

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

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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

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REPLY COMMENTS OF MOTOROLA, INC.

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SUMMARY

The record in this proceeding fully supports an additional allocation of spectrum for MSS. The Commission's proposal of 70 MHz is the minimum required to meet the needs of the current and planned Big LEO systems as well as other planned GSO systems. The comments of the parties, as well as the Conference Preparatory Meeting Report to WRC-95, NTIA Report and, most recently, the FCC Industry Advisory Committee Report document the expected growth of the MSS industry.

As the majority of commenters recognize, the Commission need not impose technical standards or restrictions other than those essential to avoid interference with other services. First, this allocation should not be limited to GSO satellite systems, as proposed by a few of the commenters. As to claims that the Commission has already provided LEO MSS with a generous allocation, the current LEO MSS licensees do not have access to adequate spectrum to meet well-documented growth trends in this service, despite the Commission's recognition that LEO satellite systems are uniquely situated to serve global markets. Nor is any current MSS licensee in a dominant position that would justify the imposition of spectrum caps for incumbent MSS licensees.

Second, the commenters agree that LEO and GSO systems cannot operate on a co-frequency, co-coverage basis. These systems must be assigned to different frequency bands within an MSS allocation. Within any allocation of spectrum to MSS, the Commission should ensure that the limited spectrum that is allocated globally be used by systems offering true global coverage by either reserving international MSS allocations to LEO systems or imposing a minimum coverage requirement on global MSS allocations.

Third, the Commission should not mandate a particular spectrum access method or impose power limits. This proceeding -- as well as several prior satellite rule

makings -- has not provided the Commission with a factual basis justifying the mandated use of CDMA or any access technology. Unless and until the Commission has real world evidence as to the superior capabilities of any access method, it should allow the marketplace to determine which methodology, if any, will gain prominence.

The long-term prospects for sharing MSS uplinks and downlinks with incumbent broadcast auxiliary service ("BAS") or microwave fixed service ("FS") licensees is poor. The commenters generally agree that the proposed MSS uplink bands cannot be shared with BAS users and that these users must be cleared from any band that is re-allocated to MSS. While downlink sharing between certain MSS and FS systems may be possible with lightly-loaded MSS systems after detailed bilateral coordination, more fully-loaded MSS systems cannot share their downlinks with FS systems. Fixed service licensees should therefore be relocated to other bands consistent with the Commission's emerging technologies policy.

Motorola agrees that incumbents who are forced to relocate to other bands should be fairly compensated for this transition. However, any such relocation plan must recognize the distinct nature of MSS operations. Since much of the spectrum will be used on a global basis and shared among MSS providers, the Commission should devise a means for sharing relocation costs among all new users of the vacated spectrum -- both foreign and domestic -- with particular sensitivity to fashioning a mechanism that compensates those MSS licensees who take the initiative in first clearing spectrum that benefits future users.

The commenters agree that it is premature for the Commission to consider competitive bidding proposals in this allocation proceeding. The 1993 Omnibus Budget Reconciliation Act obligates the Commission to resort to competitive bidding as a last resort after considering engineering solutions, negotiation, threshold qualifications, service regulations and any other means to avoid mutually exclusive applications. The Commission should consider such assignment alternatives as part of

any future MSS licensing and service rule making for the 2 GHz band. When the FCC considers the viability of competitive bidding as an assignment technique for MSS satellites it must first define the domestic and global "property right" that MSS bidders would receive from the purchase of spectrum. The Commission must also be aware that a U.S. competitive bidding program for global satellite spectrum will promote the extraction of payments from domestic MSS proponents through scores of auctions and fees adopted by other nations. These costs may be exorbitant and discriminate against U.S. licensees. Multiple auctions and fees are sure to drive up the ultimate cost of MSS to consumers and in many cases will deter investors from participating in MSS (and other satellite businesses) where capital requirements are perceived as open-ended and indeterminate.

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REPLY COMMENTS OF MOTOROLA, INC.

Motorola, Inc. ("Motorola") hereby submits its reply comments to the initial comments received in response to the Commission's proposed allocation of the 1990-2025 MHz (Earth-to-space) and 2165-2200 MHz (space-to-Earth) bands to the Mobile-Satellite Service ("MSS") set forth in its Notice of Proposed Rulemaking.^{1/} Motorola is an interested party in this proceeding having recently received a license from the Federal Communication Commission's ("FCC" or "Commission") International Bureau to construct, launch and operate the IRIDIUM® System in the 1.6 GHz MSS/RDSS band on a bi-directional basis.

The IRIDIUM® System is authorized to operate in less than one-half of the L-band spectrum that Motorola originally sought from the Commission. Motorola -- supported by the overwhelming majority of commenters in this proceeding -- believes that the existing MSS allocations are insufficient to meet current and future demands for global MSS in the United States. The record compiled in this proceeding and in

^{1/} Notice of Proposed Rule Making, ("NPRM"), 10 FCC Rcd 3230 (1995); By Order Granting Request to Defer Comment Dates, DA 95-426, the date for filing reply comments was extended until June 6, 1995. By Order Partially Granting Extension of Time, DA 95-1190 (rel. June 1, 1995), the Office of Engineering and Technology further extended the date for reply comments until June 21, 1995.

response to the Notice of Inquiry in preparation for the upcoming World Radiocommunication Conference ("WRC-95")^{2/} establishes a compelling case for the Commission to allocate at least 70 MHz of additional MSS spectrum for use by global MSS satellite systems.

I. INTRODUCTION AND SUMMARY

Last year, FCC Chairman Reed Hundt took special note of the potential for MSS to be a "billion dollar plus industry" of voice and data services such as cellular-like telephone, news gathering, position location, search and rescue, disaster management, environmental monitoring, paging, facsimile, cargo tracking, and industrial monitoring and control services. The Chairman predicted that the MSS industry would offer an important additional choice to both domestic and international consumers of mobile communications services:

The proposed LEO systems offer the potential for significant economic and social advances and for service to developing countries by providing an instant telecommunications infrastructure at minimum costs. We believe that the introduction of new services, such as those provided by the LEOs, will promote competition in the satellite service marketplace and stimulate economic growth in the U.S. and abroad. LEO technology and services will also enhance productivity and economic growth in other sectors, such as the launch industry and the satellite manufacturing industry.^{3/}

Motorola urges the Commission to move this prediction closer to reality by adopting its MSS spectrum allocation proposal. In this proceeding, the Commission proposes to allocate a portion of the 2 GHz spectrum that the 1992 World Administrative Radio Conference ("WARC-92") allocated to MSS in Region 2 and

^{2/} In the Matter of Preparation for International Telecommunications Union World Radiocommunication Conferences, 9 FCC Rcd 2430 (1994) (Notice of Inquiry); Second Notice of Inquiry, 10 FCC Rcd 4175 (1995).

^{3/} Testimony of Reed E. Hundt, Chairman, Federal Communications Commission before the House Subcommittee on Telecommunications, "The Global Information Infrastructure and the Role of Satellites," July 28, 1994.

worldwide.^{4/} In 1994, the Commission adopted an allocation for terrestrial personal communications services ("PCS") that removed the 1980-1990 MHz band from primary MSS use.^{5/} To compensate for this realignment of MSS spectrum to PCS, the Commission indicates that it will pursue at WRC-95 a global MSS downlink allocation at 2165-2170 MHz, which is now allocated only in Region 2, and a new global uplink MSS allocation in the 2010-2025 MHz band.^{6/}

The emerging mobile-satellite industry faces a shortage of usable spectrum both for domestic and global operations. Only a subset of the bands allocated worldwide are currently available in the United States for commercial voice MSS systems in either the geostationary orbit ("GSO") or non-geostationary orbit ("non-GSO" or "LEO") configurations.^{7/} This available MSS spectrum totals 101 MHz. However, much of this spectrum is not readily available for MSS use because it is shared with other services or foreign MSS proponents.^{8/} The NTIA Report estimates that, at a minimum, the above 1 GHz MSS industry will require 60 MHz of additional spectrum by the year 2004 for domestic voice services alone, while the FCC's Industry

^{4/} WARC-92 allocated on a primary basis 1970-1980 MHz for MSS uplinks and 2160-2170 MHz for MSS downlinks in Region 2 and 1980-2010 MHz for MSS uplinks and 2170-2200 MHz for MSS downlinks worldwide.

^{5/} In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services, 9 FCC Rcd. 4957 (1994) ("PCS Reconsideration Order").

^{6/} NPRM at 3231, note 13. The Commission took these actions just last week. In the Matter of Preparation for International Telecommunication Union World Radio Communication Conferences, Report, FCC 95-256 adopted June 15, 1995, ¶¶ 39-45.

^{7/} These are the 1525-1559, 1610-1626.5, 1626.5-1660.5, and 2483.5-2500 MHz bands.

^{8/} U.S. National Spectrum Requirements: Projections and Trends, ("NTIA Report"), Department of Commerce, National Telecommunications and Information Administration, March 1995, pp. 57-59.

Advisory Committee for WRC-95 estimates a need for an additional 150-300 MHz by the year 2005.^{9/}

The record in this proceeding fully supports an additional allocation of spectrum for MSS. The Commission's proposal of 70 MHz is the minimum required to meet the needs of the current and planned Big LEO systems as well as other planned GSO systems. The comments of the parties, as well as the Conference Preparatory Meeting Report to WRC-95, NTIA Report and, most recently, the Industry Advisory Committee Report document the expected growth of the MSS industry.

As the majority of commenters recognize, the Commission need not impose technical standards or restrictions other than those essential to avoid interference with other services. First, this allocation should not be limited to GSO satellite systems, as proposed by a few of the commenters. As to claims that the Commission has already provided LEO MSS with a generous allocation, the current LEO MSS licensees do not have access to adequate spectrum to meet well-documented growth trends in this service, despite the Commission's recognition that LEO satellite systems are uniquely situated to serve global markets. Nor is any current MSS licensee in a dominant position that would justify the imposition of spectrum caps for incumbent MSS licensees.

Second, the commenters agree that LEO and GSO systems cannot operate on a co-frequency, co-coverage basis. These systems must be assigned to different frequency bands within an MSS allocation. Within any allocation of spectrum to MSS, the Commission should ensure that the limited spectrum that is allocated globally be used by systems offering true global coverage by either reserving

^{9/} NTIA Report at 58; Final Report of the Federal Communications Commission Industry Advisory Committee for the ITU 1995 World Radio Communication Conference, released May 4, 1995 and placed in IC. Doc. 94-31, p.8. ("Industry Advisory Committee Report").

international MSS allocations to LEO systems or imposing a minimum coverage requirement on global MSS allocations.

Third, the Commission should not mandate a particular spectrum access method or impose power limits. This proceeding -- as well as several prior satellite rule makings -- has not provided the Commission with a factual basis justifying the mandated use of CDMA or any access technology. Unless and until the Commission has real world evidence as to the superior capabilities of any access method, it should allow the marketplace to determine which methodology, if any, will gain prominence.

The long-term prospects for sharing MSS uplinks and downlinks with incumbent broadcast auxiliary service ("BAS") or microwave fixed service ("FS") licensees is poor. The commenters generally agree that the proposed MSS uplink bands cannot be shared with BAS users and that these users must be cleared from any band that is re-allocated to MSS. While downlink sharing between certain MSS and FS systems may be possible with lightly-loaded MSS systems after detailed bilateral coordination, more fully-loaded MSS systems cannot share their downlinks with FS systems. Fixed service licensees should therefore be relocated to other bands consistent with the Commission's emerging technologies policy.

Motorola agrees that incumbents who are forced to relocate to other bands should be fairly compensated for this transition. However, any such relocation plan must recognize the distinct nature of MSS operations. Since much of the spectrum will be used on a global basis and shared among MSS providers, the Commission should devise a means for sharing relocation costs among all new users of the vacated spectrum -- both foreign and domestic -- with particular sensitivity to fashioning a mechanism that compensates those MSS licensees who take the initiative in first clearing spectrum that benefits future users.

The commenters agree that it is premature for the Commission to consider competitive bidding proposals in this allocation proceeding. The 1993

Omnibus Budget Reconciliation Act obligates the Commission to resort to competitive bidding as a last resort after considering engineering solutions, negotiation, threshold qualifications, service regulations and any other means to avoid mutually exclusive applications. The Commission should consider such assignment alternatives as part of any future MSS licensing and service rule making for the 2 GHz band. When the FCC considers the viability of competitive bidding as an assignment technique for MSS satellites it must first define the domestic and global "property right" that MSS bidders would receive from the purchase of spectrum. The Commission must also be aware that a U.S. competitive bidding program for global satellite spectrum will promote the extraction of payments from domestic MSS proponents through scores of auctions and fees adopted by other nations. These costs may be exorbitant and discriminate against U.S. licensees. Multiple auctions and fees are sure to drive up the ultimate cost of MSS to consumers and in many cases will deter investors from participating in MSS (and other satellite businesses) where capital requirements are perceived as open-ended and indeterminate.

When Chairman Hundt voiced his commitment to Congress last year of ensuring that satellites will be an important component of both the National Information Infrastructure ("NII") and the Global Information Infrastructure ("GII"), he appropriately also recognized that the chief impediment to granting multiple satellite providers an opportunity to compete is access to spectrum on a timely basis.^{10/} This spectrum allocation proceeding is the important next step to ensuring that MSS providers will have that opportunity to compete in real terms with each other and with terrestrial providers of mobile services. Coupled with the Commission's commitment to pursue additional international MSS spectrum at WRC-95, Motorola strongly supports the proposed allocation of 70 MHz of spectrum to MSS.

^{10/} Testimony of Chairman Reed E. Hundt at 21.

II. THERE IS A DEMONSTRATED NEED FOR A MINIMUM OF 70 MHZ OF GLOBAL MSS SPECTRUM

A. The Parties Support the Need for Additional MSS Spectrum Allocations

Almost without exception, the commenters strongly concur on the need for additional MSS spectrum.^{11/} In the words of Loral, the proposed 70 MHz allocation "is the minimum required to meet the needs of second-generation Big LEO systems and other national and global MSS systems."^{12/} Indeed, only one party, the American Petroleum Institute ("API"), articulated any doubts that such spectrum was necessary. Specifically, API contends that there is "no demonstrated need for additional mobile communications services at this time."^{13/} To the contrary, the need for substantial amounts of additional MSS spectrum is recognized not only by the MSS industry, but also by other 2 GHz incumbents, the FCC and other government agencies.

The need for additional MSS spectrum is both a pressing and well-documented one. The report of the 1995 ITU WRC-95 Conference Preparatory Meeting ("CPM Report")^{14/} and the Industry Advisory Committee Report in preparation for WRC-95 both estimate substantial actual and future MSS growth. Specifically, the Industry Advisory Committee Report estimates that by the year 2005, MSS spectrum needs will range from approximately 150 MHz to 300 MHz.^{15/} Moreover, contrary to

^{11/} See Comments of BellSouth at 2; Comments of Celsat America, Inc. ("Celsat") at 4; Comments of Comsat Corporation ("Comsat") at 8; Comments of Constellation Communications, Inc. ("Constellation") at 1-2; Comments of GE American Communications, Inc. ("GE") at 1; Comments of Hughes Telecommunications and Space Company ("Hughes") at 2; Comments of Loral/Qualcom Partnership ("Loral") at 2-6; Comments of Newcomb Communications, Inc. ("Newcomb") at 1; and Comments of Personal Communications Satellite Corp. ("PCSAT") at 2-4.

^{12/} Comments of Loral at 3.

^{13/} Comments of API at 5.

^{14/} Conference Preparatory Meeting Report on technical, operational and regulatory/procedural matters to be considered by the 1995 World Radiocommunication Conference ("CPM Report").

^{15/} Industry Advisory Committee Report at 9.

API's claim that new MSS services will be redundant with existing and planned terrestrial cellular systems,^{16/} that Report specifically states:

Although some critics of mobile satellite service claim that cellular and PCS build-out over the next 10 years will greatly diminish the demand for MSS, these critics do not take account of the fact that terrestrial technologies will never provide service in more than a small fraction of the geographic area of the earth. For example it is projected that only 15 percent of the world's land masses will be covered by cellular networks by the year 2010.^{17/}

These studies have not been refuted by API or by any other 2 GHz incumbent. In fact, most incumbents do not contest the need for additional MSS spectrum; indeed, the Association for Maximum Service Television specifically notes that "the MSS industry may have a legitimate need for additional spectrum."^{18/}

The FCC has itself consistently recognized the importance of additional MSS spectrum, not only through its Big LEO proceedings,^{19/} but also in its Personal Communications Services proceedings.^{20/} This view was confirmed just recently by the National Telecommunications and Information Administration ("NTIA") in its 1995 U.S. National Spectrum Requirements Report. NTIA estimates that 60 MHz of spectrum "is needed to serve the several million new MSS subscribers envisioned for the period

^{16/} Comments of API at 8.

^{17/} Industry Advisory Committee Report at 9.

^{18/} Comments of Association for Maximum Service Television, Inc. at 2.

^{19/} See e.g., 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"); 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 MHz and the 2483.5-2500 MHz Frequency Bands, 9 FCC Rcd. 5936 (1994) ("Big LEO MSS Licensing Order").

^{20/} PCS Reconsideration Order, 9 FCC Rcd. at ¶¶ 94 & 97.

beginning around the year 2004.^{21/} Given that the Commission and the ITU are contemplating a slightly longer time horizon (*i.e.*, 2005), that MSS growth is expected to occur exponentially, and that worldwide demand for global MSS must be considered, 70 MHz appears to be the minimum amount of MSS spectrum necessary to meet consumer demands for the next decade.

B. The Commission Should Not Delay These Allocations Until After WRC-95

The Commission should not delay allocating additional MSS spectrum until after WRC-95, but should proceed as quickly as possible in adopting its allocation proposals. Contrary to the contentions of a few parties, delay serves no beneficial purpose. These parties contend that delay will allow the U.S. to better coordinate U.S. and international MSS allocations, thus avoiding both unnecessary interference and the need to modify the U.S. spectrum allocations.^{22/} These concerns are unfounded.

Realistically, any allocations that the FCC makes as a result of this proceeding will not take effect until after WRC-95. Thus, by proceeding apace now, the FCC will not harm international coordination efforts, and in fact may assist those efforts by having a more concrete proposal to work with at WRC-95. Additionally, action now will put the U.S. MSS industry in a position to take full advantage of any international allocations when they are, in fact, agreed upon at the October Conference. If any changes are necessary as a result of the decisions reached at WRC-95, the Commission's proposals can be refined on reconsideration.

^{21/} NTIA Report at 59. NTIA's estimate of MSS spectrum needs should be considered as a minimum requirement since it was limited to the projected need for domestic voice services and apparently ignored the global applications that MSS is likely to provide.

^{22/} See Comments of API at 10-11; Comments of Comsat at 4-8; Comments of Constellation at 2; Comments of Ericsson at 3; and Comments of Loral at 7-8.

III. THE COMMISSION SHOULD LIMIT THE TECHNICAL RESTRICTIONS ON MSS SPECTRUM TO THOSE ESSENTIAL TO AVOIDING INTERFERENCE AND PROMOTING GLOBAL SERVICES

The Commission has consistently recognized that it should limit its technical restrictions on radio services to those essential to avoiding interference with other spectrum users. This philosophy is particularly important for new radio services -- such as global MSS -- where the imposition of excessive technical restrictions can handicap the development of innovative new products in emerging markets.^{23/} In general, the comments support Motorola's view that the Commission abstain from creating technical requirements that hinder the operation of these evolving MSS systems.^{24/}

A. The Spectrum Should Not be Allocated Exclusively to GSO MSS Systems

Motorola cannot support any proposal to limit any of the proposed MSS allocations exclusively to GSO satellites.^{25/} Such proposals would impose a needless restriction on the use of this spectrum. In fact, if any orbital restriction were placed on the 2 GHz band, it should be limited to the assignment of global LEO systems because of the likely worldwide nature of the MSS allocations.

^{23/} See, e.g., decisions creating the Personal Communication Service, Tentative Decision and Memorandum Opinion and Order, 7 FCC Rcd 7794 ¶ 5 (1992); Second Report and Order, 8 FCC Rcd 7700 ¶¶ 135-137 (1993); Memorandum Opinion and Order, 9 FCC Rcd 4957 ¶¶ 162-163 (1994); Third Memorandum Opinion and Order, 9 FCC Rcd 6906 ¶¶ 65-66 (1994); creation of the IVDS service, In the Matter of Amendments to Part 0, 1, 2 and 95 of the Commission's Rule to Create the Interactive Video and Data Service, Report and Order, 7 FCC Rcd 1630 ¶¶ 21-23 (1992).

^{24/} Motorola's position on technological restrictions is reflected in the comments of Ericsson Corporation. "The underlying rational[sic] for a market-based [technical] regulatory scheme is that system operators are best able to gauge their own needs and those of their subscribers. As long as rules are in place to prevent interference between licensees, the Commission should be as neutral as possible with respect to technology choices." Comments of Ericsson Corporation at 2.

^{25/} See Comments of Celsat at 18.

Celsat asks that the Commission reserve the entire 2 GHz allocation exclusively for GSO MSS systems, arguing that the Commission has already made "generous" allocations of MSS spectrum for LEO use at 1.6/2.4 GHz. Celsat also asks the Commission to impose a blanket prohibition on licensing any of the proposed spectrum to current licensees of MSS at the 1.6/2.4 and 1.5/1.6 GHz bands in order to promote market competition from new entrants.^{26/}

Celsat's comments, however, do not accurately reflect the nature of the evolving MSS marketplace. As Motorola noted in its initial comments, the need for MSS spectrum for either domestic U.S. or international systems far exceeds current allocations. For example, the IRIDIUM[®] System is authorized to operate over the United States with only 5.15 MHz in the 1.6 GHz band, less than half of the spectrum requested by Motorola in its application. The IRIDIUM System and the other licensed global LEO MSS systems will need additional spectrum by the beginning of the next decade to meet expected demand for their services in the United States.^{27/} Despite the shortage of existing international LEO MSS allocations, the Commission has recognized the "unique features" of LEO systems that make them optimal for providing global services:

While both LEO and GSO systems portend substantial opportunities for employment growth and export of U.S. technologies worldwide, LEO systems have greater potential to serve more uniformly the United States and international locations with smaller, more ubiquitous and lower power equipment.^{28/}

^{26/} Comments of Celsat at 4-6, 11.

^{27/} Comments of Motorola at 6-9; See also NTIA Report at 57-59.

^{28/} Big LEO MSS Licensing Order at 5946. The Commission also recognized that the sharing plan for the Big LEO applicants left "little or no spectrum available for expansion of existing systems or the future development of MSS systems within the United States." Id. at 5949. See also Comments of and Loral at 21.

Indeed, the proposed 2 GHz allocations would be more effectively used if they were assigned exclusively to LEO global systems to meet the expected demand for worldwide services, not national or regional GSO systems.^{29/}

It is also unnecessary for the Commission to consider any form of spectrum caps for MSS LEO licensees, let alone a prohibition of any additional spectrum for LEO MSS incumbents. The current LEO MSS licensees are in no position to warehouse spectrum when, in fact, the record amply demonstrates both the competitive nature of the market for mobile services -- both terrestrial and satellite-based -- and the nascent position of LEO MSS providers in this extremely competitive industry. As already noted, the existing LEO MSS licensees require additional spectrum to keep up with expected demand for this service. Moreover, existing rules are in place to prevent the spectrum "warehousing" that Celsat seems to fear.^{30/}

B. GSO and LEO MSS Systems Cannot Share the Same Spectrum

In its initial comments, Motorola indicated that global LEO and regional GSO MSS systems cannot operate on a co-frequency, co-coverage basis. That being the case, Motorola believed that GSO and LEO MSS systems should be assigned to different frequency bands within any MSS allocation the Commission might adopt. Several commenters agree that GSO and LEO systems cannot share the same spectrum, a conclusion that the Commission also reached in its Big LEO MSS Licensing decision.^{31/}

^{29/} See Comments of Constellation at 3.

^{30/} See, e.g., 47 C.F.R. §25.143(e).

^{31/} Big LEO MSS Licensing Order at 5946. See also Comments of Teledesic at 5-6; Comments of Newcomb at 7-9.

Pending the outcome of WRC-95, the amount of MSS spectrum available for global services is likely to be no more than 70 MHz in the 2 GHz band. Any spectrum that is ultimately allocated on a global basis should be reserved for the LEO systems that can take best advantage of the worldwide reach that such an allocation contemplates. Ample spectrum would remain for GSO systems that necessarily have only a national or regional span.^{32/} This position is supported by other parties to the proceeding.^{33/}

As an alternative to an outright reservation of globally-allocated 2 GHz MSS spectrum to LEO systems, the Commission could impose a minimum coverage requirement for any satellite system using spectrum reserved for MSS on a global basis. Such a requirement would ensure that this scarce allocation of global spectrum is used to its maximum extent by providers who intend to offer services worldwide.^{34/}

C. The Record Does Not Support the Imposition of a Particular Access Method or Power Limitations

The comments confront the Commission with conflicting views on various technical standards for the proposed 2 GHz MSS allocations. Motorola continues to oppose any technical requirement that imposes a particular access method or power limitations on these bands.

Two commenters urge the Commission to mandate the use of Code Division Multiple Access ("CDMA") in the 2 GHz MSS band and another commenter

^{32/} Motorola identified 70 MHz for national and regional MSS services in the 2500-2535 MHz and 2655-2690 MHz bands. Motorola Comments at 11. See also footnote 7 of Constellation's Comments.

^{33/} Comments of Constellation at 2-3; Comments of Teledesic at 8.

^{34/} Some type of minimum coverage requirement received wide support in the comments. See Comments of Comsat at 33; Constellation at 3; Loral at 22; TRW at 25.

voices support for this access method.^{35/} However, the majority of commenters do not support mandating any access method at this time.^{36/}

1. The Commission Has Repeatedly Refused To Mandate An Access Scheme For MSS

The Commission has had several opportunities to mandate CDMA or spread spectrum for MSS services and has consistently refused to do so. In the Little LEO MSS Allocation Order, Little LEO MSS Licensing Order, Big LEO MSS Allocation Order and Big LEO MSS Licensing Order,^{37/} the Commission concluded -- after reviewing substantial technical evidence and the reports of two Industry Advisory Committees -- that it could not discern a benefit of CDMA over other access methods that justified mandating CDMA use for MSS systems. In fact, the Commission has not required licensees to use CDMA (or any particular access method) for any radio service.

In its Little LEO MSS Allocation Order, the Commission recognized that the choice of access method could effect the technical feasibility of competitive systems to co-exist and to share spectrum with current users. Nevertheless, the Commission concluded that decisions on the type of access method should be made by each licensee as this would "foster competition and permit the commercial MSS licensees flexibility in coordinating their respective systems with the terrestrial

^{35/} Supporters of mandated CDMA use are CELSAT and TRW, while Newcomb prefers CDMA technology.

^{36/} These parties include Comsat, Ericsson, Loral and Motorola.

^{37/} In the Matter of Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum to the Fixed-Satellite Service and the Mobile-Satellite Service for Low -Earth Orbit Satellites, 8 FCC Rcd 1812 (1993) ("Little LEO MSS Allocation Order"); In the Matter of Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service, 8 FCC Rcd 8450 (1993) ("Little LEO MSS Licensing Order"); Big LEO MSS Allocation Order, 9 FCC Rcd 536 (1994); Big LEO MSS Licensing Order, 9 FCC Rcd 5936 (1994).

community."^{38/} The Commission was even more adamant in finding "no factual basis" for mandating a particular access technique for Little LEOs in its final operating rules:

Without experience, we do not know which technologies will even prove workable, much less preferable, as different services attempt to coexist within this particular spectrum. Further, we do not know how consumer demand for services will evolve in the NVNG MSS. In any event, it is not "efficient" to mandate at this time either use of a technology that may not work or a level of available service that may not be supported by the market.^{39/}

The Commission was again unwilling to choose among the different access methods when it first allocated spectrum for Big LEO MSS systems.^{40/} It later adopted a sharing plan that included both CDMA and TDMA/FDMA because "the record did not support a finding that one architecture is superior to the other" and the Commission's sharing plan would allow for multiple entry.^{41/}

2. The Comments in this Proceeding Provide No New Evidence as to the Superiority of CDMA For MSS

The Commission has reviewed calls to mandate CDMA in several past proceedings, as discussed above, but has declined to do so. In this proceeding, only Motorola has presented further technical evidence as to the merits (or lack thereof) of CDMA for MSS. This evidence substantiates Motorola's claim that CDMA MSS networks are not inherently more spectrum efficient than satellite systems using other

^{38/} Little LEO MSS Allocation Order at 1817.

^{39/} Little LEO MSS Licensing Order at 8456.

^{40/} Big LEO MSS Allocation Order at 540.

^{41/} Big LEO MSS Licensing Order at 5954. See also Comments of Ericsson at 2: "... individual licensees will be in a better position to determine the access technology that will best serve the needs of their subscribers...[I]t would be premature for government regulators to select a single access technology thus creating a de jure technical standard. Selection of one access technology over others will force operators into a technology decision which may prove inefficient."

modulation techniques. Nor does CDMA allow for multiple access without severe capacity limitations.^{42/}

Without the real world evidence that can only be gained by observing the operations of MSS systems, the Commission is in no better position to mandate an access methodology today than it was during its recent Little LEO and Big LEO deliberations. The Commission's conclusions in those proceedings are equally applicable to the proposed 2 GHz MSS band. Motorola once again urges the Commission to permit the marketplace to judge which access method will gain prominence in this MSS band as it did in its previous MSS decisions.^{43/}

IV. THE 2 GHZ MSS SPECTRUM CANNOT BE SHARED WITH BAS AND FS USERS OVER THE LONG TERM AND THE COMMISSION MUST DEVELOP A RELOCATION PLAN THAT IS FAIR TO BOTH INCUMBENTS AND NEW SERVICE PROVIDERS.

In its initial comments, Motorola agreed with the Commission's tentative conclusion that sharing the proposed MSS allocations with terrestrial broadcast auxiliary services ("BAS") and fixed microwave services ("FS") or between BAS and FS is not feasible. Motorola urged the Commission to plan now for the eventual relocation of all incumbent terrestrial users of the 2 GHz MSS band. Motorola also provided the Commission with several alternatives for relocating one or all of the BAS channels from the 1990-2025 MHz bands and the estimated costs of such relocation. Finally, Motorola urged the Commission to ensure that MSS licensees are not forced to incur more than their fair share of the costs of relocating BAS and FS licensees and that the

^{42/} See Comments of Motorola at 12-13, Appendix 1: "Total Capacity in a Shared CDMA LEOS Environment," Branimir R. Vojcic, Laurence B. Milstein and Raymond L. Pickholtz, IEEE Journal on Selected Areas in Communications, February 1995; See also Industry Advisory Committee Report, para. 3.3.2.1(a).

^{43/} The majority of the comments support Motorola's position that the Commission need not impose power limits for MSS satellites if all incumbent users of the band are relocated. See Comments of Comsat at 35-36; Loral at 22. TRW calls for a pfd at the earth's service of -137 dB. Such a limitation of pfd would be unnecessary if incumbent FS systems are cleared from the band.

costs of such moves are equitably shared among all of the MSS licensees who will benefit from incumbents' relocation from the 2 GHz band.

For the most part, the comments support Motorola's position on the prospects for sharing the MSS uplinks and downlinks with incumbent users as well as the ability of BAS and FS to share spectrum on a co-channel basis. The commenters also recognize the need to relocate BAS and FS incumbents in a fair and equitable manner that does not cripple the emerging MSS industry with burdensome costs.

A. Sharing Between FS and MSS Uplinks is Not Feasible

No commenters dispute the Commission's tentative conclusion that sharing of the 1990-2025 MHz Earth-to-space band between BAS users and MSS is not feasible. Motorola has reviewed Comsat's technical appendix as to the possibility of sharing between MSS uplinks and BAS.^{44/} It agrees with Comsat's conclusion that BAS transmissions in the 1990-2025 MHz band are not compatible with MSS satellite uplinks at 2 GHz and that BAS must be cleared from a portion of the band to provide for interference-free use by MSS uplinks.^{45/}

^{44/} See Comsat Comments at 8-10 and Appendix I.

^{45/} Motorola takes no position on the technical merits of Comsat's proposal to free uplink spectrum by retuning the center frequencies and bandwidth of the seven BAS/ENG channels at 1990-2110 MHz. Comsat comments at 19-20, Appendix 3. Motorola continues to believe that the most prudent and effective means of making this spectrum available for MSS use is the movement of all BAS users to higher bands. Motorola Comments at 19-21, Appendix II. In this regard, Motorola includes as Appendix I, additional information as to its earlier estimates of the cost of relocating BAS licensees. Moving BAS users to higher bands would be an especially appropriate alternative in light of the recent vote by the Senate to move BAS services to higher bands as a means of accommodating new mobile services. Pressler Amendment No. 1257 to S.652, 141 Cong. Reg. S-7928 (daily ed. June 7, 1995). Clearly, Comsat's retuning proposal would not make any sense if other BAS channels outside the MSS uplink band are moved to higher frequencies.

B. The Potential for Sharing MSS Downlinks With FS is, at Best, a Short Term Fix that is Not a Substitute for Instituting an FS Clearing Plan

In contrast to the unanimous positions of the commenters in regard to uplink sharing, the Commission was presented with conflicting views on sharing between MSS downlinks and FS in the 2160-2200 MHz band.^{46/}

At Appendix II of its initial comments, Comsat offers a summary description of a computer simulation that it claims demonstrates that MSS downlinks can share the 2 GHz band with incumbent FS users in the U.S. Comsat's conclusions are inconsistent with the studies of the ITU-R, as indicated in the CPM Report, and the findings of the FCC Industry Advisory Committee. Comsat provides insufficient details for its findings to be replicated. Moreover, the model has several inconsistencies and shortcomings that minimize the value of its conclusions.

Motorola continues to believe that sound spectrum management policies support the clearing of this band before MSS systems become operational.^{47/} As Motorola noted in its initial comments, the CPM Report found that several studies conclude that sharing between CDMA and analog FS systems as well as between FDMA/TDMA and typical FS systems could only be feasible "following detailed bilateral coordination." However, the CPM Report notes that long-term sharing between non-GSO MSS systems and FS "may become increasingly difficult and complex as

^{46/} Comsat Comments at Appendix 2. Loral does not definitively claim that MSS downlink sharing with FS is possible, but suggests that the Commission has not formed a sufficient record on the potential for MSS/BAS, MSS/FS or BAS/FS sharing and that a future Federal Advisory Committee would be the appropriate vehicle for resolving these issues. Loral Comments at 14-16. Celsat claims that its technology can co-exist with a "significant" number of microwave incumbents, but it does not supply the underlying technical basis for evaluating its claim. Celsat Comments at 9-10.

^{47/} The Association of American Railroads also recognizes the need to move FS from any bands shared with MSS or BAS. Significantly, no incumbent user of the FS bands suggested that sharing with MSS or BAS was feasible.