

STEP TOE & JOHNSON

ATTORNEYS AT LAW

1330 CONNECTICUT AVENUE, N.W.
WASHINGTON, D.C. 20036-1795

PHOENIX, ARIZONA
TWO RENAISSANCE SQUARE

TELEPHONE: (602) 257-5200
FACSIMILE: (602) 257-5299

PHILIP L. MALET
(202) 429-6239

(202) 429-3000

FACSIMILE: (202) 429-3902
TELEX: 89-2503

STEP TOE & JOHNSON INTERNATIONAL
AFFILIATE IN MOSCOW, RUSSIA

TELEPHONE: (011-7-501) 929-9700
FACSIMILE: (011-7-501) 929-9701

May 8, 1995

DELIVERY BY HAND

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: ET Docket No. 95-18

Dear Mr. Caton:

DOCKET FILE COPY ORIGINAL

Last Friday, Motorola, Inc. ("Motorola") filed its Comments in the above-referenced proceeding. Due to a clerical error, the original signed copy of these Comments was not submitted with this filing. Enclosed is the **original** copy of Motorola's Comments for inclusion in the docket file.

If there are any questions regarding this matter, please contact the undersigned.

Respectfully submitted,



Philip L. Malet

Counsel for Motorola, Inc.

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

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In the Matter of)

Amendment of Section 2.106 of the)
Commission's Rules to Allocate)
Spectrum at 2 GHz for Use by the)
Mobile-Satellite Service)

ET Docket No. 95-18
RM-7927

COMMENTS OF MOTOROLA, INC.

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Michael D. Kennedy
Vice President and Director,
Regulatory Relations
Stuart E. Overby
Assistant Director,
Spectrum Planning
Barry Lambergerman
Manager, Satellite
Regulatory Affairs
Motorola, Inc.
1350 I Street, N.W.
Washington, D.C. 20005
(202) 371-6900

Philip L. Malet
Alfred Mamlet
Pantelis Michalopoulos
Miguel S. Lawson
Pamela Strauss
Steptoe & Johnson
1330 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 429-3000

Its Attorneys

Dated: May 5, 1995

Summary

Motorola fully supports the Commission's spectrum allocation proposals. As reflected in the work of the U.S. Industry Advisory Committee to the WRC-95 ("IAC") and the Conference Preparation Meeting in Geneva ("CPM"), there is a growing demand for MSS spectrum worldwide and especially in the United States. The 70 MHz of spectrum proposed by the Commission will help facilitate the introduction and future development of handheld personal satellite communications services not only in the United States, but the rest of the world.

Motorola further believes that the only technological restrictions on this new MSS spectrum should be the separation of global LEO and regional GSO systems. These types of systems are inherently incompatible and good spectrum management dictates that they be assigned to different bands. The Commission, however, should not mandate any particular modulation technique, but instead let the marketplace decide whether any access method will succeed.

The CPM has also developed the technical bases for determining the extent to which sharing between MSS and incumbent users in the 2 GHz band is feasible. The Report of the CPM confirms the Commission's preliminary determination that, in the long run, incumbents in the 2 GHz band must be relocated in order for MSS systems to flourish. With respect to relocation costs, Motorola submits that the MSS providers should only pay for their

fair share of the costs of moving fixed microwave and BAS channels. The Commission should also consider moving BAS stations to higher frequency bands in order to clear the entire 1990-2110 MHz band for MSS and other potential users including broadband multimedia wireless applications for public safety and critical industries. To the extent that other licensees may benefit from such relocations, they too should help pay for moving these incumbent users. In addition, close attention must be paid to developing appropriate mechanisms for allocating these relocation costs among individual MSS providers licensed by the Commission.

Lastly, it is premature for the Commission to consider possible methods for assigning new MSS spectrum to system operators. As Motorola and others have argued in other proceedings, auctions clearly are inappropriate for global satellite systems. Moreover, until it can be determined -- after the Commission opens a filing window and accepts applications -- whether a mutually exclusive situation exists, the Commission does not have the legal authority to use competitive bidding to assign MSS licenses in this band. It is certainly conceivable that once the pool of applicants is determined, engineering solutions, negotiations, threshold qualifications, or other methods might be devised to award licenses without having to rely upon competitive bidding techniques. Until such a determination can be made, the Commission should defer consideration of any competitive bidding proposals.

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As the Commission is well aware, Motorola has been authorized to operate in less than one-half of the spectrum that it originally applied for, and Motorola has consistently maintained that existing and available MSS allocations are insufficient to meet current and future demands for LEO MSS in the United States. See, e.g., Petition for Expedited Action, File Nos. 9-DSS-P-91(87) et al. (June 9, 1992). It is therefore both timely and appropriate that the Commission undertake to allocate additional MSS spectrum for use by global satellite systems.

I. INTRODUCTION

As the Commission noted in its NPRM, the 1992 World Administrative Radio Conference allocated the 1970-1980 MHz (Earth-to-space) and 2160-2170 MHz (space-to-Earth) bands in Region 2 and the 1980-2010 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth) bands worldwide to the MSS. See Final Acts of the 1992 World Administrative Radio Conference, Malaga-Torremolinos (1992) ("WARC-92"). In June 1994, however, the Commission adopted a band plan -- which Motorola fully supported -- that assigned the 1850-1990 MHz band to terrestrial broadband licensed and unlicensed personal communications services ("PCS").³ In adopting this PCS band plan, the Commission indicated, among

³ See In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services, 9 FCC Rcd. 4957 (1994) ("PCS Reconsideration Order").

other things, that it intended to pursue additional international allocations for MSS at the 1995 World Radiocommunication Conference ("WRC-95").⁴

The Commission initiated the instant proceeding to investigate the possibility of allocating 70 MHz of additional spectrum for MSS at 2 GHz -- 1990-2025 MHz for the Earth-to-space links and 2165-2200 MHz for the space-to-Earth links -- in order to satisfy the current demand for more MSS spectrum in the United States and around the world. NPRM at ¶¶ 1-2. The Commission further noted in the NPRM that the adoption of its spectrum proposals will require the relocation of broadcast auxiliary service ("BAS") and fixed microwave incumbents that currently occupy this spectrum. NPRM at ¶¶ 9-14. The Commission has sought comment on these recommendations, as well as its proposal to require that the MSS providers bear the entire cost of relocating incumbent users and on whether it should adopt sharing or technical constraints -- such as limiting these new MSS bands to LEO's, GSO's, a particular access method or imposing geographic coverage requirements. NPRM at ¶ 16. In addition, the Commission has asked whether there is a need to allocate additional feeder link spectrum to support these 2 GHz MSS allocations. Id. Finally, the Commission has announced a tentative preference for

⁴ At WRC-95, the Commission states that it intends to pursue, inter alia, international allocations for space-to-Earth MSS at 2165-2170 MHz, which is currently allocated only in Region 2, and a new Earth-to-space MSS allocation in the 2010-2025 MHz band. See NPRM at ¶ 8 n.13.

awarding MSS licenses in these bands by competitive bidding. NPRM
at ¶ 17.

Motorola fully supports the Commission's spectrum allocation proposals. As reflected in the work of the U.S. Industry Advisory Committee to the WRC-95 ("IAC") and the Conference Preparation Meeting in Geneva ("CPM"), there is a growing demand for MSS spectrum worldwide and especially in the United States. The CPM has also developed the technical bases for determining the extent to which sharing between MSS and incumbent users in the 2 GHz band is feasible. The Report of the CPM confirms the Commission's preliminary determination that, in the long run, incumbents in the 2 GHz band must be relocated in order for MSS systems to flourish.

Motorola further believes that the only technological restrictions on this new MSS spectrum should be the separation of global LEO and regional GSO systems. These types of systems are inherently incompatible and good spectrum management dictates that they be assigned to different bands. The Commission, however, should not mandate any particular modulation technique, but instead let the marketplace decide whether any access method will succeed.

With respect to relocation costs, Motorola submits that the MSS providers should only pay for their fair share of the costs of moving fixed microwave and BAS channels. The Commission should also consider moving BAS stations to higher frequency bands in order to clear the entire 1990-2110 MHz band for MSS and other potential users including broadband multimedia wireless

applications for public safety and critical industries. To the extent that other licensees may benefit from such relocations, they too should help pay for moving these incumbent users. In addition, close attention must be paid to developing appropriate mechanisms for allocating these relocation costs among individual MSS providers licensed by the Commission.

Lastly, it is premature for the Commission to consider possible methods for assigning new MSS spectrum to system operators. As Motorola and others have argued in other proceedings, auctions clearly are inappropriate for global satellite systems. Moreover, until it can be determined -- after the Commission opens a filing window and accepts applications -- whether a mutually exclusive situation exists, the Commission does not have the legal authority to use competitive bidding to assign MSS licenses in this band. It is certainly conceivable that once the pool of applicants is determined, engineering solutions, negotiations, threshold qualifications, or other methods might be devised to award licenses without having to rely upon competitive bidding techniques. Until such a determination can be made, the Commission should defer consideration of any competitive bidding proposals.

II. **THERE IS A DEFINITE NEED FOR THE
ALLOCATION IN THE UNITED STATES OF AT
LEAST 70 MHz OF ADDITIONAL GLOBAL MSS
SPECTRUM**

Motorola agrees with the Commission's assessment that "a need exists for allocating a substantial amount of spectrum for MSS." NPRM at ¶ 7. As the Commission is aware, there is very little international MSS spectrum available for use in the United States by global satellite systems. In fact, as of this time, only 33 MHz of L-band spectrum has been allocated domestically for such systems.⁵ Virtually all of the remaining allocations made at WARC-92 for MSS -- other than some of the spectrum being considered in this proceeding -- is unavailable in the United States either because of existing allocations to other services or because of the technical constraints placed upon the bands.⁶ Thus, absent additional MSS allocations at future WRC's, only 20 MHz (Earth-to-space) and 30 MHz (space-to-Earth) of internationally allocated MSS spectrum remains potentially available for future use in the United States by global satellite systems. Clearly, this amount of spectrum is insufficient to satisfy the growing demand worldwide for MSS, especially by LEO satellite systems.

⁵ See In the Matter of Amendment of Section 2.106 of the Commission's Rules to Allocate the 1610-1626.5 MHz and the 2483.5-2500 MHz Bands For Use by the Mobile-Satellite Service, Including Non-geostationary Satellites, 9 FCC Rcd. 536 (1994) ("Big LEO MSS Allocation Order").

⁶ See In the Matter of Preparation for International Telecommunication Union World Radiocommunication Conferences, IC Docket No. 94-31, FCC 95-35 (rel. Jan. 31, 1995) ("Second Notice of Inquiry").

A. The Experts All Agree That There Is A Pressing Need For Much More MSS Spectrum

The Commission's tentative conclusions regarding the need to allocate more MSS spectrum have been confirmed by both international experts and the U.S. industry. For example, in the CPM Report for WRC-95,⁷ MSS requirements were described as follows:

The interest in the utilization of the "2 GHz" MSS bands is evident from the number of systems advance published at March 1995. Since WARC-92, more than 30 MSS systems, both GSO and non-GSO, have been advance published in the "2 GHz" MSS bands. Some of these systems, in particular of the non-GSO type, are intended to provide for worldwide service, while others are intended to provide national or regional service. . . .

Other bands where a number of systems are currently being planned are the 1610-1626.5/2483.5-2500 MHz bands (where, as of September 1994, a total of 43 GSO and non-GSO systems have been published in the ITU records). In view of the large number of systems under consideration in this band, and due to technical and operational characteristics of these MSS systems (e.g., global coverage and mobile stations utilizing omnidirectional antennas), the available spectrum will be sufficient to meet the requirements of only a very limited number of the systems currently being planned. Furthermore, the constraints imposed by sharing with other services further reduce the usable spectrum. . . .⁸

(...continued)

⁷ See CPM Report on Technical, Operational and Regulatory/Procedural Matters to be Considered by the 1995 World Radiocommunication Conference, ITU-R, Report E (Apr. 25, 1995) ("CPM Report").

⁸ Id. ch. 2., sec. I., pt. B., para. 2.

In the United States alone, the Commission recently licensed the IRIDIUM System and two other U.S. LEO systems to provide global MSS service.⁹ The IRIDIUM System is only authorized to operate over the United States in 5.15 MHz in the 1.6 GHz band, which is less than one-half of the spectrum requested in Motorola's application. As the record in those application proceedings clearly establishes, the IRIDIUM System, as well as the other global MSS systems licensed by the Commission, will need additional spectrum by the beginning of the next decade to meet expected demand for service. Indeed, the interim report of the IAC for WRC-95 estimates that a total of 150-300 MHz of MSS spectrum will be needed by the year 2005.¹⁰

These findings are consistent with earlier estimates of the amount of spectrum needed for MSS worldwide. For example, in In the Matter of An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum, 6 FCC Rcd. 1914 (1991), the Commission cited reports generated by the IAC for WARC-92 and the CCIR IWP. In its

⁹ See In re Application of TRW, Inc. for Authority to Construct, Launch, and Operate a Low-Earth Orbit Satellite System in the 1610-1626.5 MHz/2483.5-2500 MHz Bands, DA 95-130 (rel. Jan. 31, 1995) erratum, DA 95-371 (rel. Feb. 28, 1995); In re Application of Loral/Qualcomm Partnership, L.P. for Authority to Construct, Launch, and Operate Globalstar, a Low-Earth Orbit Satellite System to Provide Mobile Satellite Services in the 1610-1626.5 MHz/2483.5-2500 MHz Bands, DA 95-128 (rel. Jan. 31, 1995) erratum, DA 95-373 (rel. Feb. 28, 1995).

¹⁰ See FCC Industry Advisory Committee for the ITU 1995 World Radiocommunication Conference Interim Report, IC Docket No. 94-31 (rel. Jan. 30, 1995).

report, the IAC for WARC-92 recommended that, in addition to the bands proposed at 1525-1530, 1610-1626.5 and 2483.5-2500 MHz, up to 175.4 MHz of additional spectrum in each direction should be allocated for MSS.¹¹ The CCIR IWP Report to the WARC-92 estimated that up to 138 MHz of spectrum in each direction would be required for MSS.¹²

B. The Alternatives Identified by the Commission for Allocating Less MSS Spectrum Are Not Adequate

In the NPRM, the Commission proposed two possible alternatives to allocating 70 MHz of spectrum to MSS in the 2 GHz band: (1) the 40 MHz at 1990-2010 MHz and 2180-2200 MHz that was allocated worldwide at WARC-92 and that remains available for paired use after the PCS Reconsideration Order; and (2) 60 MHz at 1990-2020 MHz and 2170-2200 MHz. NPRM at ¶ 15. As indicated above, neither of these alternative proposals would meet the demonstrated requirements for global MSS spectrum. Moreover, both of these alternatives would still require relocation of the same number of BAS channels¹³ as the Commission's recommended 70 MHz allocation.

¹¹ See Second Interim Report of Ad Hoc Group C of IWG-2 Mobile Satellite Services § 2.14, IAC Report No. 37 (Dec. 3, 1990).

¹² See CCIR IWP 8/15 Report § 6.1.1.3.1.7, Helsinki, Finland (Nov. 12-21, 1991).

¹³ As the Commission correctly observes, the first BAS channel is 18 MHz with the remaining channels 17 MHz wide. Therefore, both BAS channels 1 and 2 must be relocated to clear even 20 MHz of uplink MSS spectrum.

**III. THE ONLY TECHNOLOGICAL RESTRICTIONS ON
NEW MSS SPECTRUM SHOULD BE THE
SEPARATION OF GLOBAL LEO AND REGIONAL
GSO SYSTEMS**

**A. Global LEO Systems and GSO MSS Systems
Should Be Assigned to Separate MSS Spectrum**

Global LEO and GSO MSS systems generally cannot operate in a compatible manner on a co-frequency, co-coverage basis. Motorola has consistently maintained that the operation of LEO and GSO MSS systems in the same spectrum would cause unacceptable levels of interference within each system and would substantially reduce levels of capacity for both systems. GSO Earth-to-space links contain much more power than LEO links, thereby causing excessive signal levels into the LEO satellite receivers. In the Big LEO MSS Licensing Order,¹⁴ the Commission acknowledged that "[m]ost commentators agree that it would be difficult for GSO and LEO systems to operate MSS services together in this band. Indeed, this was a significant factor in [the Commission's] decision to propose limiting the 1610-1626.5/2483.5-2500 MHz bands to LEO systems." Id. at 5946 ¶ 20.¹⁵

¹⁴ In the Matter of Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 9 FCC Rcd. 5936 (1994) ("Big LEO MSS Licensing Order").

¹⁵ The CPM Report similarly concludes that:

MSS networks employing narrow-band channels with frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques cannot share frequencies on a co-coverage basis (band segmentation is used to

There is also a limited amount of MSS spectrum available for global systems. While WARC-92 allocated several bands internationally for MSS in all three Regions of the world, much of this spectrum is unusable for global satellite systems due to incumbent users. Indeed, the only remaining spectrum which currently exists for possible use by global MSS systems is the bands under consideration in this proceeding. Even assuming that WRC-95 agrees to add the 30 MHz of MSS spectrum now currently allocated internationally -- a somewhat questionable assumption in light of the events at the recent CPM -- only 70 MHz would potentially be available for global MSS systems. Clearly, this amount of spectrum is insufficient for the near-term requirements of these systems.

National and regional GSO MSS systems should be assigned to other frequency bands that cannot, under any circumstances, be used by global LEO MSS systems. For example, the WARC-92 allocated 70 MHz for MSS in the 2500-2535 MHz and 2655-2690 MHz bands. Indeed, international Footnotes 754 and 766 contemplate usage of these bands by national and regional systems. Other alternatives may also present themselves after WRC-95.

(...continued)

achieve sharing). With potentially severe constraints on system capacity, limited co-frequency, co-coverage sharing may be possible between MSS networks using FDMA or TDMA and networks using spread spectrum channels (e.g. with code division multiple access (CDMA)).

CPM Report, ch. 2., sec. I., pt. A.2., para. 1.4.1.

Accordingly, LEO and GSO MSS systems should be assigned, to the greatest extent possible, to different frequency bands. Reserving global MSS allocations for global LEO systems is the most efficient means of separating LEO and GSO MSS systems.

B. No Other Technological Restrictions Should Be Applied to These New MSS Bands

Other than the separation of LEO and GSO systems,¹⁶ no other technological restrictions should be applied to any new MSS bands allocated by the Commission. Specifically, Motorola vigorously opposes any proposal which attempts to create a technological threshold based upon a particular access method. As the Commission is well aware, similar proposals were put forward and ultimately rejected in the Big LEO allocation and licensing proceedings.¹⁷

Motorola presented substantial evidence in the Big LEO Negotiated Rulemaking proceeding which demonstrated that high capacity CDMA systems cannot share spectrum efficiently on a co-frequency basis. CDMA MSS networks are not inherently more spectrum efficient than satellite systems using other modulation

¹⁶ Of course, the Commission may desire to define global MSS systems by establishing a minimum geographic coverage requirement as it did in the Big LEO MSS Licensing Order.

¹⁷ See Big LEO MSS Allocation Order, 9 FCC Rcd. at 538 ¶ 11 and n.15 (Commission relegated to a subsequent proceeding the question of whether operations in the 1.6/2.4 GHz bands should be limited to a specific type of access technique); Big LEO MSS Licensing Order, 9 FCC Rcd. at 5954 et seq., ¶¶ 43 et seq. (Commission established sharing plan that accommodated both CDMA and TDMA access techniques).

techniques, nor do they provide for multiple access without severe capacity limitations. Most importantly, CDMA is not the panacea that the Commission originally believed when the RDSS rules were first adopted.¹⁸ CDMA MSS networks cannot feasibly operate on a co-frequency basis at stated capacities due to unacceptable levels of intersystem and intrasystem interference. Attached hereto as Appendix I is a published paper prepared by Drs. Vojcic, Milstein, and Pickholz which sets forth some of the bases for this technical conclusion. Even proponents of CDMA access techniques now recognize the inefficiencies, interference problems and increased costs associated with using such modulation techniques for satellite systems. For example, since the conclusion of the Big LEO Negotiated Rulemaking proceeding, Globalstar -- licensee of one of the two authorized U.S. CDMA systems -- has conceded that at most two CDMA MSS systems can share the same frequencies on a co-coverage basis before each system loses at least 25 percent of its available capacity.

If more than two CDMA systems become operational, CDMA systems like Globalstar effectively will have a smaller spectrum segment within which to operate their user uplinks in the U.S. While CDMA does permit spectrum sharing among competing systems, the capacity of the systems operating within that spectrum will decrease as the number of systems operating in the band increases. By way of example, Globalstar's capacity over a given area would decrease by approximately 25% if the total number of licensed MSS systems increased from three to four, assuming that

¹⁸ See, e.g., Comments of Motorola Satellite Communications, Inc., File Nos. 9-DSS-P-91(87), et al. (July 3, 1991), at 32-34 and Appendices B and C.

Iridium is one of the licensed systems and the two other CDMA systems receiving licenses have technical characteristics similar to Globalstar's and are experiencing the same level of usage.¹⁹

The CPM Report similarly notes that "the attendant capacity constraints increase with the number of [CDMA] co-frequency networks."²⁰

By deciding not to impose any specific modulation scheme or system architecture for the 1.6/2.4 GHz bands, the Commission acknowledged that CDMA is not inherently superior to TDMA when used by MSS systems, and that a set of technical parameters and sharing criteria cannot accommodate both CDMA and TDMA systems. Big Leo MSS Licensing Order, 9 FCC Rcd. at 5954 ¶ 43 n.52. The Commission should reach the same conclusion in this proceeding and not designate any specific allocation based upon modulation or access technique. The marketplace will be a much better judge as to whether any particular access method will gain prominence in the 2 GHz band.²¹

¹⁹ Globalstar Telecommunications Limited, SEC Form S-1, at 17 (Feb. 3, 1995).

²⁰ CPM Report, ch. 2., sec. I., pt. A.2., para. 1.4.1.

²¹ There also does not appear to be any need to establish power limits for MSS satellites or fixed services if all incumbent users in the bands are ultimately relocated to other bands. MSS networks must generate relatively high levels of power flux density ("pfd") because earth stations typically have antennas with low gain. For handheld terminals, pfd levels in the range of -103dB(W/m²/4kHz) to -137dB(W/m²/4kHz) are expected. The EIRP levels radiated from handheld terminals typically range from -3 dBW to 11 dBW depending on the modulation used. Directional antennas operating with GSO satellites, however, will have much higher EIRP levels up to 36 dBW. See CPM Report, ch 2., sec. I., pt. A.2., para. 1.2. On the other hand, if incumbent users will remain in the bands and operate on a co-primary basis for some

IV. CLEARING ISSUES REQUIRE CLOSE ATTENTION TO ENSURE THAT THE MSS INDUSTRY ONLY PAYS FOR ITS FAIR SHARE OF THE COSTS OF MOVING INCUMBENT FIXED MICROWAVE AND BAS STATIONS

A. Sharing Is Not Feasible Between MSS Networks and Incumbent Broadcast Auxiliary Stations or Fixed Microwave Users

Motorola agrees with the Commission's views that sharing between MSS and BAS or Fixed Microwave users already occupying the 2 GHz bands is not feasible on a co-frequency basis because of the potential for interference between the services.²² NPRM at ¶¶ 9, 12, 14. In this regard, the CPM Report is most instructive on analyzing these issues. As set forth in this Report:

(...continued)

period of time, then the pfd coordination triggers set forth in RR 2566 should apply for space-to-Earth transmissions to determine whether coordination under Resolution 46 is required. Motorola concurs, however, with the CPM Report as to the impracticability of deriving any meaningful EIRP limits for point-to-point stations operating in the 1980-2010 MHz bands due to the difficult sharing environment encountered in those bands. Id. at para. 1.4.6.2.

²² Motorola also agrees with the Commission's assessment that sharing between BAS and fixed microwave stations in the 2 GHz band is not workable due to the mobile nature of ENG operations. See NPRM at ¶ 10.

The greatest sharing constraints are associated with potential interference to satellite receivers in MSS (Earth-to-space) allocations and to fixed service receivers in MSS (space-to-Earth) allocations. Because large geographic areas are visible to a satellite, high aggregate levels of interfering signal power can be received by a satellite as a result of the potentially large numbers of interfering fixed stations and there is a significant probability that antenna main beams of one or more fixed systems will be directed temporarily at non-GSO satellites or permanently at GSO satellites (unless orbit avoidance is used). These sharing problems incur the greatest design and operating constraints because, among other things, interference could be caused or experienced by fixed stations located far outside the service area of an MSS network.²³

With respect to the 1990-2025 MHz band, Motorola is not aware of anyone that seriously disputes the fact that co-frequency sharing between MSS and BAS simply is not feasible either for GSO or LEO satellite systems. The CPM Report states that “[i]n order to implement the GSO/MSS (Earth-to-space), provisions should be made for the avoidance of co-channel sharing between the MSS and the FS,”²⁴ and that “co-channel sharing of MSS uplinks to non-GSO/MSS satellites in frequency band segments in the 1980-2010 MHz band which are or remain heavily used by the FS would not be possible.”²⁵ In fact, due to the likely nature of interference problems between MSS and FS, the CPM Report concludes that “[c]onsideration should be given to the early development of a

²³ See CPM Report, ch. 2., sec. I., pt. A.2, para. 1.4.6.

²⁴ Id. at para. 1.4.6.1.

²⁵ Id. at para. 1.4.6.2(a).

phased transition plan for FS systems (including a possible timely freezing of the implementation of new FS stations) in this band.”²⁶

The CPM Report’s assessment of the potential for sharing between stations operating in the MSS (space-to-Earth) and fixed services is somewhat equivocal. It states that while certain studies indicate a potential for sharing between MSS and fixed services in the 2160-2200 MHz band “following detailed bilateral coordination,” “[i]n the long term sharing of non-GSO/MSS systems with the FS systems in the subject bands may become increasingly difficult and complex as MSS traffic levels build up over time with market take-up.”²⁷ Accordingly, the CPM Report recommends that “consideration should be given to a possible gradual transition approach in order to enable the FS to migrate to other frequency bands with no overlap with the MSS allocations between 1-3 GHz. . . .”²⁸ The Report ultimately scores the feasibility of sharing between FS and MSS (space-to-Earth) as “Moderate-Poor.”²⁹

²⁶ Id. at para. 1.4.6.2(e).

²⁷ Id. at para. 1.4.6.4(a). See also id. at sec. I., pt. B., para. 4.2. (“[A]s MSS traffic levels increase over time, it will become increasingly difficult in the long term to share spectrum with FS.”).

²⁸ Id. at ch. 2., sec. I., pt. B., para. 1.4.6.4(c).

²⁹ Id. at para. 1.4.13. “Moderate” is defined as follows:

Technical standards may be needed to enable sharing between stations located in nearby-to-distant geographic areas or orbit locations and the capacity for mobile-satellite systems would likely be quite limited (feasibility is highly dependent on the deployment of systems in the other service).

Id. “Poor” is defined as:

Motorola believes that the Commission should plan now for the eventual relocation of all incumbent terrestrial users of the proposed MSS bands. While sharing may be possible for a limited period of time between MSS (space-to-Earth) and FS systems operating in the 2 GHz bands, sound spectrum management policies clearly favor the clearing out of this spectrum before MSS systems become operational. This is especially true in the United States where there already are thousands of fixed microwave stations located in the subject bands. Many of these fixed links are used by public safety and critical industries which must maintain a high level of reliability on their communications facilities. Even if this reliability could be maintained with shared use, the potential coordination difficulties are enormously complex given the number of fixed systems and their varying technical specifications. In any event, since, at best, MSS networks might be able to share this spectrum only during relatively lightly loaded periods, incumbent users would eventually have to vacate the MSS downlink spectrum.

(...continued)

Sharing is impractical, i.e., little if any useful capacity would be obtained for mobile-satellite systems even with large distance or orbit separations between stations.

Id.

B. Relocation of BAS Stations Can Be Accomplished Without Undue Hardship to MSS Operators or BAS Licensees

The Commission has identified several alternatives for clearing the 1990-2025 MHz band. Its primary proposal is to relocate the bottom two BAS channels to the 2110-2145 MHz band and thereby provide the BAS service with the same amount of spectrum it currently has. See NPRM at ¶¶ 9-10. Another alternative is to move BAS operations over time to a higher band where more spectrally-efficient digital compression technologies could be employed.³⁰ Id. at ¶ 13. This latter alternative has the added advantage of opening up a substantial amount of additional spectrum in the 2 GHz band for services other than MSS, such as multimedia wireless services to support operations in public safety and critical industries.³¹ This alternative would also promote sound spectrum management policies by aggregating mobile services throughout the 1850-2200 MHz bands for both terrestrial and satellite applications, and by moving primary fixed and temporary fixed BAS operations to higher bands.

Moreover, any clearing of bands should minimize costs to MSS licensees, promote good spectrum management practices and still provide a home for all needed BAS operations. Motorola has

³⁰ Motorola notes that a 4-to-1 compression is already being used for new DBS systems and a 2-to-1 compression is being used on some broadcast network feeds.

³¹ Motorola notes that U.S. government space operations also are located in the 2025-2110 MHz band. Accordingly, Motorola recommends that the Commission discuss this alternative with NTIA.