

FEDERAL COMMUNICATIONS COMMISSION
INTERNATIONAL BUREAU
SATELLITE ENGINEERING BRANCH
SATELLITE & RADIO COM. DIVISION

FILE NO: 681-DSE-MP/L -95 ()
FEE NO: 8160277-007 CALL SIGN: E900081-
SITE-ID:

DATES: FILED: 02/21/1995 LOGGED: 03/01/1995 UPDATED: 08/03/1995 PUBLIC NOTICE: / /

APPLICANT: AMSC SUBSIDIARY CORPORATION
SITE ADDRESS: 30,000 Mobile Earth Stations
INFORMATIVE: This modification was granted by Order and Authorization, DA 95-1701, dated August 1, 1995.

APPLICANT CODE: AMSC
COUNTY: (30,000 units) STATE:
COORDINATES

LAT
LONG

STATUS: AC -08/01/1995- -JS INTERIM ACTION: - / / - / / - - / /
CURRENT STATION AUTHORIZATION: 420-DSE-P/L -90 SERVICE CODES: DLM, -MES-C-TR
ENVIRONMENTAL ACTION: POINTS OF COMMUNICATION: AMSC-1,,,,,
''''''

CONDITIONS: 2932

FREQUENCIES (MHz)	POL	EMISSION	EIRP (dBW)	EIRP DEN. (dBW/4kHz)	ASSOCIATED ANTENNA(S)	SPECIAL PROVISIONS
1. R 1530.0000-1559.0000	C	1K20GID				
2. R 1530.0000-1559.0000	C	2K40GID				
3. R 1530.0000-1559.0000	C	4K80GID				
4. R 1530.0000-1559.0000	C	9K60GID				
5. T 1626.5000-1660.5000	C	1K20GID	14.00			
6. T 1626.5000-1660.5000	C	2K40GID	17.00			
7. T 1626.5000-1660.5000	C	4K80GID	20.00			
8. T 1626.5000-1660.5000	C	9K60GID	23.00			

RECORD OF COMMISSION ACTION

() APPROVED () DISMISSED () DENIED () SURRENDERED () APPROVED AS MODIFIED ABOVE
BY *See order* ON *8/11/95* PURSUANT TO AUTHORITY DELEGATED BY

COMMISSION ACTION REPORTED TO APPLICANT BY

DATA ENTRY:	DATE: / /	REFERRED TO:	DATE: / /	ON
FEES:	/ /	REFERRED TO:	/ /	
APP. COMPLETE:	/ /	REFERRED TO:	/ /	
TECHNICAL:	/ /	REFERRED TO:	/ /	
LEGAL:	/ /	REFERRED TO:	/ /	

UNITED STATES OF AMERICA
 FEDERAL COMMUNICATIONS COMMISSION
RADIO STATION AUTHORIZATION

(page 1)

CALL SIGN: E900081
 FILE NO.: 681-DSE-MP/L-95

NAME: AMSC SUBSIDIARY CORPORATION

MODIFIED CONSTRUCTION PERMIT AND LICENSE

COMMON CARRIER

DATE OF GRANT: AUGUST 1, 1995

NATURE OF SERVICE: DOMESTIC LAND MOBILE-SATELLITE SERVICE

EXPIRATION DATE: JANUARY 21, 2002

CLASS OF STATION: MOBILE EARTH STATION

LOCATION OF STATION:

LATITUDE LONGITUDE

STATION ADDRESS: 30,000 Mobile Earth Stations
 ((30,000 units) County),

SUBJECT TO THE PROVISIONS OF THE COMMUNICATIONS ACT OF 1934, THE COMMUNICATIONS SATELLITE ACT OF 1962, SUBSEQUENT ACTS AND TREATIES, AND ALL PRESENT AND FUTURE REGULATIONS MADE BY THIS COMMISSION, AND FURTHER SUBJECT TO THE CONDITIONS AND REQUIREMENTS SET FORTH IN THIS PERMIT AND LICENSE, THE GRANTEE IS AUTHORIZED TO CONSTRUCT, USE AND OPERATE THE RADIO FACILITIES DESCRIBED BELOW FOR RADIO COMMUNICATIONS FOR THE TERM BEGINNING JANUARY 21, 1992 (3 A.M. EASTERN STANDARD TIME) AND ENDING JANUARY 21, 2002 (3 A.M. EASTERN STANDARD TIME). THE REQUIRED DATE OF COMPLETION OF CONSTRUCTION IS JANUARY 21, 1997. GRANTEE MUST FILE WITH THE COMMISSION A CERTIFICATION UPON COMPLETION OF CONSTRUCTION.

1. PARTICULARS OF OPERATIONS

FREQUENCIES (MHz) AND POLARIZATION	EMISSION	EIRP DENSITY		ASSOCIATED ANTENNA(S)	SPECIAL PROVISIONS (REFER TO FCC FORM 488-A)
		EIRP (dBW)	(dBW/4kHz)		
1. 1530.000- 1559.000 L,R	1K20G1D	- - -	- - -		
2. 1530.000- 1559.000 L,R	2K40G1D	- - -	- - -		
3. 1530.000- 1559.000 L,R	4K80G1D	- - -	- - -		
4. 1530.000- 1559.000 L,R	9K60G1D	- - -	- - -		
5. 1626.500- 1660.500 L,R	1K20G1D	14.00	14.00		
6. 1626.500- 1660.500 L,R	2K40G1D	17.00	17.00		
7. 1626.500- 1660.500 L,R	4K80G1D	20.00	20.00		
8. 1626.500- 1660.500 L,R	9K60G1D	23.00	23.00		

2. FREQUENCY COORDINATION LIMITS

Frequency Limits (MHz)	Satellite Arc (Deg. Long.)		Elevation (Degrees)		Azimuth (Degrees)		Max. EIRP Density to Horizon (dBW/4kHz)	Associated Antenna(s)
	East Limit	West Limit	East Lim.	West Lim.	East Limit	West Limit		
1. 1530.000- 1559.000	15.0W	-183.5W	-	-	-	-		
2. 1626.500- 1660.500	15.0W	-183.5W	-	-	-	-		

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

RADIO STATION AUTHORIZATION

(page 2)

CALL SIGN: E900081
FILE NO.: 681-DSE-MP/L-95

RECEIVING SYSTEM NOISE TEMPERATURE:

RECEIVING SYSTEM NOISE TEMPERATURE (Continued):

240 KELVIN AT DEGREES ELEVATION AND MHz

3. POINTS OF COMMUNICATIONS -- THE FOLLOWING SPACE STATIONS LOCATED IN THE GEO-STATIONARY SATELLITE ORBIT CONSISTENT WITH SECTIONS 1 AND 2 OF THIS LICENSE:
a. satellite(s)

4. TRANSMITTING EQUIPMENT

UNITS MANUFACTURER	MODEL NUMBER	OUTPUT POWER-WATTS
1. 1 to be determined	to be determined	20.0

5. ANTENNA FACILITIES

		SITE/ELEVATION:		METERS AMSL
UNITS	DIAMETER (Meters)	FEED MANUFACTURER	MODEL NUMBER	MAX. ANT. HT. (Meters)
1. 1	0.15	OTHR to be determined	TO BE DETERMINED	AMSL
		MAXIMUM GAIN(S): 5.0 dBi at 1 GHz	5.0 dBi at 1 GHz	AGL
2. 1	0.40	OTHR to be determined	TO BE DETERMINED	AMSL
		MAXIMUM GAIN(S): 14.0 dBi at 1 GHz	14.0 dBi at 1 GHz	AGL

6. REMOTE CONTROL POINT:

LOCATION: 1233 20TH STREET, N.W., SUITE 301
WASHINGTON

CALL SIGN:

, DC 20036-

7. ANTENNA STRUCTURE MARKING AND LIGHTING REQUIREMENTS: NONE

ATTACHED FCC FORMS 488-A AND 488-B (STANDARD PROVISIONS) ARE INCORPORATED INTO THIS AUTHORIZATION. SPECIAL PROVISION REFERENCE NUMBERS ARE LISTED IN SECTION 1 ABOVE; GENERAL PROVISION REFERENCE NUMBERS ARE AS FOLLOWS:

(1): 2932

FEDERAL COMMUNICATIONS COMMISSION
INTERNATIONAL BUREAU

ANTENNA DATA REPORT

SEND TO: ANTENNA SURVEY BRANCH
DATE FILED: 02/21/1995

RETURN TO: SATELLITE ENGINEERING BRANCH
ATTN: JS

APPLICANT: AMSC SUBSIDIARY CORPORATION

ANALYSIS RECORD

FILE NUMBER: 681-DSE-MP/L -95 CALL SIGN: E900081
SITE-ID:

RECEIVED:

SITE LOCATION ADDR: 30,000 Mobile Earth Stations
COUNTY: (30,000 units)
CITY/STATE: ,

RETURNED:

HELD FOR FAA ACTION:

COORDINATES: ' ' LAT ' ' LONG

FAA ACTION/FILE:

SITE ELEVATION: FEET

COMPLETED:

MAXIMUM ANTENNA HEIGHT: 1st FEET (AGL)
2nd FEET (AMSL)

REVIEWED:

ACTION:

- NEW EARTH STATION ANTENNA
 MODIFICATION OF EXISTING EARTH STATION ANTENNA

TO BE COMPLETED BY ANTENNA SURVEY BRANCH

17.7 NOTIFICATION CRITERIA (FILE NOTICE OF PROPOSED CONSTRUCTION WITH FAA
ON FORM FAA-7460-1)

- (A) PROPOSED ANTENNA STRUCTURE EXCEEDS 200 FEET IN HEIGHT AGL
 (B) (1) EXCEEDS 100:1 SLOPE FOR AN AIRPORT WITH A RUNWAY OF MORE
THAN 3,200 FEET IN LENGTH (EXTENDS 20,000 FEET)
 (2) EXCEEDS 50:1 SLOPE FOR AN AIRPORT WITH RUNWAYS NO MORE THAN
3,200 FEET IN LENGTH (EXTENDS 10,000 FEET)
 (3) EXCEEDS 25:1 SLOPE FOR A HELIPORT. (EXTENDS 5,000 FEET)
 (C) SITE IS WITHIN AIRPORT BOUNDARY.
 (D) SITE IS IN INSTRUMENT APPROACH AREA AND APPEARS CRITICAL.

17.14 EXEMPTION FROM NOTICE: (A) 20 FOOT CRITERIA (B) SHIELDING

AIRPORT: ELEVATION AND LONGEST RUNWAY:

ANTENNA HEIGHT ABOVE AIRPORT: DISTANCE FROM RUNWAY:

FAA ACTION REQUIRED: YES
 NO

OBSTRUCTION CRITERIA EXCEEDED: YES
 NO

NO OBSTRUCTION MARKING REQUIRED: YES
 NO

FAA ACTION: CLEARED
 DISAPPROVED

MARKING REQUIRED, FORM 715

REMARKS:

FEDERAL COMMUNICATIONS COMMISSION
INTERNATIONAL BUREAU

ANTENNA DATA REPORT

SEND TO: ANTENNA SURVEY BRANCH
DATE FILED: 02/21/1995

RETURN TO: SATELLITE ENGINEERING BRANCH
ATTN: JS

APPLICANT: AMSC SUBSIDIARY CORPORATION

ANALYSIS RECORD

FILE NUMBER: 681-DSE-MP/L -95 CALL SIGN: E900081
SITE-ID:

RECEIVED:

SITE LOCATION ADDR: 30,000 Mobile Earth Stations
COUNTY: (30,000 units)
CITY/STATE: ,

RETURNED:

HELD FOR FAA ACTION:

COORDINATES: ' ' LAT ' ' LONG

FAA ACTION/FILE:

SITE ELEVATION: FEET

COMPLETED:

MAXIMUM ANTENNA HEIGHT: 1st FEET (AGL)
2nd FEET (AMSL)

REVIEWED:

ACTION:

- NEW EARTH STATION ANTENNA
 MODIFICATION OF EXISTING EARTH STATION ANTENNA

TO BE COMPLETED BY ANTENNA SURVEY BRANCH

17.7 NOTIFICATION CRITERIA (FILE NOTICE OF PROPOSED CONSTRUCTION WITH FAA
ON FORM FAA-7460-1)

- (A) PROPOSED ANTENNA STRUCTURE EXCEEDS 200 FEET IN HEIGHT AGL
 (B) (1) EXCEEDS 100:1 SLOPE FOR AN AIRPORT WITH A RUNWAY OF MORE
THAN 3,200 FEET IN LENGTH (EXTENDS 20,000 FEET)
 (2) EXCEEDS 50:1 SLOPE FOR AN AIRPORT WITH RUNWAYS NO MORE THAN
3,200 FEET IN LENGTH (EXTENDS 10,000 FEET)
 (3) EXCEEDS 25:1 SLOPE FOR A HELIPORT. (EXTENDS 5,000 FEET)
 (C) SITE IS WITHIN AIRPORT BOUNDARY.
 (D) SITE IS IN INSTRUMENT APPROACH AREA AND APPEARS CRITICAL.

17.14 EXEMPTION FROM NOTICE: (A) 20 FOOT CRITERIA (B) SHIELDING

AIRPORT: ELEVATION AND LONGEST RUNWAY:

ANTENNA HEIGHT ABOVE AIRPORT: DISTANCE FROM RUNWAY:

FAA ACTION REQUIRED: YES
 NO OBSTRUCTION CRITERIA EXCEEDED: YES
 NO

NO OBSTRUCTION MARKING REQUIRED: FAA ACTION: CLEARED
 DISAPPROVED

MARKING REQUIRED, FORM 715

REMARKS:

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

In re Application of)	
)	
AMSC SUBSIDIARY CORPORATION)	File No. 681-DSE-MP/L-95
)	
For Modification of its Blanket License to)	
Construct and Operate 30,000 L-Band Mobile)	
Earth Stations)	

ORDER AND AUTHORIZATION

Adopted: August 1, 1995

Released: August 1, 1995

By the Chief, International Bureau:

I. INTRODUCTION

1. AMSC Subsidiary Corporation has launched its first satellite. It now seeks to use that satellite to serve its customers, replacing the satellite capacity it is leasing from its competitors. Toward that end, AMSC has filed an application to modify its current interim authorization, which permits it to operate up to 30,000 data mobile earth terminals (METs) to provide land mobile-satellite service (LMSS).¹ Its interim authorization permits the use of facilities leased from Comsat and Inmarsat in the lower L-band (1530-1544/1626.5-1645.5 MHz).² This modification application requests authorization to shift the LMSS service to AMSC's own satellite, AMSC-1.³

2. We grant AMSC's application in part, subject to certain technical and operational conditions in keeping with prior Commission decisions. In conjunction with our earlier authorization for AMSC to operate 200,000 voice METs,⁴ this authorization permits AMSC to expand its range of

¹ See In the Matter of the Application of American Mobile Satellite Corporation for Blanket License for 30,000 Mobile Earth Stations, 7 F.C.C. Rcd. 942 (1992) (Blanket Authorization).

² Comsat has been authorized to lease Inmarsat space segment capacity on the Marisat F-1 AOR (Atlantic Ocean Region) satellite located at 106° W.L. and to lease an earth station at Southbury, Connecticut to AMSC for this service. See Blanket Authorization, supra, at para. 3.

³ Public Notice of the application appeared on March 8, 1995 (Report No. DS-1512, page 2). Petitions and comments were filed by the Federal Aviation Administration (FAA), Aeronautical Radio, Inc. (ARINC), Motorola Satellite Communications, Inc., and TRW, Inc. Loral/QUALCOMM Partnership, L.P. filed its informal comments late, but in the interest of a full record we will consider them.

⁴ See note 8, infra.

services using its AMSC-1 space segment, and completes a major step in the creation of competition in the provision of messaging service on a worldwide basis.

II. BACKGROUND

3. In the Blanket Authorization, AMSC was authorized to operate 30,000 low data rate METs anywhere in the United States for domestic LMSS communications using Inmarsat's Marisat F-1 AOR satellite, pending dedication of AMSC's own satellite system. That order also required AMSC, Rockwell, and other domestic LMSS providers⁵ to file a transition plan with the Commission within 90 days after launch of AMSC's satellite to assure a smooth and expeditious migration of domestic LMSS traffic to the upper L-band (1545-1559/1646.5-1660.5 MHz) AMSC system.⁶ The Commission imposed no other technical requirements on LMSS terminals.⁷

4. AMSC now seeks authority to operate a total of 30,000 METs on a permanent basis through its AMSC-1 space segment. It currently operates some 3100 METs in the lower L-band using leased Inmarsat facilities. Of these, AMSC asks to move 1900 to the upper L-band. It seeks to continue serving the other 1200 in the lower L-band through AMSC-1, since they are only capable of operating in the lower L-band. AMSC says it will use the remainder of its permanently authorized 30,000 METs in the upper L-band for future growth.

5. AMSC states that the technical specifications for its data METs, which are essentially Inmarsat "Standard-C" units, are the same as those discussed in the Blanket Authorization. AMSC says the change is only that the terminals will use the AMSC-1 space segment (instead of Inmarsat) and operate over a different range of frequencies. Other than the 1200 existing METS which can operate only in the lower L-band, the 30,000 METs for which AMSC seeks permanent authority will be capable of operating in both the lower L-band and in the upper L-band, where AMSC is now authorized to operate its satellite.⁸

⁵ Rockwell International Corporation was similarly authorized to operate 15,000 METs as a customer of AMSC. Blanket Authorization, supra. Other interim LMSS providers were also authorized, subject to obtaining a lease from Comsat to access Inmarsat space station capacity. Id.

⁶ This application is filed pursuant to this requirement.

⁷ See Blanket Authorization, supra. See also In the Matter of the Application of American Mobile Satellite Corporation for Blanket License for 30,000 Mobile Earth Stations, 8 F.C.C. Rcd. 6310 (1993) (30,000 METs Reconsideration).

⁸ See AMSC Licensing Order, 4 F.C.C. Rcd 6041 (1989), Final Decision on Remand, 7 F.C.C. Rcd. 266 (1992); aff'd sub nom. Aeronautical Radio, Inc. v. FCC, 983 F.2d 75 (1993) (authorization to provide services in the upper L-band). See also 200,000 METs Blanket, File 2823-DSE-P/L-93, DA-95-482, released March 13, 1995 (authorization to use up to 200,000 voice METs in the upper L-band). We stated, at para. 13 of the 200,000 METs Blanket, that "This MET operating authorization . . . encompasses operation only in the frequencies 1545-1559/1646.5-1660.5 MHz [the upper L-band]." The issue of AMSC's permanent use of the lower L-band for its services is pending in File No. 59-DSS-MP-MP/ML-93. In view of the complex policy and legal issues associated with that proceeding, and the lack of any detailed justification by AMSC, we deny AMSC's request at note 3 of the subject application for Special Temporary Authority to operate its 30,000 METs in the lower L-band. However, we will grant AMSC Special Temporary Authority so that it can continue to operate its extant METs using its AMSC-1 space segment.

6. In both the upper L-band and the lower L-band, Mobile Satellite Service (MSS) operators such as AMSC must be able to provide "real-time preemptive capability" for certain safety and distress services.⁹ In the upper L-band, the relevant safety-related service is the Aeronautical Mobile Satellite (Route) Service (AMS(R)S), while in the lower L-band the relevant service is the Global Maritime Distress and Safety System (GMDSS). AMSC's proposal to transition its METs from the lower L-band to the upper L-band thus requires us to determine whether AMSC's new METs are consistent with the safety requirements of a different range of frequencies, in which somewhat different safety considerations may apply.

III. DISCUSSION

7. We will modify AMSC's authorization to permit operation of up to 30,000 METs in the upper L-band, on the condition that those METs provide real-time preemptive capability as described in this Order. However, as we discuss below, we will not authorize AMSC's operation of its existing 3100 METs in the upper L-band because of concerns expressed by aeronautical authorities over the real-time preemptive capabilities of these terminals. Instead, we will allow AMSC to continue operating its existing METs in the lower L-band temporarily, until it can introduce METs that satisfy the concerns of the aeronautical community. We will also grant AMSC special temporary authority to operate AMSC-1 in the lower L-band so that the existing METs can migrate to AMSC's own satellite as required by our prior orders.

8. Upper L-band and Real-Time Preemption. The upper L-band is allocated to both Mobile Satellite Service (MSS) and AMS(R)S, which governs safety-related communications and regularity of aircraft flight. In its AMSC Licensing Order, the Commission required AMSC to incorporate into its overall system design whatever minimum requirements for aeronautical satellite communications systems are endorsed internationally through the International Civil Aviation

transition to the upper L-band.

⁹ Section 2.106 of the Commission's Rules contains the Table of Frequency Allocations. The Table includes footnotes which denote stipulations applicable to both U.S. Government and non-Government stations. Each such footnote contains the "US" prefix. Other footnotes in the Table apply to international spectrum use; these do not contain a prefix. Footnote US308 states that in the 1549.5-1558.5/1651-1660 MHz bands the AMS(R)S requirements that cannot be accommodated in the 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz and 1660-1660.5 MHz bands shall have priority access with real-time preemptive capability with respect to communications in the MSS. Systems not interoperable with AMS(R)S shall operate on a secondary basis. Account shall be taken of the priority of safety-related communications in the MSS. Note 729A states generally that, notwithstanding any other provision of the Radio Regulations relating to restrictions in the use of the bands allocated to AMS(R)S for public correspondence, the bands 1545-1555 MHz and 1646.5-1656.5 MHz may be authorized by administrations for public correspondence with aircraft earth stations. Note 730C, which applies to United States domestic service, states that the band 1555-1559/1656.5-1660 MHz is allocated to MSS on a primary basis subject to the conditions that AMS(R)S shall have priority access and immediate availability over all other mobile-satellite communications within a network operating under this provision; mobile-satellite systems shall be interoperable with the AMS(R)S; and account shall be taken of the priority of safety-related communications in the other MSS services.

Organization.¹⁰

9. This issue was also raised in the 200,000 METs proceeding, following intervention of the Federal Aviation Administration (FAA) and the National Telecommunications and Information Administration (NTIA) on the matter of protection of safety-related communications and distress communications in the upper L-band.¹¹ In the 200,000 METs Order, the Commission conditioned AMSC's use of the upper L-band on several operational/technical conditions, including:

- (1) All METs that do not continuously monitor a separate signalling channel shall have provision for signalling within the communications channel; and
- (2) Each MET shall automatically inhibit its transmissions on any or all channels receiving a channel-shut-off command on a signalling or communications channel it is receiving from its associated Land Earth Station.¹²

The voice METs at issue in 200,000 METs complied with these conditions. Both the voice METs and AMSC's operating system function in a "full-duplex" mode (i.e., simultaneous transmission and reception of signals) permitting preemption of MSS for AMS(R)S traffic on a virtually instantaneous basis.¹³ This comports with ITU Regulations Footnote 730C, which requires immediate availability of AMS(R)S, and Footnote US308, which requires real-time preemptive access for AMS(R)S.¹⁴

10. AMSC states that its data terminals will operate in a "half-duplex" mode -- that is, they cannot receive signals while they are transmitting. The instruction to the data MET to cease transmitting comes from a land earth station on a TDM (time division multiplexed) carrier, but the MET cannot act on that instruction while it is transmitting. In a worst-case situation, a data MET could transmit for as long as several minutes, though AMSC's data indicate that in 99% of cases the data MET transmissions are 4 or fewer seconds in duration.

11. NTIA and FAA object to AMSC's request because the 30,000 AMSC METs are half-duplex rather than full-duplex terminals. FAA says this means they cannot comply with Footnote US308 to the U.S. Table of Allocations, or with Footnote 730C of the ITU's table of frequency allocations, which require immediate preemption of non-AMS(R)S for AMS(R)S transmissions. FAA recommends that the FCC: (1) require that AMSC METs be modified for full-duplex operation, with real-time preemptive capability, or (2) grant authority for AMSC to allow continued use of extant terminals with the AMSC-1 satellite in the lower L-band only.

¹⁰ See AMSC Licensing Order, *supra*.

¹¹ 200,000 METs Blanket, *supra*.

¹² *Id.*, para. 18.

¹³ See Supplemental Letter to Secretary, FCC from Chief Scientist, AMSC, dated March 23, 1995, at 3. See also Letter to Secretary, FCC from Senior Scientist, AMSC, dated June 20, 1995.

¹⁴ See Section 2.106 of the Commission's Rules, 47 C.F.R. § 2.106.

12. ARINC agrees with FAA and NTIA that the most critical issue in the development of MSS capabilities was the ability of METs to remain "under control" of the system and to be responsive to directions to cease transmission should the spectrum be needed for AMS(R)S. ARINC states that despite AMSC's acknowledgement that the METs for which it now seeks authorization are subject to preemption for AMS(R)S, the application does not "meet these requirements."¹⁵ The AMSC application, ARINC asserts, reveals that the AMSC METs will transmit in response to a time-division-multiplex forward channel from the AMSC's control center, but during transmission cannot be interrupted. This period, ARINC states, can be up to 7.5 minutes in duration. ARINC concludes that AMSC's METs violate the conditions of the NTIA/FAA requirement for immediate cessation of transmissions should AMS(R)S need access to the frequencies. Moreover, ARINC notes, the AMSC METs cannot be shut down by AMSC in the event they are subject to a "stuck carrier."¹⁶ ARINC states that without the ability to provide preemptive access, the AMSC METs could prevent transmission of critical aeronautical safety communications traffic and are therefore not interoperable with the AMS(R)S, as required. ARINC states further that the FCC should consult with NTIA and FAA prior to issuing any authorization to AMSC.¹⁷

13. In its Consolidated Reply and Opposition, AMSC states that 99.8% of the data messages on its current service using over 7,000 METs (3100 AMSC and 4000 Rockwell) are less than 9 seconds in length, with 99 percent of transmissions less than four seconds, though technically the maximum length of a transmission could be 7.5 minutes. AMSC further states that it can send a signal to the terminals which will automatically limit the maximum length of transmissions to ten seconds.¹⁸ Thus, AMSC suggests that the vast majority of data transmissions, even on half-duplex terminals, could be preempted in seconds. More fundamentally, AMSC argues that a number of features of its overall system, working together, enable the AMSC *system* to provide real-time preemption even though not every AMSC *terminal* can do so. AMSC states that its Network Operations Center will continuously monitor not only the data traffic, but also voice traffic and all other types of traffic on the AMSC system. The Network Operations Center will allocate frequencies to these various networks, taking frequencies away from lower-priority users and giving them to higher-priority users, such as AMS(R)S users. In addition, the Network Operations Center will always maintain a "reserve pool" of unoccupied frequencies, which can be allocated to AMS(R)S without preempting any other user. Furthermore, AMSC states that the data METs at issue here are expected to occupy less than ten percent of the total spectrum AMSC can access as a result of international coordination. The vast majority of its frequencies will be used by its voice METs, which are full-duplex terminals and can be preempted almost instantly. AMSC also says that there is no existing or planned satellite-based domestic aviation safety system using the upper L-band.

14. The time required to transfer resources to an aviation safety network will vary but AMSC states that all the satellite resources of data networks can be shifted to an aviation safety

¹⁵ ARINC Petition at 4.

¹⁶ *Id.* at 6. "Stuck carrier" refers to a transmitter that is erroneously switched to the transmit mode for an extended period.

¹⁷ Also see TRW Comments at 5.

¹⁸ AMSC Technical Appendix at 5.

system within less than 48 seconds, and most within less than 12 seconds.¹⁹ AMSC asserts that neither FAA nor ARINC has presented any evidence to refute the practical feasibility of the AMSC basic approach.²⁰ AMSC claims that the key determinant in preemption of its METs is the time required by the terminal protocols to insure a shut-off response of the outbound signalling channel. It asserts that the METs' typical transmissions are so short that their length will have "no impact on the amount of time required to shift resources to an AMS(R)S network."²¹

15. AMSC also opposes the options proposed by the FAA. It states that modifying the METs to make them full-duplex is too expensive, some \$500 per terminal, with a major design required that would take a year to complete. The only option is to replace the terminals, which would cost several thousand dollars each and "cause tremendous disruption."²² The other option proffered by FAA, limiting operations to the lower L-band, AMSC terms a reasonable short-term approach.²³

16. In its Reply, ARINC asserts that statistical explanations are not enough, and that in the 48 second interval AMSC says may be required to implement preemption, two aircraft closing at 1200 mph may collide. ARINC adds that placing half-duplex equipment in a portion of the band amounts to band segmentation, and that MSS terminals "have never been proven to be capable of yielding frequencies for higher priority transmissions."²⁴

17. The primary question before us with regard to preemption is whether AMSC's statistical, systematic approach to achieving real-time preemption satisfies Footnotes US308 and 730C. We cannot conclude that it does. AMSC's engineering defense of its "systemic" approach to real-time preemption is convincing, and we might well accept it were it not for the vigorous opposition of NTIA. However, the aeronautical community was very much opposed to any band-sharing between commercial services such as AMSC's and safety-related services such as AMS(R)S. The current "generic" MSS allocation in the upper L-band was adopted only after aeronautical interests were assured that all licensed MSS systems would provide real-time preemptive access to spectrum. While AMSC's arguments that it has satisfied this condition are reasonable, we are reluctant to overrule NTIA -- and its concern that accepting these arguments would be perceived by the aeronautical community as a breach of the agreement which permitted the MSS allocation. Therefore, we conclude that AMSC may not use its half-duplex METs in the upper L-band at this time. We proceed to discuss whether AMSC may continue to operate its data METs in the lower L-band, as suggested by FAA and NTIA.

18. Lower L-band and preemption. Just as footnote US308 protects AMS(R)S in the

¹⁹ AMSC at 8.

²⁰ Id. at 13.

²¹ Id. at 14.

²² Id.

²³ Id. at 17.

²⁴ ARINC Reply at 5.

upper L-band. US315 is intended to protect maritime mobile-satellite distress and safety communications domestically by providing priority access and real-time preemptive capability for distress and safety communications.²⁵ The language of US315 is sufficiently similar to US308 that we cannot conclude that US308 requires full-duplex METs but US315 does not. We are therefore inclined to believe that AMSC (like Inmarsat, Mexico, and others) currently provides mobile satellite service in the lower L-band frequencies using METs that do not comply fully with the requirements of Footnote US315 to Section 2.106 of the Commission's Rules. The low data rate "Standard C" terminal and similar models used by AMSC and others do not operate in a full-duplex mode and therefore are not capable of real-time termination of METs transmission (i.e., they cannot interrupt a transmission once it has commenced).

19. However, the maritime distress and safety services have been operational for years and are sufficiently robust and dynamic to permit us to consider less rigorous enforcement of US315 than we must require for the aeronautical services under US308. The aeronautical distress and safety-related services are untested and are potentially more time-sensitive than their maritime counterparts due to higher aeronautical vehicle velocities. We also note that the half-duplex MMSS METs currently in use have not adversely affected the effectiveness of the Global Maritime Distress and Safety System (GMDSS), although operation of the GMDSS began only three years ago and is not fully implemented. In the next two years, however, there may be a substantial increase in the number of MMSS METs in use worldwide.

20. Based on AMSC's statistical analysis of average message length and related information, we believe that, under current conditions, existing data METs in the lower L-band will provide sufficient distress and safety communication priority to comply with the intent of US315. For these reasons we believe it appropriate to issue a temporary waiver of Footnote US315 to Section 2.106 of our Rules. This waiver will continue to require AMSC to operate on a secondary basis to, and avoid harmful interference to, GMDSS. These METs also must avoid harmful interference to maritime distress and safety communications, e.g., GMDSS.²⁶ Further, the waiver applies only to METs currently used by AMSC, and only insofar as they are used to access AMSC's space segment. The waiver will terminate two years from release of this order. In this way, we can be reasonably assured that when MMSS METs are more prevalent and GMDSS preemption therefore potentially more urgent, the requirements of US315 will be followed strictly.²⁷ We will condition our waiver on

²⁵ US315 states as follows: In the frequency bands 1530-1544 MHz and 1626.5-1645.5 MHz maritime mobile-satellite distress and safety communications, e.g., GMDSS, shall have priority access with real-time preemptive capability in the mobile-satellite service. Communications of mobile-satellite system stations not participating in the GMDSS shall operate on a secondary basis to distress and safety communications of stations operating in the GMDSS. Account shall be taken of the priority of safety-related communications in the mobile-satellite service.

²⁶ AMSC states that it is working with the U.S. Coast Guard to meet requirements established by the International Maritime Organization, which oversees GMDSS, to permit the U.S. to certify AMSC as a participant in the GMDSS. According to AMSC, that process should be complete within one to two years.

²⁷ At the end of the waiver period no AMSC data METs will be in the lower L-band, unless the Commission so authorizes it in the lower L-band proceeding. This will complete implementation of the transition plan required by our Blanket Authorization. We expect transition of all AMSC METs from Inmarsat space segment to AMSC-1 by the end of 1995, as stated in Letter to Secretary, FCC from Regulatory Counsel,

AMSC maintaining its continued use of its AMSC Network Operations Center management and operational standards as set forth in its application and pleadings. We will also require AMSC to maintain the current message-length statistics as indicated in its application and pleadings.

21. Lower L-band emission suppression. Motorola and Loral argue, independently of US315, that AMSC should not be permitted to operate its METs in the lower L-band because of the danger that out-of-band emissions from AMSC's METs will interfere with the "Big LEO" service. Motorola had agreed that out-of-band emission by AMSC at line-of-sight distances from IRIDIUM's terminals "could interfere with the IRIDIUM system."²⁸ Motorola further stated that the secondary status of IRIDIUM's downlinks in this band cannot "protect [AMSC] from further scrutiny" because AMSC also will interfere with IRIDIUM's uplinks, and because the temporary authority sought by AMSC for use of the lower L-band does not permit interference with an authorized user of the spectrum, whether primary or secondary.²⁹ On June 28, 1995, however, Motorola submitted a letter by which it withdrew its opposition on this issue. Motorola now states that the terminals being manufactured for AMSC "will not cause unacceptable interference to the IRIDIUM System in the spectrum assigned to it so long as AMSC's terminals operate in the Earth-to-space direction above 1631.5 MHz."³⁰ While Motorola and AMSC appear to have resolved their technical differences on the out-of-band issue, Loral still objects. We must, therefore, respond to the arguments raised.

22. Loral states that AMSC's technical analysis regarding out-of-band emissions into the 1610-1626.5 MHz band "remains speculative because there are no technical rules for operation in the lower L-band."³¹ Loral further states that use of METs by AMSC in the lower L-band, prior to adoption of service rules and technical standards in that band, would necessitate coordination with users of licensed systems in the 1610-1626.5 MHz band. This, it concludes, "would prejudice coordination."³² For the extant 5,000 lower L-band METs, AMSC "should present a 'transition plan' to its dedicated system as the Commission requested in the grant of interim authority. This transition plan should, as contemplated by that Order, detail the manner in which AMSC will move these users from the lower L-band to the upper L-band, Loral adds. No transition plan is needed for the 25,000 nonoperational METs because it would be absurd to 'transition' nonoperational METs authorized to use spectrum for which AMSC holds no license."³³

23. AMSC asserts that Motorola and Loral vastly exaggerate the danger of interference.³⁴

AMSC, dated July 6, 1995.

²⁸ Motorola Reply at 7.

²⁹ Id. at 7-8.

³⁰ Motorola Letter at 1.

³¹ Id.

³² Id. at 3.

³³ Id., Loral Reply at 4.

³⁴ Id. at 23.

AMSC also asserts that its METs fully comply with the Commission's rules and "have considerably lower out-of-band emissions than terminals that are operating or will operate in the lower L-band on MSS systems of Inmarsat, Canada, Mexico, Australia, and others."³⁵ AMSC includes a technical appendix that purports to show technical compliance with preemption requirements and out-of-band emissions.

24. Section 25.202(f) of the Commission's Rules contains the out-of-band emissions limits that apply to the instant case. Quite apart from Motorola and AMSC's agreement, we note that there is nothing in the record that clearly demonstrates that the emission limitations of Section 25.202(f) do not adequately protect the adjacent services for the vast majority of imaginable cases. Moreover, at this time we do not know whether AMSC will operate on a permanent basis in the lower L-band or, if it does, precisely what frequencies it will use. While AMSC appears to have agreed to remain above 1631.5 MHz, there may be changes due to the complexities of satellite coordination with other countries' systems. As a general matter, we believe that further questions concerning out-of-band emissions should in the first instance be addressed by the parties themselves.³⁶ In sum, we believe that any perceived potential for interference should be resolved in a cooperative way, based on technical analysis and discussion among the users of the spectrum.

25. Operation of AMSC-1. Our limited, temporary waiver of US315 does not, by itself, enable AMSC to complete the transition of its current users from Inmarsat space segment to AMSC's own satellite, because AMSC-1 is not licensed to operate in the lower L-band. In light of our determination that the lower L-band is the only portion of the spectrum in which AMSC's data METs can operate, we must consider whether AMSC must continue to serve those METs via leased Inmarsat space segment, or whether instead we should, *sua sponte*, grant AMSC Special Temporary Authority to operate AMSC-1 in the lower L-band for the purpose of serving existing METs.³⁷

26. AMSC's application included a request for authority to continue operating 1200 terminals in the lower L-band even if we permitted AMSC to move the rest of its METs into the upper L-band. TRW opposed that request on the specific ground that AMSC has no authority to operate METs via its own space segment in the lower L-band. TRW states that the Commission granted AMSC the authority to construct up to 30,000 METs to be capable of operating in the upper L-band, authorizing AMSC to operate on an interim basis in the lower L-band via Inmarsat space segment "until AMSC's upper L-band dedicated domestic mobile satellite service (MSS) is ready."³⁸ TRW alleges that AMSC is attempting to obtain operating authority in the lower L-band which the Commission has specifically denied it. Moreover, TRW argues, it would be competitively

³⁵ Id. at 24.

³⁶ There is nothing in our rules that precludes Motorola and AMSC from discussing methods for preventing or reducing anticipated interference. To that extent, we encourage the parties to work together to solve their potential interference problems. See Section 21.100(d) of the Rules.

³⁷ See 47 U.S.C. § 309(f).

³⁸ TRW Comments at 3.

disadvantaged were AMSC permitted to use the lower L-band. Loral shares this view.³⁹

27. The long-term use of the lower L-band is currently being considered by the Commission in File No. 59-DSS-MP-MP/ML-93. We cannot and do not predict whether the Commission will ultimately assign that spectrum to AMSC or to other applicants. We conclude, however, that the public interest would be served by granting AMSC a 180-day STA for serving existing data METs in the lower L-band from AMSC-1. Doing so will permit AMSC to speed the implementation of the first domestic MSS system -- a policy the Commission has long pursued. In addition, no other MET users in the lower L-band will be prejudiced by an STA, since service to AMSC's METs from AMSC-1 will be technically indistinguishable from their perspective. Nor will Inmarsat be prejudiced, since the Commission's prior orders contemplated that AMSC would be operating its data METs via AMSC-1 by this time. Finally, we reject any suggestion that this STA in any way predetermines the outcome of File No. 59-DSS-MP-MP/ML-93.

28. GPS. We are concerned that AMSC's system include sufficient out-of-band emission suppression to protect the Global Positioning System (GPS) and the Russian Global Navigation Satellite System (GLONASS) which operate on frequencies near L-band. In its application, AMSC states that it complies with the criteria for meeting the spurious emission level standards to protect GPS contained in a Memorandum of Understanding (MOU) among the FCC, NTIA, and FAA.⁴⁰ The purpose of the MOU is to assure coexistence between GPS and GLONASS receivers and MSS METs operating in bands near the frequency bands used by GPS and GLONASS receivers, including METs to be used with AMSC's satellites. The provisions of the MOU establish specific out-of-band emissions limitations and notification requirements in the event of detected harmful interference.⁴¹ We believe that these provisions resolve any concern with regard to AMSC's data METs causing harmful interference to GPS receivers from AMSC's METs operating in bands near the frequency bands used by GPS and GLONASS receivers.

29. Radiation Hazard Analysis. In a supplemental filing (Analysis) dated March 31, 1995, AMSC provides a radiation hazard analysis for its data METs. AMSC states that its data METs will not exceed the revised maximum permissible exposure (MPE) limits established in IEEE/ANSI C95.1-1992 for separation distances of 4.4 inches for the 17 dBW Mobile Messaging Service (MMS) METs and 3.1 inches for the 10 dBW METs.⁴² It further states that there will be fewer than 2,000 of the 17 dBW MMS METs in use. AMSC observes that the antennas typically will be mounted on top of a tractor-trailer cab and that "it is highly unlikely than any person will be closer than 4.4" or 3.1" to

³⁹ Loral Letter at 2.

⁴⁰ See FCC Press Release (November 18, 1994).

⁴¹ RTCA (formerly The Radio Technical Commission for Aeronautics) Special Committee 165 (SC-165) is currently developing equipment performance standards in the L-band, as well as the standards for METs adopted in the Commission's proceedings. See American Mobile Satellite Corp., 7 F.C.C. Rcd. 942, 945-47 (1992). See also RTCA, Guidance on AMSS End-to-End System Performance (DO-215, may 13, 1993); RTCA, Minimum Operational Standards for AMSS, Part A (DO-210 Part A, June 19, 1992), and Part B (DO-210 Part B, May 13, 1993). RTCA SC-159, WG-6, is currently addressing matters of interference to Global Navigation Satellite Systems by MSS operations.

⁴² See Notice of Proposed Rule Making, ET Docket No. 93-62, 8 F.C.C. Rcd 2849 (1993).

the antenna for a 30 minute period."⁴³

30. The MPE limit under ANSI C95.1-1992 is 1.1 mW/cm². AMSC indicates in its Supplement that the power density of its 17 dBW MET at 4.4 inches is 1.06 mW/cm².⁴⁴ The power density of its 10 dBW MET at 4.4 inches is 0.21 mW/cm². (The power density of the 6 dBW MET we calculate at 4.4 inches to be 0.08 mW/cm², based on AMSC's stated duty cycle of 1/30.) AMSC Analysis at 2. Applying the 1.1 mW/cm² standard of ANSI C95.1-1992, *i.e.*, in an uncontrolled environment at full power over 30 minutes, we find that the 17 dBW (50.1 watt) MET requires a distance from the body of some 60 cm (23.7 inches); the 10 dBW (10 watt) MET requires about 27 cm (10.6 inches); and the 6 dBW (4 watt) MET requires 17 cm (6.7 inches). However, according to AMSC, a typical MET transmits a maximum of 1 minute over a period of 30 minutes, and only .003% of the messages sent by AMSC's MMS terminals during a test period exceeded one minute. Further, as indicated earlier, over 99% of these messages were less than 4 seconds in duration. If we were to assume a MET transmits fifteen 4-second messages in 30 minutes, for a total of 1 minute in 30 minutes, the MPE limits under ANSI C95.1-1992 would be met by all 3 MET types. Such an assumption appears to represent a conservative estimate of the duty cycle that can be expected for the subject METs. Based on this analysis, we find that AMSC's METs meet the ANSI C-95-1992 MPE limit and are in compliance with Commission Rules regarding radiation hazards. We note, however, that subsequent Commission action in ET Docket No. 93-62 may affect future AMSC METs.⁴⁵

IV. CONCLUSION

31. Our authorization to AMSC to operate up to 30,000 data METs using its AMSC-1 space segment represents a further step in the creation of competition in the provision of messaging service on a worldwide basis. Accordingly, we find, pursuant to sections 309 and 319 of the Communications Act of 1934, that the public interest will be served by granting AMSC authority to continue to operate its data METs in the lower L-band, pursuant to a temporary waiver of note US315 of Section 2.106 of the Rules. This waiver will expire two years from the release of this order. We also find that the public interest would be served by granting AMSC Special Temporary Authority to serve existing METs from AMSC-1 in the lower L-band. This space segment STA will expire 180 days from release of this order, or upon release of the Commission's final order on operation and licensing in the lower L-band, whichever occurs first.⁴⁶ We also find that AMSC may construct and

⁴³ AMSC states that the typical maximum time for any MMS transmission is 1 minute. As discussed below, only .003% of AMSC's customers' messages exceeded one minute during the month February 1995. Over 99% of these messages were less than 4 seconds in duration.

⁴⁴ AMSC assumes a duty cycle of 1/30, *i.e.*, a typical maximum message transmission time from an MMS terminal of 1 minute over any 30 minute period.

⁴⁵ ET Docket No. 93-62 addresses revised standards for radiofrequency radiation emissions, including exposure guidelines for people using various kinds of radio transmitting devices. The currently applicable standard for these frequency bands under Commission Rules is in ANSI C95.1-1982, and is 5 mW/cm². See 47 C.F.R. § 1.1307(b).

⁴⁶ The Special Temporary Authority issued to permit AMSC to utilize its AMSC-1 space segment to support its existing lower L-band METs expires 180 days from release of this order. Any subsequent extensions will in no event extend beyond the life of the waiver.

operate any portion of its previously authorized METs in the upper-L band. If the METs comply with the full-duplex requirement and the other, related requirements for priority and preemption discussed above.

32. We are, in effect, freezing the number of data METs that AMSC may continue to use in the lower L-band, but we are permitting AMSC to install up to 30,000 such METs in the upper L-band.

V. ORDERING CLAUSES

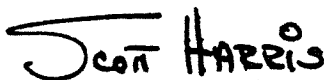
33. Accordingly, IT IS ORDERED that, pursuant to Section 0.261 of the Commission's rules on delegated authority, application File No. 681-DSE-MP/L-95, IS GRANTED and AMSC Subsidiary, Inc. IS AUTHORIZED by Special Temporary Authority for 180 days from the release date of this order to operate AMSC-1 space segment in the lower L-band (1530-1544/1626.5-1645.5 MHz) throughout the United States, subject to the conditions set forth. AMSC IS FURTHER AUTHORIZED to construct and operate any portion of its 30,000 METs throughout the United States, using its AMSC-1 space segment in the upper L-band (1545-1559/1646.5-1660.5 MHz), provided such METs operate in a full-duplex mode and fully comply with the requirements of Footnotes 730C and US308 to Section 2.106 of the Rules, and as set forth herein.

34. IT IS FURTHER ORDERED that Footnote US315 to Section 2.106 of the Commission's Rules IS WAIVED to permit AMSC to operate all its METs in use on the date of release of this order in the lower L-band on a non-real-time preemptive basis, subject to the operational and response parameters set forth in AMSC's application and pleadings in this proceeding. Under this waiver, AMSC shall operate on a secondary basis to safety and distress communications of those stations operating in the GMDSS. Further, the waiver shall terminate two years from the date of release of this order. Authority to operate in the lower L-band pursuant to Special Temporary Authority shall be limited to those METs in use in the lower L-band on the date of release of this order, and such Special Temporary Authority shall terminate contemporaneously with the waiver.

35. IT IS FURTHER ORDERED that AMSC shall file annual system usage reports, commencing with the effective date of this Order, containing the number of METs operating in the lower L-band and in the upper L-band, and maximum and average message length statistics for those data METs operating in the lower L-band. Such reports shall be submitted to the Chief, Satellite and Radiocommunication Division, International Bureau.

36. IT IS FURTHER ORDERED that AMSC's data METs SHALL CONFORM to the provisions of the Memorandum of Understanding among the FCC, NTIA and FAA discussed at paragraph 28, herein.

FEDERAL COMMUNICATIONS COMMISSION



Scott Blake Harris
Chief, International Bureau