preclude any movement within the channel band and still maintain the FCC interference protection requirements. MDS and MMDS have similar interference protection requirements for new or modified stations.

The only viable solution is a sweeping change to the entire band layout, moving channels into contiguous spectral locations and overhauling the interference protection requirements for systems going forward. The Coalition proposal achieves this goal.

b) Maximum Flexibility for Technology Selection

At this point in time, there is no dominant technology established within the industry that allows the selection of either a TDD or FDD architecture for this band. Both technologies have their benefits and limitations from a performance and cost standpoint. The selection of the appropriate technology should be based solely on the business objectives of the operator and the requirements of the market. Therefore, it is imperative the decision to go either TDD or FDD is left to the operator.

The band plan proposed by the Coalition allows enough flexibility that operators can implement either technology. Individual licensees can operate systems using TDD technology with only their channel group. Operators that own or lease two or more channel groups in the LBS and UBS can operate either a TDD or an FDD system. If the band plan were designed to accommodate the use of FDD systems by each individual licensee as proposed by the Commission in the NPRM[3], the band plan would become extremely inefficient due to guard band and out-of-band emissions requirements. Because current broadband wireless equipment requires 5 – 10 MHz of channel bandwidth plus additional guard band to meet out-of-band emission specifications, splitting the available bandwidth to a single licensee into two separate band segments may render the licensee unable to provide any kind of viable operational system.

c) Maintenance of High Power Video Band Segment

The maintenance of a segment of the band for high power operations as proposed by the Coalition is justified based on the significant use of the spectrum by ITFS distance

[3] See *NPRM* at ¶ 52.

learning, commercial television and first generation data systems. The Coalition proposal has maintained seven 6 MHz channels that fall in the center of the 2500 – 2690 MHz band, and proposes rules that allow the operation of high power, high transmit antenna height systems intended to cover large areas from single transmit sites.[4] The Coalition proposal protects a reasonable amount of spectrum for use by first generation services but also does not preclude the use of this spectrum for second generation, low power services if licensees and operators within a market agree. Therefore, first generation systems cannot be forced to convert to second generation technologies but the mechanism exists to allow markets to convert the middle band segment to low power operation initially or migrate over time as desired.

d) Protection of the Quantity of Spectrum for Each Licensee

Licensees would maintain the same amount of licensed spectrum in the Coalition proposed band plan as is allocated under the current rules.[5] Typical licensees of four channel groups with response channels will receive the same 24.5 MHz of total spectrum as they have today. However, this spectrum is arranged in a plan that is more conducive to actual system implementation.

e) Immediate Definition of Frequency Locations

The Coalition proposal would immediately define the exact location of a licensee's spectrum and the bandwidth allocations if a transition was to be triggered within a market. In addition, it would immediately define the exact location and spectrum allocations of licensees in surrounding markets. This certainty allows a

[4] Coalition Proposal at 12.

[5] *Id.*

licensee to analyze the implications of the changes and to create a transition plan that minimizes the impact to existing operations and the implementation time. The spectral environment can be quite complex in many suburban or urban markets where numerous licensees currently exist or where nearby surrounding markets exist in close proximity. By clearly defining the spectral locations and by keeping these locations consistent across market boundaries, transition plans can be well defined and accurate in their prediction of potential problems or interference.

In addition, this certainty in frequency location and bandwidths prevents an operator or licensee who is uncertain about their business goals or technology selection from delaying the rapid transition of a market to the new frequency plan and an operational system. If, for example, the band plan in a market was allowed to evolve over time based on individual licensee or operators needs, it could delay or prohibit other licensees or operators from moving forward with their systems. This could also result in band plans that are inconsistent between markets. If inconsistent band plans existed between markets, it would be virtually impossible to plan for appropriate interference mitigation techniques.

2) UNLICENSED UNDERLAY OPERATION

The Commission has requested comment on allowing the use of unlicensed "underlay" operations in the 2500 – 2690 MHz band.[6] Although underlay operations may make sense in services where operations are sporadic in nature or where coverage areas are sparse, underlay operations within services that are fixed, mobile and/or portable, and looking to achieve ubiquitous coverage of an area are not practical. This is

[6] *See* NPRM at ¶ 145.

true of both first and second generation technologies operating within the 2500 – 2690 MHz band. First generation high power television and data services are trying to achieve coverage of a broad area. Downstream transmissions operate virtually continuously for television applications and very near continuously for both upstream and downstream data services. Receiving devices exist throughout the coverage area at various distances and heights from the transmission facility. Finding increments of time or frequency where unlicensed services could operate without interference to the primary service is not practical.

Likewise, second generation technologies still attempt to achieve ubiquitous coverage but with many low power base stations located throughout the desired coverage area. Again, with downstream transmissions from the base stations and random upstream transmissions from customer premises equipment anywhere within the coverage area and mobile, the ability to time devices or track openings in frequency or time for transmission would be extremely difficult.

Any underlay operations must be predicated upon noninterference to the primary services. Interference from underlay operations will manifest themselves as degradation to a receiver's noise floor. Every dB of receiver sensitivity is precious when trying to demodulate non line of site signals over a ubiquitous coverage area. Decreased receiver sensitivity reduces coverage ability and ultimately requires more infrastructure, costs and spectrum to overcome the interference. Hardin does not believe underlay operations can coexist with primary licensed operations without interference. Therefore, Hardin does not believe underlay operations should be allowed in this band with existing and planned services.

Respectfully submitted,

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