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Mr. William F. Caton  
Office of the Secretary  
Federal Communications Commission  
1919 M Street, N.W., Room 222  
Washington, D. C. 20554

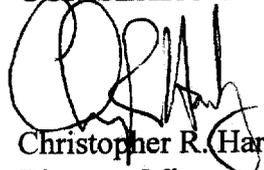
Re: In the matter of Amendment to the Commission's Rules regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, ET Docket No. 95-183 and Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz, PP Docket No. 93-253.

Dear Mr Caton:

Enclosed herewith is one (1) original, and 5 (five) copies of our reply to the comments submitted to the above captioned Notice of Proposed Rulemaking.

Sincerely,

**COMSEARCH**



Christopher R. Hardy  
Director, Microwave and Satellite Services  
Enclosure

No. of Copies rec'd 015  
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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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In the Matter of )  
)  
Amendment of the Commission's ) ET Docket No. 95-183  
Rules Regarding the 37.0-38.6 GHz and ) RM-8553  
38.6-40.0 GHz Bands )  
)  
Implementation of Section 309(j) of the ) PP Docket No. 93-253  
Communications Act -- Competitive )  
Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz )

To: The Commission

**COMMENTS OF COMSEARCH**

Comsearch hereby submits the following comments in response to the Notice of Proposed Rulemaking (NPRM) in the above captioned proceeding. This NPRM proposes to amend the Commission's Rules regarding the licensing and technical rules for operations in the 37.0 - 38.6 GHz (37 GHz) and 38.6 - 40.0 GHz (39 GHz) bands. Comsearch generally supports the Commission's action in harmonizing the 37 and 39 GHz bands in an effort to permit point-to-point operations, such as those providing broadband PCS and cellular infrastructure links. We believe that certain channels in the 37 GHz band should be licensed on a link-by-link basis utilizing existing licensing procedures and that if area licensing is employed, interference criteria and coordination procedures to minimize the potential for harmful interference should be better defined.

Comsearch is an independent engineering firm specializing in spectrum management of terrestrial microwave, satellite and mobile telecommunications systems. Comsearch has worked with the FCC and actively participated in industry groups, such as the National Spectrum Managers Association (NSMA), the Telecommunications Industry Association (TIA) and the Personal Communications Industry Association (PCIA) to develop industry recommendations and standards to promote efficient use of the radio spectrum. We have significant experience working with the 38 GHz band through the development of microwave design and analysis software done in conjunction with GSM and DCS-1800 operators in Europe and Asia. Our experience working in the microwave, satellite and mobile industries provides us with a unique perspective on which to comment on the issues surrounding the NPRM. Specifically, we will comment on spectrum sharing, interference concerns and coordination.

### Spectrum Sharing Considerations

The Commission is proposing to share the 37 GHz band between Government fixed and non-Government point-to-point operations.<sup>1</sup> In addition, comments were requested on the viability of sharing the 37 GHz spectrum with Government space research operations.<sup>2</sup>

The Commission's proposal to auction spectrum in the 37 GHz band through area licensing (BTA's),

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<sup>1</sup> See NPRM, para. 120.

<sup>2</sup> See NPRM, para. 14.

makes the concept of sharing unworkable. Under this scenario, it would be impossible for potential bidders to accurately determine the value of the auctioned spectrum when future deployment of Government facilities into any given BTA could reduce spectrum availability. This situation is similar to the 39 GHz band, where the Commission aptly recognizes the problems associated with overlapping (shared) service areas and proposes to delay auction of the encumbered spectrum until specific grand fathered links or areas are defined.<sup>3</sup> Since future government usage of this band is similarly undefined, the spectrum would always be encumbered and therefore devalued.

Spectrum sharing between Government and non-Government fixed point-to-point systems and between fixed point-to-point systems and satellite operations is possible and has been effectively accomplished in other bands.<sup>4</sup> The keys to successful and efficient implementation and utilization of the spectrum in these shared bands is the establishment of appropriate interference criteria, link-by-link licensing, and the use of the coordination procedures found in CFR 47 21.100 (d), 21.706 (c) and (d), and 25.203.<sup>5</sup>

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<sup>3</sup> See NPRM, para. 104 and 105.

<sup>4</sup> Most notably, Government and non-Government point-to-point systems currently share the 23 GHz band and non-Government terrestrial facilities currently share spectrum with satellite earth station operations in the 4,6, and 11 GHz bands.

<sup>5</sup> Interference criteria for point-to-point systems have been developed within industry organizations and can be found in TIA Bulletin 10. Interference criteria for satellite earth station facilities are addressed in Appendix 28 of the International Telecommunications Union Radio Regulations.

To expedite the use of the 37 GHz band, and to allow efficient sharing between Government and non-Government facilities, the Commission should designate a certain number of 50 MHz channel blocks for individual link-by-link assignments utilizing existing licensing procedures.<sup>6</sup> These channels would be shared on a co-primary basis between Government and non-Government terrestrial and satellite earth station facilities. A channeling plan should be implemented similar to that suggested by the TIA.<sup>7</sup> The nine existing Government links identified in the NPRM could be repacked into the allocated spectrum and the Commission's concept of utilizing the spectrum on a first come, first served basis would be achieved.<sup>8</sup>

Utilizing current link-by-link licensing procedures for certain designated channel blocks would facilitate coordination between Government and non-Government licensees. Instead of having to request system information from incumbents as proposed in the NPRM, governmental agencies interested in deploying facilities would only need to refer to Commission records to obtain the appropriate data. The existing Government/non-Government coordination procedures are acceptable but could be significantly improved. When Government and non-Government users share

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<sup>6</sup> As a point of reference in determining the amount of spectrum to allocate, the 6 GHz band between 5925 and 6425 is 500 MHz wide. It is currently divided into numerous channel bandwidths, with the largest being 30 MHz. Maximum channel capacity on each of 8 pairs of 30 MHz frequencies is 3 DS3 or 2,016 equivalent voice circuits. This band is utilized extensively for long haul, short haul and cellular microwave interconnect as well as Earth-to-Space satellite operations. According to our database records, there are approximately 30,000 point-to-point channel assignments and 3,900 earth station sites currently occupying this band.

<sup>7</sup> See NPRM, para. 18.

<sup>8</sup> See NPRM, para. 120.

spectrum, as is the case with the 23 GHz (22.4-23.6 GHz) band, non-Government users must complete the coordination process as defined in Part 21 and Part 94 of the Rules, file the application and wait until the Commission forwards the license request to the National Telecommunications and Information Administration (NTIA) for approval. Currently, if no conflicts are identified, this process is generally completed within the 30 day Public Notice period. If problems are detected, the FCC notifies the applicant that the proposal is “unacceptable” and the entire coordination process is reinitiated. To further streamline the process, we propose that the NTIA establish a direct point of contact to be responsible for the receipt and processing of shared-band coordination notices. Inclusion of the Government in the initial 30 day prior coordination process in shared bands, prior to application submittal, would expedite identification and resolution of potential problems and would significantly reduce delays found in the current process. Instead of applicants going through the time and expense of initiating multiple coordinations and potentially “unacceptable” applications, interference conflicts could be resolved expeditiously during the initial coordination period. The requirement for NTIA involvement in shared bands takes on even more significance with the changes specified in the recently adopted Rule Part 101 permitting carriers to operate their facilities upon license application filing, after successful completion of prior coordination.<sup>9</sup>

The designation of specific channel blocks to be shared between Government and non-Government individual point-to-point links and satellite earth station operations would unencumber the remaining

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<sup>9</sup> WT Docket No. 94-148, In the Matter of Reorganization and Revision of Parts 1,2,21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services.

37 GHz band and facilitate the Commission's desire to initiate auctioning of this spectrum. The ability to license links on an individual basis will also provide smaller users with the opportunity to utilize the spectrum on an as needed basis.

### Coordination Under Area Licensing

In paragraph 117, the Commission states that 39 GHz applicants are to follow a Part 21 coordination procedure: "proposed frequency usage is coordinated with other applicants, as well as existing licensees, whose facilities could suffer frequency interference or reduced system capacity as a result of implementing the new system." It also states that a similar process could be implemented for the 37 GHz band. For individual link licensing, the Part 21 coordination procedure works because the technical parameters of each link are prior coordinated and then filed with the Commission, including a showing that coordination has been completed. Because the Commission puts all applications on public notice, the industry has a means to ensure that each link for which applications have been filed has been properly coordinated.

In contrast, the coordination that has taken place in the 39 GHz band with rectangular area licensing has been a simple survey of which co-channel applicants' blocks overlap. Because the technical parameters of each link (or any link) are not known at the time of application, there is no way to effectively analyze the interference potential with neighboring applicants or licensees. To analyze the interference potential, users would have to exchange actual link information *after obtaining a license*. There is no means to ensure that this information exchange will take place under area

licensing since no further FCC filing is required. Specific information, although potentially not current, could be obtained from the data listings required to be filed with the FCC in 21.711( c ) (if the Commission puts this information on public notice or makes it otherwise publicly available).<sup>10</sup> However, with BTA licensing by auction, the Commission has proposed in the NPRM to delete the requirement of filing such a listing. Thus, there is some question as to whether Part 21 coordination as it is currently practiced in the industry is appropriate or applicable with area licensing.

We believe that the Commission must find a way to make the exchange of technical information for frequency coordination mandatory for all licensees in the 37 and 39 GHz bands. Leaving it to the licensees to “coordinate among themselves”<sup>11</sup> is not sufficient -- a licensee wishing to avoid interference needs information on the neighboring systems whether or not the neighboring licensees choose to cooperate. While a Part 21 coordination process consisting of prior coordination notice and response could, under proper conditions, work in the 37-40 GHz band, we agree with the Commission’s perception that such a process could be “burdensome”<sup>12</sup> given the number of links anticipated and the speed at which they may be installed as well as the “relatively large service areas [the Commission is] proposing.”<sup>13</sup> In the NPRM, paragraph 120, the Commission proposes to require licensees in the band 37.0 to 38.6 GHz to maintain a computer database of their links to

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<sup>10</sup> The current wording of 21.711 ( c ) is vague at best. We propose that the information submitted to the FCC contain at a minimum all of the technical parameters of each link as listed in 21.100(d)(2)(ii).

<sup>11</sup> See NPRM, Para. 117.

<sup>12</sup> See NPRM, Para. 118.

<sup>13</sup> See NPRM, Para. 117.

facilitate coordination with Government links. The regular exchange of this database information with neighboring licensees would allow proper interference analysis to take place. The Commission should extend the requirement of maintaining a computer database to the 38.6 to 40.0 GHz band as well and require that a copy of the database listing all of a licensee's operating and proposed facilities be provided not only to the FCC periodically but also upon request to any potentially affected user. The Commission could define "potentially affected user" as any co-channel or adjacent channel licensee within an appropriate coordination distance. TIA Bulletin 10-F suggests a coordination distance of 140 km for paths operating above 15 GHz.<sup>14</sup> The data to be provided should contain the technical parameters of each link as listed in 21.100(d)(2)(ii). Once the above FCC requirements are in place, users can institute a system of coordination with an initial database exchange and then regular updates showing any changes since the last exchange. This system of coordination does not require the Commission's direct involvement but does require the Commission's authority to make information exchange mandatory. Otherwise, some users may choose not to cooperate, jeopardizing everyone's operations.

### Interference Concerns

In the NPRM, the Commission requests input on using a field strength limit to control interference between BTAs. To examine this concept, consider the example of a typical point-to-point 38 GHz system with 60 dBm EIRP transmitter (a 40 dBi gain directional antenna connected to a 20 dBm

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<sup>14</sup> *TSB-10-F, Interference Criteria for Microwave Systems*, Telecommunications Industry Association, May, 1994, p. 3-3.

transmitter) 5 km from and facing a BTA border. A potential victim receiver is 5 km on the other side of the border with a 40 dBi gain antenna facing the transmitter. In Crane rain region D1, the transmitter's 60 dBm EIRP would produce a 99.999% reliability at a distance of between 2 and 3 km, assuming a receiver threshold of -82 dBm, so the desired receiver would be located within the BTA.<sup>15</sup> The transmitter would produce a field strength of 90.8 dB $\mu$  at the BTA border. To reduce this field strength, the transmitter's owner will have to either build shorter paths or accept poor reliability. Assume that interference at -100 dBm produces 1 dB threshold degradation in the victim receiver beyond the border. If line-of-sight exists between the transmitter and receiver, the field strength at the border would have to be limited to 34.9 dB $\mu$  to meet the -100 dBm interference objective. Clearly, there is a wide gulf between the field strength limit that the transmitter's owner in one BTA would like, 90.8 dB $\mu$ , and that which the receiver's owner in an adjacent BTA would like, 34.9 dB $\mu$ . Assigning an arbitrary field strength limit somewhere in between would be a terribly inefficient way to administer the spectrum. The Commission would risk creating a "no man's land" at the BTA border where the licensees could not locate transmitters nor risk placing receivers. If the field strength limit were 60 dB $\mu$  in this example, the 60 dBm EIRP transmitter would have to be placed 174 km from the border to meet the requirement under free space loss conditions. This field strength requirement would make use of the spectrum difficult in much or all of the BTA area. A field strength limit makes sense for cellular radio systems which use low gain omnidirectional or sectored antennas and have small fade margins. It does not make sense for point-to-point radio systems that use high gain directional antennas and require large fade margins. Instead of imposing

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<sup>15</sup> Crane, Robert K., "Prediction of Attenuation by Rain" *IEEE Transactions on Communications*, pp. 1717-1733, September 1980.

a field strength limit that will reduce spectral efficiency and therefore the potential value of the spectrum at auction, we believe the Commission should require coordination based on the exchange of specific link information and the use of existing interference standards such as those found in TIA Bulletin 10.

Although the Commission has declined to specify directional antenna requirements for the BTA licenses<sup>16</sup>, presumably to allow point-to-multipoint operation, we believe that a primary use of the 37-40 GHz band will be for point-to-point services such as the interconnection of PCS base stations. In the example discussed above, it is highly likely that the communication links of both licensees could be acceptably coordinated if the licensees knew the technical specifics about each other's links. For instance, the licensees could use different portions of the 50 MHz block for the two paths or one licensee could reverse the high/low frequency plan. The only spectrally efficient way to administer spectrum used for point-to-point communication is for licensees to exchange specific technical information about their systems. If this information exchange takes place, then highly efficient use of the spectrum in terms of the number of links per unit area can be achieved.

In the NPRM, footnote 186, the Commission points out the FCC "emission mask" in reference to adjacent channel interference between frequency blocks. The need for such an emission mask highlights the fact that transmitters necessarily emit some power outside of their authorized bandwidth. Likewise, it is not possible to construct perfect bandpass filters and some out of band

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<sup>16</sup> NPRM, paragraph 115.

interference power therefore enters receivers. The combination of these two facts results in a significant potential for adjacent channel interference between frequency blocks in the same BTA and, to a lesser extent, in adjacent BTAs. The exchange of specific technical information between adjacent channel licensees should therefore also be mandatory.

If and when interference problems are identified between microwave systems, it is normally the responsibility of the licensee whose link was constructed later to correct the problem. Unless specific link information is filed with the FCC, there is no way of knowing which link was constructed first. This is another reason why the Commission should require that all 37-40 GHz licensees periodically file a listing of all operating facilities. In cases of a conflict, this should help reduce confusion.

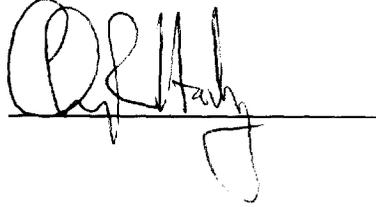
### Summary

Comsearch applauds the Commission's efforts to open spectrum in the 37 GHz band for fixed point-to-point microwave operations, and to harmonize operations with the 39 GHz band. We believe that sharing between Government and non-Government fixed point-to-point and satellite systems can best be achieved through the allocation of frequencies for these services utilizing current link-by-link coordination and licensing procedures. While we agree with the Commission's goal to provide maximum flexibility in the use and deployment of geographically licensed systems, interference concerns cannot be underestimated or trivialized. Procedures must be adopted that ensure spectrally efficient use of the bands and which minimize the potential for harmful interference.

Respectively Submitted,

COMSEARCH

Prepared By:

A handwritten signature in black ink, appearing to read "CR Hardy", is written over a horizontal line. The signature is stylized and cursive.

Christopher R. Hardy

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