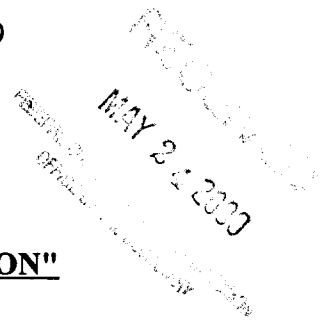
Before the
Federal Communications Commission
Washington, D.C. 20554

ORIGINAL

Application of Maritime Telecommunications Network, Inc. for Renewal of Experimental Authorization Call Sign KI2XEE	))))	FCC File No. 0100-EX-RR-1999



To: Chief, Office of Engineering and Technology

OPPOSITION TO "PETITION FOR EXPEDITED ACTION"

Maritime Telecommunications Network, Inc. ("MTN"), by its attorneys, hereby files its opposition to the "Petition for Expedited Action" (the "Petition") filed on May 10, 2000, by the Fixed Wireless Communications Coalition ("FWCC"), the Association of American Railroads ("AAR"), the American Petroleum Institute ("API"), the Association of Public-Safety Communications Officers International ("APCO") and the United Telecom Council (formerly the Utilities Telecommunications Council or "UTC") (hereinafter collectively referred to as "Joint Petitioners").[1]

MTN's pending application for renewal of experimental authorization has been on file with the Commission for over 15 months, and MTN certainly supports speedy action by the Commission. If the Joint Petitioners had filed a legitimate petition for expedited action, MTN would have joined with the Joint Petitioners in requesting expedited action. However, out of an 11-page pleading, only one paragraph occupying one half of the text on the first page is devoted to the request for expedited action. The rest of the Petition is an unauthorized, thinly-veiled attempt by the Joint Petitioners to

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[1] MTN is simultaneously filing a Motion to Strike "Petition for Expedited Consideration." In the event that the Commission grants MTN's Motion to Strike, the Commission need not consider the instant opposition.

reargue their petitions to deny and to obstruct Commission action on the pending application. The purpose of this opposition pleading is to respond to the Joint Petitioners' substantive arguments.

In the Petition, the Joint Petitioners make two basic arguments. First, claiming that the experiment is ill-advised and has failed and using a completely theoretical argument, the Joint Petitioners contend that MTN's earth stations aboard vessels ("ESVs") are causing excessive interference to fixed microwave operations in the 6 GHz band. Second, the Joint Petitioners simultaneously argue that it is impossible to detect the so-called interference because of the mobile nature of the ESVs. As explained below, both arguments fail. As to the first, the claims of interference by Joint Petitioners are theoretical only - MTN has been operating under the experimental license for many years and there has not been even one case of suspected interference, not to mention demonstrated interference. In reality, Joint Petitioners are using this proceeding as a stalking horse to reargue the interference protection criteria for all earth stations in the fixed satellite service and all fixed microwave services. As to the second, the Joint Petitioners are taking on the logic of *Alice in Wonderland* - they claim on a theoretical level that the interference is so severe that it will cause serious shutdowns, but they go on to say that such interference is only detectable if the microwave systems are themselves shut down. However, if the only way for the interference to be "seen" is to achieve the degree of quiet caused by a microwave system shutdown, and the interference cannot be "seen" if the microwave systems are operating, then MTN's ESVs could not possibly be causing any harmful interference.

I. The Joint Petitioners Have Failed to Prove that Harmful Interference will be Caused by the ESVs Operated by MTN

Before addressing the substance of the Joint Petitioners claims, it must be pointed out what is really going on. Under the guise of a "Petition for Expedited Action," regarding a petition to deny an application for experimental authority, Joint Petitioners are in fact trying to impose new standards to supersede the interference protection criteria that have been in use since the early 1970s. Joint Petitioners' theory is that the criteria are insufficient to protect the new digital microwave equipment, which was designed after the standards were established and in full disregard of those standards, and that newer, stricter interference criteria ought to be used to accommodate such equipment. Aside from the fact that those designing the new digital microwave equipment should have designed it to withstand potentially interfering signals that may be received from transmitters operating within the established criteria,[2] the reality is that Joint Petitioners are in the wrong proceeding. If they do not agree with the established interference criteria, they should either attempt to develop industry standards for stricter criteria applicable to potential interference from *all* earth stations (not just ESVs), or file a petition for rulemaking addressing these issues with the Commission. But they should not use this license renewal proceeding as a stalking horse to surreptitiously enact an industry-wide rule change.

Describing the MTN experiment as "ill-advised," and with no substantiation whatsoever, Joint Petitioners claim: "It is now abundantly clear that the successful coexistence of ESVs with the

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[2] Generally, Commission policy has encouraged the development of equipment that is more sophisticated and would permit greater, not less, frequency reuse. Based upon the arguments of the Joint Petitioners, it appears that the digital equipment design is a step backwards.

Fixed Service is not feasible; that the experiment was a failure. . . ."[3] Using a purely theoretical discussion by M. Philip Salas, the Joint Petitioners go on to claim that there has been no meaningful frequency coordination to date because MTN has used the wrong interference coordination criteria. However, Mr. Salas's theoretical discussion has not and cannot be substantiated by the real world results of MTN's experiment to date. The fact of the matter is that, given a sufficient supply of numbers,[4] mathematicians can "prove" anything,[5] but such "proof" may have no relevance to the actual situation.

As explained in the attached Engineering Statement of Daniel J. Collins, Chief Technical Officer, Pinnacle Telecom Group, LLC, the interference criteria used by MTN are the same criteria used by all operators of satellite earth stations in the 6 GHz band. The criteria, which have been unsuccessfully proposed by Mr. Salas for years, on the other hand, are more akin to radio astronomy protection criteria than fixed microwave protection criteria and have never been adopted as industry standards. If they were adopted, it would mean that most fixed microwave paths and satellite uplinks which are now successfully co-existing in the 6 GHz band today, are somehow excessively interfering with each other. Moreover, upon adoption of Mr. Salas' proposal, it would be virtually impossible for any of the fixed microwave operators to install additional paths or the satellite earth station operators to install additional earth stations. An old Chinese proverb says: "Be careful of

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[3] Petition at 2.

[4] Plus blackboards and chalk.

[5] Mathematicians have been able to "prove" that the wings on bumblebees are too small for bumblebees to be able to fly and that the human heart needs to be the size of a basketball to be able to pump a sufficient amount of blood through the human body. Kimball, Biology 101 Lectures, Cornell University, Fall Semester 1969.

what you wish for - you might get it." It would be suicidal for the fixed microwave operators to really want the criteria proposed by Mr. Salas to be adopted.

The attached Engineering Statement provides a brief overview of the critical contour point methodology used for coordinating in-motion ESV operations.[6] As explained in the Engineering Statement, the theory behind the methodology is that ships must travel within established shipping lanes and channels.[7] By identifying the one point within all the areas where the ship can possibly travel that would be the point of worst possible interference to a particular established microwave station, and analyzing whether the signal strength produced at that point would cause harmful interference per standard objectives, one can determine whether any of the in-motion operations could cause harmful interference. No one has seriously criticized the critical contour point methodology.

Moreover, the most salient fact ignored by Joint Petitioners is the fact that MTN has been operating pursuant to experimental authority for many years. During all these years there has not been even one case of suspected, not to mention demonstrated, interference. As explained by MTN in its earlier pleadings,[8] Joint Petitioners have been unable to provide a date, time and place for

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[6] The critical contour point methodology is more fully described in the paper: Dan Collins, Krishna Sampath, Tom Detrick, Kam Falkenthal, "C-Band Shipboard Earth Stations: Interference Analysis Method, Frequency Coordination, and Microwave Interference Protection", July 18, 1997, has been submitted to the Commission. It has been available on the Edwards and Kelcey Wireless, L.L.C. (E&K) website for some time.

[7] *See Crescomm Transmission Services, Inc.,* 11 FCC Rcd 10944, 10949 n.19 (OET, IB 1996).

[8] Opposition to Petition to Deny, filed April 6, 1999; Response to Reply, Informal Petition to Deny, and Oppositions, May 19, 1999. The arguments presented in those pleadings will not be repeated here.

unexplained interference. If Joint Petitioners could name even one date, time and place, MTN would check its records to see if there was a ship in the vicinity that could have been causing the unexplained interference and investigate the problem. Furthermore, MTN has offered to do tests with Joint Petitioners, to have a ship sail past fixed microwave stations to see if the ESV is causing any harmful interference. Joint Petitioners have refused all offers of holding a test. The reason for their refusal is transparent – a test would demonstrate that the ESVs do not cause any harmful interference, which would completely undermine the case presented by the Joint Petitioners. Throughout this proceeding Joint Petitioners have cried out "Interference!" without being able to document even a single case.

II. Joint Petitioners Cannot Detect Any Harmful Interference Because there is No Harmful Interference to Detect

Joint Petitioners argue that it is "impossible to enforce a restriction forbidding ESVs from transmitting after they cross an imaginary line a given distance from shore."[9] However, despite the fact that representatives of the Joint Petitioners have been at numerous meetings where they have been briefed on MTN's ESV operations, Joint Petitioners persist in their erroneous view on how MTN operates the ESVs. Each ESV is continuously monitored, 24 hours a day, 7 days a week, from MTN's control center in Holmdel, NJ. The control center monitors frequency, satellite and location. Frequencies are assigned to ships based upon the ports that the ships will be sailing to and the frequencies that have been cleared through the coordination process. If an ESV deviates from its

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[9] Petition at 7.

permitted operation, it can be shut down instantly from the control center.[10] The ESV will also automatically shut down if it loses its lock on the satellite. While the captain of a ship can order the ESV shut down from the ship, only MTN personnel can turn on the ESV. Moreover, contrary to the unsubstantiated fears of the Joint Petitioners, the ESV is mounted on the ship at a secure location which is not accessible by unauthorized personnel.

Joint Petitioners argue that the so-called interference caused by the ESVs is so intermittent that it cannot be detected by the fixed microwave operator. They go so far as to say "interference cannot be 'seen' on an operating FS system; and in order to 'see' it, the FS system operator must shut down the system."[11] This is a remarkable argument that only someone well versed in the art of "newthink"[12] could come up with. On the one hand, Joint Petitioners argue that the interference is so dreadful that it will cause severe system outages. On the other hand, they argue that it cannot be detected unless the fixed microwave systems are shutoff and everything is quiet. But if the interference is not detectable while the system is operating, where is the harm? This is no different than someone in the stands of a football stadium shining a flashlight directly at the eyes of the quarterback while the stadium is lit up for night football. If the only way the quarterback could see the flashlight is if the field lights were turned off, there is no harm in shining the flashlight, as the

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[10] Because any ESV can be shut down from the Holmdel, NJ control center, if necessary, the FCC can easily order an ESV to be shut down by simply calling the control center any time, day or night. Similarly, if a time ever comes when a fixed microwave operator experiences interference, it too has 24 hours a day, 7 days a week access to the control center.

[11] Petition at 8.

[12] Orwell, *1984*, published 1948.

quarterback would not be playing football at night if the lights were off and would not be able to see it if the lights were on..

Lastly, Joint Petitioners object to an expansion in the number of ships. Petitioners forget that this is an experiment. MTN has been operating 45 ships pursuant to the experimental license for many years, without any reported incidents of harmful interference. An increase in the number of ships is actually a good way to test whether these operations would cause harmful interference. Joint Petitioners have nothing to lose, for if they are right in their assertions, uncorrected harmful interference would be cause for the Commission to terminate the experiment. Moreover, contrary to the claims of Joint Petitioners, who here too persist in misunderstanding the ESV operations, more ships does not mean more interference. Each ship in the same area operates on a different sliver of the bandwidth assigned to MTN, because if more than one ship in the same area operated on the same frequency, they would interfere with each other's communications to the satellite. The question of whether harmful interference is caused must be looked at from point of view of the individual receiver in question. The addition of another ship in a different location or on a different frequency sliver does not increase interference to that receiver.

The bottom line is that there have been no reported cases of harmful interference. MTN has on a number of occasions offered to conduct tests with Joint Petitioners. If Joint Petitioners are so eager to prove that the ESVs will cause harmful interference they ought to accept MTN's offer of testing and welcome an expanded experiment so that the question of interference can be evaluated in the real world instead of by theoretical calculations unrelated to actual propagation.

III. Conclusion

It is abundantly clear that it is not the ESVs, but rather all satellite uplinks that are the target of the Joint Petitioners. Joint Petitioners would have the Commission radically change interference coordination objectives, notwithstanding the fact that there are no real world studies supporting their proposal. But an application to renew an experimental license is not the vehicle for such an issue. For the reasons discussed herein, Maritime Telecommunications Network, Inc. respectfully requests that the Commission promptly reject the contrary arguments of the Joint Petitioners and grant the application of MTN.

Respectfully submitted,

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May 24, 2000

DECLARATION

I, Daniel J. Collins, Chief Technical Officer of Pinnacle Telecom Group, LLC, declare under penalty of perjury that the attached Engineering Statement is true and correct.

Executed on May 24, 2000

Daniel J. Collins

Engineering Statement

Prepared by
Daniel J. Collins
Chief Technical Officer
Pinnacle Telecom Group, LLC

May 24, 2000

I have carefully reviewed the Petition for Expedited Action and its attached Engineering Statement (by Mr. M. Philip Salas of Alcatel), in connection with the application for license renewal by Maritime Telecommunications Network, Inc. ("MTN").

Background on Author

By way of background, before joining Pinnacle Telecom Group I was employed by Edwards and Kelcey Wireless, L.L.C. ("Edwards and Kelcey"), and while there I helped develop the analytical methodology used to analyze potential interference to fixed microwave stations from satellite earth stations operated aboard vessels (ESVs). I have authored (or co-authored) a number of technical papers describing the technique,[1] and led the group in Edwards and Kelcey that performed ESV frequency coordination for MTN's ESV operations. I have also actively participated in discussions with the FCC and within the National Spectrum Managers Association (NSMA) on the subject of ESV frequency coordination since early 1997. I am a two-time past president of the NSMA, served on the NSMA Board of Directors between 1984 and 1990, chaired the NSMA working group on coordination procedures from 1984 through 1986, and in 1990 was named a NSMA Fellow. Earlier in my career, AT&T published a book I authored on microwave radio system engineering, and between 1977 and 1984 I was AT&T's corporate lead radio spectrum manager.

Summary of Petition

The Petitioners state that they are concerned that ESVs may represent a major potential source of interference to fixed microwave systems sharing the same frequencies. They present (in Mr. Salas's attached statement) a theoretical mathematical analysis and argument that the interference protection objectives under which ESV operations have been frequency-coordinated are not sufficient to adequately protect today's digital microwave radio systems. They accurately point out that the interference objectives used were originally developed with analog microwave systems in mind. They also point out the importance of the communications carried via microwave radio, and note that excessive interference could potentially cause long outages that can critically affect those communications. They then claim that the mathematics presented proves theoretically that ESVs can cause long-term interference-related outages. They also argue that excessive ESV interference to one microwave receiver can effectively interrupt communications on an entire microwave network.

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[1] *See, e.g.,* Dan Collins, Krishna Sampath, Tom Detrick, Kam Falkenthal, "C-Band Shipboard Earth Stations: Interference Analysis Method, Frequency Coordination, and Microwave Interference Protection," July 18, 1997.

The problem with Petitioners' claims, however, is that they are inconsistent with real world experience. Allow me to explain.

Background on Interference Protection Objectives

More than 25 years ago, the FCC decided to permit certain fixed microwave frequency bands to be shared on a co-equal basis by satellite earth stations and enacted both frequency coordination procedures and parameters. At that time, since digital technology was just beginning to be used in microwave radio, the interference protection objectives established to avoid excessive interference from one type of system to the other were based on analog technology. In the case of potential interference to a microwave receiver from an earth station transmitter, the objectives established included a "long-term" and a "short-term" consideration, based on propagation variability.[2] The FCC specified the long-term objective as –154 dBW/4kHz, not to be exceeded for more than 20 percent of the time, and the short-term objective as –131 dBW/4kHz, not to be exceeded for more than 0.0025 percent of the time. If these objectives were both met, it was assumed, for example, that a 6 GHz uplink earth station would not cause excessive interference to a 6 GHz microwave receiver sharing the same frequencies.

Since the time those objectives were established, several thousand transmitting earth stations in the 6 GHz band have been successfully coordinated in an environment that now includes about 10,000 microwave stations. All of those earth stations were coordinated using the above-referenced, analog-based interference objectives.

***Crescomm* Waiver**

When the FCC issued its *Crescomm Waiver Order*[3] and required ESV frequency coordination to be successfully completed before any in-motion operations could occur within 100 kilometers of the US shore, MTN and its frequency coordinator, Edwards and Kelcey, understood the 100-kilometer reference as an indication from the Commission that the standard microwave interference protection objectives should be applied. The 100-kilometer distance has a special significance in earth station frequency coordination: it is the minimum default coordination contour distance used to examine short-term interference from an earth station. The short-term microwave interference protection objective for earth stations, as mentioned earlier, is –131 dBW/4kHz.

Critical Contour Point Methodology

In examining the challenge of how to analyze potential interference to a microwave station from an earth station operated while in motion, Edwards and Kelcey developed the concept of a "critical contour point". That is, along the edge of the defined ESV in-motion contour, there always would be one worst-case point in terms of potential interference to a given microwave receiver within the coordination distance. While the chance of any given ESV ever passing through that critical contour point might be slim, we conservatively assumed it would happen. We also performed a mathematical analysis that convinced us the duration of a worst-case interference exposure from any

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[2] A similar consideration had been used to coordinate potential interference between microwave stations for more than a decade before that.

[3] *Crescomm Transmission Services, Inc.*, 11 FCC Rcd 10944 (OET, IB 1996).

given ESV to any given microwave station would be of the duration considered by the FCC and ITU to be "short-term".

The ESV frequency coordination procedure we used relied on the ability to meet the short-term microwave interference protection objective (-131 dBW/4kHz) at the critical contour point for a given microwave receiver. If that could be done, then in-motion operation of the ESV at the critical contour point and all other "less-then-worst-case" points would not cause unacceptable interference. If the interference objective could not be met at the critical contour point, it was assumed that the frequencies in use by the particular microwave station could not effectively be shared by the ESV. The same process was repeated for each microwave station within the coordination distance of the limits of the ESV in-motion operating area, and the ESV frequencies considered "cleared" at the end of that process were those that "passed the test" for all of the microwave stations included in the study. This process has been well described in technical papers Edwards and Kelcey freely made available to the FCC, the NSMA, and the general public (via the Edwards and Kelcey web site).[4]

Frequency Coordination for the ESVs

Edwards and Kelcey began the ESV interference analyses for MTN in February 1997, and we began issuing the FCC-required prior coordination notifications to the industry in April 1997. In the process of performing the interference analyses, we found that the relative architecture of microwave systems in different port areas had a definite impact on the amount of frequencies that could be cleared for in-motion ESV operations. In several cases we could not clear any frequencies for shared use by ESVs. For example, Mr. Salas mentions the difficult propagation conditions and interference effects in the Gulf of Mexico. However, Mr. Salas failed to mention that we included in our analysis the many offshore microwave systems in that area. As it turned out, because of microwave systems parallel to and crossing the long narrow water path leading to New Orleans, we were not able to clear for in-motion ESV use in the port channels any frequencies used by those microwave systems. Therefore, contrary to the unsubstantiated claims of Mr. Salas, the microwave systems in the Gulf of Mexico are protected, because MTN, as a result of its own interference analysis, is limited to using some fringe areas of the band that are not assigned to any microwave users.

Non-Interference for Experimental Operations

The FCC authorizes experimental operations subject to a requirement of non-interference to other licensed facilities. Should an experiment propose to use a frequency band already in licensed use by others, the FCC requires some form of interference analysis (and, if applicable, frequency coordination) prior to granting the experimental license. Even after an experimental license is granted, if another licensee complains that the experimental operations have caused or are causing excessive interference, the experimental operations must cease.

In my nearly 30 years of microwave engineering and following the actions of the FCC, I am not aware of a single case in which an experimental operation was ceased on the basis of some mathematical demonstration, as opposed to a report of actual interference experienced. The Petitioners in this case have presented a purely theoretical

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[4] *See* note 1 above.

mathematical argument that suggests draconian results of harmful interference from in-motion ESV operations. According to the argument, the resulting ESV interference would affect multiple links in a microwave system, and would cause dramatically long microwave system outages.

But in-motion ESV operations have gone on for some time, at the ports and using the frequency ranges identified to the industry in prior frequency coordination and as authorized by the FCC. If these ESV operations caused the type of serious damage suggested by the Petitioners, one would assume there would be a long and growing record of interference-related microwave system outages put forth for MTN to respond to. However, the Petitioners do not mention a single, specific case of an outage caused – or even possibly caused – by an ESV.

Interference Testing and Identification

The Petitioners argue that ESV interference is difficult to identify. However, many of the ESVs now operating are aboard large cruise ships entering and leaving specific ports. Were there a record available of microwave system outages in the vicinity of identified cruise ports, it would not at all be difficult for MTN to check its record of ESV movements and investigate whether there was any causal connection between MTN's ESV operations and the occurrences of interference. But there is no record of outages. I understand that during the entire time MTN has been operating its ESVs, there has not been a single report of excessive interference actually experienced by a microwave user from a MTN ESV.

In discussions with the NSMA and its key fixed microwave proponents, MTN has offered to conduct cooperative testing to determine in "real life" whether its ESV operations may cause excessive interference to microwave systems. That offer has not been accepted. Instead, we have had upwards of two years of discussions about whether the mathematics presented by Mr. Salas prove that excessive interference actually occurs. There is no agreement within the NSMA on the subject. There are those who believe the mathematics, and there are those who wonder why – if the mathematics are right – they have apparently not been reflected in "real-world" occurrences of excessive interference and serious, long-term microwave system outages.

In addition, it is important to understand that interference to microwave systems can come from other microwave systems (of which there is an enormous population), or from fixed earth stations (of which there is a significant population), or from the newer ESVs (of which there is a fairly small population). The ESVs in question have been analyzed and frequency-coordinated using the identical microwave interference protection objectives used by the fixed earth stations. The Petitioners, in arguing that the interference protection objectives used for ESVs are inappropriate for digital microwave systems, are in effect arguing that those same objectives should not be used for fixed earth stations. Oddly, they do not mention any experience with excessive interference from fixed earth stations, even though those stations continue to be added to the environment with the clear ability to cause the same level of interference as might an ESV.

Petitioners' Proposed Interference Protection Objectives

The fixed microwave proponents argue for microwave interference objectives that would be much stricter than those in use today – in fact the interference objectives proposed by Mr. Salas are akin to those that are used to protect radio astronomy. While their obvious intent is to attempt to limit future potential interference, they neglect to address the continuing impact of interference from the host of existing earth stations designed with the –154 and –131 dBW/4kHz objectives (and, even if the objectives were to be changed, those operations would no doubt be "grandfathered" at their current level).

The Petitioners perhaps also have not considered the impact of new, significantly stricter objectives on their own ability – or anyone else's – to construct new microwave stations in the future. Such new microwave stations presumably would not be acceptably frequency-coordinated and built if the calculated interference from existing earth stations exceeded the new, stricter objectives. And there is a fair chance they might, since those earth stations were designed and installed using the less-strict objectives. Moreover, one could not ethically accept relatively "high" levels of interference from existing stations, but at the same time demand that earth stations subsequently proposed meet the new, stricter objectives.

Thus, the picture presented by the Petitioners defies logic. They focus their arguments on ESV interference, but they do not address the same levels of interference from other existing earth stations designed with the identical interference protection objectives. If their arguments were indeed correct, it would suggest a need to change the microwave interference protection objective for all earth stations, not just ESVs. However, since there is no evidence presented regarding "real world" interference occurrences, it suggests no change is necessary. In addition, if a change were made to tighten the earth station interference objectives, the theory is that microwave systems would receive additional protection. But that change would not protect them from the levels of interference experienced from existing earth stations, of which ESVs constitute only a tiny percentage. Moreover, stricter objectives would make it significantly difficult for microwave stations, not just earth stations, to pass the frequency coordination test in the future, thereby stifling the ability of the microwave system operators to modify or expand existing systems or build new ones.

Historical Evolution of Interference Protection

We should also point out that not all parameters in microwave frequency coordination could be traced to rigorous mathematical analysis. Mr. Salas points out in his Engineering Statement that the coordination distance for microwave station frequency coordination is "keyhole-shaped", with 400 kilometers applying within five degrees of the antenna's main axis, and an otherwise circular 200 kilometers at other angles. This keyhole, however, applies only to coordination between microwave stations, and it has nothing to do with earth station coordination.[5] In addition, the figures quoted apply to the lower microwave bands; different distances are used in the higher frequency ranges.

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[5] The United States has adopted as its WRC 2000 position that 200 kilometers should be the coordination distance for ESVs. ITU-R WRC 2000 Doc. 12; Proposal for the WRC of the Countries, United States of America.

While Mr. Salas takes the time to mention this approach, he neglects to mention the history and derivation of the microwave coordination distance. Even before the FCC made microwave "prior frequency coordination" a requirement in 1971, the microwave community – chiefly AT&T and its associated Bell companies and Western Union and GTE – were conducting a form of coordination very much like the adopted requirements. Beginning in the 1950s, a circular coordination distance of 200 miles was used. As experience in analyzing longer-distance interference cases grew, that distance was dropped to 150 miles and then rather quickly to 125 miles. The 125-mile coordination distance – experientially derived – lasted a long time. Indeed, many frequency coordinators used to think that distance was specified in the FCC's Rules and Regulations. It was not. The regulations actually said coordination should be effected with other operators "in the area" – and left the specific distance be determined by the microwave frequency coordination community. In 1990, after considerable discussion and focus on several reported cases of interference experienced at distances greater than 125 miles, the NSMA issued a recommendation to change the 125-mile circular coordination distance to the keyhole shape described by Mr. Salas. At the time, the only mathematical analysis presented to the NSMA suggested a "necessary" coordination distance of many times 400 kilometers. The mathematical analysis was rejected in favor of a compromise based on real world experience.

ESV Interference

The ESV interference issue is very similar and should fall into that same type of realistic approach. Mathematics say one thing, but experience and reality say another.

Mr. Salas argues that a compromise ESV interference objective of –145 dBW/ would be unacceptable. The compromise figure, however, followed significantly detailed mathematical modeling by both Comsearch and Edwards and Kelcey – and when both firms found results in the –141 to –147 dBW/4kHz range, a compromise figure of –145 dBW/4kHz was suggested – but abandoned as a result of the controversy raised by a handful of fixed microwave stakeholders, including Mr. Salas. To date, the NSMA has not been able to achieve any reasonable consensus or issue any recommendation on any aspect of ESV coordination. To illustrate the difficulty of achieving consensus in the NSMA, talks were delayed several months while one member who intransigently argued that the "non-interference" requirement on experimental licenses actually meant "zero interference." Zero interference is technically impossible.

Conclusion

In conclusion, mathematics has its place in microwave engineering and frequency coordination, but so do the FCC regulations and "real life" experience. It would be spectrally inefficient to adopt extremely strict theoretical interference standards where real life experience shows that today's less strict standards do not cause harmful interference. The conditions of an experimental license require cessation of operation should interference be experienced and reported. In real life, there have been no reports of ESV interference actually occurring, and there are none raised specifically by the Petitioners – even though their own description of the effects of ESV interference suggest it would be dramatic. Absent such a report of actual interference, however, simple mathematical arguments do not mean that the experiment has failed the "non-interference" test that the FCC has traditionally applied to experimental operations.

MTN's experimental license should not be denied on the basis of mathematical arm waving and no demonstration of harmful interference that is actually experienced.

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CERTIFICATE OF SERVICE

I, Penny Jackson, hereby certify that on this 24th day of May, 2000, copies of the attached, **OPPOSITION TO "PETITION FOR EXPEDITED ACTION"**, were sent via U.S. Mail, to the following:

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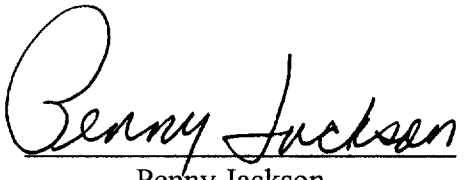

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*Via Hand Delivery