

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

In the Matter of )  
 )  
 Amendment of Parts 1, 21 and 74 to Enable ) MM Docket No. 97-217  
 Multipoint Distribution Service )  
 and Instructional Television Fixed ) File No. RM-9060  
 Service Licensees To Engage in Fixed )  
 Two-Way Transmissions )

**NOTICE OF PROPOSED RULEMAKING**

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**Comment Date: December 9, 1997**

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By the Commission:

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## I. INTRODUCTION AND SUMMARY

1. The Commission has before it a petition for rulemaking filed by a group of over one hundred participants in the wireless cable industry, including The Wireless Cable Association International, Inc., wireless cable system operators, Multipoint Distribution Service ("MDS") and several Instructional Television Fixed Service ("ITFS") licensees, equipment manufacturers and consultants, (collectively "Petitioners"),<sup>1</sup> requesting that the Commission amend its rules to enhance the ability of MDS and ITFS licensees to provide two-way communication services. The petition proposes enhancing MDS and ITFS through the use of two-way audio, video and data communications from "response" stations, the use of booster stations with program origination capability in a cellular configuration designed to create spectrum flexibility through frequency reuse, and the use of variable bandwidth ("subchanneling" and "superchanneling") to create additional flexibility. For these purposes, the Petitioners submitted a comprehensive package of proposed rules.<sup>2</sup> As discussed below, we propose to substantially amend our rules to facilitate two-way transmission services and other service improvements sought by the Petitioners. We solicit comment on the technical, procedural and economic effects of implementing the proposed rule changes.

2. Our goals in instituting this proceeding are to facilitate the most efficient use of the affected spectrum, to enhance the competitiveness of the wireless cable industry, and to provide benefits to the educational community through the use of two-way services, such as high speed Internet service. Although the primary use of MDS and ITFS frequencies has historically

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<sup>1</sup> A complete list of the Petitioners can be found in Appendix A. Petitioners filed their Petition for Rulemaking on March 14, 1997 and it was placed on Public Notice March 31, 1997. "Pleading Cycle Established for Comments on Petition for Rulemaking to Amend Parts 21 and 74 of the Commission's Rules to Enhance the Ability of Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions," *Public Notice* RM 9060, DA 97-637 (rel. March 31, 1997.) Numerous parties filed comments on May 14, 1997 and reply comments were filed on May 29, 1997. A complete list of commenters and reply commenters is also found in Appendix A.

<sup>2</sup> The complete text of all of the proposed rule changes is contained in Appendix C. As discussed in the text, we propose to adopt some of Petitioners' suggestions, modify some, and reject others. We also note here that the proposed rule changes of both MDS and ITFS are complimentary and basically the same. By this proceeding, we seek comment on all the proposed rules set out in Appendix C.

been the provision of video services, our rules permit the use of these frequencies for other services.<sup>3</sup> Through this rulemaking, we seek to facilitate these other uses when they would best serve the needs of the public.<sup>4</sup>

## II. BACKGROUND

3. Under our Rules, educational institutions may obtain licenses to use spectrum for the operation of facilities for the transmission of educational and instructional material.<sup>5</sup> The spectrum that may be used for these purposes, which is in the 2500-2686 MHz band,<sup>6</sup> is shared with that used by MDS operators for the provision of service to subscribers. Spectrum that is licensed to ITFS entities, but is unused by them, may be leased to MDS operators, subject to certain technical limitations and programming requirements. The ITFS/MDS spectrum is primarily used for the provision of either one-way video service to students, in the ITFS context, or wireless cable service to subscribers, in the MDS context. However, as discussed more fully below, some spectrum is utilized for the provision of two-way service by licensees and users. This rulemaking proposes to modify our current Rules in order to expand the opportunities for two-way service in the spectrum by changing certain technical rules, amending some programming rules and creating greater flexibility for spectrum users. This rulemaking also proposes to modify some of our current application procedures for ITFS/MDS to facilitate the flexible use that the proposed technical and programming changes would accomplish.

4. In our order in *Request for Declaratory Ruling on the Use of Digital Modulation by Multipoint Distribution Service and Instructional Television Fixed Service Stations, Declaratory Ruling and Order*, 11 FCC Rcd 18839 (1996) (petitions for clarification and partial reconsideration pending) ("*Digital Declaratory Ruling*"), we authorized wireless cable operators to employ digital compression technology in order to increase the number of usable channels available to them, and also encouraged the use of digital technology by the educational

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<sup>3</sup> See *Report and Order on Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service and Implementation of Section 309 (j) of the Communications Act - Competitive Bidding*, MM Docket No. 94-131 and PP Docket No. 92-253, 10 FCC Rcd 9589, 9619 (1995) ("*MDS Auction Order*"); 47 C.F.R. § 21.903(b).

<sup>4</sup> Commenter Catholic Television Network ("CTN") has proposed that, rather than proceed with the instant rulemaking, we pursue a negotiated rulemaking procedure and convene a federal advisory committee to evaluate Petitioners' proposals and work out the most efficient method to implement them. CTN claims that this would provide substantial, useful information and facilitate the process initiated by the Petitioners. We believe that the instant rulemaking process will provide us with the information needed to adequately evaluate Petitioners' proposals and we decline to adopt CTN's proposal for a negotiated rulemaking at this time. Should circumstances warrant, we reserve the right to revisit our decision on this issue at a later date.

<sup>5</sup> 47 C.F.R. § 74.932.

<sup>6</sup> 47 C.F.R. § 74.902.

community.<sup>7</sup> In spite of the increased capacity offered by digital compression that the *Digital Declaratory Ruling* was intended to facilitate, growth in the industry has remained limited due to economic and technological constraints.<sup>8</sup> Indeed, as discussed in our *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, CS Docket No. 96-133, FCC 96-496, Third Annual Report, 12 FCC Rcd 4358 (1997) ("*1996 Competition Report*"), the wireless cable industry as a whole was not projected even to begin operating with a positive cash flow until 1996.<sup>9</sup>

5. MDS operators are now facing challenges posed by the convergence of different information delivery systems. For example, cable operators who previously limited their operations to the one-way provision of video programming are increasingly providing a variety of two-way services, including Internet access.<sup>10</sup> As has been discussed in the press and as we noted in the *1996 Competition Report*, other services, including direct broadcast satellite ("DBS")<sup>11</sup>, satellite master antenna television services ("SMATV"), and the nascent local multipoint distribution services ("LMDS"),<sup>12</sup> are also moving toward the provision of Internet services. In order to remain competitive, the MDS industry will need to be able to offer comparable competitive services. We believe the rule changes we propose in this proceeding will enable the industry to meet the competitive challenge.

6. In addition to the competitive benefits to the MDS industry, and the resulting benefit to consumers because of a larger number of choices, increased two-way capacity over the frequencies at issue will benefit educational institutions by, for example, increasing Internet access via ITFS frequencies and enhancing the value of their spectrum. Such increased Internet abilities will help to further the goal of providing fast, reliable and affordable Internet access to every student in the country.<sup>13</sup>

7. We believe adoption of the proposed rules will also further the mandate of Section 257 of the Telecommunications Act of 1996, which requires the Commission to identify and

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<sup>7</sup> *Digital Declaratory Ruling*, 11 FCC Rcd at 18840.

<sup>8</sup> *Wireless Cable Investor*, at 9 (Dec. 31, 1996).

<sup>9</sup> *1996 Competition Report* at 4388.

<sup>10</sup> See, e.g., "Wireless Cable Futures," *Wireless Cable Investor*, at 8 (Dec. 31, 1996); Tedesco, "Cable Modems Move from Concept to Reality," *Broadcasting and Cable*, at 106 (Dec. 9, 1996).

<sup>11</sup> Breznick, "Data from Outer Space," *Cable World*, at 53 (Dec. 9, 1996).

<sup>12</sup> *1996 Competition Report* at 4393 and 4406.

<sup>13</sup> See "Background on Clinton-Gore Administration's Next-Generation Internet Initiative: Qs and As on Next-Generation Internet Initiative," *Office of the Vice President*, at 4 (rel. Oct 10, 1996); Remarks of Chairman Reed Hundt, Technology and Learning Conference, National School Board Association, Dallas, Texas (October 24, 1996).

eliminate market entry barriers for entrepreneurs and other small businesses to promote diversity of media voices, vigorous economic competition, technological advancement and promotion of the public interest.<sup>14</sup> As discussed more fully below, we believe that the proposed rule changes would simplify our current licensing system and provide greater flexibility in the use of the allotted spectrum to licensees.

### III. DISCUSSION

8. We note that our Rules already permit MDS to provide non-video services.<sup>15</sup> Furthermore, as Petitioners point out, we specifically listed the transmission of high speed computer data as a potential use of MDS facilities when we established the service.<sup>16</sup> Since that time, we consistently have recognized that MDS licensees enjoy the flexibility to provide a variety of video and non-video services, subject to compliance with, or the grant of a waiver of, our rules.<sup>17</sup> For example, the Mass Media Bureau has made clear that leased ITFS frequencies (as well as MDS channels) can be used for asymmetrical high speed digital data applications, including Internet access, if that usage complies with our technical rules and the *Digital Declaratory Ruling*.<sup>18</sup> In this proceeding, Petitioners are asking that we implement a series of technical rule changes that would give MDS and ITFS licensees the needed flexibility to fully exploit digital technology in delivering two-way communications services.

9. Even though the Commission has permitted MDS licensees to provide two-way service, Petitioners argue that the existing rules are too cumbersome and impose too great a financial burden. For example, in a recent authorization for two-way operation in the MDS band each subscriber location was individually licensed.<sup>19</sup> Petitioners argue that this type of approach is not commercially viable for most two-way wireless applications and is demonstrative of the impediments to expansion. Instead, Petitioners propose a system under which licensees would be permitted to utilize all or part of a 6 MHz channel for return path transmissions from

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<sup>14</sup> *Telecommunications Act of 1996*, P.L. 104-104, 110 Stat 56 (1996).

<sup>15</sup> *See, e.g.*, 47 C.F.R. 21.903(b); *MDS Auction Order*, 10 FCC Rcd at 9619.

<sup>16</sup> *Amendment of Parts 1, 2, 21, and 43 of the Commission's Rules and Regulations to Provide for Licensing and Regulation of Common Carrier Radio Stations in the Multipoint Distribution Service*, 45 FCC 2d 616, 617 (1974) ("*MDS Order*").

<sup>17</sup> *See, e.g.*, *Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in The Multipoint Distribution Service and in the Instructional Television Fixed Service*, 10 FCC Rcd 13821, 13825 (1995).

<sup>18</sup> *See* "The Mass Media Bureau Implements Policy for Provision of Internet Service on MDS and Leased ITFS Frequencies," *Public Notice*, DA 96-1720 (rel. Oct. 17, 1996).

<sup>19</sup> *See* Applications of Atlantic Microsystems, Inc., File Nos. BMDP-9701115KI through BMDP-970115KM (granted Jan. 27, 1997).

subscriber premises, to cellularize their transmission systems to take advantage of spectrally efficient frequency reuse techniques, and to employ modulation schemes consistent with bandwidths either larger or smaller than 6 MHz, all while providing incumbent MDS and ITFS licensees interference protection equivalent to what they currently receive.

10. Petitioners have emphasized that they are not seeking a reallocation of spectrum, but instead are seeking to modify the technical rules governing the spectrum already allotted to MDS and ITFS. However, commenters Interactive Video Trade Association ("ISTA") and WebCel Communications, Inc. ("WebCel") both have opposed Petitioners' proposal on the grounds that the contemplated rule changes would fundamentally alter the nature of MDS and ITFS, undermine the auction process, and unfairly harm potential competitors. We disagree with ISTA's and WebCel's arguments. Both of these commenters overlook the fact, discussed above, that the types of two-way service that the rule changes would encourage already have been authorized to MDS licensees.<sup>20</sup>

#### **A. Revised Definition of MDS**

11. Petitioners propose that we create a regulatory system authorizing the use of response stations and response station hubs to enable the two-way operation of wireless cable systems. Response stations would be the means of transmission from a subscriber's premises and could be implemented as separate transmitters or as parts of a transverter (combined transmitter and receiver) and could use either separate transmitting antennas for return paths or combined transmitting/receiving antennas. Response station hubs would serve as the collection points for signals from the response stations in a multipoint-to-point configuration for upstream signal flow.

12. Under our current regulatory scheme, MDS operators typically only provide two-way service to subscribers using telephone return links or individually licensed subscriber premises stations. This is an outgrowth of the basic one-way approach to MDS transmission from which our current rules originated. We propose to expand the definition of the Multipoint Distribution Service in Section 21.2 of our Rules to fully incorporate the concept of two-way transmission. The proposed definition would read:

Multipoint Distribution Service (MDS): A domestic public radio service rendered on microwave frequencies from one or more fixed stations transmitting to multiple receiving facilities located at fixed

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<sup>20</sup> ISTA also argues that adoption of the proposed rule changes would be akin to fraud, breach of contract, and unconstitutional taking of property. ISTA bases its claims on the assertion that Interactive Video and Data Service ("IVDS") operators obtained at auction a monopoly to provide certain two-way services that other providers, *i.e.* MDS and ITFS licensees, could not. However, two-way service by MDS and ITFS operators was publicly discussed and permitted before the IVDS auction took place in 1994. *See, e.g., MDS Order*, 45 FCC 2d at 617. Furthermore, the Commission has never promised the claimed monopoly and ISTA has not cited to any Commission pronouncements that established the claimed monopoly. Therefore, we reject ISTA's claims on this issue.

points and/or from multiple Multipoint Distribution Service response stations transmitting to response station hubs.

This changed definition is representative of the reorientation of the regulatory approach to MDS, from that of an essentially one-way service with two-way service permitted on a limited basis, to a fully flexible service in which licensees can provide either one-way or two-way service in response to the demands of the competitive marketplace. We solicit comment on this new service paradigm.

13. As fully set out in Appendix C, we also propose to amend the definition for a "Multipoint distribution service response station" to indicate that licensees would be permitted to utilize all or part of any 6 MHz MDS or ITFS channel as a response channel consistent with the other technical and service rules proposed herein. The proposed definition would read as follows:

Multipoint Distribution Service response station. A fixed station operated by an MDS licensee, the lessee of MDS channel capacity or a subscriber of either to communicate with a response station hub or associated MDS station. A response station under this part may share facilities with other MDS response stations and/or one or more Instructional Television Fixed Service (ITFS) response stations authorized pursuant to §74.939.

Commenter Caritas Telecommunications, Inc. ("Caritas") has proposed that we limit the availability of response channels to MDS channels 1, 2, and 2A, converting those channels from the current use for point-to-multipoint transmissions to subscribers' homes to use for transmission return paths. We tentatively decline to adopt this counter-proposal and agree with Petitioners that it would both artificially limit the amount of spectrum that could be used for return paths and unnecessarily prevent ITFS licensees from using their own channels for return paths. In regard to Caritas' belief that its proposal would provide protection from harmful interference, we believe that such protection can be achieved in other ways, as discussed more fully below. We solicit comments on our proposals regarding the expanded definition of response stations, including provision for transmissions on all available MDS and ITFS channels, and on Caritas' counter-proposal.

14. A key element of Petitioners' proposal is the use of "response station hubs," facilities that would receive the transmissions of response stations. These hubs are intended to permit MDS response stations to operate at lower power because the response stations hubs will be located closer to subscriber premises than are current transmitter sites. The hubs are expected to improve service reliability and permit greater frequency reuse than if each subscriber were required to communicate directly with their current primary transmitter site. We therefore propose to add the following definition:

Response station hub. A fixed facility licensed for use in accordance with § 21.909 that is operated by an MDS licensee or the lessee of an MDS facility for the reception of information transmitted by one or more MDS response stations. A response station hub licensed under this part may share facilities with other MDS response station hubs and/or ITFS response station hubs authorized pursuant to § 74.939.

The Petitioners suggest that channels adjacent to the channels received at response station locations most probably will be used for response station transmissions. Since the adjacent channels used in a wireless cable system are usually assigned to different licensees as a result of the interleaved channel allocation pattern in the 2.5 GHz band, it is likely that most hubs and associated response stations will be facilities shared by multiple licensees. In other words, a response station hub and associated response stations will operate under multiple authorizations, which will be identical in all respects other than in the name of the licensee and the authorized channels of operation. We seek comment on the proposed revised definition and its implications.

15. We also propose to expand the definition for "signal booster stations" such that it will be clear that those stations would be authorized to originate transmissions, as well as to relay transmissions from other stations. As envisioned by Petitioners, booster stations would be used to cellularize wireless cable operations, which now may operate in areas too large to be served by a single station. Permitting boosters to originate as well as relay programming would facilitate frequency reuse cellular configurations and two-way high speed Internet access and other services. The location restriction in the current definition would be removed because it unnecessarily duplicates a restriction already contained in § 21.913 that is retained essentially intact. The proposed definition would read:

Signal booster station. An MDS station licensed for use in accordance with § 21.913 that operates on one or more MDS channels. Signal booster stations are intended to augment service as part of a distributed transmission system where signal booster stations retransmit the signals of one or more MDS stations and/or originate transmissions on MDS channels. A signal booster station licensed under this part may share facilities with other MDS signal booster stations and/or one or more ITFS signal booster stations authorized pursuant to § 74.985.

We seek comment on the definition and the proposal to expand the role of booster stations in this manner.

## **B. Technical Standards**

### **1. Channelization**

16. Petitioners request that we permit flexible subchannelization of MDS and ITFS channels, *i.e.*, the division of a channel of a particular bandwidth into multiple channels of smaller bandwidth. Currently, licensees are assigned standard 6 MHz channels for point-to-multipoint transmission of video signals and associated audio signals; response channels of 125 kHz bandwidth are available for return path use. A paired response channel is available for each ITFS channel and for E and F MDS channel groups. In the *Digital Declaratory Ruling*, we permitted the use of digital emissions in order to allow licensees to take advantage of the fact that such emissions could facilitate the transmission of multiple video and audio signals within the 6 MHz bandwidth. However, licensees were not permitted by the *Digital Declaratory Ruling* to alter in any way the overall bandwidth limitations applicable to the channels in use (for example, power level in interference analysis), despite the fact that a single channel of video and associated audio, transmitted by either of these digital emissions, would occupy no more than a fraction of a full 6 MHz channel.

17. Petitioners point out that subchannelization would permit them to use their authorized spectrum more effectively, in that it allows more efficient channel reuse within a given service area, and can be used to control the number of response stations operating within a channel and optimize transmitter data rates commensurate with the particular communications service being provided. Petitioners suggest that code division multiple access ("CDMA") emissions could facilitate the use of 4 or 5 channels of 1.25 to 1.5 MHz bandwidth each within a single 6 MHz channel for relatively low data rates, while Quadrature Phase Shift Keying ("QPSK") and Quadrature Amplitude Modulation ("QAM") could accommodate higher data rates using multiple channels within a 6 MHz channel. With respect to 125 kHz channels now available for response use, Petitioners believe that subdivision of these channels should also be permitted, although such new subchannels would be limited to relatively low data rates because of their very narrow bandwidth. To make possible the use of spectral density analysis, for example, in interference analysis involving subchannels, Petitioners ask that proposed subchannels and superchannels be limited to digital transmissions with uniform spectral power density across the 6 MHz channel width.<sup>21</sup> We seek comment on these proposals.

18. Petitioners also request that we permit superchannelization of MDS and ITFS channels, *i.e.*, the combining of more than one channel into a single, wider channel. For example, four 6 MHz channels could be aggregated to form one channel with a 24 MHz bandwidth or four 125 kHz channels could be combined to create a single 500 kHz channel. These wide channels, Petitioners argue, could be used for the transmission of high data rates and/or the use of spread spectrum emissions. Petitioners contemplate that transmitting stations using such wideband emissions would be licensed to multiple entities in some instances, as the current channelization arrangement in both services provides generally for the assignment of interleaved, non-contiguous channels. We seek comments on Petitioners' proposals.

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<sup>21</sup> Uniform energy dispersion is a requirement for interim digital operations pursuant to the *Digital Declaratory Ruling*.

## 2. Spectral Mask

19. In the *Digital Declaratory Ruling*, we waived our rules with respect to out-of-band emissions and permitted the use of a somewhat relaxed spectral mask for digital transmission modes.<sup>22</sup> On an interim basis, the Commission waived its analog emission mask to provide for 38 dB attenuation at the channel edges, with uniformly sloping attenuation to 60 dB at 3 MHz from the channel edges and beyond. This action was taken because the Commission concluded that the application of the current analog emission mask to digital emissions would be unnecessarily restrictive and could increase the cost of digital equipment while providing no benefit. In addition, the results of laboratory tests submitted in connection with the Commission's consideration of this issue demonstrated that a digital station using the relaxed mask is less likely to cause interference than an analog station using the existing, more restrictive, mask.

20. Petitioners propose changes to sections 21.908 and 74.936 of the Commission's Rules to permanently incorporate the out-of-band emission waiver of the *Digital Declaratory Ruling*, although with certain modifications; specifically, changes are proposed for primary system transmitters and single channel booster transmitters with a power greater than -9 dBW EIRP. Likewise, for sub- and superchannels, the attenuation of out-of-band emissions would begin at the edges of the particular bandwidth in use, e.g., for a 24 MHz superchannel, 38 dB of attenuation would be required at the upper and lower edges of the combined channels, with uniformly sloping attenuation to 60 dB at 3 MHz from the edges of the combined channels and beyond the 24 MHz channel. For subchannels, 38 dB of attenuation would be required at the subchannel edges.<sup>23</sup> Where digital modulation is employed, the amount of attenuation would be related to the licensed average power level or, for subchannels, the appropriately adjusted value based on the ratio of the channel to subchannel bandwidths. We seek comment on these proposals.

21. For booster stations with an EIRP of -9 dBW or less, Petitioners request that no spectral mask whatever be applicable to the out-of-band emissions of these stations. Petitioners argue that such low power stations have only a very limited potential for interference, and that applying strict emission limitations to them would significantly increase the price of equipment with no benefit to the user or nearby licensees in terms of added interference protection. We

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<sup>22</sup> Out-of-band analog emission limitations for MDS and ITFS stations are set out at § 21.908(b) and § 74.936(b) of the Commission's Rules, and require that such emissions be suppressed at least 38 dB relative to the peak visual carrier at the channel edges and have a uniformly sloping attenuation from this level to 60 dB at 1 MHz below the lower band edge of the 6 MHz channel and 0.5 MHz above the upper band edge of the 6 MHz channel. All out-of-band emissions above or below these limits must be attenuated a minimum of 60 dB below the peak visual carrier.

<sup>23</sup> The effect of this requirement would be to permit equipment operating in subchannels away from the edges of a 6 MHz channel to have very low suppression of emissions which fall outside of the subchannel, so long as the suppression was great enough to meet the overall limits at the edges of the 6 MHz channel and beyond. Only equipment operating on subchannels near either edge of the 6 MHz channel would need significant suppression of out-of-band emissions (and then only in one direction) in order to meet the overall 6 MHz suppression requirements.

request comment on whether eliminating a spectral mask for low power boosters presents an undue interference risk, and, if so, which additional interference safeguards should be adopted.

22. For a booster station transmitting on multiple non-contiguous channels carrying separate signals ("broadband booster"), with an EIRP greater than -9 dBW and employing either digital or analog modulation, Petitioners request that a somewhat less stringent spectral mask be applied as compared to that applied to other high power stations (*i.e.*, EIRP > -9 dBW), based on laboratory tests done in connection with the *Digital Declaratory Ruling* showing that satisfactory performance and interference protection could be achieved with the relaxed levels. (*See* proposed Section 21.908(b), Appendix C.) For a response station using digital emissions in all or part of a 6 MHz channel, Petitioners propose a spectral mask requiring attenuation of the emission by 38 dB at the upper and lower edges of the 6 MHz channel (irrespective of actual bandwidth used), with linearly sloping attenuation to 60 dB at points 3 MHz above and below the 6 MHz channel and beyond. In addition, Petitioners suggest that it may be necessary to employ guardbands to meet the proposed spectral mask, which they indicate might be helpful in providing a basis for type acceptance of response station transmitters. For a response station using digital emissions contiguously over more than one 6 MHz channel, Petitioners propose a spectral mask requiring 38 dB attenuation of the emission at the upper and lower edges of the superchannel, with linearly sloping attenuation to 60 dB at points 3 MHz above and below the superchannel and beyond. As an exception to the spectral masks for response stations utilizing one or more of the 125 kHz response channels, Petitioners would permit discrete spurious emissions above the upper and below the lower authorized channel edges provided that: (1) each spur was attenuated below the average power of the emission by at least 40 dB; (2) no more than a single spur occurred each 10 MHz within 50 MHz of the channel upper and lower edges; and (3) no spurs occurred beyond 50 MHz of the upper and lower channel edges. We solicit comment on Petitioners' proposals.

23. For all spectral mask calculations involving digital emissions, Petitioners request that the average power of the emission across its bandwidth be used, as was done in the *Digital Declaratory Ruling* waiver, where we stated that digital emissions will be authorized with an average power level (EIRP) equal to the peak visual power (EIRP) of analog transmissions. At the same time, we also required that steps be taken when using digital emissions to ensure substantially uniform power density across the bandwidth in use, including at times when no data input signal is present to modulate the transmitter. For digital emissions on sub- and superchannels, Petitioners would require that transmitted power be distributed uniformly in such a way that the power per unit of bandwidth is always constant.<sup>24</sup> For example, if a maximum 100 watts EIRP were available for a 6 MHz digital emission, then in a subchannel with bandwidth 3 MHz a maximum of 50 watts EIRP would be permissible and in a superchannel of 24 MHz a maximum of 400 watts EIRP would be permissible. We seek comment on whether the degree of attenuation proposed for these various schemes is sufficient to provide adequate

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<sup>24</sup> A radiated field magnitude with uniform power flux density would be expressed in terms of watts per unit area per unit bandwidth, *e.g.*, dBW/m<sup>2</sup>/Hz.

adjacent channel interference protection, and we welcome any test results or data which shed further light on spectral masks. We also seek comment on the means for measuring compliance with the spectral mask requirements, including the appropriate resolution bandwidth(s).<sup>25</sup>

### 3. Frequency Tolerance

24. With respect to frequency tolerance, Petitioners request that, for all primary station transmitters and all booster stations with power exceeding -9 dBW EIRP, the existing +/- 1 kHz standard be continued because such stations often have large coverage areas and thus significant opportunities to cause interference to neighboring systems. For booster stations with - 9 dBW or less EIRP, and for all response stations, Petitioners argue that no frequency tolerance requirement should be imposed due to the limited coverage areas and limited interference range of these stations. Such stations would simply be required to maintain their emissions within the spectral mask specified for them. In the *Digital Declaratory Ruling*, we noted that carrier frequency tolerance is not relevant to digital modulation systems, and we did not impose a frequency tolerance requirement for use of Vestigial Sideband ("VSB") and QAM systems, including the pilot carrier frequency in VSB systems. We therein encouraged additional testing of the pilot carrier offset looking toward adoption of permanent rules for digital systems. We seek comments on whether we should continue not to impose a frequency tolerance requirement for digital transmissions.

25. Petitioners propose to eliminate current Sections 21.908(a) and (c)-(e) and Section 74.950(a)-(e), which set requirements for transmitter installation and performance. Petitioners maintain that these rules apply to analog transmissions but do not apply to digital transmissions and should be eliminated. In the *Digital Declaratory Ruling*, we waived Sections 21.908(a) and 74.950(a) with respect to digital transmissions. We tentatively agree with Petitioners that these rules are incompatible with digital transmissions. Parties are welcome to comment on whether the targeted rules should be retained and modified to apply to stations which only utilize analog video and audio transmissions, or whether they should be deleted altogether.

### 4. Type Acceptance

26. Included in Petitioners' proposed regulatory scheme are provisions for type acceptance of transmitters. The rules put forth by Petitioners specifically provide for type acceptance of response station transmitters,<sup>26</sup> while boosters fall under general MDS and ITFS type acceptance rules.<sup>27</sup> We tentatively agree that type acceptance of response station transmitters

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<sup>25</sup> In the *Digital Declaratory Ruling*, we specified a resolution bandwidth of 100 kHz. 11 FCC Rcd at 18854.

<sup>26</sup> See proposed §§ 21.909(l) and 74.939(l).

<sup>27</sup> See, e.g., 47 C.F.R. §§ 21.120 and 74.938.

and boosters, including broadband boosters, is appropriate, and we propose to adopt or retain the relevant rules.<sup>28</sup> We invite comment on this approach.

## 5. RF Emissions

27. In their comments, Petitioners further suggest that the Commission adopt rules, similar to those adopted recently for LMDS licensees,<sup>29</sup> to govern radio frequency ("RF") emissions for MDS/ITFS return path transmissions. In the *LMDS Second Report and Order*, we stated that it is incumbent upon LMDS licensees to act in good faith and to exercise reasonable care to protect users and the public from the operation of subscriber transceiver antennas. As a further safeguard, we explained that "we believe that requiring licensees to provide user and installation information, and to label subscriber antennas properly, provides adequate notice regarding the potential safety hazards of LMDS subscriber transceivers. We will therefore require LMDS licensees to attach labels to every antenna, in a conspicuous fashion." *Id.* at ¶ 295. We added that we will not mandate the specific language to be used on the labels, however we will require use of the ANSI-specified warning symbol for RF exposure. *Id.* And while we declined to require interlock features, we "strongly encourage[d]" their use to enhance the safety of subscriber transceivers where such features could be made available at reasonable cost. *Id.* at ¶ 296. In modeling the LMDS RF radiation guidelines and procedures after those applicable to MDS systems, we also acknowledged "the technical similarities between LMDS and MDS." *Id.* at ¶ 292. We propose to adopt Petitioners' suggestion and amend the provisions of Section 1.1307 of our Rules that relate to MDS and ITFS, in the manner set forth for LMDS licensees both in the *LMDS Second Report and Order* and as recently modified in our order refining the guidelines for evaluating the environmental effects of RF radiation.<sup>30</sup> We seek comment on this proposal.

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<sup>28</sup> We recently have proposed to streamline the equipment authorization program, and combine the type acceptance and certification programs into a common procedure referred to as "certification." *Amendment of Parts 2, 15, 18 and Other Parts of the Commission's Rules to Simplify and Streamline the Equipment Authorization Process for Radio Frequency Equipment, Notice of Proposed Rulemaking* in ET Docket No. 97-94, FCC 97-84 (released March 27, 1997). Thus, equipment approval requirements for boosters and response station transmitters would follow any revised procedures that we adopt in that proceeding.

<sup>29</sup> *See Rulemaking To Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, To Reallocate the 29.5-30.0 GHz Frequency Band, To Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rulemaking* in CC Docket No. 92-297 and PP-22, FCC 97-82 (released March 13, 1997) (hereinafter *LMDS Second Report and Order*).

<sup>30</sup> *Second Memorandum Opinion and Order and Notice of Proposed Rulemaking* in WT Docket No. 97-192, ET Docket No. 93-62, and RM-8577, FCC 97-303 (released August 25, 1997).

## 6. Modulation Methods

28. In the *Digital Declaratory Ruling*, we authorized the use of QAM and VSB modulation. While we declined to consider the use of other digital modulation methods in the context of that proceeding,<sup>31</sup> we stated that we would consider future requests for declaratory rulings where the requesters submit appropriate data to demonstrate that other modulation techniques could be used in a manner that would not interfere with MDS and ITFS analog and digital operations.<sup>32</sup> Petitioners intend that the rules that they propose in the Petition accommodate future Commission authorization of digital modulation techniques other than QAM and VSB, but they assert that this proceeding is not the appropriate forum to deal with the details of other modulation techniques. Specifically, Petitioners propose to retain that portion of current Section 21.905(b) of the Commission's Rules which provides that "different types of emissions may be authorized if the applicant describes fully the modulation and bandwidth desired."<sup>33</sup> Petitioners further propose to replicate that provision in Section 74.936(a), and to apply the principle to the 125 kHz channels.<sup>34</sup> Thus, given an adequate showing, Petitioners propose that any emission should be permissible for any channel of any bandwidth at any class of MDS or ITFS station, utilizing any permissible power, so long as the emission meets the applicable out-of-band emission requirements and is capable of causing no greater interference than 8-VSB or 64-QAM.

29. Pace Telecommunications Consortium ("Pace") comments that the Commission should immediately grant ITFS and MDS licensees the flexibility to use whatever digital techniques best serve their needs, with interference controlled through the use of power spectral density limits and spectral masks. Pace particularly seeks the use of frequency-shift keying (FSK) modulation and states that use of this modulation would present great cost savings to ITFS licensees. Gulf Coast MDS Service Company comments that the Commission should not impose technology standards for two-way transmissions, because doing so would undermine the development of perhaps more efficient innovations.

30. As an initial matter, as in the *Digital Declaratory Ruling*, "[w]e are not now proposing to adopt one or more 'standard' digital technologies."<sup>35</sup> As requested by Petitioners, we will retain or add provisions for accommodating the use of different modulation types. Because we wish to encourage parties to continue to identify different digital modulation schemes that could be useful in MDS and ITFS, we emphasize that we remain open to considering future

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<sup>31</sup> See *Digital Declaratory Ruling*, 11 FCC Rcd at 18847, 18865.

<sup>32</sup> *Id.* at 18848.

<sup>33</sup> 47 C.F.R. § 21.905(b).

<sup>34</sup> See proposed Sections 21.909(j) and 74.939(j).

<sup>35</sup> *Digital Declaratory Ruling*, 11 FCC Rcd at 18848-49.

requests for declaratory rulings in accordance with the *Digital Declaratory Ruling*, upon submission of appropriate data.<sup>36</sup> We invite comment on whether there is a basis for concluding that use of particular digital modulation types by MDS and ITFS stations other than VSB and QAM would not be prone to interference, based on the current 45 dB/0 dB protection ratios for cochannel and adjacent channel interference respectively, *i.e.* that such modulation formats should be permitted without requiring test data.<sup>37</sup> For example, one modulation type may be a subset of VSB and QAM and, therefore, is covered under the industry tests used to support the *Digital Declaratory Ruling*.

31. In considering Petitioners' proposals for amendment of the existing MDS and ITFS rules pertaining to channelization, spectral mask, frequency tolerance and emissions, the benefits of such changes appear to outweigh the negative effects they might engender. The technical regulations now in place for these services to a large extent reflect the engineering state-of-the-art at the time they were adopted, and were never intended to freeze in place an outdated technology or regulatory scheme to the detriment of better spectrum efficiency at some time in the future. As we noted in the *Digital Declaratory Ruling*, "We expect that the introduction of digital technology will enhance the service of wireless cable operators by allowing opportunities for increased channel capacity and programming choices available to consumers, sharper television pictures, a broader coverage area, and the provision of video, voice and data services that cannot be offered currently." 11 FCC Rcd at 18842 (footnote omitted). As an outgrowth of that action, these proposals are a logical second step to expand the Commission's technical framework for these services beyond the current, narrowly drawn, bandwidth and emission restraints into a more flexible and dynamic framework which can accommodate a vastly greater range of uses. We therefore are proposing to amend our rules as requested by Petitioners in the areas discussed above, expanding the technical flexibility of this service as we have for other services numerous times in the past when we determined that it could be accomplished with no detrimental effect on the overall interference environment for existing licensees and future applicants. We solicit comments on, and reasonable alternatives to, all of these proposals.

### C. Interference

32. The Commission's current regulations in ITFS and MDS for interference protection were designed to minimize the potential for destructive cochannel and adjacent channel interference between systems located in proximity to each other. The specific criteria for protection are of two forms, namely, (1) cochannel and adjacent channel desired-to-undesired signal (D/U) ratios and (2) limits on the magnitude of a station's free space field as measured at the edge of the station's protected service area. For cochannel interference protection, an applicant must configure its system so that the signals from each of its transmitters are at least

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<sup>36</sup> See *Digital Declaratory Ruling*, 11 FCC Rcd at 18848 n.31.

<sup>37</sup> We find that we do not currently have adequate information to evaluate Pace's proposal to use FSK modulation in this proceeding.

45 dB weaker than the signals of the existing licensee's transmitters within the licensee's protected service area and/or, in the case of ITFS licensees, at the licensee's protected receiver sites. For adjacent channel protection, the ratio must be at least 0 dB. In order to meet the second form of protection, an applicant generally must be able to demonstrate that the magnitude of the free space radiated field from each transmitter does not exceed a particular limit (*i.e.*, a power flux density  $-73$  dBW/m<sup>2</sup>) at the boundary of the applicant's service area.

33. For purposes of providing interference protection for the system configuration presented in the Petition, Petitioners propose to keep the existing interference criteria in essentially unchanged form, and to supplement them with similar new criteria to be applied to hub, booster and response stations. The 45 dB cochannel and 0 dB adjacent channel protection ratios would be applied at all hub station receivers within a primary station's protected service area, and would continue to apply within the 35-mile protected service areas. (These would not be applicable for Basic Trading Area ("BTA") protection, for which interference is prevented in part through the use of the power flux density limit at the BTA boundaries.) For booster station transmitters, the existing radiated field limitation (in terms of power flux density) would be applied to the combined radiation of all boosters within a system, rather than to individual boosters, and this combined radiation level would be added to the radiated field of the primary station transmitter to calculate the overall radiated field of the system at its boundaries to determine compliance with the field limitation or interference protection ratio.<sup>38</sup> This change is necessary, Petitioners argue, because their proposed "cellularization" of the MDS/ITFS service areas will necessitate the use of large numbers of booster transmitters, each covering a portion of the service area and operating on a cochannel basis with other boosters and/or the primary station within the service area.<sup>39</sup> This system configuration could result in numerous cochannel radiated fields which have the potential for interfering with other nearby systems. We seek comment on Petitioners' arguments.

34. For determining the interference potential of the multitude of response stations associated with Petitioners' proposed cellularized system, Petitioners propose a 3-step process using statistical analysis and worst-case assumptions, necessitated by the fact that individual response station locations and interference potential will not be available for making precise

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<sup>38</sup> For this calculation, as well as all others proposed by Petitioners, the maximum level of field permitted would be adjusted to account for the actual bandwidth in use, *e.g.*,  $-73$  dBW/m<sup>2</sup> for 6 MHz channels and  $-89.8$  dBW/m<sup>2</sup> for 125 kHz channels or subchannels. A similar adjustment is necessary in the calculation of the field strengths in connection with the 45 dB and 0 dB cochannel and adjacent protection ratios. All of these adjustments are needed in order to properly account for the spectral flux density of the particular signals being considered.

<sup>39</sup> Cellularization, in this context, is similar to the well known cellular telephone system, in that large numbers of low power transmitters and localized receivers permit efficient spectrum reuse. Booster stations could serve relatively small geographical areas and could use directional, rather than omnidirectional, antennas to achieve sectoring, *i.e.*, the simultaneous transmission of the same channel in several different directions with different information in each direction.

calculations.<sup>40</sup> This process is described in a document submitted by Petitioners entitled "Proposed Text of Attachment to Report And Order Setting Forth Method for Predicting Accumulated Signal Power From a Multiplicity of Statistically-Located Transmitters," attached as Appendix D to this notice. In step one, the hub station response service area ("RSA") is defined and a square grid of points is located within this area. The grid of points established within the RSA would consist of the intersections of a group of equidistant parallel straight lines oriented in the north/south and east/west directions and of sufficient length that the grid encompasses the entire RSA. An RSA could take any geographical shape, with its boundaries defined by geographical coordinates and a radius from the response station hub, or by other means. The RSA could be subdivided into smaller geographical regions to allow for response stations of different characteristics within regions of differing population densities. The boundaries of each region would be specified in a manner akin to that used to define the RSA. The territory within a region would be contiguous and no two regions within a RSA would be permitted to overlap. In order to estimate the likely numbers and locations of response stations within an RSA, each of the regions within the RSA would be evaluated to determine the uniformity of its population density. The test for density uniformity would consist of (1) determining the population, using U.S. Census data, of each ZIP Code within a region, (2) dividing each ZIP Code population density by the total population density of the region, and (3) identifying if the resulting quotient is 3 or less in all instances. If so, then population uniformity would be considered adequate within the region. If the quotient is more than 3 for any ZIP Code, then the region would be reconfigured, *i.e.*, the boundaries changed, until adequate uniformity was present. Population uniformity is an important facet of each region because Petitioners assume, *a priori*, that the distribution of response station transmitters will be closely matched to population distribution within each region.

35. In step two, Petitioners propose to identify the technical characteristics of response stations which will be associated with each point in the RSA grid. One or more classes of response stations would be identified within the RSA, with each class being a function of several variables, such as transmitted power (EIRP), antenna height, frequency, bandwidth, or other factors pertinent to the interference potential of the response station class. Within each region of an RSA, at least one class of response station must be specified for use in making interference calculations. In some regions, more than one class of station would be specified, with each class relating to a particular set of response stations with distinguishably similar characteristics. For example, if a particular region encompassed a valley and a large hill, one class of response stations might have relatively low antennas and a second class of response stations might have relatively high antennas. Further, the valley stations might require higher transmitter power to reliably reach the response station hub, thus resulting in two clearly distinguishable differences between the two classes of stations. Petitioners argue that classifications are essential for accurately calculating the interference potential of the response stations within an RSA, in that clearly differentiable classes will almost certainly have clearly differentiable potentials for

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<sup>40</sup> See, Appendix D.

interference to neighboring systems, and these differing interference potentials must be evaluated individually, as well as collectively, to arrive at an accurate overall interference assessment.

36. The final step in calculating response station interference would require combining the radiated fields of all response stations of all classes, of all regions, and of all RSAs within the primary station's protected service area. In order to simplify this calculation, the statistical population uniformity within each region would be used as a basis for grouping proportionate numbers of the total number of response stations of each class at the grid points laid out within each RSA. To accomplish this, each grid point would be made to represent all of the response stations of particular classes in proximity to it, *i.e.*, in the final analysis, all of the response station transmitters of all classes and their associated antennas would be presumed (for calculation purposes) to be sited at the grid point coordinates to which they are nearest. For each class of response station assigned to a grid point (multiple classes could share the same grid points), a set of worst-case assumptions would be made concerning the transmitting antenna radiation pattern, transmitter power (EIRP) and antenna height.<sup>41</sup> The combined radiated field for all of the transmitters for each class of response station at each grid point would then be calculated by assuming that all response stations in each class associated with each grid point are characterized by the worst-case technical parameters assigned for each class. For that purpose, the aggregated power (EIRP) is calculated by dividing the number of simultaneous response station emitters in each regional class by the number of grid points in that region. As a check to determine if an adequate number of grid points has been created for performing interference analyses, Petitioners propose to establish a "measurement line" around each RSA, following the shape of the RSA boundary and 0.5 miles outside of it. Measurement points would be placed at intervals no greater than 0.5 miles along the measurement line.<sup>42</sup> Petitioners would then divide all of the RSA grid points into two groups, checkerboard fashion, and calculate the power flux density from each the grid points of both groups at each point on the measurement line.<sup>43</sup> Then, at each measurement point, the separate power flux densities from all of the grid points in group one would be added together to indicate the total power flux at each measurement point from the group as a whole. A similar calculation would then be performed to aggregate the power flux density at each measurement point produced by all of the grid points in the second group. If the combined

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<sup>41</sup> All response station transmitter antennas are assumed to be oriented towards the associated response hub station. The worst-case antenna pattern would be derived by combining the azimuthal (both plane and cross-polarized) radiation patterns of all antennas in use at response stations within a class in such a way that the resulting pattern represents, in all azimuthal directions, the lowest suppression of side lobes present in any of the antennas being combined. Thus, the boresight main lobe of the worst-case pattern may originate with one antenna, while the sidelobes of the worst-case pattern may result from one or more other antennas. In this way, the worst-case pattern will always be more conservative than what would result from the use of any single pattern.

<sup>42</sup> For a circular RSA of radius 5 miles (circumference = 31.4 miles) a minimum of 69 points would be required. Alternatively, Petitioners suggest that measurements be taken every 5 degrees around the measurement line, as measured from the response station hub location, if that would yield a larger number of points.

<sup>43</sup> For this calculation, a single station at each grid point would be assumed having the combined worst-case antenna pattern, the highest EIRP and the highest antenna of any class of station at that grid point.

power flux density from all of the grid points in the first group is within 3 dB of the combined power flux density from all of the grid points in the second group at all measurement points, Petitioners argue that a sufficient number of grid points have been selected for the RSA. If the difference is greater than 3 dB at any measurement point, Petitioners would redraw the RSA grid so as to create additional grid points and continue making comparison calculations between the two groups of grid points until the difference was within 3 dB at all measurement points.

37. Once an adequate grid had been created and tested as described above, Petitioners would then use the equivalent stations at the grid points from all RSAs to calculate compliance with the  $-73$  dBW/m<sup>2</sup> (or bandwidth prorated) field intensity limit and similar compliance with the 45 dB and 0 dB cochannel and adjacent protection requirements. Thus, where under current rules these values are calculated on a per-transmitter basis, Petitioners' proposed system would necessitate that they be calculated on an aggregated basis, covering hundreds or thousands of transmitters and their combined interference potential to neighboring systems.<sup>44</sup> According to the methodology, because there is no *a priori* knowledge of the specific locations of response station transmitters, certain assumptions must be made about their distribution within defined geographical areas chosen for their homogeneity. Petitioners propose that an application for a response hub station specify all parameters involved in the analysis; *e.g.*, for each regional class, the maximum station height above ground, maximum EIRP, antenna sectorization (including polarization values), combined worst-case antenna radiation pattern, and the maximum number of assumed simultaneously operated response stations in the regional class. *See* proposed rule Section 21.909(c), Appendix C. Further, the maximum number of simultaneously transmitting response stations within each class within a region must not exceed the numerical limit proposed for a particular class in the associated response hub application without notification to the Commission. However, if a calculation of field intensities and D/U ratios indicated compliance with maximum permissible values, Petitioners argue that licensees should be free, upon notification to the Commission, to continue adding response station transmitters within their system until such time as calculations indicate that the permissible values (power flux density or D/U ratios) would be exceeded. Petitioners contend, by using worst-case parameters for every class of response station, they have built in a significant degree of extra interference protection which would serve as a buffer for situations where a different mix of stations than anticipated are activated in an RSA.

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<sup>44</sup> It should be noted that, due to the sub- and superchannelization proposals by Petitioners, the aggregation of power from response stations, as well as booster and primary stations, must take into account the bandwidths of the individual stations being aggregated. For example, if one booster station utilized a 24 MHz bandwidth and a second booster used 6 MHz of that 24 MHz, then the aggregated power would be one value over an 18 MHz bandwidth and a higher value over the re-used 6 MHz bandwidth. In an environment with hundreds, or thousands, of stations transmitting and receiving with a complex mixture of sub- and superchannels and high frequency reuse, the number of combinations of frequency overlap will be enormous. This situation also reinforces the need for uniform spectral power flux density within digital signals so that a simple additive process can be used for combining radiated fields, as Petitioners suggest, wherein the flux in dBW is converted to Watts for each field, then fields are then added together, and the result then reconverted to dBW.

38. The sort of system configuration contemplated by Petitioners must involve interference considerations not present in current systems, most especially the anticipated use of large numbers of booster stations to facilitate cellularization of wide-area systems, and the anticipated use of very large numbers of response stations. Inasmuch as the specific locations of primary station transmitters and booster station transmitters will continue to be known, the calculation of interference from these stations, although certainly more complicated than is now the case, nevertheless will be a relatively straightforward process of summation of radiated field intensities at various distances from the transmitters and calculation of D/U interference protection ratios. For response stations, the process is obviously much more complex and less certain, notwithstanding Petitioners' proposals for using Census Data within ZIP Codes for estimating transmitter locations. Such an estimate tacitly assumes a one-to-one correspondence between population density and response station density within a region which has met Petitioners' "3 or less" ratio. In addition, there is no clear way to know the degree of use to which individual response stations will be put, even though Petitioners propose to assume that all of the maximum allowable number of stations are assumed to be transmitting all of the time. The net result is that an assumption about population density would be used as the basis for an assumption about response station transmitter density and location, and these assumptions would then be combined with assumptions about response station EIRP, antenna radiation pattern and antenna height in order to form a statistical picture of response station interference potential which, according to Petitioners, gives a conservative, albeit uncertain, approximation of the operating environment.

39. Petitioners conducted a test in Tucson, Arizona of their proposal involving power accumulation at measurement points and adequacy of grid points. A small system (radius 5 miles; 93 response stations; 72 measurement points on the RSA boundary line) was put in place and measurements made which were compared to theoretical calculations. In general, actual measured signal levels were, as expected, lower than calculated levels and the comparisons of grid square halves generally yielded values which were within 3 dB of each other. Although this test was certainly useful, its results may not be generally applicable to the very diverse geographical and interference environments in which MDS and ITFS systems operate. In particular, the transmitters in the test each utilized a separate, narrowband, channel for transmission to the hub station receiver. In real systems, many transmitters might be sharing the same spectrum simultaneously, creating an environment rich in the potential for cochannel and adjacent channel interference (albeit, perhaps interference internal to the system), complicated by the presence of emissions with very narrow to very wide bandwidths. Additionally, the terrain in the Tucson test area is nearly ideal for tests of a microwave line-of-sight system, because it is almost uniformly flat and free of tall obstacles which could possibly present reflection and diffraction problems that significantly complicate the process of aggregating radiated fields and calculating interference levels. The Tucson area is also relatively devoid of foliage, which further could skew the differences between predicted and measured values.

40. In considering Petitioners' proposals, we have raised concerns, as noted above, that some facets are so complex that they may prove to be very difficult to implement and enforce. In particular, we are concerned that, with the licensing system proposed by Petitioners, numerous

filings will result over time as response and booster stations are added and calculations must be redone repeatedly, to account for the additional interference potential and to account for response station locations which did not fit within the original statistical analysis and RSA grid system. This could present a considerable burden for existing licensees and system operators faced with the need to analyze these filings to verify that no harmful interference will result to their systems. Notwithstanding our reservations, however, we believe that Petitioners' overall goal of facilitating cellularization of the services is very forward-looking, and we believe that it warrants an opportunity to proceed despite the complications and uncertainties which could arise. We therefore are considering adopting Petitioners' modifications to our interference standards for MDS and ITFS as they have been proposed, with only slight further modification.

41. Petitioners propose that, within a given system, the aggregated power from a primary station and all associated booster stations be used for one set of interference calculations, and that a separate set of interference calculations be performed using the aggregated power from response stations, which might operate on adjacent channels. Each of these calculations would then separately be compared to the relevant allowable maximum field values and the permissible D/U ratios. Such a methodology could only be indicative of reality, however, if the response stations were not using all or part of the same spectrum as the primary and booster stations. In instances where all three types of stations share, partially or completely, common spectrum, then the calculations for compliance with the interference standards must come from an aggregation of the power of all three types of stations, and we also are proposing that this be done where the response stations would operate on adjacent channels.

42. We also are proposing to place a limit of 18 dBW EIRP on response station transmitters in cellularized systems. We propose that higher power facilities be separately authorized and require a site specific interference analysis. Given the extremely complex interference situation attendant to cellularized operations and the heavily encumbered nature of MDS and ITFS environments, we do not believe that it would be prudent to permit essentially unlimited numbers of response station transmitters with 2000 watts (33 dBW EIRP) of radiated power, as Petitioners requested. We will not so constrain boosters, which we propose to permit to operate up to the maximum power levels permitted for MDS and ITFS. We note that in some areas, it may be more cost effective to use fewer higher power boosters to overcome propagation hindrances.

43. We solicit comment on these proposals, including Petitioners' interference analysis methodology represented in Appendix D, and any alternative methods by which interference to, and from, cellularized systems could be calculated. We invite specific comment on Petitioners' methodologies for statistically predicting response station locations and the creation of classes and regions for worst-case analyses. We also solicit comment specifically on any means or methods of facilitating the timely review and consideration of cellularized system filings and their associated interference showings. For example, are there less complex solutions or partial solutions for analyzing cellular and/or two-way systems of the nature proposed herein? To what extent could "worst case" analysis serve a sufficient approximation to a more exact analysis, such as a determination of noninterference based solely on terrain shadowing? Under Petitioners'

methodology for interference analysis the effects of all cells in the service area are aggregated, which may be sufficient for relatively small service areas, but to what geographical extent should individual response station areas be aggregated in large BTAs? Petitioners propose that the protected signal level of response station hubs be "the minimum received signal level that the proposed response station hub can actually utilize in the provision of service, specified in dBW/m<sup>2</sup>/Hz." See proposed Section 21.909(c)(2)(iii), Appendix C. Should such an important element in the interference analysis be permitted to be specified by a system operator without some objective basis which could be validated or, alternatively, could a suitably representative value be determined for this purpose?

44. Finally, in their Reply Comments, Petitioners espouse the idea that licensees of booster stations or response station hubs need not cure all actual interference caused by their operations. Petitioners explain that predictions of interference are based on certain assumptions, such as receive antenna height and gain and discrimination characteristics, and MDS and ITFS licensees have not been entitled to interference protection where their facilities have departed from those characteristics, for instance where the receive antenna is installed at a height greater than 30 feet. Nevertheless, we emphasize that where the receive antenna does meet the characteristics set forth in our Rules, the station causing harmful interference is responsible for curing it. This responsibility is a well-settled principle in our Rules.<sup>45</sup> We also have declared with respect to MDS stations and ITFS facilities being leased or used for non-ITFS purposes, that if a station causes harmful interference within the protected service area of another existing station and the interference is not *de minimis*, "we will require the offending station to cease operations until the interference is eradicated. The station alleging that it is being interfered with will be required to make a clear and convincing showing that the interference is occurring."<sup>46</sup>

#### **D. Application Processing Issues**

45. Petitioners have proposed a substantial number of changes in the way we would process MDS and ITFS applications. These changes would represent a fundamental shift in the review function of the Commission in this area and call for substantially increased diligence on the part of MDS and ITFS licensees in regard to tracking and monitoring the impact of applications by other parties on their own service. We note here, however, that no changes have been proposed to Sections 74.901, 74.913, 74.931 and 74.932 of our Rules which would modify the basic eligibility requirements or responsibilities of ITFS licensees. Similarly, no changes have been proposed with respect to Section 74.990 of our Rules, pertaining to the use of available ITFS frequencies by wireless cable entities and, therefore, no changes have been proposed to Section 74.990(e), governing the preferences between mutually exclusive ITFS applicants and MDS applicants for vacant ITFS channels, although, as discussed below, we ask whether some

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<sup>45</sup> See 47 C.F.R. §§ 21.902(b)(2), 21.938(d), and 21.939.

<sup>46</sup> *Amendment of Parts 21, 74 and 94 of the Commission's Rules and Regulations with regard to the technical requirements applicable to the Multipoint Distribution Service, the Instructional Fixed Television Service and the Private Operational-Fixed Microwave Service (OFS)*, 98 FCC 2d 68, 93 (1984).

changes should be considered. Nonetheless, the changes that are proposed would significantly alter the way applications are processed and reviewed. As explained below, we propose to adopt some of Petitioners' proposals, modify some and reject others.

46. Petitioners propose that we adopt a rolling, one-day filing window system to govern the filing of new or modified MDS/ITFS applications for response station hubs or boosters. Such applications when filed on the same day would not be considered mutually exclusive, but rather would all be granted. Under the contemplated system, each applicant will be required to demonstrate protection to facilities existing or proposed prior to the filing of its application. The Petitioners ask that in cases where closely-spaced facilities are proposed on the same day, the filers will be left to resolve any incompatibilities and the Commission's staff will thereby be freed from having to determine and resolve mutual exclusivity. Petitioners' proposal in this area presents a promising start, but still leaves a number of concerns and questions unresolved. Commenter CTN has raised the concern that the one-day rolling filing window will create an undue burden on ITFS licensees, who may find themselves required to evaluate a continuing stream of applications. We solicit comment on how such a concern could be resolved in the context of the one-day rolling filing window. We also solicit comment on whether we should retain our current periodic filing window system used for ITFS applications and what advantages and disadvantages exist between the existing system and the proposed system.

47. In addition to concerns regarding the burden on ITFS licensees, Petitioners' proposal leaves a number of significant questions unresolved regarding the processing of conflicting applications. For example what should be the result in the event that same-day filers of closely-spaced conflicting applicants cannot resolve their differences? Should the applicants be ordered into binding arbitration for which they will assume the cost and whose outcome will be finally subject to Commission approval? If so, what standards and criteria should govern the arbitration? Should the Commission simply freeze the applications until the parties are able to resolve their differences? Should the Commission's staff function as a referee in such cases? Should the staff impose a resolution and, if so, should it adopt any sort of comparative criteria to guide its decisions? Should the staff adopt some type of point system to rate competing applicants? We seek comment on these questions in particular and on Petitioners' proposal regarding the application process in general.

48. We also seek comment on what form the engineering section of a station application under the new rules should take. As discussed in Section C, above, any service proposal under these new rules could have significant interference implications. In connection with the engineering portion of the applications, we seek comment on the reliability of interference agreements entered into by the parties. We also seek comment on whether ITFS licensees are subjected to undue pressure to provide "no objection" letters and, if so, what actions would be useful and effective in reducing the problem.

49. In order to further expedite the processing of response station hub and booster applications and to reduce the burden on Commission resources, Petitioners propose that such applications would be placed on public notice without prior staff review of the accompanying

interference studies, and that the applications would be automatically granted on the 61st day after that notice unless a petition to deny was filed or the Commission notified the applicant prior to that date that a grant would not be made. Petitioners argue that this approach would mean that the only time the staff would be required to review the complex interference studies accompanying a two-way application would be in those situations where the applicant could not secure consent to its proposal, and/or a petition to deny is filed. Although we tentatively accept Petitioners' proposal to place the applications on public notice without prior staff review of the interference studies, we tentatively reject their proposal for an automatic grant of the applications. We believe that placing the applications on public notice without prior interference analysis will serve to speed the review process by making the relevant data available to all interested parties as quickly as possible. However, we believe that an automatic grant at the end of the proposed 60 day public notice period will not provide an adequate opportunity for interested parties or, where necessary, for Commission staff, to review the interference studies or for the Commission to make a reasoned determination in complex cases. We solicit comment on our conclusions.

50. A number of commenters share our concerns that ITFS licensees will not have adequate time or resources to evaluate proposed service plans under the terms of Petitioners' proposal.<sup>47</sup> These commenters argue that Petitioners' proposal would increase the burden on ITFS licensees to monitor and evaluate ITFS and MDS filings. This would result in a particular burden on these ITFS licensees because of the limited technical, legal and financial resources of educational institutions. These commenters are particularly concerned that they or other educational institutions may find themselves pressured or coerced by neighboring licensees or strong wireless cable operators, in part because those parties would control access to the information needed to adequately evaluate the impact of any particular service proposal. We solicit further comment on this issue and especially solicit comment from small ITFS operators.

51. Relatedly, commenter ComSpec has raised concerns regarding the availability to other affected parties of information concerning agreements between adjoining licensees. ComSpec urges that we require parties to inform us of changes in the technical parameters of their response station hub receiving antenna systems and specify any such changes. Commenter Northeastern urges that a database be maintained containing the actual operating parameters of every MDS and ITFS system so that third parties may be able to determine how new applications might affect existing stations. We solicit comment on these proposals of ComSpec and Northeastern.

52. We tentatively propose the following processing rules, taking into consideration the concerns of the various commenters. Under these rules, applicants would file an original and two copies of their system proposal and serve a copy of the proposal on any party whose MDS/ITFS interests may be affected by the proposal. A complete application would then be

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<sup>47</sup> See Comments of CTN, Dallas Community College District, *et al.* ("Dallas"), Northeastern University ("Northeastern"), Pace, ComSpec Corporation ("ComSpec"), Arizona State Board of Regents, *et al.* ("Arizona") and the Archdiocese of Los Angeles ("Archdiocese").

placed on public notice for a 60-day initial comment period. Prior to the expiration of the 60-day period, interested parties could file comments, petitions to deny or requests for extension of time to file comments or petitions to deny. Although it is our policy that requests for extension of time shall not be granted,<sup>48</sup> and we do not propose to change that policy, we anticipate that the limited resources available to an ITFS party to review a potentially complex two-way service proposal will be a factor considered in whether we grant a request for extension of time. In the alternative, we would consider adopting a 120-day initial comment period, with requests for extensions of time considered only in extraordinary circumstances. We seek comment on these proposals and solicit detailed alternate proposals. We especially seek comment on what time period parties believe would be necessary to adequately review a service proposal without unduly delaying the processing of such a proposal.

53. Rather than adopt Petitioners' proposed automatic grant, we tentatively conclude that, at the end of any comment period that we may adopt and following any further staff review, the Commission staff, pursuant to delegated authority, would issue a grant or denial of any authorization pursuant to the revised rules. If no oppositions have been filed in a particular proceeding and the Commission staff has determined that a service proposal would not cause interference in violation of our Rules, we anticipate that such a grant would be accomplished quickly. We seek comment on both our proposed approach and on Petitioners' proposed automatic grant.

54. Petitioners speculate that a large number of applications are likely to be filed once the new rules become effective and that many of the applications submitted at that time will conflict with others filed simultaneously. In order to smooth the transition to the rolling one-day filing window application processing system, the Petitioners propose that a special one-week window be employed when the new rules first go into effect, and that all applications filed during this window be deemed filed as of the same day. Following the publication of a public notice announcing the tendering for filing of applications submitted during that window, applicants would have a period of 60 days to amend their applications to resolve conflicts, provided such amendments do not result in any increase in interference to any previously proposed or authorized station (including facilities proposed during the window), absent consent of the applicant for or licensee of the station that would receive such interference. During this 60-day period, no additional applications could be filed, affording those who filed during the one-week window an opportunity to resolve any conflicts without fear that, during the pendency of settlement discussions, third parties will propose facilities that will have to be protected.

55. At the conclusion of that 60-day period, Petitioners propose that the Commission would publish a public notice announcing the acceptance for filing of all applications submitted during the initial window, as amended during the 60-day period. Petitioners propose that all petitions to deny and comments on the applications be filed within 60 days of the second public notice. Under Petitioners' proposal, each application submitted during the initial window would

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<sup>48</sup> 47 C.F.R. § 1.46.

then be automatically granted on the 61st day after the Commission shall have given notice of its acceptance for filing, unless prior to such date an interested party files a formal petition to deny or the Commission notifies the applicant that its application will not be automatically granted. Following Petitioners' plan, on the 61st day after the publication of such second public notice, applications for authorizations for response station hubs and for booster stations would henceforth be accepted and processed under the rolling one-day filing window approach. Petitioners argue that there is ample precedent for this approach.<sup>49</sup> We tentatively conclude to accept in part and deny in part this portion of Petitioners' proposal.

56. We believe the adoption of the one-week initial filing window will lessen the burden on all affected parties, including the Commission's staff, during the first round of application filing. We also believe that providing parties with an initial 60-day period during which they can resolve any apparent conflicts and then amend their applications without prejudice will provide for quicker and easier processing. We believe issuing a public notice announcing the acceptance for filing of all applications as amended will serve an important notice function for all potentially affected parties. As discussed above, however, we do not propose to accept Petitioners' automatic grant proposal. We solicit comments on these issues. Finally, Petitioners have not addressed procedures for amendment of booster station and response station hub applications. We seek comment on how to conform our MDS and ITFS rules to provide for such amendments.

57. In their Comments, Petitioners urge that we adopt a system whereby an applicant, once authorization for service has been granted, may switch from common carrier to non-common carrier service and back without seeking subsequent authorization.<sup>50</sup> In order to be eligible for this type of flexibility, an applicant would have had to have requested it at the time it filed its application. We seek comment on this aspect of Petitioners' proposal. We also seek comment on whether operators should be required to give the Commission notice when they are switching back and forth between common carrier and non-common carrier service, even if prior approval is not required.

#### **E. Proposals Specifically Regarding Use of 125 kHz Channels**

58. Petitioners propose the continued use of the 125 kHz channels as response channels by licensees of channels with which they are associated pursuant to current Section 74.939(d) of the Commission's Rules. These channels would provide further capacity as return paths in the cellularized two-way scheme, and could be superchannelized or subchannelized

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<sup>49</sup> *Citing Amendment of Parts 1, 21, 22, 74, and 94 of the Commission's Rules to Establish Service and Technical Rules for Government and non-Government Fixed Service Usage of the Frequency Bands 932-935 MHz and 941-944 MHz*, 4 FCC Rcd 2012, 2014 (1989). We note that the case cited by Petitioners does not deal with an automatic grant system, but does deal with a system whereby the Commission adopted a one-week filing period for initial applications that was then converted into a rolling one-day filing window system.

<sup>50</sup> For existing requirements for MDS licensees to provide common-carrier service, *see* 47 C.F.R. § 21.903.

pursuant to proposed Section 74.939(i). However, in response to the March 31, 1997 *Public Notice's* invitation to propose ways to permit even broader flexibility than initially suggested in the Petition, Petitioners add that the Commission should also permit the use of the 125 kHz channels for point-to-multipoint transmissions and that they should be licensed and afforded interference protection in the same manner as other point-to-multipoint MDS and ITFS facilities. Petitioners explain that for systems using digital technologies, there is a need to transmit downstream control signals over side channels that require less than a full 6 MHz channel, for instance for control over digital set top decoders or control over two-way communication systems. Petitioners maintain that use of the 125 kHz channels for such applications is beneficial in that it preserves the 6 MHz channels for transmissions that require greater bandwidth, and it can lead to reduced equipment costs. Petitioners also propound that to further offer flexibility to create channels with bandwidths exceeding 125 kHz, the Commission should remove the current rule provisions which require that the 125 kHz channels only be used in conjunction with their associated 6 MHz channels under current Section 74.939(d). Finally, Petitioners submit that to avoid confusion where the 125 kHz channels are not used as response channels, each of these channels should receive an independent designation, rather than be referenced to the primary 6 MHz channel with which it is associated. While also proposing that the 125 kHz channels be used for additional point-to-multipoint spectrum, Caritas goes a step further than Petitioners, advancing that the Commission should reallocate the 125 kHz channels to be combined into one continuous piece of spectrum to be used for such purposes.

59. Instructional Telecommunications Foundation, Inc. ("Foundation") vigorously opposes Petitioners' revised proposal on the basis of the Foundation's contention that dissociating the 125 kHz channels from specifically designated 6 MHz channels would open up commercial licensing of the 125 kHz channels associated with ITFS channels. They add that creating upstream channels with bandwidth exceeding 125 kHz can be accomplished by allowing ITFS licensees to trade response channels on a routine basis, so that these channels are no longer interleaved. In their reply to the Foundation, Petitioners deny that the 125 kHz channels associated with ITFS channels would be available for licensing directly to wireless cable operators.

60. We are proposing rules in accordance with the most flexible framework ultimately requested by Petitioners for use of the 125 kHz channels, including allowing superchannelization or subchannelization of these stations regardless of whether they are used as response stations or for point-to-multipoint transmissions.<sup>36</sup> We believe that these changes are sufficient to derive the benefits explained by Petitioners, and that a reallocation and the complications associated with that is not necessary. We solicit comment on these proposals regarding use of the 125 kHz

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<sup>36</sup> However, in an explanatory note to Petitioners' revised proposal, Petitioners state that proposed changes to Section 74.902(d)(1) are intended to have the effect that "the Commission's restriction on the number of ITFS channels normally available to a licensee only governs the 6 MHz channels, and does not include the 125 kHz channels." Regardless of what Petitioners intend, we clarify the proposed changes to Section 74.902(d)(1) to provide that an ITFS licensee is limited to the assignment of no more than four 6 MHz and four 125 kHz channels for use in a single area of operation.

channels, especially those which would permit the channels to be used for point-to-multipoint transmissions and which would remove requirements that each 125 kHz channel be used solely in conjunction with a specifically associated 6 MHz channel.

#### **F. Proposals and Issues Specific to ITFS**

61. Section 74.931 of the Commission's Rules describes the purpose and permissible service of ITFS stations, and also sets forth the minimum ITFS programming requirements for ITFS licensees.<sup>37</sup> ITFS stations are operated by educational organizations and are "intended primarily to provide a formal educational and cultural development in aural and visual form," to students enrolled for credit in accredited secondary schools, colleges and universities.<sup>38</sup> Section 74.931(e)(9) specifies that an ITFS licensee who leases excess channel capacity to a wireless cable operator must provide a total average of at least 20 hours per channel per week of ITFS programming on its authorized channels. ITFS licensees in such lease arrangements also retain the right to recapture "an average of an additional 20 hours per channel per week for simultaneous programming on the number of channels for which it is authorized."<sup>39</sup> In addition, Section 74.931(e)(9) allows an ITFS licensee to shift its required educational programming onto fewer than its authorized number of channels via channel loading or channel mapping. The licensee may further agree to transmission of recapture time on channels not authorized to it but which are included in the wireless cable system of which it is a part.

62. All of the commenting ITFS parties support the concepts and goals underlying the Petition. However, several ITFS commenters express fear that the rule changes proposed in the Petition will undermine the primary educational purpose of ITFS. For instance, CTN sees a "resounding commercial emphasis" of the proposed rules and fears that they fail to take into account the needs of ITFS educators. In its reply comments, CTN deduces that the disparity between the number of ITFS and commercial entities commenting on the Petition confirms its initial observation that the proposed rules have been generated primarily from the perspective of the wireless cable industry. In contrast, CMPBA, the licensee of ITFS station WHR-535 in Charlotte, North Carolina, contends that to the extent the wireless cable industry succeeds as the result of adoption of the proposed rules, the ITFS community stands to reap the benefits of technological innovations and the enhanced ability to serve its constituency.

63. Some ITFS commenters also claim that the Petition overemphasizes the financial benefits to ITFS licensees which Petitioners anticipate will result from the proposed rule changes. Pace, for instance, insists that any changes to the rules must promote educational use of ITFS spectrum over the financial benefits which may accrue through leasing of ITFS channels. In addition, WebCel, a prospective bidder in the upcoming LMDS auctions, charges that the leasing

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<sup>37</sup> See 47 C.F.R. § 74.931.

<sup>38</sup> 47 C.F.R. § 74.931(a)(1).

<sup>39</sup> 47 C.F.R. § 74.931(e)(9).

of ITFS channels "has increasingly supplanted the public interest aspect of ITFS in favor of commercial subsidies, an erosion that would become virtually complete" if the Commission implements the rule changes proposed in the Petition. Other ITFS commenters, however, tout the importance of the potential financial benefits to ITFS licensees. Thirty-three applicants for ITFS facilities in North Carolina, each of whom filed separate but identical comments, comment that a system integrating video and two-way digital services will attract more subscribers, thereby increasing overall revenue and fees due to ITFS licensees, and ITFS licensees will be able to use this additional income to provide much needed services for their students. CMPBA believes that the Petition strikes proper balances, and concedes that the ITFS community "has come to rely substantially on its commercial partners." Without a commercially viable wireless cable industry, CMPBA adds, the deployment of ITFS spectrum would become much less broad in scope and purpose.

64. The Archdiocese notes how planned lease agreements for its ITFS channels will enable it to finance the extension of its programming to its schools and parishes in outlying counties. We believe that enhancing the competitive viability of wireless cable service through maximization of flexibility and service offerings promotes the underlying educational purpose of ITFS. The growth of wireless cable has led to the continued development of ITFS by supporting and funding approximately 95 percent of all new ITFS applicants.<sup>40</sup> As we have stated, "revenues are key to this ITFS-MMDS partnership. Leasing channel capacity for the transmission of commercial programming generates revenues that may be vital to the continuing operations of authorized ITFS systems, to the successful deployment in many markets of ITFS service, and to the service's public interest benefits."<sup>41</sup> In evaluating the comments submitted in this proceeding and proposing changes to rules governing permissible service of ITFS stations, ITFS programming requirements, and usage of ITFS spectrum, we are mindful both of our emphasis on the primary educational purpose of ITFS, as well as our desire to in part promote that purpose through enhancements to the competitive viability of wireless cable service.

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<sup>40</sup> *MDS Auction Order*, 10 FCC Rcd at 9594.

<sup>41</sup> *Amendment of Part 74 of the Commission's Rules Governing Use of the Frequencies in the Instructional Television Fixed Service, Report and Order*, 9 FCC Rcd 3360, 3364 (1994) ("*ITFS Channel Loading Order*"). We have elaborated previously that wireless cable strengthens ITFS significantly by providing a source of funds to promote the educational purposes of ITFS, even if educational programming is not transmitted on all ITFS channels. *Id.* We also have agreed that the 20 hours per channel per week ITFS programming standard for licensees leasing excess capacity helps to insure that ITFS licenses are not secured merely to realize financial gain from wireless cable operators. *Amendment of Parts 21, 43, 74, 78, and 94 of the Commission's Rules Governing Use of the Frequencies in the 2.1 and 2.5 GHz Bands Affecting: Private Operational-Fixed Service, Multipoint Distribution Service, Multichannel Multipoint Distribution Service, Instructional Television Fixed Service, & Cable Television Relay Service, Order on Reconsideration*, 6 FCC Rcd 6764, 6773-74 (1991) ("*Wireless Cable Reconsideration Order*"). See *Amendment of Part 74 of the Commission's Rules Governing Use of the Frequencies in the Instructional Television Fixed Service, Notice of Proposed Rulemaking*, 8 FCC Rcd 2828, 2829 (1993) ("*ITFS Channel Loading NPRM*").

## 1. ITFS Programming Requirements

65. Petitioners' proposed changes to Section 74.931(e) would revise the absolute 20 hours per channel per week recapture time requirement to provide that the ITFS programming requirements constitute a total of 40 hours per channel per week, including both actual programming and recapture time. The Petition does not contemplate any changes to the required minimum of 20 hours per channel per week of actual ITFS programming. Thus, under the proposed changes, if an ITFS licensee actually provides more than an average of 20 hours per channel per week of ITFS programming, reserved recapture time would only need to make up the difference to achieve a total of 40 hours per channel per week. Petitioners argue that the Commission historically only required a total of 40 hours, and that the current absolute requirement of 20 hours per channel per week of ready recapture time was an inadvertent revision to the Rules. CTN comments that retaining the 20 hour minimum actual programming requirement is inadequate, and insists that as digital compression increases the number of channel paths, there must be a proportionate increase in the number of paths available for education, including data services. Implementing this increase, CTN contends, would ensure that the intended purpose of the ITFS spectrum is not so diminished as to effect a *de facto* reallocation to commercial use. In their reply, Petitioners urge that we reject CTN's suggestion, and they state that we decided in the *Digital Declaratory Ruling* not to impose any increase in ITFS programming requirements where digital modulation is employed. Petitioners claim that many ITFS licensees are finding it difficult to satisfy the existing ITFS minimum programming requirements. Petitioners further pose that adoption of CTN's proposal would create a disincentive for ITFS licensees to introduce the new technologies contemplated by the Petition, which would undermine realization of the benefits that Petitioners assert these technologies are sure to bring ITFS licensees. We solicit comment from ITFS licensees on these comments.

66. When the Commission first imposed a recapture time requirement, it explained that "the intended use of the spectrum will be preserved by requiring that a minimum of forty hours per week . . . must be dedicated for ITFS programming on each channel, so that if only twenty to thirty-nine hours can be currently programmed, additional hours will be . . . subject to ready recapture."<sup>42</sup> Subsequently, in the *Wireless Cable Reconsideration Order*, the Commission added the absolute 20 hour recapture time language in its revisions to Section 74.931(e)(2). At this time, we find no grounds for retreat from the absolute 20 hour recapture time requirement of Section 74.931(e), especially at this juncture when several wireless cable systems currently enjoy or imminently stand to reap the benefits of increased spectrum capacity through use of digital compression techniques. While we acknowledge the great value to wireless cable operators of maximization of spectrum available for leasing, even the more so in the context of the two-way scheme proposed in this proceeding, we also emphasize the primary educational purpose of ITFS and the importance of maintaining sufficient capacity for programming by ITFS licensees which

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<sup>42</sup> *Amendment of Part 74 of the Commission's Rules and Regulations in Regard to the Instructional Television Fixed Service, Second Report and Order (Proceeding Terminated)*, 101 FCC 2d 49, 87 (1985) ("*Second Report and Order in MM Docket No. 83-523*"); see also *Memorandum Opinion and Order*, 59 RR 2d 1355, 1393 (1986).

fulfills that purpose. Indeed, it is this balance which underlies the existence and substance of the ready recapture provisions of Section 74.931(e).

67. In the *Digital Declaratory Ruling*, we declined to impose any changes in ITFS programming requirements during the interim period governed by it, instead deferring consideration of the issue "to a future rulemaking."<sup>43</sup> In attempting to treat our interim reluctance to increase ITFS programming requirements as dispositive of the issue before us, Petitioners misconstrue what we decided in the *Digital Declaratory Ruling*, and likewise fail to acknowledge our order that nothing therein would prejudice the outcome of a future rulemaking proceeding establishing rules to govern issues relating to digital transmissions in MDS and ITFS.<sup>44</sup> In fact, this is the very type of proceeding within which we anticipated that we would address the effect that digital modulation would have on the ITFS service.<sup>45</sup>

68. We specifically seek comment on several issues related to the question of whether to change our ITFS programming requirements in light of the use of digital technology by ITFS licensees. Should there be different rules depending on whether the wireless cable system employs digital transmissions?<sup>46</sup> If so, how should our treatment vary? Should it take the form of an increase in required levels of actual ITFS programming, an increase in ready recapture time, or both? Would an increase burden ITFS licensees, or would it help them in lease negotiations with wireless cable operators to keep programming levels or reserve recapture time needed for instructional use?<sup>47</sup> How should any increased requirements be measured, e.g., additional hours or additional paths?<sup>48</sup>

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<sup>43</sup> 11 FCC Rcd at 18873.

<sup>44</sup> *See id.* The petitioners in that proceeding conceded that an interim ruling would not prejudice any rules that might ultimately be adopted establishing the recapture rights of ITFS licensees with respect to the increased capacity made available by digital compression. *Id.* at 18872-73.

<sup>45</sup> Thus, we also reject the assumption expressed by Arizona that the rules adopted in this proceeding are not intended to foreclose, and are subject to the outcome of, our consideration of a separate petition for declaratory ruling on ITFS programming requirements filed by the National ITFS Association ("NIA"). As we decided in the *Digital Declaratory Ruling*, this rulemaking proceeding is the appropriate forum for consideration of these issues.

<sup>46</sup> Commenters addressing this question should also address how to resolve the scenarios where licensees employ digital operations on one or more, but not necessarily all, of their authorized channels, and where licensees switch from analog to digital and digital to analog modulation among channels and on the same channel. In the *Digital Declaratory Ruling*, we allowed licensees to play out these scenarios. *Digital Declaratory Ruling*, 11 FCC Rcd at 18865.

<sup>47</sup> This latter question also implicates questions of the role that the Commission should have in protecting ITFS licensees in lease negotiations with wireless cable operators. *See* ¶ 85, *infra*.

<sup>48</sup> If an increase in ready recapture time is deemed appropriate, what should be the notification period to the wireless cable operator in order for the ITFS licensee to exercise its recapture rights? Commenters addressing this latter question should discuss whether the six month, reduced notification where channel loading is employed

69. With the flexibility in implementation of ITFS programming requirements currently allowed or proposed, such as channel loading and shifting of required programming onto other channels within a wireless cable system, should we retain our existing program content requirements and, if not, how should they be modified? For example, should data transmission count towards minimum ITFS programming requirements? Should voice transmission count? If data and/or voice transmission were to count, how would they be measured with respect to fulfillment of minimum ITFS programming requirements? Should time-of-day requirements be instituted for these uses to help ensure that they are really being put towards ITFS programming? Furthermore, should counting one or both of them have an effect on the amount of actual programming or ready recapture time required?<sup>49</sup> If we increase the minimum programming requirements or ready recapture requirements, how should that affect our content requirements? Petitioners state that "content used in connection with the education of students" would flow from receive sites to response station hubs, as well as to receive sites from primary or booster stations. We also invite comment on whether education-related uplink transmissions should be applied towards satisfaction of minimum ITFS programming requirements. While we note our initial impression that counting uplink transmissions will be overly complicated and impractical, given the anticipated multitudes of response stations and the difficulty in predicting or tracking exactly when they are being used for educational purposes, we nonetheless welcome suggestions on how they would be measured with respect to fulfillment of minimum ITFS programming requirements.

## **2. Shift of ITFS Programming Onto Other Channels in the Wireless Cable System**

70. Petitioners anticipate that system developers will attempt to utilize contiguous 6 MHz channels for two-way services in order to minimize the amount of spectrum that would be lost to the proposed spectral mask whenever a return path is adjacent to a downlink channel. Furthermore, depending on the demand for two-way services, entire ITFS channel groups may need to be devoted for return paths. Thus, Petitioners propose to amend Section 74.931(e)(9) to allow ITFS licensees, at their sole discretion, to satisfy their programming requirements on other channels within the wireless cable system, and not mandate that licensees meet these requirements using at least one of their own channels. Petitioners emphasize, however, that an ITFS licensee would not be forced to shift its programming off of its channels. Petitioners also note that the last sentence of current Section 74.931(e)(9) allows ITFS licensees to shift their recapture time onto other channels within the wireless cable system.

71. The proposal to allow ITFS licensees to shift their programming onto other channels within the wireless cable system, without retaining the requirement that they use at least one of their own authorized channels for such programming, would be the next step in a

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suffices, and what impact it would have in a system of widespread channel shifting and swapping.

<sup>49</sup> Cf. *Second Report and Order in MM Docket No. 83-523*, 101 FCC 2d at 87 n.43: "It is notable that compliance with these [day-of-week programming] standards is further eased by the expansion of the definition of "permissible use" programming which will meet this qualification."

progression of rule changes that have afforded ITFS licensees increased flexibility in the implementation of their minimum programming requirements.<sup>50</sup> In the *ITFS Channel Loading Order*, we adopted the view that "it is most practicable to view a licensee's group of four ITFS channels as an integral constituent of a market-wide set of channels."<sup>51</sup>

72. Some commenters express concern that full implementation of the proposed changes to Section 74.931(e)(9) may compromise the autonomy of ITFS licensees. CTN contends that the Petition's proposal for programming shifting needs modification because it does not provide a mechanism for ITFS to maintain and expand its instructional character in a way that corresponds to future cost and interactive communications needs of educators. Citing the *Wireless Cable Reconsideration Order* and the *ITFS Channel Loading Order*, CTN adds that the Commission has previously rejected proposals to allow ITFS licensees to lease their entire capacity. Other ITFS commenters generally support the proposed changes to Section 74.931(e)(9) as they relate to shifting of ITFS programming onto other channels within the wireless cable system. While supporting the proposed changes, Northeastern expresses that the Commission should also propose rules in conjunction which ensure that "substantial use" of the frequencies is maintained for instructional purposes. SWM additionally propounds the "trading" of frequencies within a wireless cable system, and suggests that this would limit the potential for interference to traditional analog ITFS operations in lease arrangements with wireless cable operators, allow continuation of such operations, and avoid "forced participation in a digital video project."

73. In addition to programming shifting, an almost necessary component of this scheme to devote significant blocks of the MDS and ITFS spectrum to return paths involves the continued allowance of channel loading. In the *ITFS Channel Loading Order*, we provided that the channel loading rules adopted there would remain in effect until we assessed the impact of digital compression on MDS and ITFS in a future notice and comment rulemaking proceeding.<sup>52</sup> Over three years later, and over a year since we adopted the *Digital Declaratory Ruling*, we believe that this proceeding, in which we consider changes to our rules to allow ITFS and MDS licensees to engage in fixed two-way digital transmissions, is the appropriate juncture to reassess our channel loading rules. To this end, as an initial matter, we request that interested parties comment on whether our channel loading rules adopted three years ago have been beneficial to ITFS licensees and wireless cable operators, or whether they have been detrimental. Because we believe that our channel loading rules have provided additional much-needed flexibility to ITFS

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<sup>50</sup> See *Wireless Cable Reconsideration Order*, 6 FCC Rcd at 6774 (allowing the use of channel mapping technology); *ITFS Channel Loading Order*, 9 FCC Rcd 3360 (allowing the use of channel loading, which is the functional equivalent of channel mapping but more cost efficient).

<sup>51</sup> 9 FCC Rcd at 3365.

<sup>52</sup> *ITFS Channel Loading Order*, 9 FCC Rcd at 3368. In the *ITFS Channel Loading NPRM*, we had proposed to authorize channel loading "for between three and five years, until digital compression technology is a viable alternative, technologically and economically." 8 FCC Rcd at 2831.

licensees and wireless cable operators, and we propose to retain them, any parties commenting that these rules have been detrimental should also focus on solutions to permit the continued application of them while rendering them more universally beneficial.

74. Because the two-way scheme advanced in the Petition could be enhanced by allowing ITFS licensees to shift their programming onto other channels, and because the suggested changes to Section 74.931(e)(9) would not call for any dilution or elimination of minimum ITFS programming requirements, we are considering changes which would enable ITFS licensees to satisfy some or all of their minimum ITFS programming requirements on other channels in the wireless cable system of which their stations are part. The flexibility that the changes would accord to ITFS licensees to lease their channel capacity, along with the maintenance of minimum ITFS programming requirements, could also encourage educators to apply for new ITFS stations and lead to more educational programming. Several proposals have been put forth looking towards providing maximum flexibility in usage of the channels within a wireless cable system, while at the same time safeguarding the continued reservation of spectrum for downstream transmission of ITFS educational programming so that the licensee can continue to deliver such programming if its relationship with the wireless cable operator ends. The DLA ITFS Parties suggest that each ITFS licensee be required to preserve at least one downstream video channel. They continue that in order to make this possible and still permit contiguous channel groupings to be converted to return link use, the Commission should institute a procedure whereby it would routinely grant applications by ITFS licensees to exchange individual ITFS channels between channel groups. The Foundation agrees that the Commission should liberally allow channel exchanges in a given metropolitan area, but would go a step farther than the DLA ITFS Parties and require that each ITFS licensee devote at least half of its capacity for downstream use.<sup>53</sup> SWM also encourages the Commission to go a step farther than the DLA ITFS Parties request, by prompting the Commission to facilitate the "trading" of channels between the ITFS and MDS bands. SWM adds that the Commission should adopt a rule with the effect of requiring that wherever an exchange of ITFS channels is permitted, reimbursement of all costs of channel changes should occur, in a manner similar to that required where microwave incumbents relocate to accommodate PCS operators. Caritas advances a different framework altogether; it counter-proposes that the Commission institute a five to ten year plan to convert MDS channels 1, 2, and 2A from their current point-to-multipoint use to be reallocated for upstream multipoint-to-point transmissions, leaving the rest of the ITFS and MDS spectrum for point-to-multipoint use.

75. In their reply, Petitioners state that they do not object to the approach suggested by the DLA ITFS Parties, but that they would prefer if that approach was implemented contractually rather than by Commission fiat. Petitioners strongly support SWM's channel exchange idea, touting that it will afford wireless cable operators and MDS and ITFS licensees

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<sup>53</sup> Noting the comments of ComSpec regarding response hub interference protection, the Foundation surmises that certain frequencies will be permanently assigned to upstream use on a region-wide basis, and thus will be unavailable for future downstream use.

increased flexibility by helping to address interference concerns, while at the same time providing further safeguards of downstream channel usage for ITFS licensees if their leases terminate. Regarding Caritas' counter-proposal, Petitioners assert that the Commission should not restrict return paths to MDS channels 1 and 2/2A. Doing so, Petitioners explain, would deny ITFS licensees the ability to employ their spectrum more flexibly to use their own channels for return paths, and would artificially limit the amount of spectrum eligible for use by a wireless cable operator for the provision of return paths, while it is anticipated that many wireless cable systems will require more than the 10-12 MHz available on MDS channels 1 and 2/2A for return paths. Furthermore, Petitioners argue, the interference protection rules proposed in the Petition fulfill the Caritas counter-proposal's objective of minimizing the potential for harmful electrical interference from return paths.

76. We seek comments on the merits of these proposals and on several related issues. We particularly seek comment on the effects of allowing complete flexibility in the number of channels "turned around" for return paths, and in the shifting of required ITFS programming onto other channels in the wireless cable system and what restrictions, if any, should be adopted. We also seek comment on whether we should require ITFS licensees to retain one or more channels for downstream transmissions and the ramifications of such a requirement. Further, we seek comment on whether ITFS channel swaps should only be just between ITFS channels, or whether ITFS licensees should be able to swap their spectrum for channels in the MDS band. Besides addressing these questions and ideas, we solicit further proposals for providing flexibility in usage of ITFS channels while ensuring that ITFS licensees are not deprived of capacity for downstream programming.

77. Finally, the proposed changes to Section 74.931(e)(9) would include a provision specifying that the use of channel mapping or channel loading, including the shifting of programming onto other channels in the wireless cable system, would "not be considered adversely to the ITFS licensee in seeking a license renewal or otherwise." The DLA ITFS Parties consider the adoption of this provision critical to the proposed two-way scheme, though they also express concern that the programming shifting proposal could be reviewed by the U.S. Court of Appeals in connection with a license renewal dispute involving an ITFS station taking advantage of that flexibility. We believe that consideration of renewal expectancy is beyond the scope of this proceeding.

### **3. Autonomy of ITFS Licensees and Agency Role**

78. Several of the ITFS commenting parties express concern that the proposed two-way scheme presents threats to the independence of ITFS licensees and their future ability to use spectrum capacity for instructional purposes. CTN, for instance, charges that any new rules and policies must preserve the ability of ITFS licensees to maintain independent control of their stations whether or not they participate in the cellularized system. Pace further cautions that because the Petition proposes a massive shift towards industry control over ITFS applications, the Commission must ensure that individual ITFS licensees "do not lose their freedom of choice" over the use of their channels, through coercion by neighboring licensees or strong wireless cable

operators. CMPBA, however, believes that the proposed rules adequately protect the interests of ITFS entities, primarily because the rules do not obligate ITFS licensees to take part in the two-way system, enter into a lease agreement, file FCC applications, or accept harmful signal levels. CMPBA instead sees a "reality" that the ITFS licensee "has complete and unfettered discretion over how to deploy its channels." Petitioners express their belief that because the post-relationship needs of each ITFS licensee will be different depending on what configuration the licensee chooses to go forward with, the Commission should generally allow the parties to address post-relationship issues by contract.

79. Some of the concerned ITFS commenting parties focus on the effect that the proposed rules may have on the engineering autonomy of ITFS licensees. The DLA ITFS Parties pose the question of what would happen if an excess capacity agreement comes to an end, and the ITFS licensee has previously converted its channels to two-way use and has shifted some or all of its programming onto other channels in the wireless cable system. Similarly, CTN asks what the impact of cellularization of a market would be on one or more ITFS licensees within it who elect not to cellularize, as well as whether a single ITFS licensee who strives to cellularize its operations would be dependent on other licensees in the market. CTN also insists that any proposal to cellularize ITFS frequencies must be permissive, not mandatory. In that regard, the Foundation raises the issue of involuntary modifications in the two-way digital environment, and hopes that the Commission ultimately prevents the filing of such applications that threaten existing and future instructional service.

80. HITN further comments that the rules must contain provisions "which explicitly state that an ITFS signal may not be originated, retransmitted, shifted to a different channel configuration or altered in any way without the express consent of the underlying licensee." Addressing in this context the more narrow issue of whether to allow wireless cable operators to file construction notifications for low power booster stations, instead of vesting this right solely in the pertinent ITFS or MDS licensees, the DLA ITFS Parties state that they do not object to such an approach, so long as it is clear that the operator may not unilaterally continue to operate the booster on the ITFS channels if the agreement between the operator and the ITFS licensee expires or terminates. In their reply, Petitioners maintain that one of the "fundamental precepts of the Petition" is that no ITFS or MDS licensee can be forced to devote its channels to a cellularized transmission system without its consent. Petitioners also reassure that they propose no rule change that would prevent an ITFS licensee from mandating, in its lease with the wireless cable operator, that its programming be transmitted on its own channels.

81. Petitioners assert that the two-way scheme is not designed to force any licensee to devote its channels to a cellularized transmission system.<sup>54</sup> Those ITFS licensees desiring to

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<sup>54</sup> Section 21.913(a) as proposed by Petitioners contains a provision that "[n]o booster station may be authorized for the reuse of channels authorized to an MDS station without the written consent of the licensee of the station whose channels are reused." In specific response to concerns expressed by HITN and the DLA ITFS Parties regarding operation of low power boosters on the ITFS channels by wireless cable operators after expiration or termination of their lease agreements with ITFS licensees, we propose to replicate that provision in Section 74.985(a)

abstain from cellularization are free to deny efforts by wireless cable lessees to modify leases for cellularization, and ITFS licensees also may decline altogether to lease their excess airtime. We emphasize that cellularization would be permissive only. We will not authorize a two-way framework which involves the mandatory participation of any ITFS licensee.<sup>55</sup> Uncertainty regarding future disposition of capacity for ITFS programming may be mitigated if, as we expect, the ITFS licensee "know[s] in advance the channel or channels within the transmission system on which to receive its own shifted, recapture-time programming."<sup>56</sup>

82. Notwithstanding all of these safeguards against diminution of the spectrum capacity available for instructional services, we realize that there may be factors or scenarios that we have not considered. Accordingly, we seek additional comment on specific potential threats to the engineering autonomy of ITFS licensees which could result from institution of the proposed two-way framework; in conjunction with such comment, we further seek proposed solutions. As discussed above, some proposed solutions include channel swapping and reimbursement of costs of channel changes, upholding that participation of ITFS licensees in cellularization is not mandatory, and potentially increasing reservation of ready recapture time for ITFS programming.<sup>57</sup> Do any of these ideas individually, or a combination of them, provide a sufficient foundation for meeting the expanding needs of some ITFS licensees? Commenters are also encouraged to address the general question of whether the Commission should establish solutions by rule, or whether solutions should be achieved by contract, as advocated by Petitioners.

83. In addition to potential threats to the engineering autonomy of ITFS licensees, CTN and Northeastern identify issues relating to possible encroachment upon the financial autonomy of ITFS licensees by implementation of the proposed two-way framework. They question whether the costs of equipment in a cellularized system will render ITFS licensees dependent on wireless cable operators, and whether ITFS licensees will be able to continue operating in a cellular mode if the commercial enterprise is unsuccessful. Petitioners reply that given the breadth of situations that can arise and the varying requirements of wireless cable

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and apply it to the reuse of channels authorized to an ITFS station.

<sup>55</sup> Cf. *ITFS Channel Loading Order*, 9 FCC Rcd at 3367 (reminding ITFS licensees that channel loading is permissive only, and not mandatory). In light of our intentions that cellularization not be mandatory for ITFS licensees, we ask that parties consider ITF's request that we prevent the filing of involuntary modification applications that jeopardize existing and future instructional service. Specifically, is abuse of this mechanism upon implementation of two-way digital services anticipated? Should we restrict the scope of Section 74.986 of the Commission's Rules to involuntary modifications that are consistent with downstream transmissions only? In speculating as to how this mechanism may be utilized in a two-way environment, commenting parties may also recount the extent to which it is currently employed.

<sup>56</sup> *ITFS Channel Loading Order*, 9 FCC Rcd at 3366.

<sup>57</sup> The Commission previously has stated that ready recapture time "is the primary means of providing the capacity to meet expanding needs." *Second Report and Order in MM Docket No. 83-523*, 101 FCC 2d at 90 n.46.

investors, there is no single solution that will be appropriate in even a majority of circumstances, and this is reflected in the fact that neither CTN nor Northeastern proposes any specific rules to address this problem. Moreover, according to Petitioners, as with challenges to the engineering autonomy of ITFS licensees, contractual arrangements are the appropriate mechanism for addressing concerns about potential threats to ITFS licensee financial autonomy. We seek comment on this issue.

84. Several commenters also addressed the degree of oversight the Commission should maintain in regulating the wireless cable industry and ITFS. In the past, the Commission has adopted rules and procedures to accommodate and protect the special needs of educational institutions and organizations, believing that "educational institutions should be treated differently from commercial entities in many situations due to limited financial and staff resources, governmental constraints, and similar factors."<sup>58</sup> In addition, ITFS licensees and applicants are required to file their excess capacity lease agreements, which are reviewed by the staff for overly restrictive provisions affecting the licensee's rights and obligations, and compliance with the Commission's leasing policies.<sup>59</sup>

85. As discussed above, several ITFS commenters expressed concern about the impact of the proposal -- which Pace characterizes as "a massive shift away from the present system of government oversight towards industry control over the timing, filing, and resolution of ITFS applications" -- on their autonomy. The Archdiocese asks that the Commission "ensure that individual licensees do not lose their freedom of choice through coercion," explaining that "[s]chools have limited technical and legal resources . . . . As a result, schools must depend increasingly upon their wireless cable operators for such support. However, with each level of incremental reliance, a school cedes a corresponding measure of control." The Foundation states that in its experience, wireless cable operators typically regard instructional programming as "inimical to their goal of offering as many commercial channels as possible" and thus, "have negotiated aggressively to restrict instructional program schedules to the minimum permitted by regulation." According to the Foundation, "[i]t is common for licensees to utilize their lessees' consulting engineers and attorneys, despite the fact that such arrangements leave them without independent advice" and warns that "[t]he lack of independent legal and engineering counsel can be disastrous."<sup>60</sup> On the other hand, CMPBA believes that the proposed rules adequately protect the interests of ITFS licenses, primarily because the proposed rules do not impose obligations on

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<sup>58</sup> *Report and Order* in Gen. Docket No. 90-54, 5 FCC Rcd 6410, 6411 (1990).

<sup>59</sup> *Second Report and Order*, 101 FCC 2d at 90-91.

<sup>60</sup> For example, the Foundation states that on more than one occasion, its wireless cable operator asked it to sign "no objection" letters to technical proposals from adjacent markets the same operator was developing, only to discover that the proposals produced "serious levels of predicted interference." The Foundation also asserts that "at times operators simply do not fulfill their lease commitments" and that "ITF can attest from direct experience that more than one of today's prominent, publicly-held wireless cable companies has nakedly ignored contractual commitments."

ITFS licensees who do not wish to become part of a two-way cellular design, and warns that "the Commission should be wary of being unnecessarily 'paternalistic' when it comes to protecting the ITFS community." We welcome comment on these concerns.

86. In order to ensure that educators retain control of their facilities and to protect their interests, the Foundation proposes that the Commission require that two-way digital applications and interference consents be reviewed by legal and engineering counsel that do not represent commercial interests, and that these independent advisors "certify that in their professional opinion the submission will not be harmful to future instructional service." In response, Petitioners assert that the proposal is unworkable, in that no one can predict the impact of an application or consent on "future instructional service," and is also inappropriate. According to Petitioners, it is the licensee educators, not lawyers or consulting engineers, who are in the best position to determine the educational needs of their community. We have declined in the past to require all leasing parties to hire separate counsel, finding this "safeguard" unnecessary and relying instead on the staff's review and monitoring of lease.<sup>61</sup> We see no reason to change our position on this issue and seek comment on this issue.

87. SW&M also proposes that in order to protect the rights of incumbent ITFS licenses, the Commission require that leases approved or submitted under the previous rules "be amended to make clear that the wireless cable lessee and the ITFS licensee have together considered the rule changes adopted and made any appropriate changes to lease terms, prior to the commencement of commercial operations on the frequencies using cellularization, sectorization or differing channelization plans." Petitioners oppose this proposal, stating that the parties to the excess capacity lease agreements, and not the Commission are best positioned to determine whether proposed system changes require contract revisions. Accordingly, we seek comment on SW&M's proposal. We also seek comment on what impact the proposed rule changes would have on our requirements regarding excess capacity lease agreements. For example, the Commission has consistently maintained an ITFS licensee should be permitted to purchase the ITFS equipment necessary to maintain its operation in the event the lease is terminated.<sup>62</sup> In addition, we also require that the licensee maintain ultimate control over its licensed facilities. Several commenters have expressed concern that given the complexity and cost of Petitioner's proposal, ITFS licensees will be unable to sever their relationship with the wireless cable operator and acquire the equipment to either continue cellular operations or return to non-two-way transmissions. We particularly seek comment on this matter and on what type of equipment MDS lessees of ITFS channels should be required to make available to the ITFS licensees upon termination of a lease. For example, should it only be digital equipment comparable to that in use on the system at the time the lease is terminated or should it be equipment that would make it possible for the ITFS licensee to restore analog video operation, if necessary? Finally, with respect to Petitioners' proposal that ITFS licensees be allowed to

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<sup>61</sup> *Second Report and Order*, 101 FCC 2d at 91.

<sup>62</sup> *See Turner Independent School District*, 8 FCC Rcd 3153, 3155 (1993).

utilize their entire channel for return paths and shift their ITFS programming to other channels, we request comment on whether the parties should be required to file written agreements governing the ITFS licensee's lease of an ITFS programming channel, and whether our present requirements for excess capacity leases, including those dealing with control issues, length of lease, and rights on termination, should apply.

#### 4. Accountability of ITFS Licensees

88. CTN further comments that the proposal to permit transmissions of more or less than 6 MHz on contiguous channels, which may be licensed to different entities, raises issues of accountability for such transmissions. CTN points to the proposal to eliminate Section 74.982 of the Commission's Rules, the ITFS call sign transmission requirement, as a manifestation of this problem. Petitioners assert that lessors and lessees would be held accountable for transmissions on superchannels on the same basis as they today are held accountable for transmissions. Specifically regarding the proposal to eliminate Section 74.982, Petitioners argue that continued enforcement of the ITFS call sign transmission requirement in a two-way environment will impose substantial costs on ITFS licensees. Petitioners conclude that because it is proposed that the Commission's records will reflect who is transmitting on what channels at all times, the burdens of the call sign transmission requirement far outweigh the benefits.

89. In the *Digital Declaratory Ruling*, we declined to waive the call sign transmission requirements for ITFS stations employing digital technology, instead deferring consideration of the wisdom of continuation of these requirements until a future rulemaking proceeding. We did, however, allow that "the burdens of requiring ITFS licensees to transmit call signs may outweigh the benefits, especially where the channels are leased to a wireless cable operator, whose identity is readily discernible and whose licensing status is readily ascertainable."<sup>63</sup> Nevertheless, we recognize the complexity of the interference environment that would result from implementation of the two-way scheme, and the difficulty that this may pose in determining sources of harmful interference. Thus, we seek comment on the proposed elimination of Section 74.982. Where commenters oppose its elimination, we seek proposals for more flexible application of its requirements in a two-way environment, balancing the perceived need to use this device for ITFS licensee accountability against the costs to ITFS licensees and wireless cable operators of doing so. We also solicit alternative solutions for maintaining the accountability of ITFS licensees.

#### IV. PROCEDURAL MATTERS

90. For purposes of this nonrestricted notice and comment rulemaking proceeding, members of the public are advised that *ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed under the Commission's rules. See generally 47 C.F.R. Sections 1.1202, 1.1203 and 1.1206(a).

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<sup>63</sup> *Digital Declaratory Ruling*, 11 FCC Rcd at 18868.

91. Pursuant to applicable procedures set forth in 47 C.F.R. Sections 1.415 and 1.419, interested parties may file comments on or before December 9, 1997 and reply comments on or before January 8, 1998.<sup>64</sup> All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. To file formally in this proceeding, participants must file an original and five copies of all comments, reply comments, and supporting comments. If participants want each Commissioner to receive a personal copy of their comments, an original plus ten copies must be filed. Participants should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center (Room 239) at the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

92. As required by Section 603 of the Regulatory Flexibility Act of 1980, Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601, *et. seq.*, the Commission has prepared an Initial Regulatory Flexibility Analysis of the expected impact on small entities of the proposals suggested in this document. *See* Appendix B. We request written public comment on the analysis. Such comments must be filed in accordance with the same filing deadlines as comments filed in this rulemaking proceeding, but they must have a separate and distinct heading designating them as responses to the Initial Regulatory Flexibility Analysis. **IT IS ORDERED** that the Commission's Office of Managing Director **SHALL SEND** a copy of this *Notice*, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

93. For further information on this proceeding, please contact Michael J. Jacobs at (202) 418-7066 or Dave Roberts at (202) 418-1600, Video Services Division, Mass Media Bureau.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton  
Acting Secretary

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<sup>64</sup> Noting that many of the parties which filed comments in the initial round of this proceeding are ITFS entities, SWM requested an early Fall comment date in light of the academic schedules which predominate amongst these entities. The comment period that we establish here, therefore, should enhance the ability of ITFS entities to file carefully considered comments and reply comments.

**APPENDIX A**  
**LIST OF PETITIONERS AND COMMENTING PARTIES**

**PETITIONERS**

ADC Telecommunications Corp.	George Mason University
Aims Community College	Instructional
Alamosa Public Schools	Foundation, Inc.
Alda Wireless Holdings, Inc.	Humanities Instructional Television
American Communications Services, Inc.	Hybrid Networks, Inc.
American Foundation for Instructional TV	Indiana Higher Education
American Telecasting, Inc.	Telecommunication System
Aquinas and St. Mary's Catholic Schools	Indio Wireless Partnership
Augustina College	Instructional Media Center,
Barnesville Public School	California State University,
Broadband Networks, Inc.	Chico
Broadcast Cable, Inc.	ITS Corporation
Bruning Public School	Ivy Tech State College
C.D.V. Incorporated	Kessler and Gehman Associates,
CAI Wireless Systems, Inc.	Inc.
California Amplifier	Lance Industries
California Human Development Corporation	Lucas County Educational Service
California State University, Stanislaus	Center
Center for Economic & Social Justice	Magellan University
Central Community College Foundation	Malcolm Public Schools
Central Oregon Community College	McConnell Communications, Inc.
CFW Cable, Inc.	Microwave Filter Company, Inc.
Clarendon Foundation	Milwaukee Regional Medical ITS,
Communications & Energy Corp., Inc.	Inc.
Community School of Naples	Missouri Baptist College, ITFS
Comwave	Montrose School District
Concord Community Schools	Multimedia Development
Concordia College	Corporation
Conifer Corporation	National Digital Network,
Cooperative Educational Services Agency #7	Inc.
Cornerstone Christian School System, Inc.	National Wireless Holdings, Inc.
Cross Country Wireless, Inc.	Northern Arizona University
CS Wireless Systems, Inc.	Oklahoma City University
DeLawder Communications, Inc.	Oklahoma Educational Television
Delta-Montrose Area Vocational Technical Center	Authority
Denver Public Schools	Omni Microwave
Digital & Wireless Television	Oregon Public Broadcasting
DiviCom Inc.	Pacific Monolithics, Inc.
Durand Community Unit School District #322	Pacific Telesis Group
EMCEE Broadcast Products	PCTV Gold, Inc.

First Assembly of God, Kahului, Maui, Inc.  
People's Choice TV Corp.  
Pikes Peak Community College  
Polk Community College  
Portland Community College  
Preferred Entertainment, Inc.  
Pueblo Community College  
Pueblo School District 60  
Purdue University  
Raymond Central School  
School District of Oakfield  
South Florida Television, Inc.  
Specchio Developers Ltd.  
Springfield Board of Education  
St. Norbert College  
Stanford Telecommunications, Inc.  
Suncoast Wireless Communications Corporation  
Superchannels of Las Vegas, Inc.  
Tennessee Wireless  
Teton Wireless Television  
The Knowledge Network of Greater Omaha  
University of Colorado at Colorado Springs  
University of Northern Colorado, Academic  
Technology Services  
University of South Dakota  
University of Southern Colorado/KTSC-TV  
University of South Florida  
Valley Lutheran High School  
Views on Learning, Inc.  
Virginia Communications, Inc.  
W.A.T.C.H. TV Company  
Weld County School District RE-1  
Winnebago Community Unit District 323  
Wireless Cable Association International, Inc.  
Wireless Cable Digital Alliance  
Wireless Cable of Indianapolis  
Wireless Holdings, Inc. (Videotron USA)  
Wireless One, Inc.  
Wireless One of North Carolina, LLC  
Yellowstone Education Center  
Yuba Community College  
Zenith Digital Media Group

Pecatonica Community School

**COMMENTERS**

ADC Telecommunications Corp. et al. ("Petitioners")  
Archdiocese of Los Angeles Education and Welfare Corporation  
Arizona State Board of Regents et al.  
Asheville-Buncombe Technical Community College  
Asheville Christian Academy  
Belmont Abbey College  
Bladen Community College  
Brunswick Community College  
Caritas Telecommunications, Inc.  
Catholic Television Network, Inc.  
College of the Albemarle  
ComSpec Corporation  
The Crary School  
Currituck County Board of Education  
Dallas County Community College District et al.  
Davidson County Community College  
Durham Technical Community College  
Edgecombe Community College  
Fayetteville Technical Community College  
Gaston College  
Gulf Coast MDS Service Company  
Halifax Community College  
Hispanic Information and Telecommunications Network  
Instructional Telecommunications Foundation, Inc.  
Interactive Video Data Trade Association, Inc.  
Isothermal Community College  
James Sprunt Community College  
Johnston Community College  
Lenoir Community College  
Meredith College  
Mitchell Community College  
Moore County Schools  
Nash Community College  
The National ITFS Association  
Northeastern University  
Pace Telecommunications Consortium  
Pamlico Community College  
Randolph Community College  
Richmond Community College  
Roanoke Bible College  
Roanoke Rapids Graded School District  
Robeson Community College

Sandhills Community College

A-3

Schwartz, Woods & Miller

Spartansburg County School District Two

University of North Carolina

Wake Technical Community College

Wayne Community College

WebCel Communications, Inc.

### **REPLY COMMENTERS**

ADC Telecommunications Corp. et al. ("Petitioners")

Catholic Television Network, Inc.

Charlotte-Mecklenburg Public Broadcasting Authority

WebCel Communications, Inc.

## APPENDIX B

## Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act (RFA),<sup>a</sup> the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the expected significant economic impact on small entities by the policies and rules proposed in this *Notice of Proposed Rule Making* in MM Docket No. 97-217 ("*Notice*"). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *Notice* provided above in paragraph 92. The Commission will send a copy of the *Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). *See* 5 U.S.C. § 603(a). In addition, the *Notice* and IRFA (or summaries thereof) will be published in the Federal Register. *See id.*

**Need for, and Objectives of, the Proposed Rules:** The Commission is instituting this rulemaking to determine whether, and if so, how, to amend its rules to promote the ability of MDS and ITFS licensees to provide two-way digital services. The objective of this proceeding is to encourage the efficient use of the spectrum allotted to MDS and ITFS by simplifying our current two-way licensing system and providing greater flexibility in the use of the allotted spectrum where such flexibility would best serve the needs of the public. In addition, we intend to enhance the competitiveness of the wireless cable industry and the resultant choices available to consumers, and to increase Internet access for educational institutions and their students via ITFS frequencies.

**Legal Basis:** Authority for the action proposed in this proceeding may be found in Sections 4(i) and (j), 301, 303(g) and (r), and 403 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 154(j), 301, 303(g), 303(r), and 403.

**Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply:** The RFA generally defines "small entity" as having the same meaning as the terms "small business," "small organization," and "small business concern."<sup>b</sup> In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.<sup>c</sup> A small business concern is one which: (1) is independently owned and operated;

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<sup>a</sup> *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et. seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

<sup>b</sup> 5 U.S.C. § 601(6).

<sup>c</sup> 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of small business applies unless an agency after consultation with the Office of Advocacy of the Small Business Administration and after an opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes definitions in the Federal Register.

(2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.<sup>d</sup>

**MDS:** The Commission has defined "small entity" for the auction of MDS as an entity that, together with its affiliates, has average gross annual revenues that are not more than \$40 million for the preceding three calendar years.<sup>e</sup> This definition of a small entity in the context of MDS auctions has been approved by the SBA.<sup>f</sup> The Commission completed its MDS auction in March 1996 for authorizations in 493 basic trading areas (BTAs). Of 67 winning bidders, 61 qualified as small entities.<sup>g</sup>

MDS is also heavily encumbered with licensees of stations authorized prior to the auction. The SBA has developed a definition of small entities for pay television services, which includes all such companies generating \$11 million or less in annual receipts.<sup>h</sup> This definition includes multipoint distribution systems, and thus applies to MDS licensees and wireless cable operators which did not participate in the MDS auction. Information available to us indicates that there are 832 of these licensees and operators that do not generate revenue in excess of \$11 million annually. We tentatively conclude that for purposes of this IRFA, there are approximately 892 small MDS providers as defined by the SBA and the Commission's auction rules, and some of these providers may be impacted by the outcome of this *Notice*. We seek comment on this tentative conclusion.

**ITFS:** There are presently 2032 ITFS licensees. All but 100 of these licenses are held by educational institutions (these 100 fall in the MDS category, above). Educational institutions may be included in the definition of a small entity.<sup>i</sup> ITFS is a non-pay, non-commercial broadcast service that, depending on SBA categorization, has, as small entities, entities generating either \$10.5 million or less, or \$11.0 million or less, in annual receipts.<sup>j</sup> However, we do not collect, nor are we aware of other collections of, annual revenue data for ITFS licensees. Thus, we

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<sup>d</sup> Small Business Act, 15 U.S.C. § 632.

<sup>e</sup> 47 C.F.R. § 21.961(b)(1).

<sup>f</sup> *See Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service and Implementation of Section 309(j) of the Communications Act - Competitive Bidding*, MM Docket No. 94-31 and PP Docket No. 93-253, Report and Order, 10 FCC Rcd 9589 (1995).

<sup>g</sup> One of these small entities, O'ahu Wireless Cable, Inc., was subsequently acquired by GTE Media Ventures, Inc., which did not qualify as a small entity for purposes of the MDS auction.

<sup>h</sup> 13 C.F.R. § 121.201.

<sup>i</sup> *See* 5 U.S.C. §§ 601 (3)-(5).

<sup>j</sup> *See* 13 C.F.R. § 121.210 (SIC 4833, 4841, and 4899).

tentatively conclude that up to 1932 of these educational institutions are small entities. We seek comment on this conclusion.

**Description of Reporting, Recordkeeping and Other Compliance Requirements:** The Commission seeks comment on proposals to amend its rules to promote the ability of MDS and ITFS licensees to provide two-way digital services, including implementation of simplified procedures governing application for, and authorization of, booster stations and response station hubs. Because the proposed rule changes would enable licensees to apply for and receive authorizations for new types of booster stations and for response station hubs, certain commensurate new reporting and recordkeeping obligations would follow as part of this process, though the nature of the obligations and the MDS and ITFS rules directly addressing them<sup>k</sup> would remain the same. At the same time, however, the proposed rule changes would make the overall licensing process for two-way digital services much less cumbersome than the current process, which requires individual licensing of each response station and booster station. In the *Notice*, we request comment on whether we should increase ITFS programming requirements, and if so, in which way and to what degree. While the proposed two-way scheme would result in more complicated interference analysis requirements for MDS and ITFS entities seeking to establish or modify service, regardless of whether the entities themselves choose to engage in fixed two-way transmissions, these interference safeguards are necessary to promote the objectives of this proceeding. We seek comment on these conclusions and how we can modify any proposed new requirements so as to reduce the burden on small entities and still meet the objectives of this proceeding.

**Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternative Considered:** As described in the *Notice*, in response to a March 31, 1997 *Public Notice* soliciting comment on the Petition, several of the ITFS commenting parties express concern that the proposed two-way scheme presents threats to the independence of ITFS licensees and their future ability to use spectrum capacity for instructional purposes. Pace, for instance, cautions that because the Petition proposes a massive shift towards industry control over ITFS applications, the Commission must ensure that individual ITFS licensees "do not lose their freedom of choice" over the use of their channels, through coercion by neighboring licensees or strong wireless cable operators. Other commenting ITFS parties, however, do not perceive such a threat. For instance, CMPBA believes that the proposed rules adequately protect the interests of ITFS entities, primarily because the rules do not obligate ITFS licensees to take part in the two-way system, enter into a lease agreement, file FCC applications, or accept harmful signal levels. Nevertheless, in order to find solutions that would allay the concerns of some ITFS licensees, in the *Notice* we seek suggestions on ways to provide maximum flexibility in usage of ITFS channels while ensuring that capacity is reserved for downstream ITFS programming, pose the question of whether solutions should be established by rule or by contract and what role the Commission or other third parties should play in reviewing excess capacity lease agreements, and confirm that cellularization by ITFS licensees would be permissive only, and not mandatory.

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<sup>k</sup> See, e.g., 47 C.F.R. § 21.911.

CTN raises the concern that Petitioners' one-day rolling application filing window plan and automatic grant proposal will create an undue burden on ITFS licensees who may find themselves required to evaluate a continuing stream of applications. We solicit comment on how such a concern could be resolved in the context of a one-day rolling filing window or whether we should retain a periodic filing window system. Furthermore, we tentatively reject the automatic grant component of Petitioners' application processing proposal, and instead propose a "comment period" of 60 or 120 days, after which applications would be processed pursuant to current procedures. In proposing the comment period alternative, we acknowledge the complexity of the engineering information in the response hub or booster station applications, and the substantial number of affected parties, particularly ITFS licensees, that frequently have very limited resources and that often would not be able to file a petition against an application before the application is automatically granted. Thus, in the *Notice*, we particularly solicit comment from small ITFS operators. Similarly, we express concern that the proposed interference prediction methodology is so complex that it may lead to numerous filings updating system configurations, which would present considerable burdens upon existing licensees and operators needing to analyze these filings. We therefore solicit suggestions for other possible prediction methodologies.

In some instances, a proposed rule will impact different classes of small entities in different ways. For instance, in considering whether to increase ITFS programming requirements, including ready recapture time, we acknowledge in the *Notice* the balance which underlies the existence and substance of the ready recapture provisions of 47 C.F.R. § 74.931(e): the great value to wireless cable operators of maximization of spectrum available for leasing, and the importance of maintaining sufficient capacity for programming by ITFS licensees which fulfills the primary educational purpose of ITFS. We decline to retreat from the current recapture time requirements of Section 74.931(e), but we solicit comment in the *Notice* on whether we should adopt any changes to the number of hours required for ready recapture by ITFS licensees.

Other proposals, tentative conclusions, or questions that we pose in the *Notice* are designed to minimize the impact on all small entities involved. For example, we tentatively reject Caritas' proposal to limit the availability of response channels to MDS channels 1, 2, and 2A, because it would both artificially limit the amount of spectrum that could be used for return paths and unnecessarily prevent ITFS licensees from using their own channels for return paths, while providing no interference protection benefits that cannot be derived in other ways.

CTN and SWM both put forth procedural suggestions for this proceeding. CTN proposes that rather than proceeding with the instant rulemaking, we pursue a negotiated rulemaking procedure and convene a federal advisory committee to evaluate Petitioners' proposals and work out the most effective method to implement them. CTN asserts that this would provide substantial, useful information and facilitate the process initiated by Petitioners. We believe that the instant rulemaking process will provide us with sufficient information to adequately evaluate Petitioners' proposals. In addition, the need for swift consideration of these proposals, in order to enhance the competitiveness of the wireless cable industry and expedite educational institutions' access to the Internet via ITFS frequencies, may be defeated by implementing a potentially lengthy negotiated rulemaking procedure. Thus, we reject CTN's proposal for a negotiated rulemaking

at this time. Should circumstances warrant, however, we reserve the option to revisit our decision on this issue at a later date. Conversely, SWM requests the issuance of an NPRM in this proceeding, and noting that many of the parties which filed comments in the initial round of this proceeding are ITFS entities, requests an early Fall comment date in light of the academic schedules which predominate amongst these entities. The comment period that we establish here, therefore, should enhance the ability of ITFS entities to file carefully considered comments and reply comments. We solicit comment in the *Notice* on other substantive and procedural alternatives to adoption of the proposed two-way digital transmission scheme.

**Federal Rules that Overlap, Duplicate or Conflict with the Proposed Rule:** None.

## APPENDIX C

Parts 1, 21 and 74 of Title 47 of the Code of Federal Regulations are proposed to be amended as follows:

### **PART 1 - PRACTICE AND PROCEDURE**

1. Section 1.1307 would be amended by adding the following language directly following the reference to MDS stations:

MDS licensees are required to attach a label to subscriber transceiver or transverter antennas that (1) provides adequate notice regarding potential radio frequency safety hazards, *e.g.*, information regarding the safe minimum separation distance required between users and transceiver antennas; and (2) references the applicable FCC-adopted limits for radio frequency exposure specified in §1.1310 of this chapter.

1a. Section 1.1307 likewise would be amended by adding the following language directly following the reference to Part 74, Subpart I stations:

ITFS licensees are required to attach a label to subscriber transceiver or transverter antennas that (1) provides adequate notice regarding potential radio frequency safety hazards, *e.g.*, information regarding the safe minimum separation distance required between users and transceiver antennas; and (2) references the applicable FCC-adopted limits for radio frequency exposure specified in §1.1310 of this chapter.

### **PART 21 - DOMESTIC PUBLIC FIXED RADIO SERVICES**

2. The authority citation for Part 21 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334.

3. Section 21.2 would be amended by revising the definitions of "Multipoint distribution service," "Multipoint distribution service response station" and "Signal Booster Station" and by adding a definition for "Response Station Hub" to read as follows:

#### **§21.2 Definitions.**

\* \* \* \* \*

*Multipoint Distribution Service (MDS).* A domestic public radio service rendered on microwave frequencies from one or more a fixed stations transmitting to multiple receiving facilities located at fixed points and/or from multiple Multipoint Distribution Service response stations transmitting to response station hubs.

*Multipoint Distribution Service response station.* A fixed station operated by an MDS licensee, the lessee of MDS channel capacity or a subscriber of either to communicate with a response

station hub or associated MDS station. A response station under this part may share facilities with other MDS response stations and/or one or more Instructional Television Fixed Service (ITFS) response stations authorized pursuant to §74.939.

\* \* \* \* \*

*Response Station Hub.* A fixed facility licensed for use in accordance with §21.909 that is operated by an MDS licensee or the lessee of an MDS facility for the reception of information transmitted by one or more MDS response stations. A response station hub licensed under this part may share facilities with other MDS response station hubs and/or ITFS response station hubs authorized pursuant to §74.939.

\* \* \* \* \*

*Signal Booster Station.* An MDS station licensed for use in accordance with §21.913 that operates on one or more MDS channels. Signal booster stations are intended to augment service as part of a distributed transmission system where signal booster stations retransmit the signals of one or more MDS stations and/or originate transmissions on MDS channels. A signal booster station licensed under this part may share facilities with other MDS signal booster stations and/or one or more ITFS signal booster stations authorized pursuant to §74.985.

\* \* \* \* \*

4. Section 21.27 would be revised by adding a new subsection (d) to read as follows:

**§21.27 Public notice period.**

\* \* \* \* \*

(d) Effective as of [date of adoption of new rules], there shall be one one-week window at such time as the Commission shall announce by public notice for the filing of applications for booster stations and response station hub authorizations, during which all applications shall be deemed to have been filed as of the same day for purposes of §§21.909 and 21.913. Following the publication of a public notice announcing the tendering for filing of applications submitted during that window, applicants shall have a period of sixty (60) days to amend their applications, provided such amendments do not result in any increase in interference to any previously proposed or authorized station (including facilities proposed during the window) absent consent of the applicant for or licensee of the station that would receive such interference. At the conclusion of that sixty (60) day period, the Commission shall publish a public notice announcing the acceptance for filing of all applications submitted during the initial window, including those amended during the sixty (60) day period. All petitions to deny applications filed during the one-week window must be filed within sixty (60) days of such second public notice. On the sixty- first (61st) day after the publication of such second public notice, applications for new or

modified response station hub and booster station authorizations may be filed and will be processed in accordance with the provisions of §§ 21.909 and 21.913.

5. In Section 21.30, paragraph (a)(4) would be revised to read as follows:

**§21.30 Opposition to applications.**

(a) \* \* \*  
\* \* \* \*

(4) except as provided in §21.901(d)(1) regarding Instructional Television Fixed Service licensees, in §21.909 regarding MDS response station hubs and in §21.913 regarding MDS booster stations, be filed within thirty (30) days after the date of public notice announcing the acceptance for filing of any such application or major amendment thereto, or identifying the tentative selectee of a random selection proceeding in the Multichannel Multipoint Distribution Service or for Multipoint Distribution Service H-channel stations (unless the Commission otherwise extends the filing deadline); and

\* \* \* \*

6. In Section 21.42, paragraph (c) would be revised to read as follows:

**§21.42 Certain modifications not requiring prior authorization.**

\* \* \* \*

(c) Modifications that may be made without prior authorization under paragraph (b) of this section are:

\* \* \* \*

(9) A change to a sectorized antenna system comprising an array of directional antennas, provided that such system does not change polarization or result in an increase in radiated power by more than one dB in any direction.

7. In Section 21.101(a), note 2 would be revised to read as follows:

**§21.101 Frequency tolerance.**

(a) \* \* \*

<sup>2</sup>Beginning November 1, 1991, equipment authorized to be operated in the frequency bands 2150-2162 MHz, 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz, and 2674-2680 MHz for

use in the Multipoint Distribution Service shall maintain a frequency tolerance within  $\pm 1$  kHz of the assigned frequency. MDS booster stations authorized pursuant to §21.913(b) shall maintain a frequency tolerance within  $\pm 1$  kHz of the assigned frequencies. MDS booster stations authorized pursuant to §21.913(e) and MDS response stations authorized pursuant to §21.909 shall employ transmitters with sufficient frequency stability to ensure that the emission stays within the authorized frequency block.

\* \* \* \* \*

8. In Section 21.118, paragraph (c) would be revised to read as follows:

**§21.118 Transmitter construction and installation.**

\* \* \* \* \*

(c) Each transmitter employed in these services shall be equipped with an appropriately labeled pilot lamp or meter which will provide continuous visual indication at the transmitter when its control circuits have been placed in a condition to activate the transmitter. Such requirement will not be applicable to MDS response stations or MDS booster stations authorized pursuant to § 21.913(e). In addition, facilities shall be provided at each transmitter to permit the transmitter to be turned on and off independently of any remote control circuits associated therewith.

\* \* \* \* \*

9. Section 21.201 would be revised to read as follows:

**§21.201 Posting of station authorization information.**

Each licensee shall post at the station, the booster station authorized pursuant to §21.913(b) or the MDS response station hub the name, address and telephone number of the custodian of the station license or other authorization if such license or authorization is not maintained at the station or response station hub. Each authorized operator of an MDS booster station authorized pursuant to §21.913(e) shall post at the booster station the name, address and telephone number of the custodian of the notification filed pursuant to §21.913(e) if such notification is not maintained at the station.

10. In Section 21.901, paragraphs (a), (b) and (d) would be revised, and new paragraph (g) would be added, to read as follows:

**§21.901 Frequencies.**

(a) Frequencies in the bands 2150-2162 MHz, 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz, 2674-2680 MHz and 2686-2690 MHz are available for assignment to fixed stations in this service. Frequencies in the band 2150-2160 MHz are shared with nonbroadcast omnidirectional radio systems licensed under other parts of the Commission's Rules, and frequencies in the band 2160-2162 MHz are shared with directional radio systems authorized in other common carrier services. Frequencies in the 2596-2644 MHz band are shared with Instructional Television Fixed Service stations licensed under Part 74 of the Commission's Rules. Channels H4e, H4m, H4f and H4n, listed in §74.939(i) of this chapter, are assigned to fixed stations in the 2596-2620 band, and are shared with Instructional Television Fixed Service Stations licensed under Part 74 of the Commission's Rules to operate in this band; grandfathered channels H4u, H4cc, H4v and H4dd, listed in §74.939(i) of this chapter, are licensed under Part 21 or Part 74 of the Commission's Rules, as applicable.

(b) Applicants may be assigned a channel(s) according to one of the following frequency plans:

(1) At 2150-2156 MHz (designated as Channel 1), or

(2) At 2156-2162 MHz (designated as Channel 2), or

(3) At 2156-2160 MHz (designated as Channel 2A), or

(4) At 2596-2602 MHz, 2608-2614 MHz, 2620-2626 MHz, and 2632-2638 MHz (designated as Channels E1, E2, E3 and E4, respectively, with the four channels to be designated the E-group channels), and Channels H4e and H4m listed in §74.939(i),<sup>1</sup> or

(5) At 2602-2608 MHz, 2614-2620 MHz, 2626-2632 MHz and 2638-2644 MHz (designated as Channels F1, F2, F3 and F4, respectively, with the four channels to be designated the F-group channels), and Channels H4f and H4n, listed in §74.939(i),<sup>1</sup> or

(6) At 2650-2656 MHz, 2662-2668 MHz and 2674-2680 MHz (designated as Channels H1, H2 and H3, respectively, with the three channels to be designated the H-group channels).<sup>1</sup>

\* \* \* \* \*

(d) Frequencies in the band 2596-2644 MHz and associated 125 kHz channels listed in Section 74.939(i) will be assigned only in accordance with the following conditions.

\* \* \* \* \*

(g) Frequencies in the bands 2150-2162 MHz, 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz and 2674-2680 MHz are available for point-to-multipoint use and/or for communications between MDS response stations and response station hubs when authorized in accordance with the provisions of §21.909, provided that such frequencies may be employed for MDS response stations only when transmitting using digital modulation.

NOTES:

<sup>1</sup> No 125 kHz channels are provided for Channels E3, E4, F3, F4, H1, H2 and H3, except for those grandfathered for Channels E3, E4, F3 and F4.

11. Section §21.902 would be revised by adding a new paragraph (l) to read as follows:

**§21.902 Frequency interference.**

\* \* \* \* \*

(l) Special rules relating to response station hubs and booster service areas are set forth in §§21.909, 21.913, 74.939 and 74.985. To the extent those specific rules are inconsistent with any rules set forth above, those specific rules shall control.

12. In Section 21.903, paragraph (a) would be revised to read as follows:

**§21.903 Purpose and permissible service.**

(a) Multipoint Distribution Service channels are available for transmissions from MDS stations and associated MDS signal booster stations to receive locations, and from MDS response stations to response station hubs. When service is provided on a common carrier basis, subscriber supplied information is transmitted to points designated by the subscriber. When service is provided on a non-common carrier basis, transmissions may include information originated by persons other than the licensee, licensee-manipulated information supplied by other persons, or information originated by the licensee. Point-to-point radio return links from a subscriber's location to a MDS operator's facilities may also be authorized in the 18,580 through 18,820 MHz and 18,920 through 19,160 MHz bands. Rules governing such operation are contained in Subpart I of Part 101 of this chapter, the Point-to-Point Microwave Radio Service.

\* \* \* \* \*

13. In Section 21.904, paragraph (c) would be revised to read as follows:

**§21.904 Transmitter power.**

\* \* \* \* \*

(c) An increase in station transmitter power, above currently-authorized or previously proposed values, to the maximum values provided in paragraphs (a) and (b) of this section, may be authorized, if the requested power increase would not cause harmful interference to any authorized or previously proposed co-channel or adjacent-channel station entitled to interference protection under the Commission's rules or if an applicant demonstrates that:

(1) A station, that must be protected from interference, potentially could suffer interference that would be eliminated by increasing the power of the interfered-with station; and

(2) The interfered-with station may increase its own power consistent with the rules and without causing interference to any MDS booster station or response station hub which operates as part of the same coordinated system as the interfered-with station; and

(3) The applicant requesting authorization of a power increase agrees to pay all expenses associated with the increase in power to the interfered-with station.

\* \* \* \* \*

14. In Section 21.905, paragraph (b) would be revised to read as follows:

**§21.905 Emissions and bandwidth.**

\* \* \* \* \*

(b) For purposes other than standard television transmission, different types of emissions may be authorized if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the bandwidth desired is no wider than needed to provide the intended service. The licensee may subchannelize its authorized bandwidth, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel, and may utilize all or a portion of its authorized bandwidth for MDS response stations authorized pursuant to §21.909. The licensee may also, jointly with affected adjacent channel licensees, transmit utilizing bandwidth in excess of its authorized frequencies, provided that digital modulation is employed, all power spectral density requirements set forth in this Part are met and the out-of-band emissions restrictions set forth in §21.908 are met at the edges of the channels employed.

\* \* \* \* \*

15. In Section 21.906, paragraphs (a) and (d) would be revised to read as follows:

**§21.906 Antennas.**

(a) Transmitting antennas shall be omnidirectional, except that a directional antenna with a main beam sufficiently broad to provide adequate service may be used either to avoid possible interference with other users in the frequency band, or to provide coverage more consistent with distribution of potential receiving points. In lieu of an omnidirectional antenna, a station may employ an array of directional antennas in order to reuse spectrum efficiently. When an applicant proposes to employ a directional antenna, or a licensee notifies the Commission pursuant to §21.42 of the installation of a sectorized antenna system, the applicant shall provide the

Commission with information regarding the orientation of the directional antenna(s), expressed in degree of azimuth, with respect to true north, and the make and model of such antenna(s).

\* \* \* \* \*

(d) Directive receiving antennas shall be used at all points other than response station hubs and shall be elevated no higher than necessary to assure adequate service. Receiving antenna height shall not exceed the height criteria of Part 17 of this chapter, unless authorization for use of a specific maximum antenna height (above ground and above mean sea level) for each location has been obtained from the Commission prior to the erection of the antenna. Requests for such authorization shall show the inclusive dates of the proposed operation. (See Part 17 of this chapter concerning the construction, marking and lighting of antenna structures.)

16. Section 21.907 would be deleted in its entirety.

17. In Section 21.908, the title would be revised, current paragraphs (a), (d) and (e) would be deleted, current paragraph (b) would be redesignated as paragraph (a), new paragraph (b) would be added and paragraph (c) would be revised to read as follows:

**§21.908 Transmitting equipment.**

(a) On or after November 1, 1991, the maximum out-of-band power of a transmitter or of a booster transmitting on a single channel with an effective isotropic radiated power in excess of -9 dBW employing analog modulation shall be attenuated 38 dB relative to the peak visual carrier at the channel edges and constant slope attenuation from this level to 60 dB relative to the peak visual carrier at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge. All out-of-band emissions extending beyond these frequencies shall be attenuated at least 60 dB below the peak visual carrier power. The maximum out-of-band power of a transmitter or of a booster transmitting on a single channel or a portion thereof with an effective isotropic radiated power in excess of -9 dBW employing digital modulation shall be 38 dB attenuation relative to the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to- subchannel bandwidths) at the licensed channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower licensed channel edges, and 60 dB attenuation below the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at all other frequencies. Notwithstanding the foregoing, in situations where a booster station transmits, or where adjacent channel licensees jointly transmit, a single signal over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the licensed average power level of each channel at all other frequencies. However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required. A transmitter licensed prior to

November 1, 1991, that remains at the station site initially licensed, and does not comply with this subsection, may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, must be replaced by a transmitter meeting the requirements of this subsection.

(b) The maximum out-of-band power of a booster transmitting on multiple channels carrying separate signals (a "broadband" booster) with an effective isotropic radiated power in excess of -9 dBW, employing either analog or digital modulation, shall be attenuated 38 dB relative to the peak visual carrier at the channel edges of channels occupied by analog signals and relative to the licensed average power level at the edges of channels occupied by digital signals. Within unoccupied channels within the overall passband of the booster, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower edges of occupied channels. For boosters operating in the frequency range 2.150-2.160/2 GHz, the maximum out-of-band power shall be attenuated 60 dB at 3 MHz and beyond above the upper and below the lower of these frequencies. For boosters operating in the range 2.500-2.690 GHz, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower of these frequencies, constant slope attenuation to 60 dB at 20 MHz above the upper and below the lower of these frequencies, and 60 dB attenuation at all frequencies beyond. Boosters operating with an effective isotropic radiated power less than -9 dBW shall have no particular out-of-band power attenuation requirement, except that if they cause harmful interference, their operation shall be terminated within 2 hours of notification by the Commission until the interference can be cured.

(c) The maximum out-of-band power of a response station using all or part of a 6 MHz channel and employing digital modulation shall be 38 dB attenuation relative to the rated power level at the 6 MHz channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower channel edge, and 60 dB attenuation below the rated power level at all other frequencies. Notwithstanding the foregoing, in situations where response stations transmit over more than one 6 MHz channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the rated power level within each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the rated power level of each channel at all other frequencies. Notwithstanding either of the two foregoing sentences, the out-of-band power for discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). Notwithstanding any provision hereof, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required.

18. In Section 21.909, paragraphs (a), (b) and (c) would be revised and new paragraphs (d), (e), (f), (g), (h), (i), (j), (k), (l) and (m) would be added to read as follows:

**§21.909 MDS response stations.**

(a) An MDS response station is authorized to provide communication by voice, video and/or data signals with its associated MDS response station hub. An MDS response station may be operated only by the licensee of the MDS response station hub, by any lessee of the MDS response station hub, or by a subscriber of either. More than one response station may be operated at the same or different receiving locations. When a 125 kHz channel is employed for communications to a response station hub, the specific frequency channel which may be used by the response station is determined by the channel assigned to the licensee of the MDS station, in accordance with §74.939(i). The specified frequency channel may be subdivided to provide a distinct operating frequency for each of more than one response station. An MDS response station may also transmit utilizing bandwidth in excess of that authorized to the licensee jointly with affected adjacent channel licensees, provided that digital modulation is employed, all power spectral density requirements set forth in this Part are met and the out-of-band emissions restrictions set forth in §21.908(b) are met at the edges of the channels employed.

(b) MDS response stations that utilize the bands 2150-2162 MHz, 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz and 2674-2680 MHz or the 125 kHz channels may be installed and operated without an individual license to communicate with a response station hub authorized under a response station hub authorization, provided that the conditions set forth in §21.909(f) are complied with and that MDS response stations operating in the bands 2150-2162 MHz, 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz and 2674-2680 MHz employ only digital modulation.

(c) An application for a response station hub authorization shall be filed on FCC Form 304 and shall in addition to the requirements of that form, include the following:

(1) The geographic coordinates, street address, and the height of the center line of the reception antenna(s) above mean sea level for the proposed response station hub; and

(2) A specification of:

(i) the response service area in which the applicant or its lessee proposes to install MDS response stations to communicate with the response station hub, any regions into which the response service area will be subdivided for purposes of interference analysis, and any regional classes of response station characteristics which will be used to define the operating parameters of groups of response stations within each region for purposes of interference analysis, including:

(A) the maximum height above ground level of the transmission antenna that will be employed by any response station in the regional class and that will be used in interference analyses without the receipt of additional, site- specific authorization; and

(B) the maximum equivalent isotropic radiated power (EIRP) that will be employed by any response station in the regional class and that will be used in interference analyses; and

(C) any sectorization that will be employed, including the polarization to be employed by response stations in each sector and the geographic orientation of the sector boundaries, and that will be used in interference analyses; and

(D) the combined worst-case outer envelope plot of the patterns of all models of response station transmission antennas that will be employed by any response station in the regional class to be used in interference analyses; and

(E) the maximum number of response stations that will be operated simultaneously in each region using the characteristics of each regional class applicable to each region.

(ii) the channel plan (including any guardbands at the edges of the channel) to be used by MDS response stations in communicating with each response station hub, including a statement as to whether the applicant will employ the same frequencies on which response stations will transmit to also transmit on a point-to-multipoint basis from an MDS station or MDS booster station; and

(iii) the minimum received signal level that the proposed response station hub can actually utilize in the provision of service, specified in dBW/m<sup>2</sup>/Hz; and

(3) A demonstration that:

(i) The proposed response station hub is within a protected service area to which the applicant is entitled either (i) by virtue of its being the licensee of an incumbent MDS station whose channels are being converted for MDS response station use, or (ii) by virtue of its holding a Basic Trading Area or Partitioned Service Area authorization. In the case of an application for response stations to utilize one or more of the 125 kHz response channels, such demonstration shall establish that the response service area is within the protected service area of the station authorized to utilize the associated channel E1, E2, F1 or F2; and

(ii) The entire proposed response service area is within a protected service area to which the applicant is entitled either (i) by virtue of its being the licensee of an incumbent MDS station whose channels are being converted for MDS response station use, or (ii) by virtue of its holding a Basic Trading Area or Partitioned Service Area authorization. In the alternative, the applicant may demonstrate that the licensee entitled to any protected service area which is overlapped by the proposed response service area has consented to such overlap. In the case of an application for response stations to utilize one or more of the 125 kHz response channels, such demonstration shall establish that the response service area is entirely within the protected service area of the station authorized to utilize the associated channel E1, E2, F1 or F2, or, in the alternative, that the licensee entitled to any cochannel protected service area which is overlapped by the proposed response service area has consented to such overlap; and

(iii) The combined signals of all MDS response stations within all response service areas and oriented to transmit towards their respective response station hubs will not generate a power flux density in excess of  $-73 \text{ dBW/m}^2$  (or the pro rata power spectral density equivalent based on the bandwidth actually employed in those cases where less than a 6 MHz channel is to be employed (e.g.,  $-89.8 \text{ dBW/m}^2$  for 125 kHz channels or subchannels)) outside the boundaries of the applicant's protected service area, except to the extent that consents have been granted pursuant to §21.909(b)(3)(B) to an extension of the response service area beyond the boundaries of the protected service area; and

(iv) The combined signals of all MDS response stations within all response service areas and oriented to transmit towards their respective response station hubs will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) (i) within the protected service area of any authorized or previously proposed cochannel incumbent MDS or ITFS station with a 56.33 km (35 miles) protected service area with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, (ii) within the booster service area of any cochannel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f) and located within 160.94 km (100 miles) of the proposed response station hub, or (iii) at any cochannel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g) and located within 160.94 km (100 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to the application; and

(v) The combined signals of all MDS response stations within all response service areas and oriented to transmit towards their respective response station hubs will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel to subchannel bandwidths) (i) within the protected service area of any authorized or previously proposed adjacent channel incumbent MDS or ITFS station with a 56.33 km (35 miles) protected service area with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, (ii) within the booster service area of any adjacent channel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f) and located within 160.94 km (100 miles) of the proposed response station hub, or (iii) at any adjacent channel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g) and located within 160.94 km (100 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to the application; and

(vi) The combined signals of all MDS response stations within all response service areas and oriented to transmit towards their respective response station hubs will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel to subchannel bandwidths) at any registered receive site of any authorized or previously-proposed cochannel ITFS station or booster station, or at any ITFS response station hub, located within 80 km (50 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to the application; and

(vii) The combined signals of all MDS response stations within all response service areas and oriented to transmit towards their respective response station hubs will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel to subchannel bandwidths) at any registered receive site of any authorized or previously-proposed adjacent channel ITFS station or booster station, or at any ITFS response station hub, located within 80 km (50 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to the application; and

(viii) The proposed response station hub can receive transmissions from the response service area without interference.

(4) A certification that the application has been served upon

(i) the licensee of any station (including any booster station or response station hub) with a protected service area which is overlapped by the proposed response service area;

(ii) the holder of any authorization (including any booster station or response station hub authorization) with a protected service area that adjoins the applicant's protected service area;

(iii) every licensee of or applicant for (a) any authorized or previously proposed incumbent MDS or ITFS station with a 56.33 km (35 miles) protected service area with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, or (b) any associated booster station or response station hub authorized to the holder of a license for a facility described in (a); and

(iv) every licensee of or applicant for any authorized or previously proposed ITFS station (including any booster station or response station hub) located within 80 km (50 miles) of the proposed response station hub.

(d) Notwithstanding the provisions of §21.901(d)(4) and except as set forth in §21.27(d), applications for response station hub authorizations may be filed at any time. Notwithstanding any other provision of Part 21 (including §21.31), applications for response station hub authorizations meeting the requirements of §21.909(c) shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed response station hubs. A response station hub shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the response station hub authorization is filed. Response stations shall not be required to protect from interference facilities proposed on or after the day the application for the response station hub authorization is filed.

(e) Notwithstanding the provisions of §21.30(b)(4) and except as set forth in §21.27(d), any petition to deny an application for a response station hub authorization shall be filed no later than

the sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(f) An MDS response station hub authorization shall be conditioned upon compliance with the following:

(1) No MDS response station shall be located beyond the response service area of the response station hub with which it communicates; and

(2) No MDS response station shall operate with an EIRP in excess of that specified in the application for the response station hub pursuant to §21.909(c)(2)(i)(B) for the particular regional class of characteristics with which the response station is associated, and such response station shall not operate at an excess of 18 dBW EIRP without a demonstration that no interference shall occur from that facility operating at a higher power level; and

(3) Each MDS response station shall employ a transmission antenna oriented towards the response station hub with which the MDS response station communicates, and such antenna shall be no less directional than the worst case outer envelope pattern specified in the application for the response station hub pursuant to §21.909(c)(2)(i)(D) for the regional class of characteristics with which the response station is associated; and

(4) The combined out-of-band emissions of all response stations using all or part of a 6 MHz channel and employing digital modulation shall comply with §21.908(b). The combined out-of-band emissions of all response stations using a 125 kHz channel shall comply with §21.909(j). However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required; and

(5) The response stations transmitting simultaneously at any time within any given region of the response service area utilized for purposes of analyzing the potential for interference by response stations shall conform to the numerical limits for each class of response station proposed in the application for the response station hub authorization. Notwithstanding the foregoing, the licensee of a response station hub authorization may alter the number of response stations of any class operated simultaneously in a given region without prior Commission authorization, provided that the licensee first notifies the Commission of the altered number of response stations of such class(es) to be operated simultaneously in such region, provides the Commission with an analysis establishing that such alteration will not result in any increase in electrical interference to any existing or proposed MDS or ITFS station, booster station or response station hub or to any MDS Basic Trading Area or Partitioned Service Area authorization holder entitled to protection pursuant to §21.909(c)(3), or that the applicant or licensee of such facility has consented to such interference, and serves a copy of such notification and analysis upon each party entitled to be served pursuant to §21.909(c)(4); and

(6) The height employed at any location shall not exceed the criteria set forth in §17.7 of this chapter.

(g) The response channels associated with Channels E3, E4, F3, F4, H1, H2 and H3 are allocated to the private operational-fixed service (Part 101).

(h) Commencing upon the filing of an application for an MDS response station hub authorization and until such time as the application is dismissed or denied or, if the application is granted, a certificate of completion of construction is filed, the incumbent MDS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902(b)(3) and (4) and 21.938(b)(2) and to protection of the response station hub pursuant to the following provisions of this subsection. Upon the filing of a certificate of completion of construction for an MDS response station hub where the channels of an incumbent MDS station are being utilized, unless the application for the response station hub authorization specifies that the same frequencies will be employed for point-to-multipoint transmissions by MDS stations and/or MDS booster stations, the incumbent MDS station whose channels are being utilized shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4) and 21.938(b)(2) within the response service area with regard to any portion of any 6 MHz channel employed solely for response station communications. In such situations, in lieu of the requirements set forth in §§21.902, 21.938(b)(2) and 74.903, an applicant for any new or modified MDS or ITFS station (including any response station or booster station) shall be required to demonstrate that the predicted desired to undesired signal ratio at each response station hub to which the proposed new or modified MDS or ITFS station has an unobstructed signal path will be at least 45 dB cochannel or 0 dB adjacent channel (or the appropriately adjusted values based upon the ratios of the channel-to-subchannel bandwidths) as a result of the new or modified MDS or ITFS station. In making such demonstration, the applicant shall assume installation of an omnidirectional unity gain plane-polarized receive antenna mounted with its centerline as specified in the application for the response station hub in lieu of the reference antenna specified in §§21.902 and 74.903. Upon the certification of completion of construction of an MDS response station hub where the channels of an incumbent MDS station are being utilized and the application for the response station hub authorization specifies that the same frequencies will be employed for point-to-multipoint transmissions, the incumbent MDS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902(b)(3) and (4) and 21.938(b)(2) and to protection of the response station hub pursuant to the preceding provisions of this subsection.

(i) For purposes of §21.11, §21.38, §21.39, §§21.43 - 21.45, and §21.303 of this Part, an MDS response station hub authorization shall be deemed a license and subject to the requirements of those sections as if such authorization were a license.

(j) 125 kHz wide response channels shall be subject to the following requirements: The 125 kHz wide channel shall be centered at the assigned frequency. If amplitude modulation is used, the carrier shall not be modulated in excess of 100%. If frequency modulation is used, the deviation shall not exceed  $\pm 25$  kHz. Any emissions outside the channel shall be attenuated at the channel edges at least 35 dB below peak output power when analog modulation is employed or 35 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel

bandwidths). Any emissions more than 125 kHz from either channel edge, including harmonics, shall be attenuated at least 60 dB below peak output power when analog modulation is employed or 60 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths). Notwithstanding the foregoing, in situations where adjacent channel licensees jointly transmit over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 35 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels. Emissions more than 125 kHz from either edge of the combined channels, including harmonics, shall be attenuated at least 60 dB below peak analog power or average digital power of each channel, as appropriate. Notwithstanding the foregoing, the out-of-band power for discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). Different types of emissions may be authorized for use on 125 kHz wide channels if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the modulation selected will cause no more interference than is permitted under this subsection. Greater attenuation may be required if interference is caused by out-of-channel emissions.

(k) The transmitter of a response station may be operated unattended. The overall performance of the response station transmitter shall be checked as often as necessary to ensure that it is functioning in accordance with the requirements of the Commission's rules. The licensee of a response station hub is responsible for the proper operation of associated response station transmitters at all times. The transmitters shall be installed and protected in such manner as to prevent tampering or operation by unauthorized persons.

(l) The transmitting apparatus employed at MDS response stations shall have received type acceptance.

(m) An MDS response station shall be operated only when engaged in communication with its associated MDS response station hub or MDS station, or for necessary equipment or system tests and adjustments. Radiation of an unmodulated carrier and other unnecessary transmissions are forbidden.

Note 1: Calculations required under this rule shall be performed in accordance with Method For Predicting Accumulated Signal Power From a Multiplicity of Statistically-located Transmitters as published as Appendix \_\_\_ to the [cite to the Report and Order adopting proposed rules].

18. Section 21.913 would be revised in its entirety to read as follows:

**§21.913 Signal booster stations.**

(a) Authorizations for Multipoint Distribution Service (MDS) booster stations may be granted to an MDS conditional licensee or licensee, or to a third party with a fully-executed lease or

consent agreement with an MDS conditional licensee or licensee. An MDS booster station may reuse channels to repeat the signals of MDS stations or for the origination of signals on MDS channels. An MDS booster station authorized pursuant to subsection (b) may only be licensed to an MDS licensee or conditional licensee, and may operate only on one or more MDS channels that are licensed to the licensee of the MDS booster station. An MDS booster station authorized pursuant to subsection (e) may be licensed to an MDS licensee or conditional licensee or to a third party with a fully-executed lease or consent agreement with an MDS conditional licensee or licensee, and may operate only on one or more MDS channels that are licensed to or leased by the licensee of the MDS booster station. No booster station may be authorized for the reuse of channels authorized to an MDS station without the written consent of the licensee of the station whose channels are reused, and such consent must be included with the booster station application. The aggregate power flux density generated by an MDS station and all associated signal booster stations may not exceed  $-73$  dBW/m<sup>2</sup> (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at or beyond the boundaries of the protected service area of any MDS station whose channel is being reused, as measured at locations for which there is an unobstructed signal path, unless the consent of the adjoining cochannel protected service area licensee is obtained.

(b) Any eligible party under §21.913(a) may secure an authorization for an MDS signal booster that has a maximum power level in excess of  $-9$  dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) by submitting an application on FCC Form 304 and including, in addition to the requirements of that form;

(1) A demonstration that the proposed booster station site is within the protected service area, as defined in §§21.902(d), 21.933 and 74.903(d), of every incumbent MDS or ITFS stations whose channels are to be reused; and

(2) A study which demonstrates that the aggregate power flux density of the MDS station and all associated booster stations at or beyond the boundary of the protected service areas of the MDS station whose channels are to be reused does not exceed  $-73.0$  dBW/m<sup>2</sup> (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at locations for which there is an unobstructed signal path unless the consent of the adjoining protected service area licensee has been obtained; and

(3) In lieu of the requirements of §§21.902(c) and (i), a study which demonstrates that the proposed booster station will cause no harmful interference to co-channel and adjacent-channel existing or previously-proposed ITFS and MDS stations with protected service area center coordinates as specified in §21.902(d) or, in the case of ITFS stations without protected service areas, transmitters, within 160.9 kilometers (100 miles) of the proposed booster station's transmitter site, or any ITFS or MDS response station hubs or booster stations within 160.94 kilometers (100 miles) of the proposed booster station's transmitter site. In the alternative, a statement from the MDS or ITFS permittee, licensee or conditional licensee stating that it does not object to operation of the MDS signal booster station may be submitted; and

(4) A written consent statement of the licensee of each MDS and ITFS station whose channel is reused; and

(5) A specification of the area to be served by the booster (the booster service area ), which may not overlap the booster service area of any other booster authorized to or proposed by the applicant; and

(6) A demonstration either

(i) that the booster service area is entirely within the protected service area to which each licensee of a station whose channels are being reused is entitled either

(A) by virtue of its being the licensee of an incumbent MDS station whose channels are being converted for MDS response station use, or

(B) by virtue of its holding a Basic Trading Area or Partitioned Service Area authorization; or

(ii) that the licensee entitled to any protected service area which is overlapped by the proposed booster service area has consented to such overlap; and

(7) A demonstration that the proposed booster service area can be served by the proposed booster without interference; and

(8) A certification that copies of the materials set forth in this §21.913(b) have been served upon the licensee, conditional licensee or permittee of each station (including each response station hub and booster station) required to be studied pursuant to §21.913(b)(3) and the holder of any Basic Trading Area or Partitioned Service Area authorization adjoining the proposed booster service area.

(c) Notwithstanding the provisions of §21.901(d)(4) and except as provided in §21.27(d), applications for booster station authorizations may be filed at any time. Notwithstanding any other provision of Part 21 (including §21.31), applications for booster authorizations meeting the requirements of §21.913(b) shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed booster stations. A booster station shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the booster station authorization is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application for the booster station authorization is filed.

(d) Notwithstanding the provisions of §21.30(b)(4), any petition to deny an application for a booster station authorization shall be filed no later than the sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(e) An eligible party pursuant to §21.913(a) may install and commence operation of a signal booster station that has a maximum power level of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths), subject to the condition that for sixty (60) days after installation, no objection or petition to deny is filed by an authorized co-channel or adjacent-channel ITFS or MDS station with a transmitter within 8.0 kilometers (5 miles) of the coordinates of the signal booster. An eligible party pursuant to §21.913(a) seeking to install a signal booster under this rule must, within 48 hours after installation, submit

(1) a description of the signal booster technical specifications (including an antenna envelope plot or, if the envelope plot is on file with the Commission, the make and model of the antenna, antenna gain and azimuth), the coordinates of the booster, the height of the center of radiation above mean sea level, the street address of the signal booster and a description of the area to be served by the signal booster (the booster service area ),

(2) a demonstration that the booster service area is entirely within the protected service area to which each licensee of a station whose channels are being reused is entitled either

(i) by virtue of its being the licensee of an incumbent MDS station whose channels are being converted for MDS response station use, or

(ii) by virtue of its holding a Basic Trading Area or Partitioned Service Area authorization, or, in the alternative, that the licensee entitled to any protected service area which is overlapped by the proposed booster service area has consented to such overlap; and a demonstration that the proposed booster service area can be served by the proposed booster without interference;

(3) either a certification that no Federal Aviation Administration determination of No Hazard to Air Navigation is required under Part 17 of this chapter or, if such determination is required, either:

(i) a statement of the FCC Antenna Structure Registration Number; or

(ii) if an FCC Antenna Structure Registration Number has not been assigned for the antenna structure, the filer must indicate the date the application by the antenna structure owner to register the antenna structure was filed with the FCC in accordance with Part 17 of this chapter. and

(4) a certification that:

(i) The maximum power level of the signal booster transmitter does not exceed -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths); and

(ii) No registered receiver of an ITFS E or F channel station, constructed prior to May 26, 1983, is located within a 1.61 km (1 mile) radius of the coordinates of the booster, or in the alternative, that a consent statement has been obtained from the affected ITFS licensee; and

(iii) No environmental assessment location as defined at §1.1307 of this chapter is affected by installation and/or operation of the signal booster; and

(iv) Each MDS and/or ITFS station licensee (including the licensees of booster stations and response station hubs) with protected service areas or registered receivers within a 8.0 km (5 mile) radius of the coordinates of the booster has been given notice of its installation; and

(v) Consent has been obtained from each MDS station licensee whose signal is reused by the signal booster; and

(vi) The signal booster site is within the protected service area of the MDS stations whose channels are to be reused, and

(vii) The aggregate power flux density of the MDS stations to be reused and their associated booster stations at or beyond the boundary of the protected service areas of the MDS stations to be reused does not exceed  $-73.0 \text{ dBW/m}^2$  (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at locations for which there is an unobstructed signal path; and,

(viii) The MDS booster station filer understands and agrees that in the event harmful interference is claimed by the filing of an objection or petition to deny, the licensee must terminate operation within two (2) hours of written notification by the Commission, and must not recommence operation until receipt of written authorization to do so by the Commission.

(f) An applicant for any new or modified MDS or ITFS station (including a response station hub authorization or a booster station) shall demonstrate compliance with the desired to undesired signal ratio protected service area protection requirements set forth in §§21.902, 21.938 and 74.903 with respect to the portion of any previously proposed or authorized booster service area that is within the protected service area of a primary incumbent MDS station by using the transmission parameters of the MDS booster station (including EIRP, polarization(s) and antenna height) with respect to those channels authorized to an incumbent MDS station that are being reused. Upon the filing of a certification of completion of construction for an MDS booster station applied for pursuant to §21.913(b) or upon the filing of an MDS booster station notification pursuant to §21.913(e), each incumbent MDS station whose channels are being reused by the MDS signal booster shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and (3) and 74.903 within the booster service area based on the transmission parameters of the incumbent MDS station whose channels are being reused. A booster station shall not be entitled to protection from interference caused by facilities proposed

on or prior to the day the application or notification for the booster station is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application or notification for the booster station is filed.

20. In Section 21.925, paragraph (b) would be revised to read as follows:

**§21.925 Applications for BTA authorizations and MDS station licenses.**

\* \* \* \* \*

(b) Separate long-form applications must be filed for each individual MDS station license sought within the protected service area of a BTA or PSA, including:

(1) an application for each E-channel group, F-channel group, and single H, 1, and 2A channel station license sought;

(2) an application for each MDS response station hub authorization sought;

(3) an application for each MDS booster station that will operate with an EIRP in excess of -9 dBW (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths); and

(4) an application for authority to operate at an MDS station in the area vacated by an MDS station incumbent that has forfeited its station license; and

(5) an application for each ITFS-channel group station license sought in accordance with §§74.990 and 74.991.

\* \* \* \* \*

21. In Section 21.938, paragraph (b) would be revised to read as follows:

**§21.938 BTA and PSA technical and interference provisions.**

\* \* \* \* \*

(b) Unless the affected parties have executed a written interference agreement in accordance with §21.937, and subject to the provisions of §§21.909, 21.913, 74.939 and 74.985 regarding the protection of response station hubs and booster stations from harmful electromagnetic interference, stations licensed to a BTA or PSA authorization holder must not cause harmful electromagnetic interference to the following:

(1) the protected service area of other authorization holders in adjoining BTAs or PSAs.

(2) the 56.33 km (35 mile) protected service areas of authorized or previously proposed MDS stations (incumbents).

(3) registered receive sites and protected service areas of authorized or previously proposed stations in the Instructional Television Fixed Service pursuant to the manner in which interference is defined in §74.903(a).

\* \* \* \* \*

**PART 74 - EXPERIMENTAL, AUXILIARY, AND SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTION SERVICES**

22. The authority citation for Part 74 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334.

23. Section 74.901 would be revised by amending the definition of an ITFS response station and by adding definitions for Response station hub and Signal booster station to read as follows:

**§74.901 Definitions.**

\* \* \* \* \*

*ITFS response station.* A fixed station operated by an ITFS licensee, the lessee of ITFS channel capacity or a subscriber of either to communicate with a response station hub or associated ITFS station. A response station under this part may share facilities with other ITFS response stations and/or one or more Multipoint Distribution Service (MDS) response stations authorized pursuant to §21.909.

\* \* \* \* \*

*Response Station Hub.* A fixed facility licensed to an ITFS licensee and operated by an ITFS licensee or the lessee of an ITFS channel for the reception of information transmitted by one or more ITFS or MDS response stations. A response station licensed under this part may share facilities with other ITFS response station hubs and/or one or more MDS response station hubs authorized pursuant to §21.909.

\* \* \* \* \*

*Signal Booster Station.* An ITFS station licensed for use in accordance with §74.985 that operates on one or more ITFS channels. Signal booster stations are intended to augment service as part of a distributed transmission system where signal booster stations retransmit the signal of an ITFS station and/or originate information. A signal booster station licensed under this part

may share facilities with other ITFS signal booster stations and/or one or more MDS signal booster stations authorized pursuant to §21.913.

\* \* \* \* \*

24. In Section 74.902, paragraphs (c) and (d) would be amended to read as follows:

**§74.902 Frequency assignments.**

\* \* \* \* \*

(c) Channels 2596-2602, 2602-2608, 2608-2614, 2614-2620, 2620-2626, 2626-2632, 2632-2638, and 2638-2644 MHz and the corresponding 125 kHz channels listed in §74.939(i) are shared with the Multipoint Distribution Service. No new Instructional Television Fixed Service applications for these channels filed after May 25, 1983 will be accepted. In those areas where Multipoint Distribution Service use of these channels is allowed pursuant to §21.902, Instructional Television Fixed Service users of these channels will continue to be afforded protection from harmful co-channel and adjacent channel interference from Multipoint Distribution Service stations.

(d) (1) A licensee is limited to the assignment of no more than four 6 MHz and four 125 kHz channels for use in a single area of operation, all of which should be selected from the same Group listed in paragraph (a) of this section unless good cause to utilize channels from multiple Groups is shown. An area of operation is defined as the area 20 miles or less from the ITFS transmitter. Applicants shall not apply for more channels than they intend to construct within a reasonable time, simply for the purpose of reserving additional channels. The number of channels authorized to an applicant will be based on the demonstration of need for the number of channels requested. The Commission will take into consideration such factors as the amount of use of any currently assigned channels and the amount of proposed use of each channel requested, the amount of, and justification for, any repetition in the schedules, and the overall demand and availability of ITFS channels in the community. For those applicant organizations formed for the purpose of serving accredited institutional or governmental organizations, evaluation of the need will only consider service to those specified receive sites which submitted supporting documentation pursuant to §74.932(a)(4).

(2) An applicant leasing excess capacity and proposing a schedule which complies in all respects with the requirements of §74.931(e) will have presumptively demonstrated need, in accordance with paragraph (d)(1) of this section, for no more than four channels. This presumption is rebuttable by demonstrating that the application does not propose to comport with our educational programming requirements, that is, to transmit some formal educational programming, as defined in §74.931(a), and to transmit the requisite minimum programming of §74.931(e) for genuinely educational purposes and to receive sites when students are there.

\* \* \* \* \*

25. In Section 74.903, paragraph (a)(3) would be amended and paragraph (b)(6) would be added to read as follows:

**§74.903 Interference.**

(a) \* \* \*

(3) For purposes of this section and except as set forth in §74.939 regarding the protection of response station hubs, all interference calculations involving receive antenna performance shall use the reference antenna characteristics shown in Figure 1, §74.937(a) or, in the alternative, utilize the actual pattern characteristics of the antenna in use at the receive site under study. If the actual receive antenna pattern is utilized, the applicant must submit complete details including manufacturer, model number(s), co-polar and cross-polar gain patterns, and other pertinent data.

\* \* \* \* \*

(b) \* \* \*

(6) Special rules relating to response service areas and booster service areas are set forth in §§21.909, 21.913, 74.939 and 74.985. To the extent those special rules are inconsistent with any rules set forth above, those special rules shall control.

\* \* \* \* \*

26. In Section 74.911, paragraph (a)(1) would be amended and a new paragraph (e) would be added to read as follows:

**§74.911 Processing of ITFS station applications.**

(a) \* \* \*

(1) In the first group are applications for new stations or major changes in the facilities of authorized stations. These applications are subject to the provisions of paragraph (c) of this section. A major change for an ITFS station will be any proposal to add new channels, change from one channel (or channel group) to another, change polarization, increase the EIRP in any direction by more than 1.5 dB, increase the transmitting antenna height by 25 feet or more, or relocate a facility's transmitter site by 10 miles or more. Applications submitted pursuant to §§74.939 and 74.985 shall not be considered major change applications. However, the Commission may, within 15 days after the acceptance of an application, or 15 days after the acceptance of any other application for modification of facilities, advise the applicant that such application is considered to be one for a major change, and subject to the provisions of paragraph (c) of this section.

\* \* \* \* \*

(e) Notwithstanding any other provisions of this Part 74, effective as of [date of adoption of new rules], there shall be one one-week window at such time as the Commission shall announce by public notice for the filing of applications for booster stations and response station hub authorizations, during which all applications shall be deemed to have been filed as of the same day for purposes of §§74.939 and 74.985. Following the publication of a public notice announcing the tendering for filing of applications submitted during that window, applicants shall have a period of sixty (60) days to amend their applications, provided such amendments do not result in any increase in interference to any previously proposed or authorized station (including facilities proposed during the window) absent consent of the applicant for or licensee of the station that would receive such additional interference. At the conclusion of that sixty (60) day period, the Commission shall publish a public notice announcing the acceptance for filing of all applications submitted during the initial window, as amended during the sixty (60) day period. All petitions to deny such applications must be filed within sixty (60) days of such second public notice.

27. In Section 74.912, paragraph (a) would be revised to read as follows:

**§74.912 Petitions to deny.**

(a) Any party in interest may file with the Commission a petition to deny any application for new facilities or major changes in the facilities of authorized stations, provided such petitions are filed by the date established pursuant to the cut-off provisions of §74.911(c). In the case of all other applications, except those excluded under Section 309(c) of the Communications Act of 1934, as amended, and except as provided in §§74.939 and 74.985, petitions to deny must be filed not later than 30 days after issuance of a public notice of the acceptance for filing of the applications. In the case of applications for renewal of license, petitions to deny may be filed after the issuance of a public notice of acceptance for filing of the applications and up until the first day of the last full calendar month of the expiring license term. Any party in interest may file with the Commission a petition to deny any notification regarding ITFS booster stations within the 60 day period provided for in §74.985(e).

\* \* \* \* \*

28. In Section 74.931, paragraphs (a)(1), (b) and (e) would be revised to read as follows:

**§74.931 Purpose and permissible service.**

(a)(1) Instructional television fixed stations are intended primarily to provide a formal educational and cultural development in aural and visual form, to students enrolled in accredited public and private schools, colleges and universities. Authorized instructional television fixed station channels must be used to transmit formal educational programming offered for credit to enrolled students of accredited schools or for response channels employed in connection with formal

educational courses offered for credit to enrolled students of accredited schools, with limited exceptions as set forth in paragraph (e)(9) of this section and §§74.990 through 74.992 of this part.

(2) \* \* \*

(b) Such stations may also be used for the additional purpose of transmitting other visual and aural educational, instructional and cultural material to selected receiving locations, including in-service training and instruction in special skills and safety programs, extension of professional training, informing persons and groups engaged in professional and technical activities of current developments in their particular fields, and other similar endeavors, and for transmitting associated information from ITFS response stations to response station hubs.

\* \* \* \* \*

(e) A licensee may use excess capacity on each channel to transmit material other than the ITFS subject matter specified in paragraphs (a), (b), (c), and (d) of this section subject to the following conditions:

(1) \* \* \*

(2) If the time or capacity leased is to be used for "wireless cable" operations (the provision of video, voice and/or data services to subscribers), before leasing excess capacity on any one channel, the licensee must provide at least 20 hours per week of ITFS programming on that channel, except as provided in paragraph (e)(3) of this section. All hours not used for ITFS programming may be leased to a "wireless cable" operator. An additional 20 hours per week per channel must be reserved for recapture by the ITFS licensee for its ITFS programming, subject to one year's advance, written notification by the ITFS licensee to its "wireless cable" lessee. These hours of recapture are not restricted as to time of day or day of the week, but may be established by negotiations between the ITFS licensee and the "wireless cable" lessee.

\* \* \* \* \*

(9) A licensee may shift its requisite ITFS programming onto fewer than its authorized number of channels, via channel mapping technology or channel loading, so that it can lease full-time channel capacity on its ITFS station, associated ITFS booster stations or on ITFS response stations and associated response station hubs to a wireless cable operator, subject to the condition that it provide a total average of at least 20 hours per channel per week of ITFS programming either on its authorized channels or on channels not authorized to it, but which are included in the wireless system of which it is a part. The use of channel mapping or channel loading in accordance with the preceding sentence shall not be considered adversely to the ITFS licensee in seeking a license renewal or otherwise. The licensee also retains the unbridgeable right to recapture, subject to six months' written notification to the wireless cable operator, an average of an additional 20 hours per channel per week for simultaneous programming on the

number of channels for which it is authorized. The licensee may agree to the transmission of this recapture time on channels not authorized to it, but which are included in the wireless system of which it is a part.

\* \* \* \* \*

29. Sections 74.936 would be revised in its entirety to read as follows:

**§74.936 Emissions and bandwidth.**

(a) An instructional television fixed station shall normally employ amplitude modulation (C3F) for the transmission of the visual signal and frequency modulation (F3E) or (G3E) for the transmission of the aural signal when transmitting a standard television signal. For purposes other than standard television transmission, different types of emissions may be authorized if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the bandwidth desired is no wider than needed to provide the intended service.

(b) On or after November 1, 1991, the maximum out-of-band power of a transmitter or of a booster transmitting on a single channel with effective isotropic radiated power in excess of -9 dBW operating in this service utilizing analog modulation shall be attenuated 38 dB relative to the peak visual carrier at the channel edges and constant slope attenuation from this level to 60 dB relative to the peak visual carrier at 1 MHz below the lower band and 0.5 MHz above the upper band edge. All out-of-band emissions extending beyond these frequencies shall be attenuated at least 60 dB below the peak visual carrier power. The maximum out-of-band power of a transmitter or of a booster transmitting on a single channel or portion thereof with effective isotropic radiated power in excess of 9 dBW employing digital modulation shall be 38 dB attenuation relative to the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at the licensed channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower licensed channel edges, and 60 dB attenuation below the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at all other frequencies. Notwithstanding the foregoing, in situations where a booster station transmits, or where adjacent channel licensees jointly transmit, over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the licensed average power level of each channel at all other frequencies. However, should interference occur as a result of emissions outside the assigned channel, additional attenuation may be required. A transmitter licensed prior to November 1, 1991, that remains at the station site initially licensed, and does not comply with this subsection, may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, shall be replaced by a transmitter meeting the requirements of this subsection.

(c) The maximum out-of-band power of a booster transmitting on multiple channels carrying separate signals (a broadband booster) with an effective isotropic radiated power in excess of -9 dBW, employing either analog or digital modulation, shall be attenuated 38 dB relative to the peak visual carrier at the channel edges of channels occupied by analog signals and relative to the licensed average power level at the edges of channels occupied by digital signals. Within unoccupied channels within the overall passband of the booster, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower edges of occupied channels. For boosters operating in the range 2.500-2.690 GHz, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower of these frequencies, constant slope attenuation to 60 dB at 20 MHz above the upper and below the lower of these frequencies, and 60 dB attenuation at all frequencies beyond. Boosters operating with an effective isotropic radiated power less than -9 dBW shall have no particular out-of-band power attenuation requirement, except that if they cause harmful interference, their operation shall be terminated within 2 hours upon notification by the Commission until the interference can be cured.

(d) The maximum out-of-band power of a response station using all or part a 6 MHz channel and employing digital modulation shall be 38 dB attenuation relative to the rated power level at the 6 MHz channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower channel edge, and 60 dB attenuation below the rated power level at all other frequencies. Notwithstanding the foregoing, in situations where response stations transmit over more than one 6 MHz channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the rated power level within each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the rated power level of each channel at all other frequencies. Notwithstanding either of the two foregoing sentences, the out-of-band power for discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required.

(e) The requirements of §73.687(c)(2) will be considered to be satisfied insofar as measurements of operating power are concerned if the transmitter is equipped with instruments for determining the combined visual and aural operating power. However, licensees are expected to maintain the operating powers within the limits specified in §74.935. Measurements of the separate visual and aural operating powers must be made at sufficiently frequent intervals to insure compliance with the rules, and in no event less than once a month. However, the provisions of §73.687(c)(2) and of this subsection shall not be applicable to ITFS response stations or to low power ITFS booster stations authorized pursuant to §74.985(e).

30. In Section 74.937, paragraphs (a) and (b) would be revised to read as follows:

**§74.937 Antennas.**

(a) In order to minimize the hazard of harmful interference from other stations, directive receiving antennas should be used at all receiving locations other than response station hubs. The choice of receiving antennas is left to the discretion of the licensee. However, for the purpose of interference calculations, except as set forth in §74.939, the general characteristics of the reference receiving antenna shown in Figure 1 of this section (i.e., a 0.6 meter (2 foot) parabolic reflector antenna) are assumed to be used in accordance with the provisions of §74.903(a)(3) unless pertinent data is submitted of the actual antenna in use at the receive site. Licensees may install receiving antennas with general characteristics superior to those of the reference receive antenna. Nevertheless, should interference occur and it can be demonstrated by an applicant that the existing antenna at the receive site is inappropriate, a more suitable yet practical receiving antenna should be installed. In such cases, the modification of the receive site will be in the discretion, and will be the responsibility, of the licensee serving the site.

(b) Except as set forth in §74.931(e)(7), directive transmitting antennas shall be used whenever feasible so as to minimize interference to other licensees. The radiation pattern shall be designed to minimize radiation in directions where no reception is intended. When an ITFS station is used for point-to-point service, an appropriate directional antenna must be used.

\* \* \* \* \*

31. Section 74.938 would be revised to read as follows:

**§74.938 Transmission Standards.**

The width of an ITFS channel is 6 MHz. However, the licensee may subchannelize its authorized bandwidth, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel, and may utilize all or a portion of its authorized bandwidth for ITFS response stations authorized pursuant to §74.939. The licensee may also, jointly with affected adjacent channel licensees, transmit utilizing bandwidth in excess of its authorized bandwidth, provided that digital modulation is employed, all power spectral density requirements set forth in this Part are met and the out-of-band emissions restrictions set forth in §74.936 are met at the edges of the channels employed. ITFS transmitters must be type accepted by the Commission for the particular signals that will be employed in actual operation. Either the manufacturer or the licensee must obtain transmitter type acceptance for the transmitter by filing an application for type acceptance with appropriate information concerning the signal waveforms and measurements.

\* \* \* \* \*

32. Section 74.939 would be revised in its entirety to read as follows:

**§74.939 Special rules governing ITFS response stations.**

(a) An ITFS response station is authorized to provide communication by voice, video and/or data signals with its associated ITFS response station hub. An ITFS response station may be operated only by the licensee of an instructional television fixed station and only at an authorized receiving location of the instructional television fixed station, by any lessee of excess capacity, or by a subscriber of any lessee of excess capacity. More than one ITFS response station may be operated at the same or different locations by the same licensee. The specific frequency channel may be subdivided to provide a distinct operating frequency for each of more than one response station, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel. An ITFS response station may also transmit utilizing bandwidth in excess of that authorized to the licensee jointly with effective adjacent channel licensees, provided that digital modulation is employed, all power spectral density requirements set forth in this Part are met and the out-of-band emission restrictions set forth in §74.936 are complied with.

(b) ITFS response stations that utilize the bands 2500-2650 MHz, 2656-2662 MHz, 2668-2674 MHz and/or 2680-2686 MHz or the 125 KHz channels identified in §74.939(f) may be installed and operated without an individual license to communicate with a response station hub authorized to an ITFS licensee under a response station hub authorization, provided that the conditions set forth in §74.939(f) are complied with and that ITFS response stations operating in the bands 2500-2650 MHz, 2656-2662 MHz, 2668-2674 MHz and/or 2680-2686 MHz only employ digital modulation.

(c) An application for a response station hub authorization shall be filed with the Commission in Washington, D.C., on FCC Form 330. Section VI of that form shall supply the following information for each response station hub:

(1) The geographic coordinates, street address, and the height of the center line of the reception antenna(s) above mean sea level for the response station hub; and

(2) A specification of:

(i) The response service area in which the applicant or its lessee proposes to install ITFS response stations to communicate with the response station hub, any regions into which the response service area will be subdivided for purposes of interference analysis, and any regional classes of response station characteristics which will be used to define the operating parameters of groups of response stations within each region for purposes of interference analysis, including:

(A) the maximum height above ground level of the transmission antenna that will be employed by any response station in the regional class and that will be used in interference analyses without the receipt of additional, site- specific authorization; and

(B) the maximum equivalent isotropic radiated power (EIRP) that will be employed by any response station in the regional class and that will be used in interference analyses; and

(C) any sectorization that will be employed, including the polarization to be employed by response stations in each sector and the geographic orientation of the sector boundaries, and that will be used in interference analyses; and

(D) the combined worst-case outer envelope plot of the patterns of all models of response station transmission antennas that will be employed by any response station in the regional class to be used in interference analyses; and

(E) the maximum number of response stations that will be operated simultaneously in each region using the characteristics of each regional class applicable to each region.

(ii) The channel plan (including any guardbands at the edges of the channels) to be used by ITFS response stations in communicating with the response station hub, including a statement as to whether the applicant will employ the same frequencies on which response stations will transmit to also transmit on a point-to-multipoint basis from an MDS station or MDS booster station; and

(iii) The minimum received signal level that the proposed response station hub can actually utilize in the provision of service, specified in dBW/m<sup>2</sup>/Hz; and

(3) A demonstration that:

(i) The proposed response station hub is within the protected service area of the ITFS station whose channels will be used for communications to the response station hub (for purposes of this rule, an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site) or, in the case of an application for response stations to utilize one or more of the 125 kHz response channels, the response station hub is within the protected service area of the station authorized to utilize the associated channel; and

(ii) The entire proposed response service area is within the protected service area of the ITFS station whose channels will be used for communications to the response station hub, (for purposes of this rule, an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site) or, in the alternative, the applicant may demonstrate that the licensee of any protected service area which is overlapped by the proposed response service area has consented to such overlap. In the case of an application for response stations to utilize one or more of the 125 kHz response channels, such demonstration shall establish that the response service area is entirely within the protected service area of the station authorized to utilize the associated 125 kHz channel, or, in

the alternative, that the licensee entitled to any cochannel protected service area which is overlapped by the proposed response service area has consented to such overlap; and

(iii) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hubs will not generate a power flux density in excess of  $-73 \text{ dBW/m}^2$  (or the pro rata power spectral density equivalent based on the bandwidth actually employed in those cases where less than a 6 MHz channel is to be employed (e.g.,  $-89.8 \text{ dBW/m}^2$  for 125 kHz channels or subchannels)) outside the boundaries of the applicant's protected service area, except to the extent that consents have been granted pursuant to §74.931(b)(1)(B)(ii) to an extension of the response service area beyond the boundaries of the protected service area; and

(iv) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths)

(A) within the protected service area of any authorized or previously proposed cochannel MDS or ITFS station with center coordinates located within 160.94 km (100 miles) of the proposed response station hub,

(B) within the booster service area of any cochannel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f), or

(C) at any cochannel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g), or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to such application; and

(v) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) (i) within the protected service area of any authorized or previously proposed adjacent channel MDS or ITFS station with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, (ii) within the booster service area of any adjacent channel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f), or (iii) at any adjacent channel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g), or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to such application; and

(vi) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at any registered receive site of any authorized or previously-proposed cochannel ITFS station located within 80 km (50 miles) of the proposed

response station hub, or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to such application; and

(vii) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at any registered receive site of any authorized or previously-proposed adjacent channel ITFS station located within 80 km (50 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to such application; and

(viii) The proposed response station hub can receive transmissions from the response service area without interference.

(4) A certification that the application has been served upon

(i) the licensee of any station (including any booster station or response station hub) with a protected service area which is overlapped by the proposed response service area;

(ii) the holder of any authorization (including any booster station or response station hub authorization) with a protected service area that adjoins the applicant's protected service area;

(iii) every licensee of or applicant for

(A) any authorized or previously proposed incumbent MDS or ITFS station with a 56.33 km (35 miles) protected service area with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, or

(B) any associated booster station or response station hub authorized to the holder of a license for a facility described in (A); and

(iv) every licensee of or applicant for any authorized or previously proposed ITFS station (including any booster station or response station hub) located within 80 km (50 miles) of the proposed response station hub

(d) Applications for response station hub authorizations meeting the requirements of §74.939(c) shall be deemed minor change applications and shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed response station hubs. A response station hub shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the response station hub authorization is filed. Response stations shall not be required to protect from interference facilities proposed on or after the day the application for the response station hub authorization is filed.

(e) Notwithstanding the provisions of §74.912 and except as provided by §74.911(e), any petition to deny an application for a response station hub authorization shall be filed no later than the sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(f) An ITFS response station hub authorization establishing a response service area shall be conditioned upon compliance with the following:

(1) No ITFS response station shall be located beyond the response service area of the response station hub with which it communicates; and

(2) No ITFS response station shall operate with an EIRP in excess of that specified in the application for the response station hub pursuant to §74.939(c)(2)(i)(B) for the particular regional class of characteristics with which the response station is associated, and such response station shall not operate at an excess of 18 dBW EIRP without a demonstration that no interference shall occur from that facility operating at a higher power level; and

(3) Each ITFS response station shall employ a transmission antenna oriented towards the response station hub with which the ITFS response station communicates, and such antenna shall be no less directional than the worst case outer envelope pattern specified in the application for the response station hub pursuant to §74.939(c)(2)(i)(D) for the regional class of characteristics with which the response station is associated; and

(4) The combined out-of-band emissions of all response stations using all or part of a 6 MHz channel and employing digital modulation shall comply with §74.936(c). The combined out-of-band emissions of all response stations using a 125 kHz channel shall comply with §74.939(i). However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required; and

(5) The response stations transmitting simultaneously at any time within any given region of the response service area utilized for purposes of analyzing the potential for interference by response stations shall conform to the numerical limits for each class of response station proposed in the application for the response station hub authorization; Notwithstanding the foregoing, the licensee of a response station hub authorization may alter the number of response stations of any class operating simultaneously in a given region without prior Commission authorization, provided the licensee first notifies the Commission of the altered number of response stations of such class(es) to be operated simultaneously in such region, provides the Commission with an analysis establishing that such alteration will not result in any increase in electrical interference to any existing or proposed MDS or ITFS station, booster station or response station hub or to any MDS Basic Trading Area or Partitioned Service Area authorization holder entitled to protection pursuant to §74.939(c)(3), or that the applicant or licensee of such facility has consented to such interference, and serves a copy of such notification and analysis upon each party entitled to be served pursuant to §74.939(c)(4).

(g) See Part 17 of this chapter concerning notification to the Federal Aviation Administration of proposed antenna construction or alteration. The provisions of §§74.967 and 74.981(a)(5) of this subpart, concerning antenna painting and lighting requirements, apply to ITFS response stations as well as main ITFS stations.

(h) Commencing upon the filing of an application for an ITFS response station hub authorization and until such time as the application is dismissed or denied or, if the application is granted, a certificate of completion of construction is filed, the incumbent ITFS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and 74.903, and to protection of the response station hub pursuant to the following provisions of this subsection. Upon the filing of a certificate of completion of construction of an ITFS response station hub, unless the application for the response station hub authorization specifies that the same frequencies will be employed for transmissions from ITFS response stations and point-to-multipoint transmissions from ITFS stations and/or ITFS booster stations, the ITFS station whose channels are being utilized shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and 74.903 within the response service area with regard to any portion of any 6 MHz channel employed for response station communications. In such situations, in lieu of the requirements set forth in §§21.902, 21.938(b)(2) and 74.903, an applicant for any new or modified MDS or ITFS station (including any response station or booster station) shall be required to demonstrate that the predicted desired to undesired signal ratio at the response station hub of each previously-proposed response service area to which the proposed new or modified MDS or ITFS station has an unobstructed signal path will be at least 45 dB cochannel or 0 dB adjacent channel (or the appropriately adjusted values based upon the ratios of the channel-to-subchannel bandwidths). In making such demonstration, the applicant shall assume installation of an omnidirectional unity gain plane-polarized receive antenna mounted with its centerline as specified in the application for the response station hub in lieu of the reference antenna specified in §§21.902 and 74.903. Upon the filing of a certificate of completion of construction of an ITFS response station hub where the application for the response station hub authorization specifies that the same frequencies will be employed for transmissions from ITFS response stations and from ITFS stations and ITFS booster stations, the ITFS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902, 21.938(b)(2) and 74.903 and to protection of the response station hub pursuant to the preceding provisions of this subsection.

(i) ITFS response stations may operate on either all or part of a 6 MHz channel assigned a licensee, on any 125 kHz channel assigned a licensee, or on adjacent frequencies authorized to multiple licensees where such stations are operated jointly. The 125 kHz channels listed in the following table shall be assigned to the licensees of MDS and ITFS stations for use as response stations or for licensing for point-to-multipoint transmissions, in accordance with the table. The specified 125 kHz frequency channel may be subdivided to provide a distinct operating frequency for each of more than one station, may be combined with adjacent channels, or may be exchanged with the licensee of another MDS or ITFS station for use of another 125 kHz channel assigned to the other licensee.

<u>Frequency (MHz)</u>	<u>Primary Channel Designation</u>	<u>125 kHz Channel Designation</u>
2686.0625	A1	H4a
2686.1875	B1	H4b
2686.3125	C1	H4c
2686.4375	D1	H4d
2686.5625	E1	H4e
2686.6875	F1	H4f
2686.8125	G1	H4g
2686.9375	H1	H4h
2687.0625	A2	H4i
2687.1875	B2	H4j
2687.3125	C2	H4k
2687.4375	D2	H4l
2687.5625	E2	H4m
2687.6875	F2	H4n
2687.8125	G2	H4o
2687.9375	H2	H4p
2688.0625	A3	H4q
2688.1875	B3	H4r
2688.3125	C3	H4s
2688.4375	D3	H4t
2688.5625	E3	H4u
2688.6875	F3	H4v
2688.8125	G3	H4w
2688.9375	H3	H4x
2689.0625	A4	H4y
2689.1875	B4	H4z
2689.3125	C4	H4aa
2689.4375	D4	H4bb
2689.5625	E4	H4cc
2689.6875	F4	H4dd
2689.8125	G4	H4ee

(j) An 125 kHz wide ITFS response channel is 125 kHz wide and is centered at the assigned frequency. If amplitude modulation is used, the carrier shall not be modulated in excess of 100%. If frequency modulation is used, the deviation shall not exceed  $\pm 25$  kHz. Any emissions outside the channel shall be attenuated at the channel edges at least 60 dB 35 dB below peak output power when analog modulation is employed or 35 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths). Any emissions more than 125 kHz from either channel edge, including harmonics, shall be attenuated at least 60 dB below peak output power when analog modulation is employed or 60 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths). Notwithstanding the foregoing, in situations where adjacent channel licensees jointly transmit over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 35 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels. Emissions more than 125 kHz from either edge of the combined channels, including harmonics, shall be attenuated at least 60 dB below peak analog power or average digital power

of each channel, as appropriate. Notwithstanding the foregoing, the out-of-band power for discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). Different types of emissions may be authorized for use on 125 kHz wide channels if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the modulation selected will cause no more interference than is permitted under this subsection. Greater attenuation may be required if interference is caused by out-of-channel emissions.

(k) The transmitter of an ITFS response station may be operated unattended. The overall performance of the ITFS response station transmitter shall be checked as often as necessary to ensure that it is functioning in accordance with the requirements of the Commission's rules. The licensee of an ITFS response station hub is responsible for the proper operation of the transmitters of associated response stations at all times. The transmitters shall be installed and protected in such manner as to prevent tampering or operation by unauthorized persons.

(l) The transmitting apparatus employed at ITFS response stations shall have received type acceptance in accordance with §74.952.

(m) An ITFS response station shall be operated only when engaged in communication with its associated ITFS response station hub or ITFS station, or for necessary equipment or system tests and adjustments. Radiation of an unmodulated carrier and other unnecessary transmissions are forbidden.

Note 1: For purposes of subsections (c)(3)(i), (ii), and (iii), an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site.

Note 2: Calculations required under this rule shall be performed in accordance with Method For Predicting Accumulated Signal Power From a Multiplicity of Statistically-located Transmitters as published as Attachment \_ to the [cite to the Report and Order adopting proposed rules].

33. In Section 74.950, current paragraphs (a) through (e) would be deleted in their entirety and current paragraph (f) would be redesignated as paragraph (a).

34. In Section 74.951, paragraph (b) would be revised to read as follows:

**§74.951 Modification of transmission systems.**

\* \* \* \* \*

(b) Any change in the antenna system affecting the direction of radiation, directive radiation pattern, antenna gain, or radiated power; provided, however, that a licensee may install a sectorized antenna system without prior consent if such system does not change polarization or

result in an increase in radiated power by more than one dB in any direction and notice of such installation is provided to the Commission on FCC Form 330 within ten (10) days of installation.

\* \* \* \* \*

35. In Section 74.961, paragraph (a) would be revised to read as follows:

**§74.961 Frequency tolerance.**

(a) The frequency of the visual carrier for any ITFS station or ITFS booster station authorized pursuant to §74.985(b) shall be maintained within  $\pm 1$  kHz of the assigned frequency at all times when the station is in operation. ITFS booster stations authorized pursuant to §74.985(e) and ITFS response stations authorized pursuant to §74.939 shall employ transmitters with sufficient frequency stability to ensure that the emission stays within the authorized frequency block. A transmitter licensed prior to November 1, 1991, that remains at the station site initially licensed and does not comply with this paragraph may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, must be replaced by a transmitter meeting the requirements of this paragraph.

\* \* \* \* \*

36. Section 74.965 would be revised to read as follows.

**§74.965 Posting of station license.**

(a) The instrument of authorization, a clearly legible photocopy thereof, or the name, address and telephone number of the custodian of the instrument of authorization shall be available at each station and response station hub. Each authorized operator of an ITFS booster station shall post at the booster station the name, address and telephone number of the custodian of the notification filed pursuant to §74.985 if such notification is not maintained at the booster station.

(b) If an ITFS station, an ITFS booster station or an ITFS response station hub is operated unattended, the call sign and name of the licensee shall be displayed such that it may be read within the vicinity of the transmitter enclosure or antenna structure.

37. Section 74.982 would be deleted in its entirety.

38. Section 74.985 would be revised in its entirety to read as follows:

**§ 74.985 Signal booster stations.**

(a) Authorizations for Instructional Television Fixed Service (ITFS) booster stations may be granted to an ITFS licensee, or to a third party with a fully-executed lease agreement with an

ITFS applicant or licensee in the case of booster stations authorized pursuant to §74.985(e). The eligibility requirements of §74.932 will not apply to such third-party booster station applicants. An ITFS booster station may reuse channels to repeat the signals of ITFS stations or for the origination of signals on ITFS channels except as provided for in §74.985(e), but no booster station may be authorized for the reuse of channels authorized to an ITFS station without the written consent of the licensee of the station whose channels are reused, and such consent must be included with the booster station application. The aggregate power flux density generated by an ITFS station and all associated signal booster stations may not exceed  $-73$  dBW/m<sup>2</sup> (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at or beyond the boundaries of the protected service area of the ITFS station whose channel is being reused, as measured at locations for which there is an unobstructed signal path. For purposes of the preceding sentence and §§74.985(b)(1) and (2) and (c)(5) and (6), an ITFS station will be deemed to have a protected service area pursuant to §21.902(d) regardless of whether it is leasing excess capacity.

(b) Any ITFS licensee may secure an authorization for an ITFS signal booster that has a maximum power level in excess of  $-9$  dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) by submitting an application on FCC Form 330 and including, in addition to the requirements of that form:

(1) A demonstration that the proposed signal booster station site is within the protected service area, as defined in §§21.902(d) of this chapter, of the ITFS station whose channels are to be reused; and

(2) A demonstration that the booster service area is entirely within the protected service area of the ITFS station whose channels are being reused, or in the alternative, that the licensee entitled to any cochannel protected service area which is overlapped by the proposed booster service area has consented to such overlap; and

(3) A demonstration that the booster service area can be served by the proposed booster without interference; and

(4) A demonstration that the aggregate power flux density of the ITFS station and all associated booster stations does not exceed  $-73.0$  dBW/m<sup>2</sup> at (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) or beyond the edge of the a protected service area for the primary ITFS transmitter station, as defined by §21.902(d) of this chapter, whose channels are to be reused; and.

(5) In lieu of the requirements of §74.903, a demonstration that the proposed signal booster station will cause no harmful interference to co-channel or adjacent-channel, authorized or previously-proposed ITFS, MDS, or MMDS stations with protected service area center coordinates as specified in §21.902(d) or, in the case of ITFS stations without protected service areas, transmitters within 160.94 kilometers (100 miles) of the proposed booster station's

transmitter site, or any ITFS or MDS response station hubs or booster stations within 160.94 kilometers (100 miles) of the proposed booster station's transmitter site. In the alternative, a statement from the MDS or ITFS licensee or conditional licensee stating that it does not object to operation of the ITFS signal booster station may be submitted; and

(6) A specification of the area to be served by the booster (the booster service area ), which may not overlap the booster service area of any other booster authorized to or proposed by the applicant, and a demonstration that the booster service area is entirely within the protected service area of the station whose channels are being reused and can be served by the proposed booster without interference; and

(7) A certification that copies of the materials set forth in §94.985(b) have been served upon the licensee, conditional licensee or permittee of each station (including each response station hub and booster station) required to be studied pursuant to §74.985(b)(3).

(c) Notwithstanding the provisions of §74.911(c)(1), applications for booster station authorizations may be filed at any time. Notwithstanding any other provision of Part 74, applications for booster authorizations meeting the requirements of §74.985(b) shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed booster stations. A booster station shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the booster station authorization is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application for the response station hub authorization is filed.

(d) Notwithstanding the provisions of §74.912 and except as provided in §74.911(e), any petition to deny an application for a response station hub authorization shall be filed no later than the sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(e) A signal booster station that has a maximum power level of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) may be installed and operated by an ITFS conditional licensee or licensee for the purpose of retransmitting the signals of the ITFS station or for originating signals. A signal booster station that has a maximum power level of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) may be installed and operated by a third party with a fully-executed lease or consent agreement with an ITFS conditional licensee or licensee for the purpose of retransmitting the signals of the ITFS station. In either case, such installation and operation shall be subject to the condition that for sixty (60) days after installation, no objection or petition to deny is filed by an authorized co-channel or adjacent-channel ITFS or MDS station with a transmitter within 8.0 kilometers (5 miles) of the coordinates of the signal booster. An eligible party seeking to install a signal booster under this rule must, within 48 hours after installation, submit

(1) a description of the signal booster technical specifications (including an antenna envelope plot or, if the envelope plot is on file with the Commission, the make and model of the antenna, antenna gain and azimuth), the coordinates of the booster, the height of the center of radiation above mean sea level, the street address of the signal booster, and a description of the area to be served by the booster (the booster service area ),

(2) a demonstration that the booster service area is entirely within the protected service area of the station whose channels are being reused, or, in the alternative, that the licensee entitled to any protected service area which is overlapped by the proposed booster service area has consented to such overlap,

(3) either a certification that no Federal Aviation Administration determination of No Hazard to Air Navigation is required under Part 17 of this chapter or, if such determination is required, either:

(i) a statement of the FCC Antenna Structure Registration Number; or

(ii) if an FCC Antenna Structure Registration Number has not been assigned for the antenna structure, the filer must indicate the date the application by the antenna structure owner to registered the antenna structure was filed with the FCC in accordance with Part 17 of this chapter; (iv) a demonstration that the proposed booster service area can be served by the proposed booster without interference, and (v) a certification that:

(A) The maximum power level of the signal booster transmitter does not exceed -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths); and

(B) No registered receiver of an ITFS E or F channel station, constructed prior to May 26, 1983, is located within a 1 mile (1.61 km) radius of the coordinates of the booster, or in the alternative, that a consent statement has been obtained from the affected ITFS licensee; and

(C) No environmental assessment location as defined at §1.1307 of this chapter is affected by installation and/or operation of the signal booster; and

(D) Each MDS and/or ITFS station licensee (including the licensees of booster stations and response station hubs) with protected service areas or registered receivers within a 8 km (5 mile) radius of the coordinates of the booster has been given notice of its installation; and

(E) The signal booster site is within the protected service area of the ITFS MDS station whose channels are to be reused, if the signal of an MDS station is repeated; and

(F) The aggregate power flux density at or beyond the boundary edge of the protected service area of the ITFS station whose channels are to be reused and associated booster stations does not exceed  $-73.0 \text{ dBW/m}^2$  (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at locations for which there is an unobstructed signal path and

(G) The antenna structure will extend less than 6.10 meters (20 feet) above the ground or natural formation or less than 6.10 meters (20 feet) above an existing manmade structure (other than an antenna structure); and

(H) The ITFS licensee understands and agrees that in the event harmful interference is claimed by the filing of an objection or petition to deny, the licensee must terminate operation within two (2) hours of written notification by the Commission, and must not recommence operation until receipt of written authorization to do so by the Commission.

(f) An applicant for any new or modified MDS or ITFS station (including any response station authorization or booster station) shall demonstrate compliance with the protected service area protection requirements set forth in §§21.902, 21.938 and 74.903 with respect to any previously proposed or authorized booster service area using the transmission parameters of the ITFS booster station (including EIRP, polarization(s) and antenna height). Upon the filing of a certificate of completion of construction of an ITFS booster station filed pursuant to §74.985(b) or upon the filing of an ITFS booster station notification pursuant to §74.985(e), each incumbent ITFS station whose channels are being reused by the ITFS signal booster shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and (3) and 74.903 within the booster service area based on the transmission parameters of the ITFS station whose channels are being reused. A booster station shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application or notification for the booster station is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application or notification for the response booster is filed.

## **APPENDIX D**

### **PROPOSED TEXT OF ATTACHMENT TO REPORT AND ORDER SETTING FORTH METHOD FOR PREDICTING ACCUMULATED SIGNAL POWER FROM A MULTIPLICITY OF STATISTICALLY- LOCATED TRANSMITTERS**

## Major Steps

*In carrying out the interference studies required in this section, the aggregate power of the interfering signals to be expected from the response station transmitters shall be determined using a process comprising three major steps, as described below. First, a grid of points statistically representative of the distribution of transmitters to be expected within the response service area shall be defined. Second, any regions and any classes of response stations to be used shall be defined. Third, the equivalent power of each of the representative transmitters shall be determined and used in the various required interference studies.*

### Defining Grid of Points for Analysis

Since it is impossible to know *a priori* where response stations will be located, a grid of points is used to represent statistically in a relatively small number of locations the potentially much larger number of response stations that are likely to be installed in the areas surrounding each of them.

*Defining the representative grid of points to use in all the interference studies required in Sections 21.909 and 74.939 begins by geographically defining the response service area (RSA) of the response station hub (RSH). This can be done using a list of coordinates, a radius from the response station hub location, a line on a map, or a similar method sufficient to allow others to duplicate the interference studies to be conducted. Similarly, the coverage areas of any sectors in the RSH receiving antenna must be described geographically. Any overlaps of the sector patterns should be bisected in order to provide definitive borders for interference analysis purposes. The polarization in each sector must be identified.*

The RSA may be subdivided into regions to allow different characteristics to be used for response stations in different portions of the RSA. (For details on regions and their use, see the section below on Defining Regions and Classes for Analysis.) Any regions to be used when analyzing interference must also be described in a manner similar to that used to describe the RSA itself. Analysis of the regions involves use of one or more classes of response station characteristics that include combinations of the values for maximum antenna height and for maximum effective isotropic radiated power (EIRP) and of the worst case antenna patterns that will be allowed in practice in installations of response stations associated with the various classes within the respective regions. (For details on classes and their use, see the section below on Defining Regions and Classes for Analysis.)

Maximum numbers of simultaneous transmissions from response stations associated with each class within each region must be specified as part of the application process.

*A line is established surrounding the RSA, following the shape of the RSA boundary, 1/2 mile outside the RSA, and never more than 1/2 mile from the RSA boundary at any point. This is termed the "measurement line" and will be used in determining that an adequate number of points representing transmitters is being used in the interference analyses. A starting point is defined on the measurement line due north (true) of the response station hub. A series of measurement points is then spaced along the measurement line with the starting point being one of those points. The measurement points must occur at least every 1/2 mile along the measurement line or every 5 degrees (as seen from the response station hub), whichever yields the largest number of measurement points. When an RSA has a non-circular shape, the choice of distance along the measurement line or angle from the response station hub must be made for each portion of the line so as to maximize the number of measurement points in that portion. The measurement points are to be described by their geographic coordinates. (The results of this method are that, for a circular RSA, a minimum of 72 measurement points will be used, and that, for portions of the measurement line of any RSA more than 5.73 miles from the response station hub, the distance method will be used.)*

*Now, a grid of points is defined within the RSA to statistically represent the response stations. The grid uses uniform, square spacing of the points with the first square surrounding the RSH and with its points equidistant from it. The lines connecting the points on one side of any grid square point true north, east, south, or west. The grid is defined so as to include all points within or on the boundary of the RSA. Any points falling at locations at which it would be physically impossible to install a response station (such as in the middle of a*

*lake, but not the middle of a forest) are removed from the grid. The points of the grid are to be described by their geographic coordinates.*

*The grid of points is then divided into two groups. The division is to be done using a checkerboard (or quincunx) pattern so that alternating points along the east-west and north-south axes belong to opposite groups and points along any diagonal line belong to the same group.*

*The combination of the grid of points within the RSA and the points on the measurement line is next used to determine that the number of grid points is truly representative of a uniform distribution of response station transmitters within the RSA. This is done by conducting a power flux density analysis from each grid point within the RSA to each point on the measurement line. For this analysis, a single response station should be assumed to be located at each grid point, the response station having the combined worst case antenna pattern without regard to polarization of all response station classes assigned to that grid point and the maximum EIRP of any response station class assigned to that grid point. (For details on the method for determining the combined worst case antenna pattern, see the section below on Defining Regions and Classes for Analysis.) The response station antennas all should be oriented toward the response station hub.*

The analysis should be done using free space path loss over flat earth only and should not include the effects of terrain in the calculation of received signal levels. At each point on the measurement line, the power flux density from all grid points in each group of the checkerboard pattern should be aggregated. This is done by converting power received from each assumed transmitter from dBW/m<sup>2</sup> to W/m<sup>2</sup>, summing the power in W/m<sup>2</sup> from all transmitters in each group, and then converting the sum back to dBW/m<sup>2</sup>.

*Once the aggregated power flux density from each of the two groups has been calculated, the received power flux densities from the two groups are compared at each of the points on the measurement line. The power flux densities from the two groups must be within 3 dB of one another at each of the points on the measurement line. If they are within 3 dB at every measurement point, a sufficient number of grid points is included for use in further analyses. If they are not within 3 dB at every measurement point, a larger number of grid points (i.e., closer spacing of grid points) must be used so that the 3 dB criterion is met.*

## **Defining Regions and Classes for Analysis**

*To provide flexibility in system design and to assure that the clustering of response stations likely within higher population density areas is properly reflected in interference analyses, regions may optionally be created or may be required within response service areas. Regions may be of arbitrary size, shape, and location but must be evaluated on the basis of the uniformity of their population densities in order to preclude unidentified clustering of response stations. The territory within a region must be contiguous. Regions within a single RSA may not overlap one another. Within regions, response stations are apt to be randomly distributed and for analysis purposes are to be assumed to be uniformly distributed. Regions are to be defined by their boundaries in the same manner as is the response service area. (For details on describing boundaries, see the section above on Defining Grid of Points for Analysis.)*

*While regions may be established virtually arbitrarily, they must be tested to determine that the population densities they represent are reasonably uniform. This is done using postal zip code territories. For each postal zip code within a region, the population of the zip code and its area (in square miles or square kilometers) are used. If a zip code is divided between two (or more) regions, the proportion of the zip code area falling in each region should be calculated and*

*the same proportion of the population of the zip code then should be ascribed to each associated region.*

*The test for population density uniformity consists of calculating the population density of each zip code within a region and dividing it by the average population density of that region taken as a whole. The resulting value must be three (3) or less. The required relationship can be expressed by the following inequality:*

Where

*Within each region, at least one class of response station with defined characteristics must be specified to balance the interference expected to be caused and the types of installations to be made. The classes are to be used in interference analyses and to provide limitations on the installations that may be made in the related region. The characteristics of each such class of response stations will include the maximum height above ground level (AGL) for antennas, the maximum effective isotropic radiated power (EIRP), and the combined worst-case antenna radiation pattern – for each polarization when both are used – for all response stations of that class installed. For each defined class of response stations within a region, the maximum number of such response stations that will transmit simultaneously on any channel or subchannel must be specified.*

*The combined worst-case antenna radiation pattern is required to be specified collectively for all of the classes of response stations located at each grid point (in the procedure above, in the section on Defining of Grid of Points for Analysis, for confirming that the required number of grid points is specified) and individually for each of the classes defined for each region of the RSA. In the case of the collective pattern used to determine adequacy of the number of grid points, if both polarizations are used in the system, the horizontal and vertical patterns of each antenna should be treated as deriving from separate antennas and should be combined with one another and with the patterns from all the other antennas at that grid point. In the case of the individual patterns for each class used for interference analyses, if both polarizations are used in the system, the horizontal and vertical combined worst-case patterns should be determined separately for all classes defined. Similarly, the cross-polarized worst-case pattern should be determined for each polarization.*

These combined worst-case patterns are derived by setting the maximum forward signal power of all antenna types to be used within the class or classes to the same value and then using the highest level of radiation in each direction from any of the antennas as the value in that direction for the combined antenna pattern. The same method is used to determine both plane- and cross-polarized patterns, which are used separately in interference analyses. The combined worst-case plane- and cross-polarized patterns for each class will be used in all of the interference studies and are not to be exceeded in real installations of response stations within a class to which the pattern applies.

## **Calculating Aggregated Power from Transmitters**

*The final major step is the calculation of the effective isotropic radiated power (EIRP) to be attributed in each regional class to each of the grid points in the various interference studies so as to be representative of the number of response stations that are expected to be in operation simultaneously within the RSA.*

*This calculation starts by assigning a number of transmitters in each regional class to each grid point. The population of response stations is assumed to be uniformly distributed within each region, therefore divide the number of simultaneous transmitters specified in each regional class by the number of grid points in the region and assign the resulting number to each grid point. If there are no grid points within a region, assign the number of simultaneously operating transmitters equally to those grid points immediately surrounding the region in addition to those assigned to them from the regions within which they are located. If a specific location is known for one or a group of transmitters, an additional point off the grid may be established to represent them. The total number of transmitters assigned to the grid points and any additional points must equal the maximum number of transmitters specified to be in operation at one time on each channel or subchannel.*

*Next, the total EIRP to be assumed for each regional class at each of the grid points or additional points for interference studies is calculated. This is done by converting the maximum EIRP for each regional class at each grid point or additional point, expressed in dBW, to Watts, multiplying by the number of simultaneously operating transmitters in the regional class assigned to that grid point or additional point, and converting the resulting power in Watts back to dBW. The values so calculated are the aggregate powers of all the response station transmitters of each regional class represented by each grid point or additional point.*

In a system using both polarizations, the response stations represented by each grid point are to be assumed to use the polarization of the response station hub antenna sector in which they are located. The appropriate plane-polarized or cross-polarized combined worst-case antenna pattern is to be used in interference studies depending upon the polarization of the station receiving interference. In a system using only one polarization, the effect of antenna sectors can be ignored and the choice between plane- and cross-polarization patterns made identically for all grid points with respect to any particular neighboring system.

*Finally, the aggregate power of each regional class at each grid point is used in conducting the required interference studies described in this section. For example, to determine that the -73 dBW/m<sup>2</sup> limitation is met, a field strength contour is calculated by first calculating a matrix of field strengths from each regional class at each grid point in the RSA in the region of the PSA or other boundary to be protected using an appropriate terrain-based propagation analysis tool (e.g. free space path loss plus reflection and multiple diffractions). The matrix represents an array of locations on a square grid separated by a short distance (no more than 1/2-mile). Once the matrix is calculated for each regional class at each grid point or additional point, the matrices are summed by first converting from dBW/m<sup>2</sup> to W/m<sup>2</sup>, adding the field strength values from all regional classes at all grid points at each matrix point, and converting from W/m<sup>2</sup> back to dBW/m<sup>2</sup>. The summed matrix is then used to route a contour by interpolating between matrix points. The contour so determined should not cross the boundary under consideration.*

Similar methods should be used in conducting the other interference studies required in this section. These include the desired-to-undesired (D/U) signal ratio studies for co-channel and adjacent channel interference. In all of these studies, the analysis should use the aggregate power of each regional class at each grid point or additional point, the worst case plane- or cross-polarized antenna pattern, as appropriate, for each regional class, with the antennas at each grid point aimed toward the response station hub, and the maximum antenna height above ground specified for each regional class at each grid point or additional point.