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June 12, 1992

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JUN 12 1992

Federal Communications Commission
Office of the Secretary

Ms. Donna R. Searcy
Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Dear Ms. Searcy:

Re: Requests for Pioneer's Preference With Regard to
Establish Low-Earth Orbit Satellite Systems in the
1610-1626 MHz and 2483.5-2500 MHz bands, ET Docket
Nos. 92-28, PP-29, PP-30, PP-31, PP-32, PP-33

Transmitted herewith is an original and five copies of
the "REPLY COMMENTS" of Constellation Communications, Inc.
("CONSTELLATION") regarding the supplemental filing of Motorola
Satellite Services, Inc. in the above-captioned proceeding.

If you have any questions regarding this comment,
please contact the undersigned.

Very truly yours,

Robert A. Mazer
Robert A. Mazer

RAM:mvr
Enclosure

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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JUN 12 1992

Federal Communications Commission
Office of the Secretary

In the Matter of)
)
MOTOROLA SATELLITE COMMUNICATIONS, INC.) ET Docket No. 92-28
) PP-32
Request for Pioneer's Preference to)
Establish a Low-Earth Orbit Satellite)
System in the 1610-1626.5 MHz Band.)

REPLY COMMENTS

CONSTELLATION COMMUNICATIONS, Inc.

Robert A. Mazer
Albert Shuldiner

NIXON, HARGRAVE, DEVANS & DOYLE
Suite 800
One Thomas Circle, N.W.
Washington, D.C. 20005
(202) 457-5300

Dated: June 12, 1992

SUMMARY

Constellation Communications, Inc. ("Constellation") files these "Reply Comments" in response to the "Supplement to Request for Pioneer's Preference" ("Supplement") filed by Motorola Satellite Communications, Inc. ("Motorola") in the matter captioned above.

Motorola's April 10, 1992 Supplement is no more than a cynical attempt to flood the Commission's files with redundant, superfluous material in an attempt to divert the Commission's attention from the serious legal and policy issues raised by its pioneer's preference request "for a national and global" (emphasis added). The Supplement, as well as Motorola's entire request for pioneer's preference, should be rejected as an abuse of the Commission's processes since it is a blatant attempt to obtain exclusive use of the 1616-1626.5 MHz band on a world-wide basis. The Commission can not grant Motorola such a global preference, and it should not countenance Motorola's attempt to obtain such a monopoly under its pioneer's preferences policies.

The great bulk of the material submitted by Motorola in the Supplement is no more than random collections of press clippings and articles, which it properly characterizes as "accumulations," that merely regurgitate the same information already contained in Motorola's application. Nothing new of substance is being added by these submissions, other than to demonstrate the scope of Motorola's lobbying and public relations capabilities. Instead, Motorola is desperately trying

to convince the Commission that a vast quantity of paper is equivalent to the substantive technical material the Commission requires to support the award of a premier's preference.

The far greater abuse of Commission process is raised by the use of Motorola's "Confidential Appendix" to the Supplement. Motorola claims that this confidential material contains "highly sensitive and company proprietary information" relating to relevant pending patent applications reflecting innovations of the Iridium system. Motorola also claims that this confidential material "confirm[s] the IRIDIUM system's design characteristics under adverse propagation conditions", that "the IRIDIUM system will provide reliable communications even in environments of heavy shadowing by tress, multipath caused by reflecting surfaces, and inside vehicles", and that it "support[s] the technical feasibility of the system design. As detailed in Constellation's Confidential Reply Comments filed today, the most charitable characterization Constellation can make of these claims by Motorola is that they are misleading. That confidential material provides no basis for these claims. Nor does that material provide any of the information required by the Commission to support an award of a pioneer's preference. Motorola's submission of such material is only another cynical attempt to confuse the real issues surrounding its request for a pioneer's preference.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)

MOTOROLA SATELLITE COMMUNICATIONS, INC.)

Request for Pioneer's Preference to)
Establish a Low-Earth Orbit Satellite)
System in the 1610-1626.5 MHz Band.)

ET Docket No. 92-28

~~PRE~~ RECEIVED

JUN 12 1992

REPLY COMMENTS

Federal Communications Commission
Office of the Secretary

Constellation Communications, Inc. ("Constellation") files these "Reply Comments" in response to the "Supplement to Request for Pioneer's Preference" ("Supplement") filed by Motorola Satellite Communications, Inc. ("Motorola") in the matter captioned above.^{1/}

I. Motorola's Supplement Is No More Than A Cynical Attempt To Abuse The Commission's Pioneer's Preference Policies

Motorola's April 10, 1992 Supplement is no more than a cynical attempt to flood the Commission's files with redundant, superfluous material in an attempt to divert the Commission's attention from the serious legal and policy issues raised by its

^{1/} The date for filing these "Reply Comments" is June 12, 1992. See DA92-674 (FOIA Control No. 92-83, 92-88, 92-86 released May 28, 1992 ("Protective Order")). Under separate cover, Constellation is also submitting "Confidential Reply Comments" on the "Confidential Appendix" to Motorola's "Supplement" pursuant to the Commission's protective order.

pioneer's preference request "for a national and global" (emphasis added).^{2/} The Supplement, as well as Motorola's entire request for pioneer's preference, should be rejected as an abuse the Commission's processes since it is a blatant attempt to obtain exclusive use of the 1616-1626.5 MHz band on a world-wide basis. The Commission can not grant Motorola such a global preference, and it should not countenance Motorola's attempt to obtain such a monopoly under its pioneer's preferences policies.

The great bulk of the material submitted by Motorola in the Supplement is no more than random collections of press clippings and articles, which it properly characterizes as "accumulations," that merely regurgitate the same information already contained in Motorola's application.^{3/} Nothing new of substance is being added by these submissions, other than to demonstrate the scope of Motorola's lobbying and public

^{2/} Motorola Supplement at 2.

^{3/} Motorola claims that it has already "provided the Commission with a thorough technical description of all five segments of the proposed system -- the space segment, gateway segment, system control segment, subscriber unit segment and launch segment." Supplement at page 2. If Motorola believes this to be the case, its motives must be questioned for the submission of the voluminous accumulations of repetitive articles that add no new information to this proceeding.

relations capabilities.^{4/} Instead, Motorola is desperately trying to convince the Commission that a vast quantity of paper is equivalent to the substantive technical material the Commission requires to support the award of a premier's preference.

The far greater abuse of Commission process is raised by the use of Motorola's "Confidential Appendix" to the Supplement. Motorola claims that this confidential material contains "highly sensitive and company proprietary information" relating to relevant pending patent applications reflecting innovations of the Iridium system.^{5/} Motorola also claims that this confidential material "confirm[s] the IRIDIUM system's design characteristics under adverse propagation conditions", that "the IRIDIUM system will provide reliable communications even in environments of heavy shadowing by trees, multipath caused by reflecting surfaces, and inside vehicles", and that it "support[s] the technical feasibility of the system design."^{6/} As detailed in Constellation's Confidential Reply Comments filed today, the most charitable characterization Constellation can make of these claims by Motorola is that they are misleading.

^{4/} In fact, Attachment A to Motorola's Supplement characterizes itself as a "media placement report."

^{5/} Supplement at pages 7-8.

^{6/} Supplement at pages 11-12.

That confidential material provides no basis for these claims. Nor does that material provide any of the information required by the Commission to support an award of a pioneer's preference. Motorola's submission of such material is only another cynical attempt to confuse the real issues surrounding its request for a pioneer's preference.

II. The Innovations Claimed By Motorola Are At Best Exaggerated And In Any Event Do Not Warrant A Pioneer's Preference

Despite all of Motorola's lobbying, public relations, press clipping activities and FCC filings, it can only demonstrate three basic differences between its system and those of the other LEO applicants in the RDSS bands. One difference is that the Iridium system presents unprecedented risks in terms of the technical ability of the Iridium system to actually achieve in practice all of the claims Motorola is making for it, and the economic risks in financing a \$3 to 4 billion system and make a profit at it. The second difference is the overly complicated system design that uses inter-satellite links to provide international bypass of national telecommunications administrations, a highly controversial feature that raises significant foreign policy issues. The final difference is that the Iridium system will exclude any other service from the requested band throughout the world because of the harmful

interference produced by the high transmission power levels required for its time division duplex ("TDD") architecture. Nevertheless, Motorola champions such a system as an "innovation" worthy of a pioneer's preference. With these kinds of clear detriments it is all but impossible to determine how the Commission could award a pioneer's preference to Motorola.

In its Supplement, Motorola reduces its claims of innovation to eight points, each of which is addressed in detail in the following discussion.

Claim (1): The ability to provide personal mobile communications to anyone, anywhere, anytime using earth terminals that are small, lightweight, pocket-sized, battery operated, and have low-profile antennas

Motorola's characterization of its ability to provide service "to anyone, anywhere, anytime" is more marketing hype than a technical description of its service capabilities. Motorola's ability to serve "anyone" will be limited by the high cost of its system to serving only the wealthiest of users and then, only in countries who are willing to allow users to bypass their national networks. Its ability to serve a user "anywhere" will be limited to outdoor environments since there is not enough link margin in to penetrate into buildings. Its ability to serve a user anytime will of course be limited by the reliability of its satellites and Motorola's ability to get

operating agreements to permit use of its terminals in every country of the world.^{1/}

The use of "small, lightweight, pocket-sized, battery operated" user terminals with "low-profile antennas" is not unique to the Motorola system. The key technical factors that allow LEO systems to provide service to such terminals is a sufficiently high G/T on the satellite and a sufficiently low path loss to the satellite. Together, these factors allow any LEO system to provide service to user terminals with non-directional antennas and transmit powers of about 500 milliwatts, which correspond to current cellular handheld terminals. Motorola is not the only LEO applicant whose spacecraft have this capability since the other LEO applicants provide the necessary spacecraft capabilities to serve handheld

^{1/} To the extent that "anywhere" includes on-board aircraft, the Commission's experience with the problems caused by cellular telephones warrants caution in light of the proximity of the proposed Iridium frequencies to satellite radio navigation and conventional mobile satellite operations. Also, significant policy questions under Article 8 of the Inmarsat Agreement are raised if "anyone, anywhere, anytime" includes service to ships on the high seas, or under Article XIV(d) of the Intelsat Agreement and Resolution COM5/11 of the 1992 WARC if "anyone, anywhere, anytime" includes by-pass of national telephone systems.

user terminals as well.^{8/} Additionally, Motorola has not demonstrated in fact the viability of its proposal nor has it provided any technical detail explaining precisely how the system would work.

Finally, the Commission should note that Motorola is not the first to propose satellite service directly to handheld terminals. Geostar proposed such service almost a decade ago when it proposed frequency allocations for RDSS in the first place. Geostar in fact developed prototype production user terminals that were "small, lightweight, pocket-sized, battery operated" and which had "low -profile antennas" and demonstrated such terminals in actual satellite transmissions.

Claim (2): The coverage of the Earth with cells, coupled with beam hopping/TDMA, provides for a high degree of frequency reuse

Existing satellites using multiple spot beams are already in operation which provide frequency re-use among the "cells" represented by the individual spot beams. In fact, such a design is reflected by the National Exchange Satellites authorized by the Commission in the domestic fixed satellite

^{8/} Constellation has indicated in previous filings that it intends to modify its first generation satellite design to add the necessary spot beam capabilities to serve handheld terminals as well as vehicle terminals.

arena, and has been proposed recently in the mobile satellite bands.^{2/}

"[B]eam hopping TDMA" is no more than a form of satellite switched, time division multiple access ("TDMA") which is a technology well documented in standard engineering texts. Motorola satellites can switch the bit stream through different satellite beams and provide virtual links between different uplink and downlink satellite antenna beams. But this technique is currently employed on various satellite systems, such as Intelsat VII and the soon to be launched ACTS satellite. In fact, this technique was first proposed to the Commission in the Advanced Westar application a decade ago which provided satellite switched TDMA between four beams covering the United States at 225 mbps in each beam.

Claim (3): Distributed processing systems in orbit using inter-satellite links. Each IRIDIUM satellite demodulates the signals, converts them to baseband, employs on-board processing, and routes them efficiently

Inter-satellite links are not an innovation of Motorola. They are in fact an integral part of the Tracking and Data Relay

^{2/} See e.g., the "Tritium" design concept advanced by Hughes Aircraft Company and the second generation system concept advanced by American Mobile Satellite Corporation in these proceedings.

Satellite System ("TDRSS") that has been in operation for years to collect data from numerous LEO satellites and for space shuttle communications. Similarly, the concept of space switched, TDMA satellites covered under Claim (2) described above means that each such satellite "demodulates the signals, converts them to baseband, employs onboard processing, and routes efficiently."^{10/}

Inter-satellite links are not necessary to provide global interconnectivity. Such worldwide coverage can be provided more easily and reliably by interconnection among the gateway earth stations as proposed in Constellation's system.^{11/} In fact, the only reason for employing inter-satellite links, and the resulting complexity of on-board processors with their attendant risks, is to provide for the capability of by-passing national telecommunications networks. However, such by-pass raise serious policy questions under Article XIV(d) of the Intelsat Agreement and are reflected in Resolution COM5/11 of the 1992 World Administrative Radio Conference ("WARC").

^{10/} These techniques are well described in standard engineering texts and journal articles dealing with satellite communications.

^{11/} See Constellation's June 3, 1991 "Satellite System Application", File Nos. 17-DDs-P-91(48) and CSS-91-013, Appendix C.

Claim (4): Soft, trouble-free cell and satellite-to-satellite handoffs, and the method for predicting such handoffs

Cell handoffs are common today and are an inherent part of cellular operations, and there is nothing new or novel in the handoffs required in LEO satellite systems. Applying these techniques to LEO satellite systems is simply a variation of these ground-based techniques, and predicting such handoffs are a common feature of all LEO systems which provide position determination to the user.^{12/}

Claim (5): Bidirectional operation in the service bands

Motorola's bidirectional operations are no more than a faster version of the push-to-talk communications protocol used in mobile communications since the beginnings of radio. There is little that is innovative in a TDD system architecture as proposed in the Iridium system. Such a network architecture is simply one means of serving multiple users over a communications channel.

^{12/} To the extent that Motorola may rely on material contained in its confidential Appendix to this Supplement to support this claim, see Constellation's "Confidential Reply Comments".

Nor is bidirectional use of a frequency band novel. The Commission previously rejected the idea of using mobile satellite bands in a bidirectional manner because of interference between different systems using the band.^{13/} Thus, the only way this can be done is to assign the band exclusively to Motorola. Moreover, its bidirectional operations in the 1613.8-1626.5 MHz band can not be continued in any other band under the 1992 WARC allocations. Thus, any such bidirectional operation is unique to this particular application and can not constitute a general advancement of the state of the art.

Claim (6): Multiple hopped beam deployable satellite antenna systems

"Multiple beam deployable space antenna systems" are already in use. These include the TDRSS satellites, Intelsat satellites, and to some extent even current domestic fixed satellites. One example is the complex multiple beam satellite authorized by the Commission to National Exchange, and a similar level of advanced multiple beam space antenna system is presented by the ACTS satellite currently under construction.

^{13/} See, Notice of Proposed Rulemaking, Docket 90-56.

Claim (7): A power management system whereby overlapping cells are turned off as satellites approach the polar regions

Power management systems have been a fact of life for decades in satellites. Every satellite is subject to being eclipsed by the earth's shadow at some time, and satellites have needed power management systems to charge batteries, reroute power from solar cells to batteries, and otherwise adjust and regulate power supply operations as operational configurations change. Shutting down cells as satellites approach the polar regions is no more than an additional operational condition that an onboard satellite power management system has to handle in addition to the numerous other conditions already being handled by operational satellites. In the case of Constellation's system, a power management scheme is used to adjust power levels over ocean areas as well in order to improve the ratio of peak-to-average power load requirements.

Claim (8): Devices for narrow band doppler compensation which conserve power and can be used with handheld communications units

"[N]arrow band Doppler compensation" is not unique to the Motorola system. All LEO systems require such compensation and Constellation proposed its own techniques in its

application.^{14/} While the two methods may differ in their implementation, both employ predictive techniques that improve doppler correction beyond what would be possible in a simple closed loop tracking design.

III. Grant Of The Pioneer's Preference Requested
By Motorola Would Violate The Communications
Act And Established Commission Policies

The Commission's pioneer preference policies^{15/} were devised to eliminate the disincentive facing spectrum innovators who initiate rulemaking proceedings to establish the new radio services and then face costly, time consuming licensing proceedings if they are successful in obtaining the proposed rule changes. The Commission seeks to reward the pioneering efforts of the initial petitioner by providing some form of preference in the subsequent licensing proceedings. In simple terms, the basic intent of the Commission's pioneer preference policies is to eliminate the penalty facing a spectrum innovator of having to first make the effort to establish new service rules, and then having to compete with speculators who file

^{14/} See Constellation system application, supra note 11 at Appendix B, pages 9-10.

^{15/} Report and Order in General Docket No. 90-217, 6 FCC Rcd. 3488 (May 13, 1991), recon. in part, 7 FCC Rcd 1808 (February 26, 1992).

applications in later proceedings to award licenses in the new service created by the innovator.

Regardless of any claims of innovation for the Iridium system, Motorola should not be able to avail itself of the Commission's pioneer preference policies because it does not seek a preference for a single local market or even for the U.S. market but rather it seeks a preference on an exclusive basis for a world-wide monopoly for the 1616-1626.5 MHz frequency band.^{16/} At no time has the Commission ever envisioned that its pioneer's preference policies would result in such a monopoly license being granted to an applicant. Moreover, the Commission has no jurisdiction to grant such an exclusive worldwide license.^{17/} In essence, a grant of a pioneer's preference would result in the FCC exercising sovereign jurisdiction authority over every country in the world to make decisions regarding use of frequencies.

There can be no doubt that a grant of Motorola's request would be inconsistent with the Commission's jurisdiction and

^{16/} Motorola insists on a system architecture that uses the assigned frequency band for both uplinks and downlinks. The only band allocated by the 1992 WARC for such types of operation is the 1613.8-1626.5 MHz band. However, Motorola can not use the 1613.8-1616 MHz portion of this allocated band because of the interference it causes to radioastronomy observatories and the Glonass system.

^{17/} See Report and Order, supra note 15, at paragraph 19.

rules in the 1616-1626.5 MHz band. This is for several reasons. First, Motorola can not share this band with terrestrial services because the power flux density levels created by the Motorola satellites far exceeds the current permissible levels. Motorola can not share this band with the proposed expansion of the Glonass system because of the high interference levels that would be caused to Glonass receivers using the proposed wideband carriers extending to about 1621 MHz. Nor can the Motorola system share with any other LEO system, whether using the same architecture as Motorola or using spread spectrum techniques. Because any nationwide preference necessarily becomes an exclusive assignment to Motorola and a de facto denial of the other applicants requests to use the same frequencies, such an action would be in violation of the Ashbacker doctrine.

Second, the Commission can grant a nationwide preference to any of the other LEO applicants because they all propose system architectures that provide for multiple system sharing the same assigned band. Thus, grant of a nationwide preference to any of the other applicants does not necessarily raise an Ashbacker issue.

Motorola's argument that it is requesting only one-third of the available spectrum is another example of the cynicism

inherent in Motorola's approach to the Commission.^{18/} In effect, Motorola is saying that other applicants can have the bands because Motorola can't use them. As indicated in earlier pleadings of Constellation,^{19/} requiring the other LEO applicants to utilize 6 MHz of uplink at 1610-1616 MHz and 16.5 MHz of downlink at 2483.5-2500 MHz is not a practical means of establishing competing systems because of the imbalance between uplink and downlink spectrum and because of the inability to employ dynamic frequency assignment techniques to mitigate the worst cases of interference that might occur in the 1610-1616 MHz band.

For the Commission to grant a pioneer's preference to Motorola based on the existing record would be a disservice to the public and every other country in the world. This is because Motorola has failed to demonstrate that its system is economically or technically viable. There can be no guarantee that the system on which Motorola bases its claim for a pioneer's preference will ever be built. Motorola has indicated that it

^{18/} Motorola recently filed a Petition for Expedited Action which offers other unsatisfactory alternatives. Constellation will reply to this filing at the appropriate time as established by the Commission's rules.

^{19/} See e.g., Constellation's "Reply Comments" in this proceeding.

intends to provide only a small fraction of \$3-4 billion investment needed for the Iridium system. Motorola has failed to demonstrate that it has in fact solved the unprecedented technical problems that have to be solved before it can make its system work in practice.^{20/} Finally, the United States has not obtained the appropriate coordination agreements required under the Final Acts of the 1992 WARC with respect to some forty countries operating terrestrial services which would receive harmful interference from the Motorola system.

^{20/} Although Motorola claims that such confirmations are provided in the "Confidential Appendix" attached to the "Supplement", Constellation demonstrates that these claims are unfounded in its "Confidential Reply Comments."

Conclusion

For these reasons, Constellation requests the Commission to reject Motorola's April 10, 1992 "Supplement" and deny Motorola's request for a pioneer's preference.

Respectfully submitted,

Robert A. Mazer
Albert Shuldiner

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(202) 457-5300

Counsel for Constellation
Communications, Inc.

Dated: June 12, 1992

CERTIFICATE OF SERVICE

I, Robert A. Mazer, hereby certify that the copies of the foregoing Reply Comments were served by first-class mail, postage prepaid, this 12th day of June 1992, on the following persons:

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