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

In the Matter of	)	
	)	
Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules	)	ET Docket No. 01-75
	)	
Telecommunications Industry Association, Petition for Rule Making Regarding Digital Modulation for the Television Broadcast Auxiliary Service	)	RM-9418
	)	
Alliance of Motion Picture and Television Producers, Petition for Rule Making Regarding Low-Power Video Assist Devices in Portions of the UHF and VHF Television Bands	)	RM-9856
	)	

COMMENTS OF MICROWAVE RADIO COMMUNICATIONS

Microwave Radio Communications, LLC ("MRC") hereby submits these comments in response to the above-captioned Notice of Proposed Rulemaking ("NPRM"), FCC 01-92, 66 Fed. Reg. 28686. MRC is a manufacturer of analog and digital Electronic NewsGathering ("ENG"), Studio-to-Transmitter Links ("STL") and Inter-city Relay ("ICR") microwave equipment. We have served the broadcast industry continuously since 1964 and have been the leading supplier of Broadcast Auxiliary Service ("BAS") microwave equipment throughout that period

Summary of Position

MRC supports many of the Commission's proposals affecting the Broadcast Auxiliary Service. We support the use of Part 101 frequency coordination for fixed links, while retaining the system of local coordination for portable ENG links. We support the proposal to treat radios that carry a combined analog and digital signal as analog if a majority of the bandwidth and power is used by the analog component. Similarly such radios should conform to the analog emission mask, not the digital emission mask. The digital emission mask is too stringent for portable ENG radios that can be switch-selected to transmit either an analog or digital; the analog mask should apply in that case. The analog emission mask would

allow for an easier evolution to split channel applications using channel offsets and COFDM techniques, while the digital emission mask would make that evolution more difficult and expensive for the broadcaster.

MRC also supports the proposal for tighter frequency stability for new products, while grandfathering existing products. We support the modification of the path length formula, but short fixed links should be forced out of the 2 GHz band rather than be allowed to reduce their power. We support the routine conversion of analog links to links that carry multiplexed digital plus analog signals. Old receivers with overly wide IF bandwidths should not be protected against adjacent channel interference in such case. .

MRC's Interest

Since the early 1960s, MRC has served television organizations with point-to- point microwave systems for video transport. Applications include studio-to-transmitter links (STLs), electronic news gathering (ENG), international outside broadcast (OB) operations, inter-city relays, satellite backhauls, and regional networks. Today the MRC brand is the product of choice for digital and digital-ready video microwave transport applications. In recent years, all new MRC products have been designed to provide a migration path from analog to digital transmission.

Today MRC has the largest share of video microwave systems in domestic and global broadcast markets. Serving most major television broadcasting networks, MRC has an installed base of over 100,000 microwave radios in over 60 countries around the world. MRC has been ISO-certified since 1994 and is dedicated to providing exactly the kind of round-the-clock, round-the-globe support that television broadcasters require.

Recently MRC introduced two major product families to address the needs of television broadcasters worldwide. Both product lines are now in full production, helping the industry transition to digital technologies: The TwinStreamTM Series is ideal for evolving video microwave transport applications that require the simultaneous distribution of analog legacy video content and compressed digital high definition (HD) TV content. Product configurations include dual-carrier (analog plus digital) and single-channel analog or digital versions. The advantages of the TwinStream include –use of legacy infrastructure, reduced system complexity, no added latency and minimal cost without requiring additional valuable RF spectrum.

The TwinStream dual-carrier radio was the first factory-integrated, dual-carrier radio system to carry an analog NTSC signal plus a digital ATSC (19.39 Mbps) signal and a 1.544 Mbps (DS1) wayside channel, in a single 25 MHz RF channel. The MRC TwinStream supports the DTV transition by using two modulation schemes - 16 QAM for the digital channel and FM for the analog channel.

As of May 2001, MRC estimates that it has supplied over 90 percent of the microwave links required to interconnect digital studios with their DTV transmitter sites, of which most links have been TwinStream dual-carrier radios. There are over 242 TwinStream links now in operation.

The CodeRunnerTM Series provides digital and digital-ready microwave radio products for electronic news gathering (ENG) and outside broadcast (OB) applications. The CodeRunner Series offers analog and COFDM (coded orthogonal frequency division multiplexing) modulation options. For special event and news coverage around the world, broadcasters are increasingly turning to the new CodeRunner Series radios for flexibility and performance. MRC CodeRunner products are designed to support a wide range of analog and digital modulation requirements, including COFDM techniques that have been proven to transmit successfully in severe multipath environments. As of May 2001, MRC has delivered in excess of 225 CodeRunner systems that have been shipped to customers representing a majority of the COFDM and COFDM-ready portable and mobile systems in the U.S.

The new CodeRunner.2/7 extends the CodeRunner van transmitter family to the 7 GHz band, with an option of incorporating dual-band operation (2 and 7 GHz) with a single van transmitter utilizing one control unit and two RF units. The new CodeRunner.2.DC extends the CodeRunner transmitter to portable and airborne applications requiring DC power operation. The new CodeRunner.4.7 extends the CodeRunner central receiver to digital applications in the 7 GHz band. This is achieved via a proprietary low-noise, high-stability block downconverter in the central receive antenna feed. The new CR.Sector provides cost-effective 90-degree sector antennas for low-cost, low-profile central receive applications.

Frequency Coordination and Interference Protection Criteria

MRC supports the proposal (NPRM, para. 38) to require prior frequency coordination for fixed, point-to-point links. Whatever can be done to minimize cases of harmful interference created by new or modified links needs attention. However, frequency coordination for non-fixed links, such as TV Pickup stations used for Electronic NewsGathering (ENG) operations, should be exempted from Part 101 prior

coordination requirements. Local frequency coordination already exists in most of the top 150 TV markets. We do not feel it is necessary to create new rules for operations currently in place and working well.

The Commission has proposed to apply the Part 101 frequency coordination process to fixed digital BAS transmitters (NPRM, para. 38). We note that Section 101.105(c) adopts the interference protection criteria of TIA Bulletin TSB 10 for fixed-point-to-point microwave stations. We support this criteria due to its requirement for C/I numbers that are consistent with current Section 74.638 requirements for adjacent channel interference - " the existing or previously authorized system must be afforded a carrier to interfering (C/I) signal protection ratio of at least 56 dB". It has been our experience with fixed point to point digital microwave systems using MRC's TwinStream product that 50 to 51 dB of adjacent analog channel protection is more than sufficient at the 1 dB degradation point.

Multiplexed Analog and Digital Signals

Paragraph 31 of the NPRM proposes to apply the rule of Section 101.141(b) to BAS transmitters that carry both an analog FM video signal and a digital video signal multiplexed together. That rule requires that such a transmitter should meet the digital emission mask requirements when the digital modulation occupies 50% or more of the total peak frequency deviation. MRC supports that proposal.

MRC is the manufacturer of the TwinStream radio, which is the basis for the Commission's proposal. The TwinStream allows a broadcasters to add DTV programming support within existing analog STL, TSL, or intercity RF channel. Analog video plus digital video streams are carried within the same 25 MHz RF channel. The TwinStream supports single and dual-channel applications, including analog and digital modems; studio-to-transmitter links and transmitter-to-studio links; satellite backhauls; analog plus digital news gathering backhauls; cable headend feeds and multi-hop networks. It supports channel bandwidths of 25 to 28 MHz and FCC and ITU channel plans from 1.9 to 15.4 GHz. The analog part of the Twinstream signal typically occupies about 68% of the channel, and contains more than two-thirds of the total signal power, so the composite digital and analog signal would be treated as an analog signal for purposes of applying an emission mask requirement.

Emission Designators

We also support the proposal (NPRM, para. 32) to use a single emission designator for TwinStream and other radios transmitting multiplexed analog and digital signals. Section 2.201(c) provides for a

combination of modulations and 2.201(d) provides for a combination of analog and digital signals. Since these radios will carry both video and associated audio programming, we believe that an emission designator of F9F or F9W is appropriate for the TwinStream. However, with respect to digital transmissions, we note that (apart from the bandwidth portion) all digital signals exhibit much the same emission spectrum, and thus the emission designator no longer serves any useful purpose for either interference or record keeping. Thus the Commission should consider eliminating the need to specify an emission designator in license applications for digital systems.

Emission Mask

The Commission has proposed to apply the emission mask of Section 101.111(a)(2)(i) for all digital BAS transmitters below 15 GHz. NPRM, Para. 27.

That mask requires an attenuation (A) below the mean output power level, using a 4 kHz measurement bandwidth, using the following formula of- $A = 35 + 0.8 (P – 50) + 10 \log (B)$ where "P" is the percentage bandwidth removed from the carrier frequency and "B" is the authorized bandwidth but in no event is less than 50 dB and a maximum of 80 dB.

For composite broadcast applications such as our TwinStream radio, the FM emission mask set forth in part 74.637(c) (1) should be used, and not part 101.111 (a)(2)(1). We believe that the Part 101 digital emission mask is too stringent for a composite broadcast radio application that supports legacy analog video traffic. The current emission mask of Section 74.637 requires 25 dB of attenuation for any frequency removed from the center within 50% to 100% of the occupied bandwidth, while section 101.111(a)(2)(1) would require 50 dB of attenuation over the same bandwidth points.

We also believe the Part 101 digital emission mask should not be applied to radios that support both analog modulation and digital modulation that are used for ENG (electronic newsgathering) applications when covering a news venue. For example, MRC supplies portable ENG radios that can transmit either FM signals or COFDM signals with a flip of a switch. It would be unreasonable to require a single radio to support two different emission masks, depending on the selection of the modulation. As noted above, several hundred of these systems have been shipped to broadcasters in the US.. Only the less stringent FM emission mask should be required.

Moreover, the Section 101.111(a)(2)(1) emission mask would impose undo hardships on the broadcaster to duplicate his current coverage area, because it would decrease system gain in COFDM systems, and would be a barrier to an evolution to narrower channels. This hardship will be more pronounced with the upcoming BAS bandwidth reduction changes planned for the 2 GHz band. Since, the broadcasters use local frequency coordinators and assigned channels within the 2 GHz band, they are able to negotiate a higher degree of adjacent channel (C/I) interference. The penetration of more 2 GHz COFDM systems also allows them more flexibility to work through C/I interference conditions and the ability to operate in split channel applications using channel offsets. The emission mask for part 101.111 is less conducive to support current or future split channel BAS application requirements. Thus, even for portable ENG radios that transmit only COFDM signals, the analog emission mask coupled with local coordination procedures is both sufficient to protect against interference, and to promote the future evolution to narrower channels.

MRC believes that for the 2 GHz BAS currently used for ENG applications, the emission mask set forth in Section 74.637 (a) is sufficient to cover both digital-COFDM techniques and analog radio applications respectively, while still giving the broadcaster flexibility and reliability to maintain his current requirements.

Frequency Stability

The Commission has recommended a frequency tolerance of ±0.001% for both fixed and portable operation. NPRM, para. 41. This is acceptable and achievable for new products. MRC employs a frequency tolerance of ±0.005% for fixed analog and ±0.002% for portable analog TV BAS radios for its current products. MRC reiterates that all radios in the field and currently under production for existing product lines should be grandfathered at their current frequency tolerance. This common frequency tolerance should only impact new designs or upcoming products going forward.

Path Lengths

We support the proposal (NPRM, para. 16) to use the formula of Section 101.143 to eliminate the current step function at 17 km. We also support the proposal (NPRM, para. 17) to require a minimum path length of 17 km for fixed links in the 2450-2483 MHz band, and this should apply to 1990-2110 MHz as well. Moreover, fixed operation in the 2 and 2.5 GHz bands should be phased out over a suitable period of time. It is more appropriate that these bands be used for Electronic NewsGathering (ENG) and other remote pickup services. Consequently, to encourage migration of fixed links out of both the 2 and 2.5 GHz bands, MRC recommends all fixed links must be at least 17 kilometers, without the right to operate with lower power on shorter paths. Existing links not meeting that requirement should be given five years to migrate out.

Grandfathering and Conversion of Existing Links

We expect that many more broadcasters will convert their existing analog STL and ICR links to multiplexed digital plus analog links such as our Twinstream product. Existing links that now operate at higher power levels than specified in Section 74.644, because they are grandfathered pursuant to the note in that section, should not lose their rights to continue to use such power levels, provided they do not cause harmful interference to existing co-channel or adjacent channel services. The substitution of new technology dual-carrier or multiplexed digital plus analog STL or ICR microwave should not cause an existing licensee to lose its grandfathered power levels. But substitution of the new technology microwave should not be allowed to cause harmful interference to existing co-channel or adjacent channel services. An exception to this is the case where a user has an old analog receiver with a overly-wide IF bandwidth that is greater than30 MHz at the 3 dB point. In this case, if interference to the old receiver occurs, it should be up to the existing old receiver user to upgrade or replace his equipment using state of the art front ends which would more efficiently utilize valuable spectrum.

So long as there is evidence submitted that the local coordinating body has examined the conversion and has no objections, MRC feels that the conversion from an analog link to a multiplexed link should be treated by the FCC as a minor amendment. A properly supported Form 601 with the new emission and transmitter data should suffice. With the exception of interference caused to an existing analog receiver with a wider than necessary front-end, the new link should not be permitted to cause harmful interference to existing co-channel or adjacent-channel services

Power Specifications

The Commission proposes to specify power in EIRP rather than output power. NPRM, para. 24. MRC supports this proposal. This would facilitate the design of more practical systems and reduce the need to mount some transmitters closer to their antenna. We support the proposal (NPRM, para. 21) for a maximum EIRP of 35 dBW at 2 and 2.5 GHz band. These EIRP numbers are representative of what is currently used for ENG applications.

Antenna Specifications

Periscope antenna systems should be prohibited in the BAS as they are in most other services. The reflector of a periscope antenna has a side lobe rejection that is both poor and unpredictable. Undesired side lobe radiation may cause interference to satellite and other ground-mounted services. In contrast, beam-benders, which are back-to-back parabolic antennas, have many useful applications and have lower side lobe patterns than an equivalent gain periscope (splash plate). Passive beam-benders are often used to route microwave signals around a building obstacle or over a hill. Careful selection of the size and type of antenna can control gain and radiation pattern. This is not so with a periscope. The angle the signal can be bent with a beam-bender is nearly without practical limit whereas a periscope is useable over just a zero to 120-degree range. The alternative to passive back-to-back antennas is often an active repeater, which will usually require another frequency or frequencies. For the above reasons, the Commission should continue to allow passive back-to-back beam-benders but not periscope systems.

Automatic Transmit Power Control

Although MRC has no objection to modifying the Part 74 BAS rules to allow automatic transmitter power control (NPRM, para. 33), it is not likely to be as effective as it is in other services. BAS links tend to be simplex (one-way), and thus there is no way for the receiver to signal the transmitter to increase power.

Signal Identifiers for Digitally Modulated fixed and Portable Links

MRC recommends that all digitally modulated transmissions in the fixed and remote pickup BAS bands contain some sort of signal identifier. However, it may be awhile before a universally recognized standard can be adopted. Therefore a phase-in period should be used to allow equipment manufacturers and signal providers time to incorporate the identifier either in the program source or in the digital modulation process.

Split Channel Operation in the 2, 2.5 and 6.5 GHz Remote Pickup Bands

The evolution of radio transmissions has resulted in reduced individual channel bandwidths. This has been mainly the result of improved receiver selectivity. However, more efficient modulation techniques have contributed. Currently, it is common to split the 2 and 2.5 GHz channels in half and operate simultaneously under controlled co-located venues.

In the largest TV markets, Home Channel Plans have been devised where a number of users are assigned just one half of a particular 17 MHz wide channel. This has become absolutely necessary since the number of users greatly exceeds the number of channels. In smaller markets, these channel offsets are used primarily to move away from interference due to adjacent channel transmissions and yet stay within the assigned channel.

MRC would like the Commission to encourage more widespread use of split channels by revising the Section 74.602 channel plans. With the loss of the 1990-2008 MHz band segment only a year or so away, broadcasters are faced with 14.5 MHz wide channels. NPRM, para.11. There is the possibility of 12.1 MHz wide channels further down the road. Widespread conversion to COFDM with an occupied bandwidth of only 6 MHz will allow for 2 adjacent transmissions in a 14.5 MHz channel. The current 25 MHz wide channels in the 6425-6525 MHz Remote Pickup band could be easily split into eight 12.5 MHz wide channels right now and not obsolete much existing equipment used there. Down the road with COFDM, twelve 8.33 MHz channels could be used. The Commission should modify the channels plans in Section 74.602 to encourage efficient use of the bands.

Shared Use in the 2.5 GHz TV BAS Band

MRC is in total agreement with the recent Declaratory Ruling that clarified the co-equal status of ENG operations and public safety agencies (*e.g.*, police and sheriff departments). However, given the frequency congestion that exists in the major metropolitan markets, the feasibility of shared use of the 2450-2483 MHz band is limited. It is quite common to originate video transmissions from helicopters and fixed-wing aircraft in this band. As effective as local coordination has become, putting too many terrestrial and airborne users in this band causes a great deal of interference potential.

Although not part of this proposed Rulemaking, MRC would like to call the Commission's attention to the need for additional spectrum at a time when frequencies are reallocated to other services. When a crisis situation arises, both broadcast and public safety entities have a genuine need to move signals around without interference from each other. In view of the imminent loss of the 1990-2008 MHz band segment, broadcasters will need to both re-channel what is left at 2 GHz and utilize the 2.4 GHz band more heavily. There has been discussion about possibly re-allocating a portion of the 1.7 GHz Government spectrum for tactical video down links (TVDL) and surveillance. If COFDM is utilized, transmissions are both bandwidth-efficient (6 MHz max-occupied BW) and secure. COFDM is self-encrypting by its nature. If some of the public safety transmissions (especially from airborne platforms) could be moved to the 1.7 GHz band, it will surely ease the burden in the 2450-2484 MHz band.

Conclusion

In light of these considerations, the Commission should adopt many of the proposals contains in its NPRM. However, the proposal to impose the digital emission mask on portable ENG links should not be adopted, because it would limit the ability to evolve to narrower channel bandwidths.

Respectfully submitted,

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