

be required.²⁴ If the Commission adopts a frequency separation plan, such issues should be addressed in a Further NPRM.

V. THE PROPOSED TECHNICAL RULES DO NOT PROVIDE SUFFICIENT GUIDANCE CONCERNING INTERFERENCE PROTECTION RIGHTS AND OBLIGATIONS FOR CO- AND ADJACENT-CHANNEL STATIONS.

The regime for operation of two-way services on ITFS and MDS frequencies proposed in the NPRM would make substantially more complex the interference rights and obligations of applicants and licensees. Accordingly, if the Commission were to adopt rules authorizing two-way transmissions on co- and adjacent-channels to ITFS stations, rather than CTN's proposals in Section IV above, then it would be necessary for the Commission's Rules governing ITFS and MDS to explain with sufficient clarity what obligations are imposed on applicants and what rights are held by licensees. On these grounds, the proposed rules require amplification and modification.

²⁴ For example, clearing point-to-multipoint ITFS operations could be accomplished by allowing any ITFS licensee in the affected bands to (i) consent to its channels being used as response channels, (ii) request relocation of its channels, or (iii) enter into a shared-time agreement with another ITFS licensee on other ITFS Channel groups. Channel exchanges among ITFS licensees should also be permitted in the event that there is an ITFS operator which does not object to use of all its channels for response transmissions and distribution of its programming on other stations' channels.

A. The Proposed Methodology for Co-Channel and Adjacent-Channel Interference Analysis is Inadequate.

The Petitioners' proposed methodology for analyzing the potential for co- and adjacent-channel interference from new facilities is unduly complicated and represent an unwarranted risk of interference with ITFS stations. See Joint Engineering Exhibit, ¶ 9. The Petitioners proposed a theoretical model for predicting aggregate signal power from a large number of response stations within a given area. The calculated aggregate signal power levels would be used to derive desired to undesired signal ratios at ITFS receive sites.

This proposal raises many questions which have not been answered. One very real problem is that there is no procedure for ensuring that the actual installation of response stations corresponds to what the applicant predicted. This alone vitiates the usefulness of the proposal as a method to ensure that harmful interference to existing receive sites would not occur.

Moreover, the Petitioners' model uses a predicted density of response stations based on the population density of a response station service area ("RSA"). Yet, the proposal does not account for differences in population densities between residential and business areas. While response stations may be placed in residential areas, it is equally likely that response stations would be clustered in business districts. Also, the size, shape, and location of an RSA could affect the aggregate signal power to a given point within the RSA. Given the number of

variables, it would be difficult to use this methodology as a means for applicants to demonstrate to existing licensees that no harmful interference would occur.

B. The Commission Should Define Operation of "Shared" Facilities.

The Commission has proposed to adopt the Petitioners' concept of "shared" ITFS and MDS facilities, particularly with respect to response station hubs and booster stations. See proposed Sections 21.2 (MDS definitions), 21.905(b) (emissions and bandwidth), 21.908 (MDS response station hubs), 21.909 (MDS booster stations), 74.901 (ITFS definitions), 74.936(b) (emissions and bandwidth), 74.938 (ITFS response station hubs), 74.985 (ITFS booster stations). The apparent use of such shared facilities is to permit transmissions on channels across existing ITFS and MDS channel boundaries. See NPRM, ¶¶ 16-18.

However, many questions regarding "shared" facilities are not addressed. For example, what is a permissible shared facility? And, what are the responsibilities of each licensee with respect to compliance with the Commission's rules, particularly where different obligations may attach to frequencies used for shared operation? The Commission should provide further explanation of the rights and obligations of applicants and licensees in the proposed rules regarding response station hub authorizations and booster stations.

C. The Commission Must Approve Authorization for All Co- and Adjacent-Channel Response Stations.

Proposed Sections 21.909(c)(2)(i)(E) and 74.939(c)(2)(i)(E) both suggest that in the initial application for a response station hub, the MDS or ITFS applicant will identify a maximum number of response transmitters that will be deployed in a response station service area. The maximum numbers are to be used in the analysis proposed by the Petitioners for the impact of these response stations on co- and adjacent-channel stations.

Curiously, Sections 21.909(f)(5) and 74.939(f)(5) are intended to permit MDS and ITFS licensees to "alter" the authorized number of response station transmitters without prior Commission authorization. No limit is placed on an alteration designed to install additional response stations. The licensee is supposed to certify to the Commission that there would be no increase in interference to other stations. However, there is a substantial potential for interference from response station transmitters; there would be great difficulty in locating sources of actual interference; and, in any event, the location as well as the number of response stations may make a difference to the interference environment. Accordingly, these rules are unacceptable and should not be adopted. If a response station hub licensee desires to modify its license, then it should file an application to do so in accordance with procedures established for obtaining an initial license.

D. Modifications Are Needed to the Proposed Rules for Booster Stations.

A variety of modifications are needed to the proposed rules governing booster stations.

First, the references to ITFS channels in Sections 21.913(b)(1) and (4) should be eliminated. MDS operators cannot be licensed to reuse channels licensed to an ITFS operator for a booster station with an EIRP in excess of -9 dBW. See proposed Section 74.985(a). There is thus no reason for the applicant to establish the protected service area of the ITFS station or to seek consent of the ITFS licensee.

Second, an applicant for a higher power booster station should be required to demonstrate that the 45 dB and 0 dB interference protection ratios will be met at any co- or adjacent-channel registered ITFS receive site. Accordingly, Sections 21.913(b)(3) and 74.985(b)(5) must be revised to include this requirement.

Third, booster stations with a maximum EIRP of -9 dBW should operate on a secondary basis only, and not be entitled to protection from harmful interference by main transmitters. See proposed Sections 21.913(e)(4)(viii), 74.985(e)(3)(v)(H). Accordingly, Sections 21.913(f) and 74.985(f) must be modified to reflect that the service areas of only high power booster stations are entitled to interference protection.

COMMENTS: PRESERVATION OF ITFS FOR INSTRUCTIONAL USES

VI. THE COMMISSION MUST REQUIRE SUBSTANTIAL USE OF ITFS SPECTRUM FOR INSTRUCTIONAL PURPOSES.

In the NPRM, the Commission seeks comment on whether the programming obligations currently imposed on ITFS licensees should be modified to reflect the implementation of digital technology. NPRM, ¶ 68. CTN submits that the advent of increased airtime as a result of digital equipment and the availability of two-way data services must be taken into account in the Commission's ITFS programming rules.

A. Analog Programming Requirements Should Remain Unchanged.

The current ITFS programming requirements "reflect a balancing of the Commission's concern for restricting ITFS spectrum to legitimate ITFS operations, on the one hand, and ensuring full spectrum utilization, on the other."²⁵ These requirements promote the public interest benefits of ITFS by ensuring that the ITFS frequencies remain "primarily dedicated to the purpose for which they were allocated."²⁶ No party has presented a reason to modify these requirements with

²⁵ 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, 6 FCC Rcd 6764, 6774 (1991).

²⁶ 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, 5 FCC Rcd 6410, 6415 (1990) ("1990 Amendments").

respect to stations operating in analog format. Accordingly, in order to maintain the public interest benefits of the ITFS spectrum reservation, the current programming requirement for analog ITFS stations should remain in place.

B. ITFS Programming Requirements Must Be Modified to Reflect Increased Capacity Arising from Use of Digital Technology.

The existing ITFS programming requirements were designed to ensure that licensees make "substantial use" of the ITFS spectrum for its intended instructional purpose.²⁷ The Commission reasoned that:

A minimum "substantial use" for ITFS service . . . is an elementary necessity to guarantee the intended use of ITFS channels in the face of the revenue-generating uses which will also be permitted.²⁸

The Commission has previously recognized that decreasing these programming obligations for analog stations could adversely affect the public interest by (1) inducing ITFS applicants in search of financial benefits to request more channels than they actually need and (2) encouraging potential operators with no intent of providing instructional programming to apply for ITFS channels, which could change the nature of the service.²⁹

²⁷ Instructional Television Fixed Service, 101 FCC 2d at 85-88.

²⁸ Id. at 85; see Channel Loading Order, 75 RR 2d at 764.

²⁹ See 1990 Amendments, 5 FCC Rcd at 6416; Amendment of Parts 2, 21, 74 and 94 of the Commission's Rules and Regulations in Regard to Frequency Allocations to Instructional Television Fixed Service, the Multipoint Distribution Service, and the Private Operational Fixed Microwave Service, 98 FCC 2d 129, 137 (1984).

As the Commission is aware, installation of digital equipment will increase the capacity of spectrum used for transmission of ITFS and MDS programming. Accordingly, a proportionate increase in instructional usage is needed to prevent the dilution of the instructional nature of ITFS channels. CTN recommends that any station operating with digital equipment be required to use and/or reserve up to 25% of the available capacity on its channels for ITFS purposes. This proposal for stations operating with digital equipment is proportional to the current requirements for analog operations and strikes an appropriate balance between educators' need for enhanced instructional technologies and the expectations of commercial operators.

C. Data Transmissions Should Be Eligible "Instructional" Usage.

The Commission has asked whether data transmissions should be counted toward instructional use requirements. NPRM, ¶ 69. CTN agrees that data transmissions which are used for instructional purposes should be applicable to an ITFS licensee's instructional obligations. An ITFS operator should be permitted to use any combination of video and data services to meet programming obligations as long as the service is educational, cultural or instructional in nature. Interactive capability can enhance educational opportunities and help reduce per student costs of instruction. However, as with video programming, there should be an actual instructional use requirement for data transmissions.

VII. THE RULES ADOPTED IN THIS PROCEEDING MUST PROTECT THE AUTONOMY OF ITFS STATIONS.

In comments on the Petition for Rulemaking, a number of ITFS parties, including CTN, pointed out that the rules proposed in the Petition could have an adverse impact on the autonomy of ITFS licensees. See NPRM, ¶¶ 78-87. These concerns arise from several sources, including the potential for interference into ITFS stations from a wireless cable system offering two-way services as well as the engineering and financial impact on ITFS stations which participate in such systems. The Commission recognized these concerns and sought comment on proposed solutions to these perceived threats.

The proposed rules contemplate a new mode of operation for ITFS and MDS stations which differs significantly from most existing facilities. Under the current rules, ITFS and MDS stations can and do operate independently, although certain coordinated actions (e.g., colocation) may decrease the potential for interference and thereby increase protected service areas. On the other hand, the proposed rules contemplate joint operation of multiple ITFS and MDS stations. Indeed, joint operation (e.g., pooling of frequencies to create new channel bandwidths, joint licensing of response station hubs) is an integral feature of facilities providing two-way services as proposed in the Petition and the NPRM.

Of particular concern for ITFS operators participating in such systems is the fact that the cost of installation and maintenance of a cellularized system is likely to be far beyond both the means and the needs of ITFS licensees.

Currently, the Commission has a policy that ITFS licensees should have the ability to purchase equipment used for operation of their station at the end of an excess capacity lease term. See NPRM, ¶ 87. However, there are at least two critical issues which this policy does not specifically address.

First, in a coordinated ITFS/MDS system, some equipment is dedicated to the operation of specific stations, while other equipment is used in common for all stations which are part of the system. Arguably, the Commission's policy only extends to "dedicated" equipment and does not require the lessee to make available "common" equipment at the end of the lease term. As a result, an ITFS licensee may not be able to continue operation unless it purchases additional equipment or enters into an agreement with the lessee to use the common equipment.

Second, the Commission's policy does not address circumstances in which an airtime lease may terminate as a result of financial insolvency of the wireless cable lessee. In such situations, the ITFS licensee/lessor may not as a practical matter have access to the equipment because there may be secured liens on the equipment and/or the equipment may become the property of an estate in bankruptcy. The lessee may thus not always have the power to direct disposition of the equipment and sale to the ITFS licensee/lessor.

These two scenarios represent significant gaps in the Commission's policy that an ITFS licensee/lessor should have access to the equipment used for distribution of its signal when a lease terminates. The cost of digital equipment,

the expense of maintaining a digital transmission system, and joint operation will only exacerbate the difficulty of obtaining access to equipment for ITFS lessors.

To address the first issue, CTN recommends that the Commission's policy on purchase of equipment at the end of a lease term include reference to dedicated and common equipment, or the equivalent thereof. In other words, an ITFS licensee should have access to all equipment necessary for continued distribution of its signal consistent with its distribution during the lease term. Included in this policy must be the ability of the ITFS licensee to operate on its assigned frequencies with the same quality of signal that it enjoyed at all receive sites prior to termination of the lease. The parties can negotiate more specific terms for purchase of dedicated equipment and purchase or use of common equipment.

To address the second issue, CTN recommends that wireless cable operators implementing a digital system should be required to establish a performance bond or escrow account with sufficient funds to ensure uninterrupted operation of participating ITFS stations, in the event the wireless cable operator becomes insolvent. The funds should become available if the lessee fails to commence commercial operations or ceases commercial operation.

Finally, the Commission must be mindful of the impact of the rules adopted in this proceeding on existing excess capacity lease agreements. Many ITFS leases were negotiated before the parties understood the nature of digital service or had considered the availability of two-way services. If the Commission adopts rules and policies in this proceeding which potentially enhance ITFS, it cannot

rely on the parties to agree to implement those policies unless they are adopted as rules which all licensees must follow. Therefore, to ensure that these improvements become available immediately to all ITFS operators, the Commission should adopt a policy that requires excess capacity lease agreements to be consistent with current rules rather than the rules in effect when the lease took effect.

VIII. THE COMMISSION'S PROCESSING RULES SHOULD FACILITATE REVIEW OF APPLICATIONS FOR TWO-WAY SERVICES WHILE NOT INCREASING THE BURDEN OF REVIEW FOR ITFS LICENSEES.

The Commission has proposed to adopt the majority of Petitioners' application processing rules. Generally, applications for response station hubs and booster stations would be treated as minor amendments, and deemed cut-off from mutually-exclusive applications on the day of filing. See proposed Sections 21.909(d) (MDS response hubs), 21.913(c) (MDS boosters), 74.939(d) (ITFS response hubs), 74.985(c) (ITFS boosters). The Commission also proposes to open an initial one-week filing window for response station hub and booster station applications, and all applications filed during this window would be treated as filed on the same day. See proposed Sections 21.27(d), 74.911(e). CTN believes that these processing proposals require substantial modification.

A. The Commission Should Open Periodic and Regular Filing Windows.

The Petitioners' proposals for application processing are a recipe for administrative disaster. First, the number of applications that are likely to be filed after the effective date of the new rules is astonishing. Pursuant to the proposals in the NPRM, it would be necessary in each market for each station used for upstream transmissions or for "cellularized" booster stations to file multiple applications for each response station hub site or booster site. (Potentially, every station in a market would be "cellularized," if not used for upstream transmissions.) Based on past experience, the Commission should realize that the initial one-week window will draw thousands of applications. This will produce an avalanche of paper that could easily overwhelm the Commission's resources. Indeed, the Video Services Staff has not yet processed all the applications from the last such window which was opened more than two years ago.

Second, the Commission is aware that the one-day filing procedure currently used in MDS can precipitate confusion and litigation. In a one-day filing system, it is nearly impossible for any applicant to know with certainty when it files an application whether that application is complete with respect to interference studies. While MDS applicants may have the desire and financial resources to deal with these risks, it is unfair to impose them upon ITFS eligibles whose resources are limited.

Nevertheless, CTN does support the concept of instituting parallel processing procedures for ITFS and MDS applications. But, the Commission must provide applicants with more certainty and more opportunities to file so that they will not feel obligated to flood the Commission with applications whenever a rare filing window opens. Moreover, the Commission must give its Staff more time to produce public notices listing applications tendered for filing.

CTN recommends that the Commission open regular periodic filing windows; for example, the first five business days of every month should be days on which ITFS and MDS applications implementing two-way services would be acceptable for filing, and all applications filed on those days should be deemed cut-off together from subsequently-filed applications. If applicants knew that there would be specific days for filing at regular intervals, they would more likely to schedule their filing dates in advance and less likely to flood the Commission with applications in the same window. Monthly filing windows would also give the Commission's Staff sufficient opportunity to release a public notice listing applications filed during the window.

Accordingly, CTN recommends adoption of the following modifications to Sections 21.27(d) and 74.911:³⁰

New Section 21.27(d).

Applications for booster stations, response station hub authorizations and associated modifications to existing stations may be filed on the first five

³⁰ Conforming amendments would be required to Sections 21.909(d), 21.913(c), 74.939(d) and 74.985(c).

business days of every month, as defined in Section 1.4, and all applications filed on those days in each month shall be deemed to have been filed as of the same day for purposes of §§ 21.909 and 21.913. Applications filed in one month shall cut-off applications that are filed during a subsequent month for facilities that would cause harmful electromagnetic interference. A transmitting station and response station hub shall not be entitled to protection from interference caused by facilities proposed in a month prior to the day the application for the station or hub is filed. Stations shall not be required to protect from interference the facilities of other stations or response station hubs proposed after the month in which the application for the station authorization is filed.

New Section 74.911(e).

Applications for booster stations, response station hub authorizations associated modifications to existing stations may be filed on the first five business days of every month, as defined in Section 1.4. All applications filed on those days in each month shall be deemed to have been filed as of the same day for purposes of §§ 74.939 and 74.985. Applications filed in one month shall cut-off applications that are filed during a subsequent month for facilities that would cause harmful electromagnetic interference. An ITFS transmitting station and response station hub shall not be entitled to protection from interference caused by facilities proposed in a month prior to the day the application for the station or hub is filed. ITFS stations shall not be required to protect from interference the facilities of other stations or response station hub proposed after the month in which the application for the station authorization is filed.

It should be noted that these provisions encompass modifications to existing stations designed to conform such stations to a "cellularized" market. The proposed rules apparently did not contemplate inclusion of such changes in the initial filing window; but, changes to existing stations are obviously an integral part of the new regime for ITFS and MDS.

B. ITFS and MDS Applications Should Be Processed Together.

CTN also recommends that MDS and ITFS applications be processed together to the extent possible given the differences in processing requirements. The proposed rules include reference to a number of "joint" facilities which could involve multiple ITFS and MDS stations. See proposed Sections 21.2, 74.901. For example, it would be helpful to all if the Commission were to process ITFS and MDS applications on a market-by-market basis rather than separately by service. Given the proposals in the NPRM, a market-by-market approach would be more efficient and effective in rolling out two-way service.

C. Staff Review and Grant of Complete Applications Is Necessary.

CTN agrees with the Commission's conclusion that it cannot allow applications to be granted automatically. See NPRM, ¶ 49. Staff review of applications for compliance with applicable rules and interference protection requirements is a cornerstone of Title III licensing procedures. The Petitioners have offered no reason why the safeguards of these procedures should be eliminated for ITFS and MDS upstream transmission applications.

In this regard, CTN notes that the opportunity to submit a "no objection" letter of an interested station in lieu of an interference protection analysis (see 47 C.F.R. §§ 21.902(c)(2)(i), 74.903(b)(4)) is subject to substantial abuse as a result of applicants filing neither -- with a statement that a no objection letter will be obtained. These applications are nothing more than placeholders, which -- in the

proposed processing regime -- would unfairly block the filing of compliant applications as of the day that the noncompliant application is filed. Moreover, it is unfair to the public to require review of applications which may never be grantable.

Accordingly, CTN recommends that applications which are filed with neither an interference protection analysis nor a written statement of consent for one or more affected stations not be accorded the status of an application acceptable for filing. The facilities proposed in such an application should not obtain interference protection rights as of the date of filing, and, if the application is brought into compliance, it should not be accorded protected status until the next filing window. Only by taking such measures can the Commission prevent warehousing frequencies through noncompliant applications and protect the rights of others to file complete applications.

Finally, in order to expedite grant of applications, the Commission may want to consider a dual grant procedure. For example, if the 60-day public notice period closes without the filing of an opposition, the Commission could grant a conditional authorization for construction and operation of the proposed station. Then, the permittee would receive a final authorization if there have been no complaints of actual interference for 180 days after it files a certificate of completion of construction, or, if there have been complaints, they have been resolved in satisfaction to the Commission and complainant.

IX. CONCLUSION

CTN recommends adoption of new rules governing ITFS and MDS consistent with the modifications indicated above.

Respectfully submitted,

CATHOLIC TELEVISION NETWORK

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January 8, 1998

Catholic Television Network

**Joint Engineering Exhibit
in Support of Comments to
MM Docket No. 97-217**

January 7, 1998

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Catholic Television Network

Joint Engineering Statement of

John F.X. Browne, P.E., Robert W. Denny, Jr., P.E., and Dane E. Ericksen, P.E.

The firms of John F.X. Browne and Associates, Denny & Associates, and Hammett & Edison, Inc., have been jointly retained on behalf of the Catholic Television Network ("CTN"), representing numerous Instructional Television Fixed Service ("ITFS") stations licensed to, and operated by, the Roman Catholic Archdioceses and Dioceses throughout the United States, in support of CTN comments to MM Docket 97-217 concerning two-way, "cellularized" ITFS and Multipoint Distribution Service ("MDS") stations.

Three Reasons Why Proposed Rules Need To Be Modified

1. There are three reasons why the new and revised rules proposed in the Notice of Proposed Rulemaking ("NPRM") need to be modified: brute force overload ("BFO") interference, co-channel and adjacent-channel interference, and the preclusive nature of Response Station Hubs employing omnidirectional receiving antennas. Each of these problem areas will be addressed in detail.

Brute Force Overload Issue

2. On October 10, 1997, the Commission released the above-captioned NPRM. One issue not addressed in the NPRM was that of brute force overload* to broadband downconverters typically used at fixed ITFS receive sites; or, in other words, the issue of protecting non-co-channel and non-adjacent-channel ("nonCOADJ") ITFS receive sites from nearby Response Station transmitters having main-beam equivalent isotropic radiated powers ("EIRP") of up to +48 dBm (63 Watts).

3. While technical data on the brute force overload levels from conventional National Television System Committee ("NTSC") signals is available from downconverter manufacturers, there is a lack of similar data on the combined downconverter input power level allowable when the signals are a mix of NTSC and digital. Since Response Station transmitters would undoubtedly only use digital modulation, research on the input levels at which such signals would cause brute force overload in the front ends of existing and commonly used downconverters is needed.

4. However, it is nevertheless possible to provide an illustrative example of the brute force interference threat. For the California Amplifier Model 130001 32 dB gain, 31-channel

* "Brute force overload" refers to a condition where the first active device of a receiving system is presented with so much combined radio frequency energy that the active device (typically a transistor or integrated circuit) operates in a non-linear fashion. This can cause receiver de-sensitization, the generation of undesired intermodulation distortion products, or both.



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downconverter, the maximum input level is specified as -21 dBm for a single NTSC channel, or as -50 dBm for 31 NTSC channels (representing a combined power level of -35 dBm, which is 15 dB less input power than for the single-channel case). A reasonable estimate of the maximum allowable input level for an arbitrary mix of NTSC and digital signals would be to therefore assume a value approximately halfway between these two cases, or -28 dBm. Further assuming a Response Station transmitter having an EIRP of +48 dBm, utilizing 6 MHz of Response Station spectrum, and that the Response Station transmitting antenna is aimed directly at the ITFS receiving antenna, yields a receive carrier level ("RCL") of the undesired Response Station signal of +4 dBm (+48 dBm EIRP -64 dB free space path loss + 20 dBi receive antenna gain). That level is more than 30 dB above the allowable maximum input level. It is clear that this would cause brute force overload, in turn causing interference to nonCOADJ ITFS channels. No assumption of cross polarization isolation between Response Station transmitters and ITFS receive sites should be made because it would require the entire universe of all ITFS stations in a given area to have the same polarization, an unlikely occurrence.

5. Because Response Station transmitters would be located throughout the service areas of other ITFS stations, the possibility, indeed, the likelihood, exists that one or more Response Station transmitters would be located in close proximity to an existing ITFS receive site that is neither co-channel nor adjacent-channel to the frequency being used by the Response Station transmitter. It can also reasonably be assumed that in some cases the main beam of the Response Station's transmitting antenna will be aimed directly at the nonCOADJ receiving antenna, either because the nonCOADJ ITFS receiving antenna has the misfortune to be directly in line with the path to the Response Station's hub receive site, or because the Response Station's transmitting antenna is mis-oriented, but not so badly mis-oriented that the non-technical subscriber loses service and therefore triggers a service call that would presumably correct the mis-orientation.

6. Therefore, it is clear that by allowing a large number of Response Station transmitters to be intermingled among existing ITFS receive sites, an entirely new brute force interference threat would be created. This interference threat did not exist under conventional ITFS and MDS architectures, because transmitters and receivers are generally not intermingled. One potential solution to this new brute force interference threat would be to require the use of a guard band, so as to allow the practical use of either protective filters, downconverters having greater immunity to brute force overload, or a combination of both mitigation measures, where appropriate, to ensure that nonCOADJ receive sites do not suffer interference from Response Station transmitters. It should be noted that, because the interference threat is brute force overload to the input stage of ITFS downconverters, post-downconversion filtering is not a solution.



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7. To resolve the BFO interference threat, CTN and its consulting engineers have had several conference call discussions with the technical consultants retained by the Wireless Cable Association, International (“WCA”). As a result of these discussions, CTN offers the following proposals to ensure that BFO interference to existing ITFS receive sites does not occur:

7a. All Response Station transmitters shall be at fixed locations; that is, no mobile, portable, or itinerant Response Stations are permitted.

7b. All Response Stations must utilize directional transmitting antennas, and those antennas can only be installed by qualified technicians working for the Response Station hub licensee; that is, no customer-installed Response Stations will be allowed.

7c. Response Stations shall be limited to transmitter power outputs (“TPO”) of not greater than +33 dBm (2 Watts) and EIRPs of not greater than +48 dBm (63 Watts), as adjusted for the actual bandwidth of the Response Station transmitter. For example, a Response Station transmitter employing a bandwidth of 3 MHz would have to reduce its allowable TPO and EIRP by 3 dB [$10 \log_{10} (3 \text{ MHz}/6 \text{ MHz})$]; a Response Station transmitter employing a bandwidth of 1 MHz would have to reduce its allowable TPO and EIRP by 7.8 dB [$10 \log_{10} (1 \text{ MHz}/6 \text{ MHz})$]; a Response Station transmitter employing a bandwidth of 100 kHz would have to reduce its allowable TPO and EIRP by 17.8 dB [$10 \log_{10} (0.1 \text{ MHz}/6 \text{ MHz})$]; and so on. A Response Station transmitter must use the minimum EIRP necessary to achieve the desired service.

7d. Within the operational area served by a wireless cable operator wishing to offer “two-way” wireless cable services, the locations of all nonCOADJ channel ITFS receive sites shall be determined by the applicant. (Protection requirements for co-channel or adjacent-channel ITFS receive sites would become moot, as, under the proposed alternative spectrum allocation discussed later in this filing, there would be no co-channel or adjacent-channel Response Station transmitters.) Any Response Station transmitters falling within 1,960 feet* of an ITFS receive site shall trigger a Notification requirement to the licensee of the receive site, informing that licensee of the wireless cable operator’s intent to establish an upstream Response Station within the Notification zone. In the event the proposed Response Station would be further located in the smaller Equipment Test zone also shown in the attached Figure 1, then a further requirement would be imposed, where the Response Station operator would have to first conduct tests

* The 1,960-foot figure was suggested by one of WCA’s technical consultants, Mr. Patrick D. McConnell, in a December 30, 1997, facsimile, wherein for a 24 dBi gain ITFS receiving antenna, the maximum BFO distance was described as a “teardrop” shaped area comprising 0.021 square miles and 1,960-feet long in its major axis. From this information a “width” of approximately 300 feet either side of the teardrop centerline can be computed. For simplicity, this shape has been converted to a rectangle with “rounded” ends, as shown in Figure 1.

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demonstrating that no BFO interference is caused to the nearby ITFS receive site. In the event BFO interference is detected, appropriate mitigation measures would first have to be satisfactorily accomplished before the Response Station transmitter could be turned over to the customer and allowed to commence regular commercial operation. For BFO overload tests, the Response Hub licensee would be given the choice of 1) activating any already existing Response Stations within the Notification Zone during the BFO tests on the newcomer Response Station, to ensure that the worst case total power to the first active device of the downconverter was being tested, or 2) to test using just the newcomer Response Station, but at 6 dB higher transmitter power than would be employed for normal operation of that Response Station transmitter. This higher test power level would have to use the actually-installed transmitting antenna (and orientation) that the newcomer Response Station would use in normal operations; that is, the temporarily increased power would have to be achieved using a temporarily installed power amplifier, as opposed to a temporarily installed higher gain Response Station transmitting antenna. It is the intent of this provision to evaluate fully the interference potential of Response Hub licensees electing to use time division multiple access (“TDMA”) architectures. (TDMA systems, especially “mature” systems, may not be able to simultaneously activate all Response Station transmitters within the Notification Zone).

7e. On the assumption that all Response Station transmissions will be digital, and that such a signal would appear as a “noise like” interfering signal to an NTSC analog receiver, BFO interference would be considered to exist if greater than a 1 dB degradation in the carrier-to-noise (“C/N”) ratio of the downconverted ITFS signal was observed when the Response Station transmitter was activated.** This measurement would be easy to perform using low cost and widely available spectrum analyzers such as the Tektronix 2712 and Hewlett Packard HP8590L, which provide directly a C/N measurement for NTSC analog signals. Since the measurement would of necessity be performed on the downconverted signal (so that the BFO effects generated in the downconverter would be included), not only would it allow the use a relatively low-cost 1,800 MHz spectrum analyzer, it would also allow using the analyzer at a convenient location (typically inside a structure, protected from the elements, and having access to 120V AC power).

7f. If the above protocols were to be adopted, it is our joint opinion that it would make BFO interference to ITFS receive sites a manageable problem, and CTN would then be comfortable with a “safety net” rule section stipulating that, regardless of any other provisions in these new rules,

** The concept of a 1 dB degradation in the pre-existing C/N of an NTSC analog signal as a definition for BFO interference is borrowed from Section 101.105(b) of the Commission’s Rules governing interference protection criteria for fixed point-to-point terrestrial microwave stations.



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if an ITFS licensee can demonstrate actual interference to a licensed ITFS receive site in existence prior to the operational date of a newcomer Response Station transmitter, then the Response Station Hub licensee must either promptly eliminate the interference or have the offending Response Station transmitter cease operation.

Protection of Co-Channel and Adjacent-Channel ITFS Stations (Plan A Scenario)

8. Because the locations of Response Station transmitters would not be known in advance, the WCA Petition for Rule Making, and the resulting NPRM, proposed a new and complex scheme where certain assumptions would be made concerning the average amount of interference caused to co-channel or adjacent-channel stations. These assumptions would be based on a presumed uniform distribution of Response Station transmitters, which could be provided in several types, each with differing occupied bandwidths, TPOs, EIRPs, and transmitting antenna patterns. A wireless cable applicant seeking blanket authorization for Response Station transmitters in a given area would submit, as part of its application for blanket authority to install one or more types of Response Station transmitters to customers within its service area, an interference study based on these new protocols, demonstrating that the aggregate interference caused by all types of Response Station transmitters would nevertheless provide co-channel stations with desired-to-undesired (“D/U”) ratios of 45 dB or better, and would provide adjacent-channel stations with D/U ratios of 0 dB or better.

9. After careful consideration, it is the combined opinion of the undersigned consulting engineers, each with many years of experience in the design of ITFS and MDS stations, and their associated interference studies, that the new interference calculating protocols proposed by WCA are unduly complicated and represent an unwarranted risk of new interference to existing ITFS stations. Unlike the current situation for ITFS interference studies, where third parties can obtain a copy of an application and independently verify the site coordinates, site elevation, antenna gain, line/combiner losses, and the azimuth and elevation patterns of the proposed transmitting antenna, and thereby check the accuracy of the interference calculations, the WCA proposal does not allow an independent interference study. For example, it would appear that a critical input parameter to such “uniform distribution” Response Station interference studies would be the total number of Response Station transmitters that would be allowed to transmit at any one time. Under the WCA proposal, there would be no such means to independently check whether the claimed number of Response Station transmitters that would be allowed on the air at any one time was accurate.



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10. An alternative approach to avoid this “how many angels can dance on the head of pin” question entirely would be to partially reformat the 2.5 GHz ITFS/MDS spectrum as shown in the attached Figure 2. Under this Plan A scenario, only conventional “downstream” ITFS operations would be allowed between 2,500 and 2,620 MHz. Between 2,620 and 2,644 MHz only conventional “downstream” MDS operations would be permitted. And between 2,150 and 2,162 MHz (MDS Channels 1, 2, and 2A) and between 2,644 and 2,686 MHz, both conventional MDS “downstream” and new Response Station two-way “upstream” operations would be permitted.

11. Under the Plan A approach, a 24 MHz “guard band” between conventional downstream ITFS operations and MDS upstream operations would be created, which would allow the practical use of bandpass filters, bandreject filters, or both, where necessary, to mitigate BFO interference, while MDS operators could still use the 24 MHz of guardband spectrum for conventional downstream MDS operations. Further, there would no longer be the possibility of co-channel or adjacent-channel Response Station transmitters, and, as far as ITFS operators would be concerned, there would then be no need to debate the merits of any new and complex set of interference-calculating algorithms, and questions about the validity of uniform distribution assumptions, arbitrary calculation areas, and the number of Response Station transmitters of a given type that could be on the air simultaneously. All of these discussions would become moot, as far as ITFS licensees, and the Commission, would be concerned.

12. These would still be questions of great importance to the wireless cable operator, who would now have upstream Response Station transmitters interspersed with downstream MDS subscribers, but now the new service would become self-regulating: that is, if the wireless cable operator mis-calculated the interference levels, or allowed too many Response Station transmitters to be installed and on the air at the same time, the interference threat would be to its own operations, and not to innocent third-party ITFS operators, who typically lack the resources necessary to resolve complex interference problems.

13. Under the Plan A scenario, up to 54 MHz of upstream spectrum (that is, up to 12 MHz at 2.1 GHz, and up to 42 MHz at 2.5 GHz) would be available for Response Station two-way use. This represents 27% of the available MDS/ITFS spectrum. If it is the intent of this rule making to enhance the ability of MDS operators to offer new and innovative services, while still preserving the fundamental educational nature of ITFS, then up to 54 MHz of spectrum for upstream, two-way transmissions certainly should be adequate. To allow greater spectrum results in a “tail wagging the dog” situation, and becomes a *de facto* re-allocation of the ITFS band.