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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

RM 7806

In the Matter of	)	
	)	
Amendment of Parts 2, 22 and 25 of the Commission's Rules to Allocate Spectrum for the Mobile Satellite Service	)	RM-
	)	
In the Matter of the Applications of	)	
	)	
Ellipsat Corporation	)	File No. 11-DSS-P-91(6)
	)	
Motorola Satellite Communications, Inc.	)	File Nos. 9-DSS-P-91(87) CSS-91-010

PETITION OF
AMERICAN MOBILE SATELLITE CORPORATION

American Mobile Satellite Corporation ("AMSC"), by its attorneys, hereby requests that the Commission: (i) allocate the frequencies at 1616.5-1626.5 MHz and 1515-1525 MHz to the Mobile Satellite Service ("MSS"); (ii) assign the frequencies to the United States MSS system; and (iii) dismiss or deny the above-referenced applications of Ellipsat Corporation ("Ellipsat") and Motorola Satellite Communications, Inc., ("MSCI").[1]

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[1] AMSC has filed these requests in a single document because the issues raised in each of the matters are strongly related. Section 1.44 of the Commission's rules permits parties to combine more than one request into a single pleading if all of the requests are to be acted on by the Commission itself. AMSC expects that all the issues raised herein will be (continued...)

The common thread running through these requests is that, in light of the current international shortage of spectrum for MSS systems, this spectrum is best used for the development of the already-authorized U.S. MSS system. To demonstrate the practicality and benefits of integrating the bands into the planned U.S. MSS system, AMSC is attaching a specific proposal (Exhibit A) that describes how AMSC would use the frequencies.[2] The proposal demonstrates that AMSC can add the frequencies to its satellites at very little cost and use the spectrum to provide substantial additional capacity. AMSC urges the Commission to dismiss or deny the Ellipsat and MSCI applications because, as demonstrated below, these are extremely speculative

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[1](...continued)
addressed by the Commission itself. To the extent that the Commission delegates any of these requests to its staff, AMSC requests a waiver of the rule. At a minimum, the request to deny the Ellipsat and MSCI applications should be considered timely filed.

[2] In a separate filing today, AMSC also is submitting this proposal as a formal application in order to preserve AMSC's rights in connection with the cut-off provisions of the Commission's recent Public Notice. Report No. DS-1068, DA 91-407 (April 1, 1991). In its Public Notice, the Commission accepted for filing the applications of Ellipsat and MSCI and established a deadline for the filing of competing applications to use the frequencies proposed by these applicants.

and technically-deficient applications.[3] As discussed below, the Ellipsat and MSCI systems must operate with such limited power that they have virtually no capacity or, if they operate at their proposed power levels, they will violate international standards and interfere with a large number of existing and planned users of the band.

Background

The MSS Proceeding. From the Commission's initial decision to allocate spectrum to a Mobile Satellite Service to meet the need for high-quality mobile communications in rural and remote areas, the Commission has held the view that the service will require at least 20 MHz of spectrum for a U.S. system to be economically viable and provide a full range of services. See Notice of Proposed Rulemaking ("NPRM"), in Gen. Docket No. 84-1234, 50 Fed. Reg. 8149, paras. 9-11 (February 28, 1985).[4] Based

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[3] As the licensee of the U.S. MSS system, a proponent of the reallocation of the RDSS bands to MSS, and an applicant for the 1616.5-1626.5 MHz band, AMSC has standing as an interested party. For a discussion of the impact of the recent Court of Appeals decision in Aeronautical Radio, Inc. v. FCC, 928 F.2d 428 (D.C. Cir. 1991) on AMSC's license, see Comments of AMSC, Gen. Docket No. 84-1234, pp. 11-15 (April 11, 1991); Reply Comments of AMSC, Gen. Docket No. 84-1234, pp. 11-16 (April 23, 1991).

[4] Twenty megahertz is a small amount of spectrum relative to what the Commission allocates to other satellite and mobile services. Fixed Satellite Service and Direct Broadcast Satellite Service systems each operate with several hundred megahertz of spectrum. Terrestrial-based mobile communications services similarly have been allocated hundreds

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on this estimate and the Commission's understanding of the difficulty of identifying spectrum for a U.S. system, the Commission concluded that it should license only one MSS system. Id., para. 23; Second Report and Order in Gen. Docket No. 84-1234, 2 FCC Rcd 485, paras. 4-8; recon. denied, Memorandum, Opinion and Order in Gen. Docket No. 84-1234, 4 FCC Rcd 6029.[5] The Commission also cited the high cost and risk of building an

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[4](...continued)
of megahertz of spectrum by the Commission. Even the smallest rural cellular system has more than 24 MHz of spectrum.

In part because of the shortage of spectrum for the service, MSS technology is very spectrum efficient. The typical voice channel in AMSC's system will require no more than 6 kHz; current cellular systems use 30 kHz channel spacing.

The Commission anticipated that the geosynchronous MSS system would provide a broad range of services, including voice and data communications in rural and remote areas, aeronautical mobile communications and position location services. NPRM, para. 46 and Appendix E. The system being built by AMSC will be capable of providing all of these services.

[5] There are a number of reasons for the Commission to adopt a policy of licensing an MSS system for the U.S., rather than relying on foreign systems for service. Perhaps the most important is the need to retain U.S. ownership of vital communications facilities such as the MSS system. The U.S. MSS system is expected to be used to provide sensitive communications to, among others, local, state and federal government agencies. A separate U.S. system is also an efficient way to provide service to the large American market. By licensing a separate system, the Commission is best able to insure that the U.S. market gets its fair share of the limited available spectrum.

MSS system as a factor in its decision to license only one system. NPRM, para. 23.[9]

Subsequent events have confirmed the virtue of the Commission's decision to license one MSS operator. The shortage of MSS spectrum has become even more severe since the Commission made its initial decision. Most significantly, the International Maritime Satellite Organization ("Inmarsat") has begun an aggressive expansion effort that includes the construction of a spectrum inefficient third-generation system for which it is attempting to coordinate access to the entire MSS band at 1530-

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[9] Other factors included the relative ease with which the Commission could coordinate internationally on behalf of a single MSS system and the improved efficiency of a single system operator providing priority access to aviation safety communications. Memorandum Opinion, Order and Authorization in Gen. Docket No. 84-1234, 4 FCC Rcd 6041, para. 49 (1989).

The Commission's current allocation to MSS requires the system operator to provide priority access to aviation safety communications throughout the 1545-1559/1646.5-1660.5 MHz band. This requirement has the effect of restricting AMSC's ability to guarantee priority access in these bands to land mobile and maritime mobile safety communications, such as rural ambulances and the Coast Guard. These land mobile and maritime mobile safety users are expected to comprise a large share of AMSC's market.

While the Commission licensed only one MSS operator, at the same time it recognized that substantial competition would be provided by other services. Second Report and Order, 2 FCC Rcd 485, para. 34; Memorandum Opinion and Order, 4 FCC Rcd 6029, paras. 43-46. In addition, the Commission took the precaution of regulating the MSS operator as a streamlined common carrier and of requiring the system operator to provide non-discriminatory access to resellers. Second Report and Order, 2 FCC Rcd 485, para. 34.

1559 MHz and 1626.5-1660.5 MHz.[7] In addition, Canada, Mexico and the Soviet Union have plans to build MSS systems that will severely restrict the U.S. system's access to the MSS band, and numerous other foreign MSS systems are in some degree of planning. All told, there are at least 35 MSS satellites vying to use the existing MSS bands in or near North America. Various estimates have been made of the size of the additional allocation required for MSS, ranging from 44.8 MHz to 175.4 MHz.[8]

In order to ameliorate the international spectrum shortage, AMSC and others have been exploring the possibilities for additional MSS allocations to be made by the 1992 World Administrative Radio Conference. Among the most prominent of the bands that have been identified by the Commission for additional MSS allocations are the bands currently assigned to the Radiodetermination Satellite Service ("RDSS") at 1610-1626.5 MHz (Earth-to-space) and 2483.5-2500 MHz (space-to-Earth).[9] Both Canada and Inmarsat suggested a reallocation of a ten megahertz

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[7] See AMSC Petition to Deny, File No. CSS-91-001-LA (November 13, 1990).

[8] Document JIWP 92/110-E, CCIR Joint Interim Working Party WARC-92 (March 12, 1991); Third Interim Report of Ad Hoc Group C of IWG-2, Mobile Satellite Services, Section 2.1 (February 14, 1991).

[9] See Second Notice of Inquiry, Gen. Docket No. 89-554, para. 70 (October 1, 1990).

portion of the RDSS uplink at 1616.5-1626.5 MHz to MSS that would be paired with a new downlink band.[10]

There also is support for an allocation to MSS of a downlink band immediately below 1530 MHz. The 1435-1530 MHz band is predominantly used in the United States for aeronautical telemetry. The Commission has proposed that the U.S. should support an allocation to MSS at the 1992 WARC of the 1525-1530 MHz band.[11] This downlink band could be used to match the current uplink allocation at 1626.5-1631.5 MHz.[12] The allocation of the 1515-1525 MHz band to MSS is particularly attractive because these frequencies can be implemented easily and inexpensively with existing MSS allocations. An MSS allocation in the 1515-1530 MHz band would have little impact on aeronautical telemetry operations, since some geographic and time

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[10] See Report of the CITEL, 1992 World Administrative Radio Conference Interim Working Group, at Section 2.2.4.a.2 (May 10, 1991); Mobile Satellite Services at L-band, prepared by Inmarsat, Doc. JIWP 92/17-E at 1 (February 20, 1991). As discussed below, the principal problem with the current RDSS downlink band is that RDSS or MSS operation in the band would have extremely limited capacity as a result of meeting the power limits that have been established in order to avoid interference to other services using the band.

[11] Second Notice of Inquiry, Gen. Docket No. 89-554, para. 68 (October 1, 1990).

[12] An MSS allocation at 1525-1530 MHz is also supported by the administrations that are members of CITEL, which consist of countries in the Western Hemisphere, and members of CEPT, which represents European countries. See Report of the CITEL, 1992 World Administrative Radio Conference Interim Working Group, Section 2.2.4.a.2 (May 10, 1991); WARC-92, Revised Provisional View of the CEPT, Annex D (March 6, 1991).

sharing between MSS and aeronautical telemetry is possible and other telemetry systems could operate in the remaining 80 MHz (1435-1515 MHz) or in the aeronautical telemetry band at 2310-2390 MHz. Brazil, Canada and Inmarsat support MSS allocations in the 1515-1525 MHz band.[13] Based on the records of the International Frequency Registration Board, the 1515-1525 MHz band is used in Canada and Mexico by at most a few fixed systems. If necessary, a U.S. MSS system could be coordinated to operate without interference with these foreign systems.

It is unlikely that the WARC will allocate to MSS more than ten megahertz of paired spectrum that can be used in the near future in the United States. There are other proposals for new MSS allocations, such as 1850-1990 MHz, 2110-2130 MHz, 2160-2180 MHz and 2410-2450 MHz, but there are significant numbers of existing systems using these bands in North America, making it more likely that these additional bands would be used for the development of MSS systems elsewhere in the world, at least in the near future.

AMSC has made substantial progress in its efforts to construct and launch the U.S. MSS system. With a strong ownership in place, including subsidiaries of such communications industry leaders as Hughes Aircraft Company, McCaw Cellular

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[13] See Report of the CITEL, 1992 World Administrative Radio Conference Interim Working Group, at Section 2.2.4.a.2 (May 10, 1991); Mobile Satellite Services at L-band, prepared by Inmarsat, Doc. JIWP 92/17-E at 1 (February 20, 1991).

Communications, Inc., and Mobile Telecommunications Technologies Corp., AMSC has begun construction of the first of its satellites and has an agreement with Telesat Mobile, Inc., the Canadian MSS licensee, to develop similar satellites and ground segment facilities, and to provide backup and restoration to each other's system. AMSC also has contracted with Comsat to develop the ground segment specifications for the U.S. MSS system, and this work is due to be completed in September, 1991. AMSC is awaiting Commission authorization to begin offering an interim service using limited capacity on the Marecs-B satellite. AMSC is also planning the design of a second generation satellite that will provide additional frequency reuse. (See Exhibit B, attached hereto.) Despite this progress, however, the development of the U.S. MSS system still faces significant uncertainty and risk, among the most critical of which is the amount of available spectrum.

The RDSS Proceeding. The efforts to establish the Radiodetermination Satellite Service began at approximately the same time as the efforts to establish MSS.[14] Indeed, Geostar received its RDSS license in 1986, fully three years before AMSC received its license.[15] Nonetheless, there has been far less

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[14] See Petition for Rulemaking of Geostar Corporation, RM-4426 (March 31, 1983); Applications of Geostar Corporation, File Nos. 2191/2192/2193/2194-DSS-P/LA-84 (March 31, 1983).

[15] Memorandum Opinion, Order and Authorization, 60 RR 2d 1725 (1986).

progress towards the launch of an RDSS system than is the case with MSS.

One of the principal problems faced by RDSS has been that other, existing uses of its frequencies severely limited their utility. Internationally and domestically, the RDSS downlink band is widely used for fixed services, typically point-to-point microwave systems, and is part of the Industrial, Scientific and Medical ("ISM") allocation (2400-2500 MHz), which includes millions of microwave ovens. As a result, the 1987 Mobile Services WARC adopted a severe limit on the power of RDSS downlinks and required RDSS systems to accept any interference generated by fixed service systems or by ISM equipment.[16]

Parts of the uplink band are similarly problematic. Radio astronomy operates sensitive radio observatories in the United States and abroad in the 1610.6-1613.8 MHz band. The Soviet Union and the International Civil Aviation Organization are developing a global navigation satellite system called "Glonass," that will operate worldwide in the 1610-1616.5 MHz band. Internationally, the entire uplink band is also allocated to fixed services, although there are no fixed service operations in the band in the United States. To protect existing and planned uses of the uplink band, the 1987 WARC adopted a power limit for the uplink band and a coordination requirement for airborne and

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[16] RR Article 28, Nos. 2556-2559; RR Article 8, No. 752.

terrestrial RDSS terminals operating within 400 km and 100 km, respectively, of countries using the band for terrestrial services.[17] To protect radio astronomy further, the Commission imposed a requirement that RDSS terminals in the vicinity of a radio astronomy facility restrict their operations to brief intervals timed to avoid interference with radio astronomy observations.[18]

In addition to the technical limits on RDSS systems, the Commission established other restrictions, in part to preserve the opportunity for several RDSS systems to share the same frequencies.[19] These include required use of psuedo-random-noise codes; use of random access time division multiplex techniques and limitation of communications to short bursts by relegating non-RDSS services provided by RDSS systems to ancillary status. As a result of all these limits, however, RDSS systems have very

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[17] RR Article 28, No. 2548a; RR Article 11, No. 1107.2.

[18] Report and Order, Gen. Docket Nos. 84-689 and 84-690, 58 RR 2d 1416 (1985) at Appendix D.

[19] The requirement of multiple entry in licensing RDSS systems has always been an integral part of the Commission's RDSS policies. See Notice of Proposed Rulemaking in Gen. Docket Nos. 84-689 and 84-690, 49 Fed. Reg. 36512, paras. 33-34 (September 18, 1984); Second Report and Order, 104 FCC 2d 650, 660 (1986); Memorandum Opinion, Order and Authorization, File No. 1705-DSS-MP/ML-87, paras. 17-18 (August 28, 1987); Memorandum Opinion and Order, File Nos. 1145-DSS-MP/ML-89, et al, DA 91-528, paras. 12-13 (April 30, 1991).

little potential capacity.[20] Moreover, the requirement to operate in short bursts with random access to facilitate multiple entry means that voice service cannot be provided. RDSS Second Report and Order, 104 FCC 2d 650, Appendix B (1986). The Commission also limits RDSS systems to the provision of position location service and communications services that are "ancillary" to the provision of position location services.[21]

Four entities, including Geostar, filed applications to provide RDSS and all were granted. Soon thereafter all but Geostar had relinquished their authorizations. Geostar persisted in its efforts, spending at least $125 million in the process, but ultimately was required to file for bankruptcy $48 million in debt.[22]

At this point, with Geostar's bankruptcy, the only remaining applicants for the RDSS spectrum are Ellipsat and MSCI, both of which propose to use the RDSS spectrum to provide Mobile

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[20] See Comments of AMSC, Gen. Docket No. 89-554, Technical Appendix, p. 11 (April 12, 1991).

[21] Radiodetermination is defined as the determination of position, or the obtaining of information relating to position, by means of the propagation properties of radio waves. Radionavigation is radiodetermination used for purposes of navigation, including obstruction warning, and radiolocation is radiodetermination for purposes other than those of radio navigation. See Section 2.1 of the Commission's rules.

[22] See "Geostar Shut Down as GRP Cites FCC, Customs Service Decision"; Mobile Satellite Reports, May 17, 1991, at 1.

Satellite Service and neither of which conforms to the Commission's RDSS rules.

The Application of Ellipsat Corporation. On November 2, 1990, Ellipsat Corporation filed an application to construct Ellipso I, an elliptical orbit satellite system consisting of six small satellites, based on Amateur Satellite technology, each of which is expected to have a three-year useful life. Ellipsat proposes to operate in the 1610-1626.5/2483.5-2500 MHz bands, providing domestic mobile voice service and a form of position location service. Ellipsat claims that customers of existing cellular telephone systems will be able to access its satellites by adding a piece of equipment to their existing mobile radios at a cost of only three hundred dollars. With its Ellipso I service, Ellipsat estimates that it can serve 25,000 customers.

Ellipsat claims that the cost to construct, launch, and operate its system for one year is under $27 million, including preoperational expenses and ground segment. Ellipsat provides a balance sheet showing assets of $20,000 and letters from two venture capital companies, Venture First Associates and ITR Group, Inc., stating that if the Ellipsat system is authorized and certain other conditions are met, they might be able to put together financing.

Application of Motorola Satellite Corporation, Inc. On December 3, 1990, Motorola Satellite Corporation, Inc. ("MSCI") filed an application for what it calls the Iridium system, a

constellation of 77 low-earth orbit satellites. MSCI's application is for authority to provide two-way mobile voice and data communications and position location service throughout the world. MSCI claims that its system will be uniquely capable of providing mobile service to small, hand-held units and of avoiding the delays inherent in communications using geosynchronous satellites.[23] MSCI proposes to operate both its uplinks and downlinks in the 1610-1626.5 MHz band, but states that additional L-band spectrum will be required by the end of the decade to meet projected demand for the service. Id. p. 2. Motorola also is requesting 400 MHz of spectrum in the 22/32 GHz bands for inter-satellite crosslinks and in the 20/30 GHz for feeder links.

MSCI estimates that it will serve several million subscribers, the large majority of which will be located in foreign countries. Id. p. 34. MSCI concedes that it must obtain separate grants of authority from foreign administrations and an allocation at the 1992 WARC, but it requests that the Commission grant its application now in order to improve its chances of securing these other actions. Id. pp. 105-108.

MSCI estimates the cost of construction, launch and operation of the MSCI system to be more than $3.7 billion through 1997, the first year of proposed service. Id. p. 115. MSCI

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[23] Application of MSCI, p. 14.

states that it is willing to finance this cost with funds provided by Motorola Inc., its parent corporation. Id. p. 115-116. Press reports, however, indicate that Motorola's business plan is to rely on joint venture partners to finance the construction and operation of its proposed system. See The Associated Press, June 26, 1990, The Los Angeles Times, April 2, 1991, at D1, Col. 4. Companies in Great Britain, Australia, Hong Kong and Japan have been mentioned as potential partners. Id.

Discussion

I. The Commission Should Allocate the 1616.5-1626.5 MHz and 1515-1525 MHz Bands to Mobile Satellite Service

A. The Spectrum is Needed for Mobile Satellite Service

As should be clear from the above background information, the Commission's policy of licensing a viable MSS system to provide service to the United States is in serious jeopardy due to the shortage of L-band spectrum. A large number of foreign systems have submitted notices to the International Frequency Registration Board seeking to use the spectrum that the Commission has assigned to AMSC. The 1992 WARC presents an opportunity to alleviate the current congestion, but the conference is likely to allocate only a small amount of additional spectrum that could be used in the United States in the near future.

AMSC therefore urges the Commission to make the best use possible of the RDSS bands by reallocating the RDSS uplink band to MSS and pairing the band with ten megahertz below 1530 MHz. As demonstrated by the proposal contained in Exhibit A, AMSC is prepared to integrate these new bands into its system as soon as they become available. As a result, AMSC is optimistic that the U.S. system can gain access to a significant portion of the new MSS allocation. This, plus the allocation of additional MSS spectrum at the WARC that might be useful outside North America, should provide relief from the immediate spectrum shortage.

B. AMSC Can Use The Additional Spectrum Efficiently

The proposal in Exhibit A demonstrates the practicality and the benefits of allocating this additional spectrum to MSS and assigning it to the U.S. system. Because the bands are contiguous to an existing MSS allocation, the U.S. MSS system can add this band to its satellites at a cost of as little as $1 million per satellite and no more than $10 million per satellite. The cost of adding these frequencies to the mobile equipment also would be insignificant.

This additional capacity presents an opportunity for AMSC to provide non-preemptible service to public safety users such as rural ambulance services, law enforcement agencies, and disaster relief services. Currently, AMSC must provide priority and preemptive access for aeronautical safety services in the 1545-

1559/1646.5-1660.5 MHz bands, and thus is unable to guarantee non-preemptible service to land mobile and maritime mobile safety customers. Additional spectrum will help to solve this problem.

AMSC also will provide high-quality position location service. Using receivers adapted for the Global Positioning Service, AMSC's customers will be able to secure instant position location information that is accurate to within fifty meters. As discussed in the Technical Appendix this is superior to the Ellipsat and MSCI service, though MSCI also proposes to offer GPS.

AMSC can offer service using higher power than Ellipsat or MSCI. This is because AMSC will not operate in the 2483.5-2500 MHz band, in the 1610-1616.5 MHz band, or outside the United States, where fixed services are located.

AMSC's use of the spectrum will result in much more capacity being available to the U.S. public than would result from its assignment to either Ellipsat or MSCI. As much as 3600 channels will be added to AMSC's system. As demonstrated in the attached Technical Appendix, the Ellipsat and MSCI systems would have much less capacity than claimed. Ellipsat's modified Amateur Satellite would be able to serve no more than five users at a time and Motorola would have no more than ten channels in the United States.

MSCI claims that its proposed system is uniquely spectrum efficient, offering substantial frequency reuse and capacity when

compared with geostationary MSS systems. These claims are without merit. AMSC has demonstrated that geostationary MSS systems are as efficient as low-Earth orbit systems.[24] For example, AMSC has shown that geostationary MSS systems can flexibly provide capacity in accordance with demand, whereas low-Earth orbit systems are severely constrained in this regard. Thus, AMSC can serve many more customers dispersed non-uniformly across the country than could a low-Earth orbit system using the same amount of spectrum. Id.

In addition, AMSC expects that the next generation of MSS systems will provide even greater spectrum efficiency. The system design presented in Exhibit B includes satellite antennas that are 45 feet in diameter, having footprints on the Earth that are smaller than the footprints of MSCI's proposed system. The additional power of this next generation system will permit AMSC to offer service to hand-held units.

C. There is No Point to Preserving an RDSS Allocation

The bankruptcy of Geostar and the filing of MSS applications by Ellipsat and MSCI demonstrate conclusively that the market will not support a satellite system that is devoted principally to position location services. Simply put, it is extremely difficult to finance a multi-million dollar satellite system that

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[24] Reply Comments of AMSC, Gen. Docket No. 89-554, Technical Appendix, p. 7, Exhibit 6 (January 8, 1991).

cannot generate significant revenue from providing data and voice communications.

It is clear that Ellipsat and MSCI do not conform to the Commission's RDSS rules. See Technical Appendix, pp. 21-26.

AMSC opposes the use of waiver requests. Ellipsat and MSCI have done nothing to demonstrate that there are circumstances unique to their applications which require a waiver.[25] Instead, the Commission should proceed by reallocating the spectrum to MSS and maximize the utility of the spectrum by assigning it to AMSC.

D. The 1515-1525 MHz Band is an Appropriate MSS Downlink

As discussed earlier, there are significant problems with the 2483.5-2500 MHz band that require the Commission to allocate a different downlink band to MSS to match with the 1616.5-1626.5 MHz band. These problems include PFD limits that protect existing fixed users. In addition, there is a serious problem with microwave ovens and other ISM devices operating throughout the 2400-2500 MHz band.[26]

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[25] The proponent of a waiver request has a heavy burden to overcome. It must "plead with particularity the facts and circumstance which warrant such action." Rio Grande Radio v. FCC, 406 F.2d 6664, 666 (D.C. Cir. 1968). See also Station WHTR, 47 RR 2d 1130 (1980).

[26] See Comments in Gen. Docket No. 89-554 of Fusion Systems Corporation, International Microwave Power Institute, Dow Chemical, Amana, Omnipoint Data Communications, Raytheon, James River Corporation, CEM Corporation, Carolyn Dodson, Inc., Enersyst Development Center, Inc., Schwan's, Cober Electronics, APV, and University of Washington.

For this reason, AMSC recommends that the Commission allocate a new downlink to be paired with the 1616.5-1626.5 MHz band, the 1515-1525 MHz band being the most suitable of the candidate bands. This allocation would have a minimal impact on aeronautical telemetry users who could operate in the remaining 80 MHz below 1515 MHz or in the aeronautical telemetry band at 2310-2390 MHz. Internationally, AMSC will be able to coordinate, if necessary, with fixed systems operating in Canada and Mexico to ensure that there will not be interference.

In addition, because the allocation would be contiguous to existing MSS allocation, it could be added to the AMSC satellites and mobile earth stations at a minimal cost. As noted above, when paired with the 1616.5-1626.5 MHz band, these additional frequencies will yield up to 3600 channels in one satellite beam and even more channels among multiple spot beams, permitting AMSC to provide a wider variety of services, including position location service, and making AMSC's services more attractive to providers of land mobile distress and safety services.

If the Commission is unwilling to reallocate the 1515-1525 MHz band to MSS, then AMSC recommends that the Commission consider a 10 megahertz section of either the 1850-1990 MHz, 2110-2130 MHz or 2160-2180 MHz bands. All of these bands have been proposed for MSS allocations by the Commission in the WARC proceeding. However, these bands are not as desireable as the 1515-1525 MHz band because they are not proximate to the existing

allocations and thus will be more costly to implement. In addition, it appears that reaccomodation of existing users in the 1515-1525 MHz band will be less problematic than in these other proposed bands because of the volume of users and the types of equipment in use.

II. The Applications of Ellipsat and MSCI Should Be Dismissed or Denied

A. The Applications Are Technically Deficient

As discussed in detail in the attached Technical Appendix, there are serious technical problems with the Ellipsat and Motorola applications. These problems include the violation of existing domestic and international limits on the power of RDSS systems operating in these bands. As a result of this excess power and other design elements, the Ellipsat and Motorola systems would cause severe harmful interference to existing users of the bands in which they propose to operate. In addition, there is strong evidence that the proposed systems would be extremely unreliable, although the applicants must provide further information before a thorough analysis of this issue can be completed. MSCI's system, with its proposal to orbit 77 satellites through the polar region, also creates a problem of potential space collisions, with the attendant risk of creating hazardous space debris. To make matters worse, Iridium satellites have an expected lifetime of only five years; thus, overtime, there will be many more than 77 Iridium satellites posing collision hazards.

1. Excess power and harmful interference

The most obvious problem with the Ellipsat and MSCI applications is their violation of the rules of the Commission and the International Telecommunication Union prescribing certain power limits on RDSS systems operating in the 1610-1626.5 MHz and 2483.5-2500 MHz bands. Both Ellipsat and MSCI violate these limits substantially. As a result, Motorola and Ellipsat would interfere with a large number of fixed services systems, radio astronomy observatories, and the planned Glonass navigation system, all of which operate in at least portions of the 1610-1626.5 MHz band. In addition, Ellipsat would interfere with fixed, mobile and radiolocation systems in the 2483.5-2500 MHz band and MSCI, which proposes to operate feeder links in the 20/30 GHz bands, would interfere with Fixed Satellite Service systems.[27]

These power and interference problems do not appear to be remediable. If the power of the proposed systems is reduced to the acceptable levels, they will have dramatically less capacity. For instance, the MSCI system would have roughly one tenth of a percent of its stated capacity if it were to operate at the

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[27] In addition, as shown in the Technical Appendix, the Ellipsat and MSCI systems would preclude the licensing of other similar systems and would significantly reduce the ability for true RDSS systems to operate in these bands. Technical Appendix, pp. 21-26. Thus, they are totally inconsistent with the Commission's efforts to provide for multiple entry.

required power level compatibility with radio astronomy and radionavigation satellite systems.

A geostationary satellite system providing service in North America would not have these same interference problems as long as its operations are limited to the upper ten megahertz of the 1610-1626.5 MHz band. This is because all radio astronomy and radionavigation facilities operate or plan to operate in the lower part of the band and there are no fixed service operations in the upper portion of the band in North America.

2. Reliability

The Ellipsat and MSCI applications also present serious reliability problems. Based on the available information, it appears that users of the systems would experience frequent and prolonged outages. For instance, it appears that neither system design can provide enough battery power to permit operation at night when the solar arrays are not illuminated. At a minimum, these problems would preclude the use of the systems for safety communications. Although it is clear that a substantial reliability problem exists for the two systems, further information is required in order to understand the full severity of the problem. See Space Station Filing Requirements, 93 FCC 2d 1260, 1265 Appendix B, Section II.9 (1983).

3. Space Debris

In a previous filing, AMSC has demonstrated that a substantial risk exists that MSCI's proposed system will cause collisions in or below the orbital sphere at 765 km altitude that could destroy any of the critical strategic communications satellites, military surveillance satellites, search and rescue satellites, weather observation satellites, scientific satellites or Earth resources satellites that operate in the same or lower orbital spheres. See Reply of AMSC, Gen. Docket No. 89-554, Technical Appendix, at 4-6, Exhibit 5 (January 8, 1991). The earlier filing is incorporated herein by reference. MSCI has responded in only the most perfunctory fashion to these concerns.[28] This is not a silly issue that is the concern of some "fringe" element that is opposed to technological progress. Quite to the contrary, it has been recognized as a problem by, among others the Office of Technology Assessment. As such, it clearly merits a more thoughtful reply.

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[28] See Supplemental Comments of Motorola, Gen. Docket No. 89-554, p. 6 (March 27, 1991). In partial recognition of the potential for collision, Motorola has proposed a space traffic control system that will prevent collision between Motorola satellites. However, this space traffic control center is totally inadequate because it ignores all of the many other objects that also orbit the Earth in this sphere.

B. The Applications Are Speculative

AMSC is not opposed to competition. Indeed, AMSC expects to face competition in many areas of the domestic market from terrestrial mobile radio systems such as rural cellular and from other satellite systems, such as the Qualcomm Ku-band system and VSAT systems. In the international market and some parts of the domestic market, AMSC will face competition from Inmarsat and other foreign systems. Thus, AMSC is not opposed to the Ellipsat and MSCI applications because they present possible competition. Rather, AMSC opposes the applications because they are unrealistic proposals and, thus, a grant of either application would result in the warehousing of spectrum that AMSC needs and could put to good use in the near future.

As discussed above, the Ellipsat and MSCI applications have serious technical deficiencies that call into question their legitimacy. Equally important, however, their business plans are based on speculative and unreasonable assumptions. Ellipsat, for instance has been able to demonstrate no committed financial resources other than a balance sheet of $20,000. MSCI presents a similarly speculative application; one that is all the more troubling because of its excellent corporate reputation. Despite that reputation, however, the Commission cannot grant MSCI's application without first assuring itself that the technology is adequately developed, the approach being taken is a practical