LORAL SPACE

June 10, 1996

ORIGINAL

Before the

Federal Communications Commission

Washington, D.C.

Application of

Loral Space & Communications Ltd.

To Construct, Launch and Operate

A Communications Satellite

in the Fixed-Satellite Service

SUMMARY

LORAL SPACE & COMMUNICATIONS LTD ("LORAL SPACE" or the "Applicant") seeks authority to construct, launch and operate one flight-model communications Ku-band satellite. Loral Space proposes to utilize the standard Ku-band (14.0 - 14.5 and 11.7 - 12.2 GHz) and the extended Ku-band (13.75 - 14.0 and 11.45 - 11.7 GHz) for coverage of North and South America from the 81° W.L. orbital position. Loral Space will be able to provide extensive selection and service alternatives to its customers through effective and efficient use of the orbital arc and frequency spectrum. This approach will lead to enhanced services, increased competition for satellites services, and tremendous benefits to the public.

The Commission has taken great strides to open the doors of fixed-satellite services to new competitors and to encourage the development of new technologies and services, while optimizing the use of the orbital arc and radio spectrum. The approval of Loral Space's instant application will be one more action that will pay testimony to those goals.

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Appendix

TABLES

ITU	International Telecommunication Union
LAC	Loral Aerospace Corporation
LAHI	Loral Aerospace Holdings, Inc.
LEO	Low-Earth Orbit
LNA	Low Noise Amplifier
MSS	Mobile Satellite Services
N-S	North-South
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
OSR	Optical Solar Reflectors
PFD	Power Flux Density
RCV	Receiver
RF	Radio Frequency
SFD	Saturation Flux Density
SQ/PSK	Single Sideband/Phase Shift Keying
SS/L	Space Systems/Loral
SSPA	Solid-State Power Amplifier
TDMA	Time-Division Multiple Access
TT&C	Tracking, Telemetry and Control
TV	Television
TWTA	Traveling Wave Tube Amplifier
VSAT	Very Small Aperture Terminals
WL	West Longitude

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

In the Matter of the Application of	)	
	)	
	)	
LORAL SPACE & COMMUNICATIONS LTD	)	File No.
	)	
For Authority to Construct, Launch, and Operate A Hybrid Communications Satellite in the Fixed-Satellite Service	)	

APPLICATION

LORAL SPACE & COMMUNICATIONS LTD. (the "Applicant" or "Loral Space"), hereby requests authority to construct, launch, and operate a satellite using the standard and extended Ku-band frequencies in the fixed-satellite service (FSS) at 81° W.L. The satellite proposed in this application will provide communications capability for 12 years of life over the contiguous United States (CONUS), Alaska, Hawaii, Puerto Rico and the Virgin Islands, Canada, Mexico, and Central and South America. It will become part of a larger integrated satellite system being developed by Loral Space that will provide state-of-the-art communications capability to all parts of the Western Hemisphere.

The Loral Space satellite at 81° W.L. will use the standard (14.0-14.5/11.7-12.2 GHz) and extended Ku-band (13.75-14.0/11.45-11.7) for coverage of North and South America. Loral recognizes that the FCC has not yet completed the domestic allocation of the 13.75 - 14.0 GHz band for FSS. In February the Commission released a Notice of Proposed Rulemaking in which it proposed to allocate the 13.75 - 14.0

GHz frequency band to the fixed satellite service for uplink transmissions.[1] Loral, along with numerous other fixed satellite service applicants and licensees, supports the allocation.[2] Given the growing demand for FSS service, this new allocation will facilitate the availability of competitive services to the public. Pending adoption of the Commission's proposal to reallocate the band, Loral requests a waiver of the domestic Table of Allocations to provide fixed satellite service uplinks (Earth-to-Space) in the 13.75 - 14.0 GHz band.

This application includes all information specified in Appendix B of Space Station Filing Procedures, 48 Fed Reg. 40256 (September 6, 1983) and 47 C.F.R. §25.114 and §25.140. Loral Space has included information set forth in such regulations as appropriate to the fixed-satellite service. Loral Space, of course, will supplement the instant application with such additional information as the FCC deems appropriate to grant the license.

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1 See Amendment of Parts 2 and 25 of the Commission's Rules to Allocate the 13.75 - 14.0 GHz Band to the Fixed-Satellite Service, ____ FCC Rcd ___, 1996 FCC Lexis 884 (1996) ("Extended Band Order"). The Notice was released in response to a petition for rule making filed by Hughes Communications Galaxy, Inc. in 1995.

2 See Comments and Reply Comments of Loral Space and Communications, Inc. filed April 1, 1996, and April 26, 1996, respectively.

1.1 IDENTIFICATION

The name and address of the Applicant is:

LORAL SPACE & COMMUNICATIONS LTD.
600 Third Avenue
New York, NY 10016
(212) 697-1105

1.2 CORRESPONDENCE

Inquiries, correspondence, and communications concerning the application should be directed to the individuals listed in the following paragraphs.

1.2.1 Contact Within the Company

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1.3 TYPE OF AUTHORIZATION REQUESTED

Loral Space requests authority to construct, launch, and operate a FSS satellite to operate in the Ku-band. The satellite will provide service to North and South America. Requests for modification of TT&C earth stations will be submitted subsequently.

It is anticipated that Space Systems/Loral (SS/L), a subsidiary of the Applicant, will manufacture the spacecraft. SS/L will begin construction of the flight spacecraft upon approval of this application. It is expected that the satellite will be launched approximately 36 months after construction and launch approval is granted.

1.4 COMMON CARRIER DETERMINATION

The Applicant currently intends to offer all available transponders on its proposed satellite system on a non-common carrier basis. The transponders will be either sold outright or leased over the life of the spacecraft. Loral Space will either sell or lease its transponders at the option of its customers. All leases will be granted on a long-term basis.

SECTION 2 – PUBLIC INTEREST CONSIDERATIONS

Grant of this application will serve the public interest in several respects, including by (1) fostering Commission policies to promote competition, providing open entry by new applicants, and developing new markets and services in the satellite industry; (2) using the orbital arc and frequency spectrum efficiently from high quality, state-of-the-art satellites; (3) providing high quality coverage to North and South America, which will foster the development and availability of the global information infrastructure; and (4) enhancing the provision of satellite service by using Loral Space and its affiliated companies' wealth of experience in the satellite business.

The global satellite business is thriving and satellite service providers around the world are seeking to expand their business base. Commission policy encourages open entry in the satellite industry.[1] In fact, the Commission recently stated that its "primary obligation is to ensure that the U.S. public has available to it the widest possible range of satellite service offerings from the greatest number of competitors possible."[2] Over the past decade the Commission has promoted the development of competition in the satellite business and encouraged satellite manufacturers to

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1 Loral Space was recently authorized to construct, launch, and operate two satellites in the domestic fixed-satellite service from 77° W.L. and 129° W.L. See Assignment of Orbital Locations to Space Stations (File Nos. 72-SAT-P/LA-95, 73-SAT-P/LA-95, 137-SAT-P-95) in the Domestic Fixed-Satellite Service, DA 96-713 (rel. May 7, 1996).

2 In the Matter of Amendment of the Commission's Regulatory Policies Governing Domestic Field Satellites and Separate International Satellite Systems, 11 FCC 2429, at ¶ 40 (1996), ("DISCO I Order").

develop new markets and services for satellites. Indeed, the DISCO I Order facilitates the provision of competitive satellite communications to both North and South America. These policies will be enhanced by grant of the instant application. Grant of this license to Loral Space will promote competition, foster the development of new and innovative satellite services and take advantage of new technologies, including digital communications. The trend towards consolidation in the U.S. satellite industry has left the satellite marketplace with few participants. Therefore, Loral Space's participation in the market will stimulate diversity and competition and provide customers with new choices and opportunities.

The instant satellite represents the state-of-the-art satellite technology in a proven satellite design. Loral Space's satellite is also highly reliable and efficient. The Loral Space design exceeds the FCC's minimum standards for frequency utilization. The Loral Space satellite will provide frequency reuse techniques using orthogonal linear polarization. In addition, all transponders will contain commandable gain step attenuators. Accordingly, the satellite design will permit Loral Space to use the scarce orbital arc and frequency spectrum efficiently.

In addition, the satellite design and requested orbital location will permit Loral Space to provide high quality coverage to North and South America. Because of distance and topography, satellites are uniquely able to provide a cost efficient means of meeting global communication service needs. Fifty-state and international coverage by the Loral Space system will foster the development and availability of the global information infrastructure to everyone who lives and/or works in the satellites' service area, particularly those in remote areas.

Furthermore, Loral Space will bring to the U.S. satellite business its wealth of experience from its existing businesses, along with technical and service innovations, all of which will further the public interest. Loral Space manages, and is the largest equity owner of, both Globalstar, which is building and preparing to launch and operate a worldwide satellite-based digital telecommunications system (the "Globalstar™ System"), and SS/L, which is one of the world's premier satellite manufacturers. The Globalstar System is designed to enable local service providers to offer low-cost, high-quality wireless voice telephony and data services in virtually every populated area of the world. Globalstar service providers have to date agreed to offer Globalstar service and seek to obtain all necessary local regulatory approvals in 90 different nations, accounting for 67% of the world's population. Loral Space, in partnership with established international telecommunications companies such as AirTouch Communications and France Telecom, as well as local wireless or telephone companies, will itself act as a Globalstar service provider in several key territories, including Canada, Brazil and Mexico.

Globalstar and SS/L have established strategic alliances with world-class telecommunications service providers and equipment manufacturers and with leading aerospace companies. Through these alliances, Loral Space's affiliates have substantially expanded their technological, regulatory and marketing capabilities, telecommunications expertise and financial resources.

In addition, SS/L's market leadership and technological skills give Loral Space exceptional insight into both the demands of the evolving marketplace for satellite services and the technical capabilities of future generations of satellite technologies. To be sure, Globalstar is the first satellite services initiative created by the combination of SS/L's satellite expertise with the entrepreneurial management resources of Loral.

In summary, Loral Space's entry into the global FSS market will provide a high-quality, low-cost system that will enhance overall market competitiveness and efficiency while adding innovative services and increasing customer choice and opportunities.

SECTION 3 - GENERAL SYSTEM DESCRIPTION

Loral Space proposes to construct one FS-1300 class, three-axis stabilized spacecraft, that will operate Ku-band and will be located at 81° W.L. The satellite will have 48 standard Ku-band transponders and 24 extended Ku-band transponders. Full frequency reuse will be provided by using orthogonal linear polarization. The Ku-band transponders will operate at 120 watts combinable to 240 watts. All transponders will contain commandable gain step attenuators.

The satellites will provide coverage as follows:

a. Ku-band (standard and extended) - Countries of South America except for interior and Northern areas of Brazil and the Guyanas,

b. Ku-band (standard and extended) - CONUS, Puerto Rico and the Virgin Islands, Canada, Mexico and the countries of Central America except Panama.

The satellite will be designed for a 12-year service life. Receiver redundancy of 6-for-4 will be provided in Ku-band. Power amplifiers will be traveling wave tube amplifiers (TWTAs).

Uplink and TT&C facilities will be developed by the Applicant and, to the extent possible, will be integrated with Loral Space facility developed for standard band satellites. The uplink facilities will primarily be for signal replaying and turnaround. There will be minimal production capabilities. Some Loral Space customers may have their own uplink facilities, which could be used to access leased transponders.

The number and distribution of earth stations will be commensurate with customer requirements of Loral Space's satellite system and will be the responsibility of the customer.

3.1 SERVICE TECHNICAL CHARACTERISTICS

The service objective is to provide all Ku-band transponder service optimized for delivering analog and compressed digital signals to cable headends, and to provide digital business service communications links. Direct to home TV service will be provided where EIRP permits. The satellite will primarily provide point-to-point digital data transmission. The predominant transmission for Ku-band is anticipated to be single-carrier QPSK compressed digital TV, although the satellites can accommodate other types of traffic, e.g., QAM and SCPC.

3.1.1 Transmission Characteristics

The Loral Space satellite will provide analog FM-TV signals and compressed digital TV. The compressed digital TV will use QPSK or QAM with forward error correction (FEC). A typical modulation will be 21 M symbols/sec rate QPSK with a net data rate of 24 Mb/s. The high degree of FEC results in an abrupt threshold in picture quality corresponding to an E_b/N_o of about 5.5 dB. Above that level the picture is essentially noiseless; below it the picture quickly becomes unusable. The transmission objective is to minimize link outage due to rain fade. The antenna coverages will be weighted to provide increased gain to those areas of the U.S. which require higher EIRP to offset rain fade.

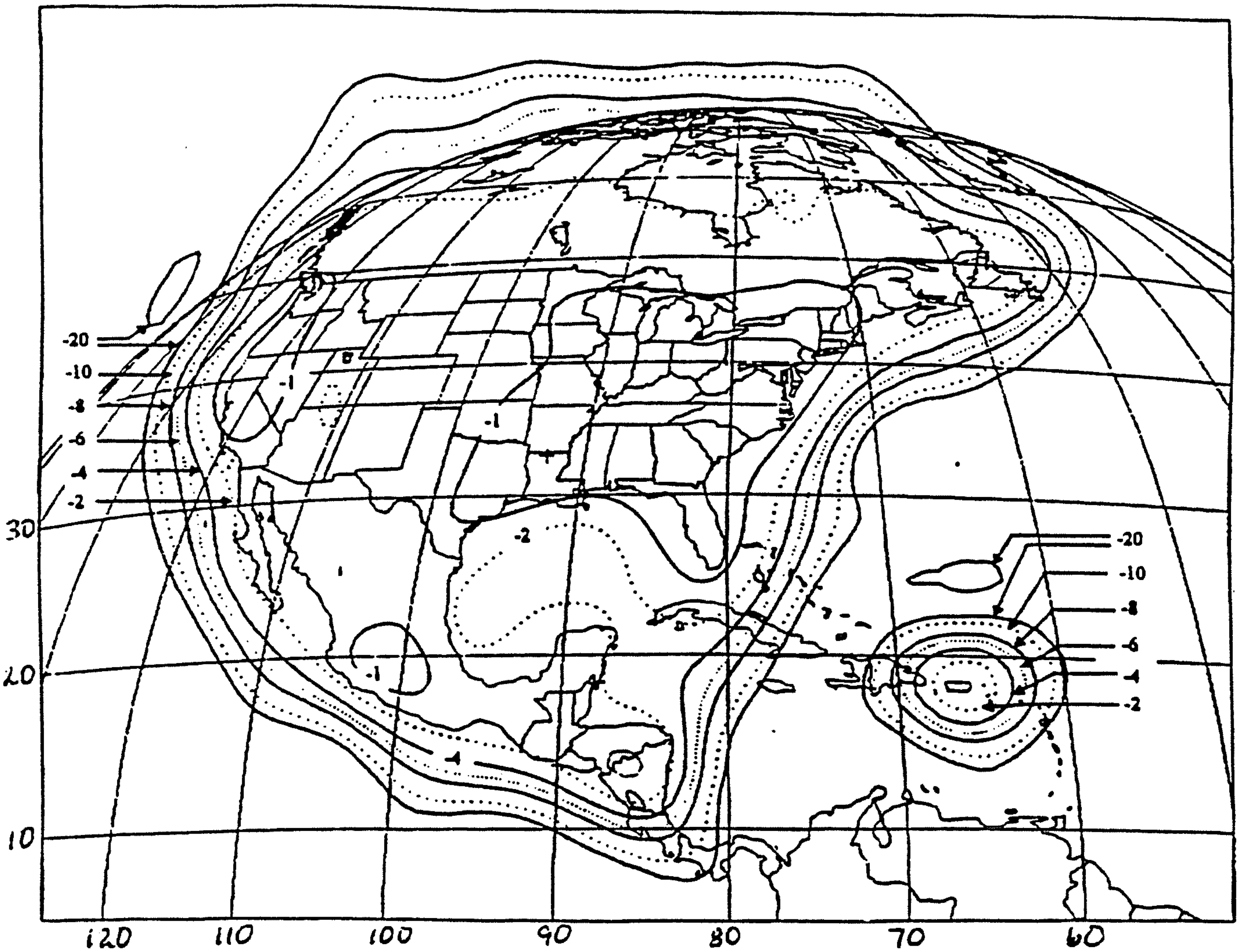
3.2 ANTENNA COVERAGE PATTERNS

The satellites will provide coverage as follows:

a. Ku-band (standard and extended) - Countries of South America except for interior and Northern areas of Brazil and the Guyanas,

b. Ku-band (standard and extended) - CONUS, Puerto Rico, and the Virgin Islands, Canada, Mexico and the countries of Central America except Panama.

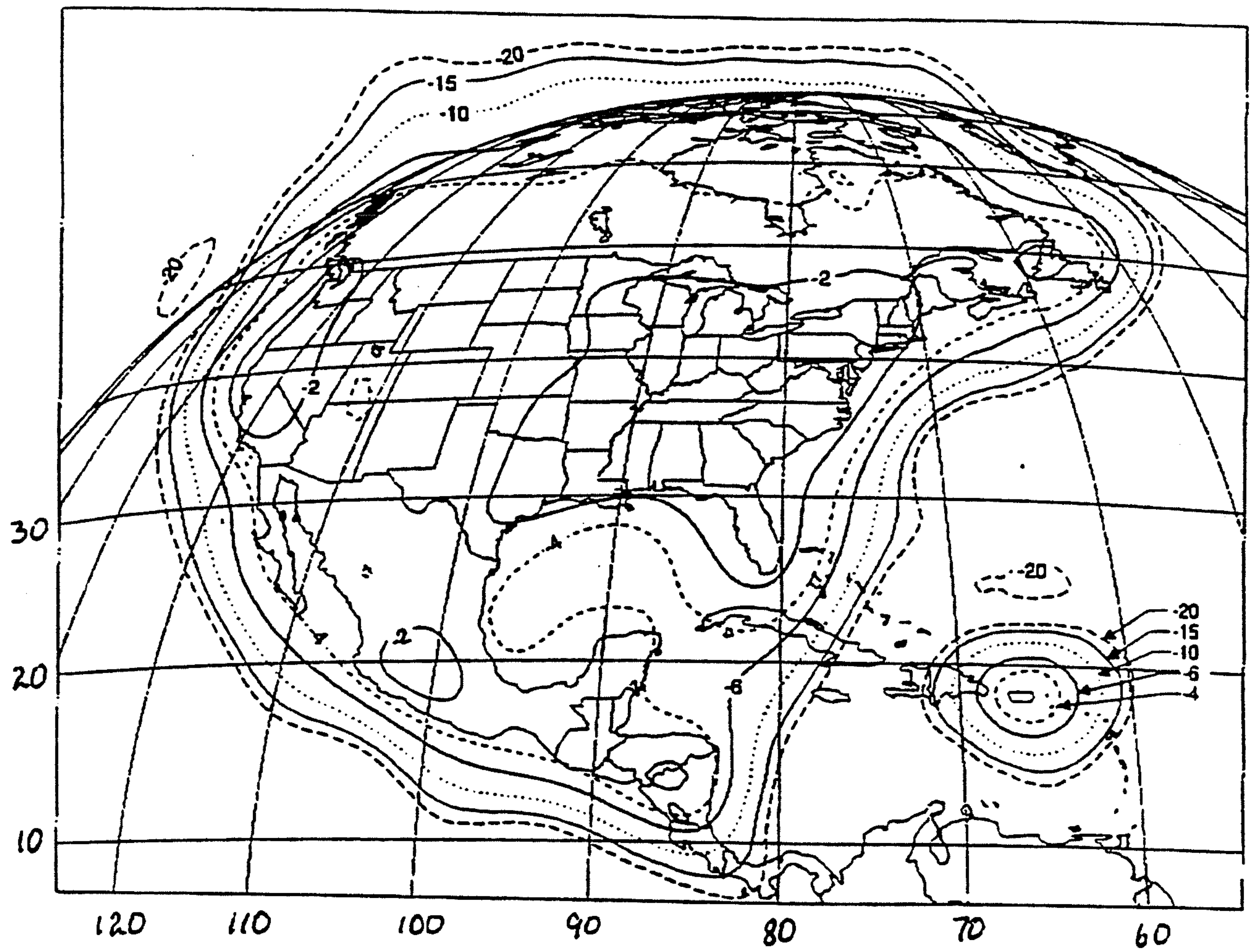
Ku-band antenna coverage is provided via six shaped-reflector antennas. The Ku-band antennas utilize Gregorian optics for high-polarization purity. The antennas will provide nearly identical patterns for each polarization. Four Ku-band antennas, east and west mounted, provide 32 channel standard band coverage of both North and South America. The other two Ku-band, earth deck mounted, antennas provide extended band coverage of both North and South America. This six antenna approach enables optimization of the communications payload equipment layout. Figures 3-1a through 3-2b give the predicted transmit and receive coverage contours for the orbital location of 81° W.L.



Notes:

1. Contours shown are -1, -2, -4, -6, -8, -10, and -20 dB relative to maximum gain.
2. Maximum isotropic gain is +31.4 dBi.
3. Does not include antenna pointing error of ±0.1° worst case.
4. X Denotes subsatellite point.
5. + Denotes peak gain.

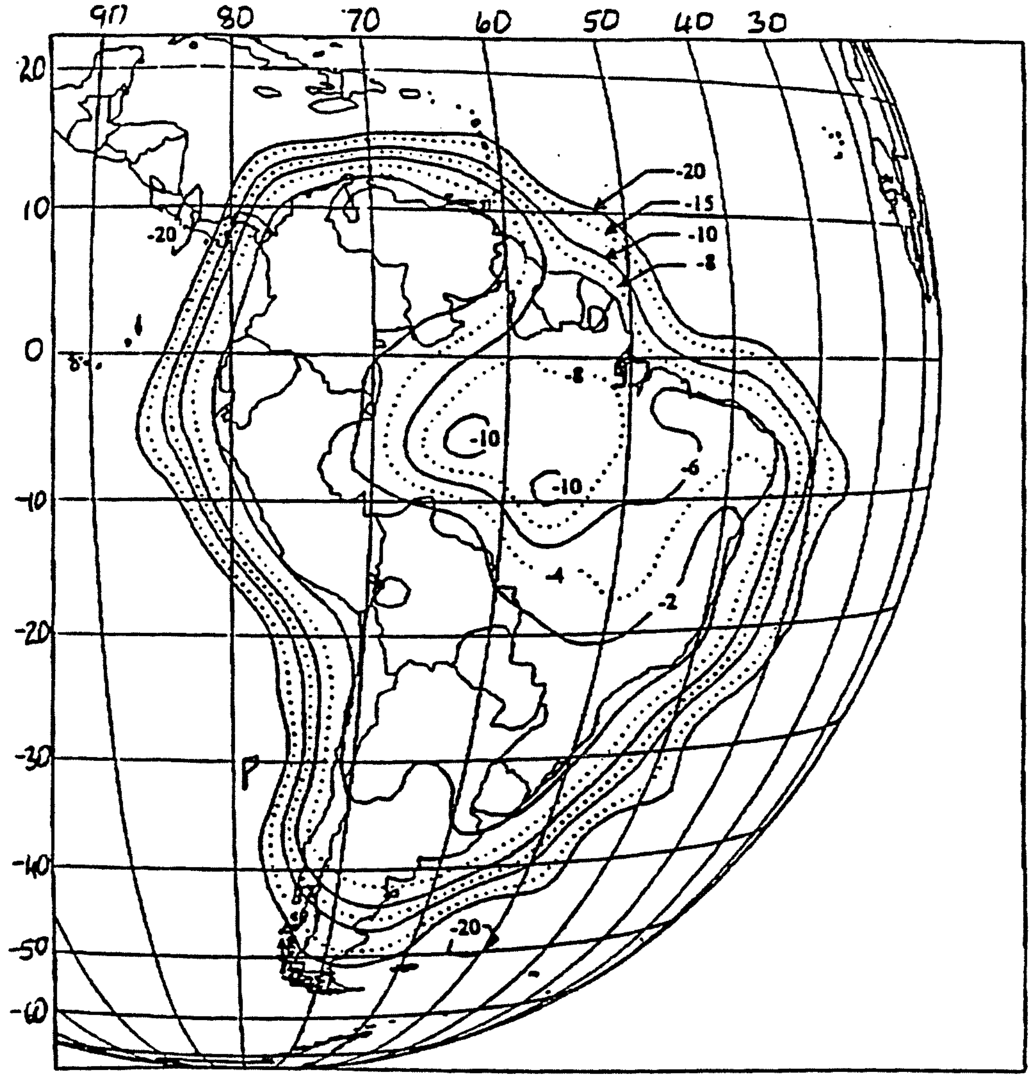
Figure 3-1a. North American Ku-Band Transmit Coverage from 81° W.L.



Notes:

1. Contours shown are -2, -4, -6, -10, -15, and -20 dB relative to maximum gain.
2. Maximum isotropic gain is +31.4 dBi.
3. Does not include antenna pointing error of ±0.1° worst case.
4. X Denotes subsatellite point.
5. + Denotes peak gain.

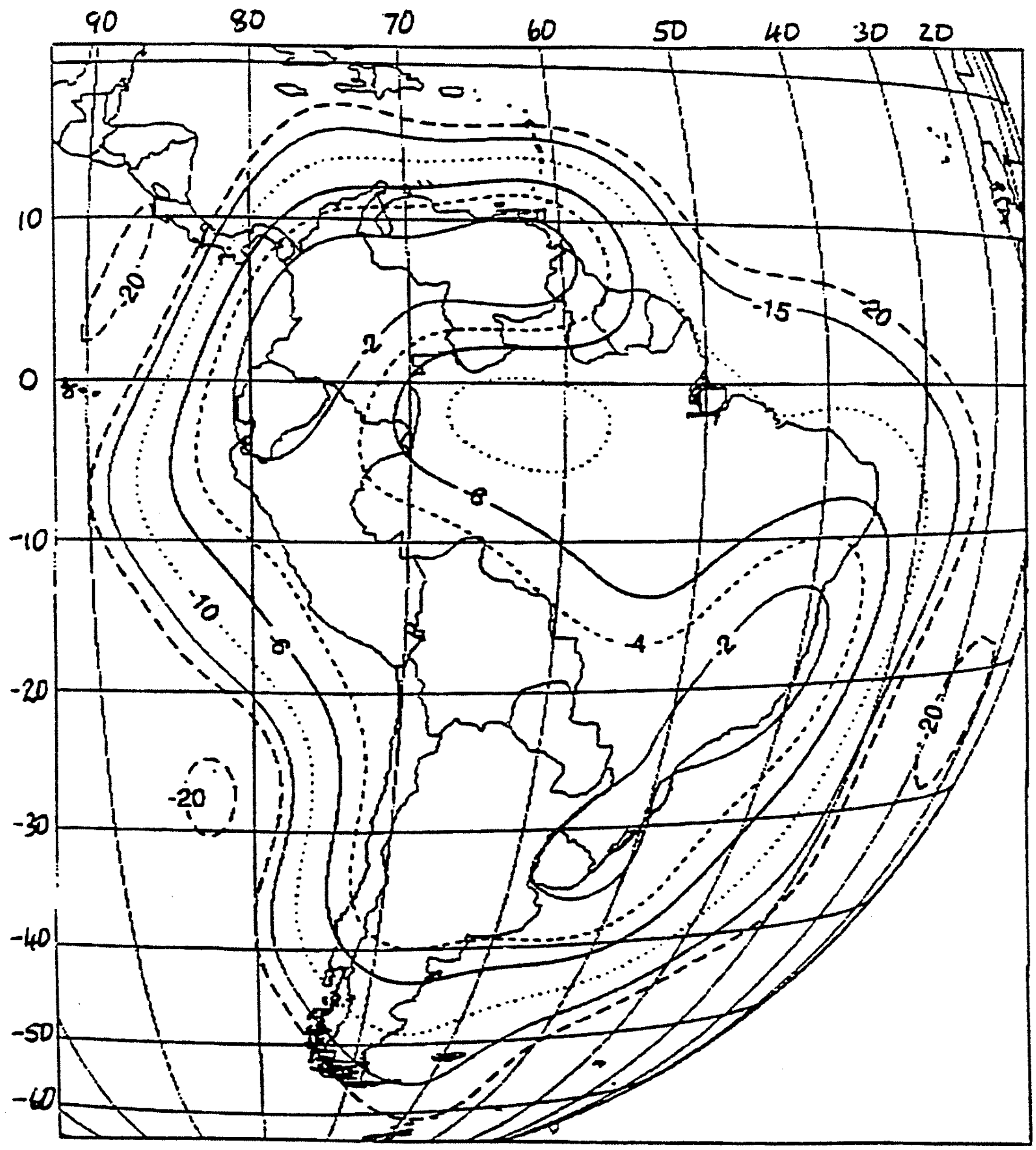
Figure 3-1b. North American Ku-Band Receive Coverage from 81° W.L.



Notes:

1. Contours shown are -2, -4, -6, -8, -10, -15, and -20 dB relative to maximum gain.
2. Maximum isotropic gain is +30.4 dBi.
3. Does not include antenna pointing error of ±0.1° worst case.
4. X Denotes subsatellite point.
5. + Denotes peak gain.

Figure 3-2a. South American Ku-Band Transmit Coverage from 81° W.L.



Notes:

1. Contours shown are -2, -4, -6, -10, -15, and -20 dB relative to maximum gain.
2. Maximum isotropic gain is +30.4 dBi.
3. Does not include antenna pointing error of ±0.1° worst case.
4. X Denotes subsatellite point.
5. + Denotes peak gain.

Figure 3-2b. South American Ku-Band Receive Coverage from 81° W.L.

3.3 LINK BUDGETS

Typical Ku-band uplink budget data for the feeder links are given in Table 3-1. For the Ku-band compressed digital transmission, it is anticipated that a combination of rain fade control and spatial diversity will be used to essentially eliminate any link outage due to rain fade on the uplink.

Downlink budgets for Ku-band are given in Table 3-2 for a 4.5-m earth station typical of broadcast stations or cable headends. The clear sky link margin is tabulated, followed by the predicted link availability. The availability prediction is based on the CCIR/ITU (1994) Rain Model and includes the effects of increased noise during rain as well as rain attenuation. The earth terminal latitude, altitude, elevation to the spacecraft, and the rain zone are used in the calculation. Broadcast stations and cable headends in high rain rate regions such as Miami and Houston can use spatial diversity for improved availability..

Table 3-1. Ku-Band Uplink Budget Summary

Parameter	North America	South America
Carrier Frequency	14.250 GHz	14.250 GHz
On-axis EIRP	73.4 dBW	73.4 dBW
Pointing Loss	-0.1 dB	-0.1 dB
EIRP (Including Pointing Loss)	73.3 dBW	73.3 dBW
Range Factor (39,598 km)	-162.9 dB-m^2	-162.9 dB-m^2
Atmospheric Loss	-0.3 dB	-0.3 dB
Incident Flux Density	-90.0 dBW/m^2	-90.0 dBW/m^2
Aperture Factor	-44.5 dB-m^2	-44.5 dB-m^2
Incident Isotropic Power	-134.5 dBWi	-134.5 dBWi
Antenna Gain	26.4 dB	27.4 dB
Line Loss	-1.0 dB	-1.0 dB
Net gain at receiver	25.4 dB	26.4 dB
Net Receiver Input Power	-109.1 dBW	-108.1 dBW
System Temp (515.7 K) (Ta=290 K, Rcvr NF=2.5 dB)	27.1 dB-K	27.1 dB-K
Receive G/T	-1.7 dB/K	-0.7 dB/K
C/No	92.4 dB-Hz	93.4 dB-Hz
Transponder Bandwidth (27 MHz)	74.3 dB-Hz	74.3 dB-Hz
Transponder S/N Ratio	18.1 dB	19.1 dB
Max EIRP capability	80.9 dBW	80.9 dBW
Uplink Rain Fade Margin	7.5 dB	8.5 dB

Table 3-2. Ku-Band Downlink Budget Summary

	North America	South America
EIRP at Edge of Coverage, dBW	48.2	49.2
Path Loss, dB	-205.7	-205.7
Net incident isotropic power, dBWi	-157.5	-156.5
4.5m dish performance		
G/T, dB/K	30.5	30.5
C/No, dB-Hz	101.6	102.6
Net Data Rate (24 Mb/s), db-Hz	73.8	73.8
Eb/No, dB	27.8	28.8
Eb/Io, dB	30.0	30.0
Eb/(No+Io), dB	25.8	26.3
Required Eb/(No+Io), dB	5.5	5.5
Clear sky margin, dB	20.3	20.8
Availability, %	>99.99	>99.99
Minutes/Month outage	<4	<4

SECTION 4 – DESCRIPTION OF SERVICES PROVIDED

In this application, Loral Space proposes to construct, launch and operate a general purpose communications satellite. Depending upon the needs of the transponder customers, the transponders can be used to provide the following services: distance learning, cable television programming, sports programming, niche programming, interactive services, teleconferencing, business video, training, very small aperture terminals, direct-to-home and pay-per-view.

Demand for Ku-band transmission is expected to grow strongly in the next decade, particularly with the advent of digital compression. Through digital compression, the Loral Space satellite will be able to deliver hundreds of channels of programming to customers, while making optimum use of the radio spectrum.

Traditionally, video service providers have been the primary users of satellite transponders. Technological advances in hardware and software, especially digital compression and VSAT manufacturing, will reduce the break-even cost for networks and programmers, making Ku-band capacity more attractive to customers, while making optimum use of the radio spectrum.

In addition to demand from these users, many schools and universities have begun to use satellite transponders for distance learning. Corporations, medical and scientific institutions, governments, and businesses are also developing private networks which will demand satellite capacity. For example, many universities transmit course materials between locations via satellite. In addition, several governments have established satellite networks to distribute educational programming to local public schools. For example, Georgia, Kentucky, and South Carolina have each established educational satellite networks.

Ku-band capacity is also being used for satellite news gathering operations. Digital compression will reduce channel costs and enable customization of commercial services to specific regional or special interest markets. In geographic locations that have sufficient e.i.r.p. levels, Loral Space also plans to provide direct-to-home service.

Loral Space's entry into the global communications satellite business responds to this growing demand for Ku-band capacity on state of the art, efficient satellites. The Loral Space satellite is designed for low mass and high power, yielding more data per dollar than older generation spacecraft. These cost savings will be reflected in the costs to Loral Space's customers.

4.1 UPLINK

The uplink center will primarily be for the program signal "turn-around." Programmers will be able to send programming to the uplink center via a variety of modes -- private network, public network, or actual tape delivery. Loral Space currently operates uplink centers and has extensive experience in this field. It is also anticipated that Loral Space will apply for authority to own and operate uplink facilities for this system at the appropriate time. Some customers may uplink their signals directly from their own existing uplinks.

4.2 GROUND RECEIVERS

Loral Space does not anticipate entering the business of designing, manufacturing, or distributing receivers. Ku-band FSS ground receivers are commercially available for direct-to-home and headend applications. Loral Space will work with standard-setting bodies to develop digital satellite receiver standards. In addition Loral Space will work with manufacturers during the satellite design and manufacturing phase to ensure that the products they develop will be compatible with Loral Space's system. Loral Space anticipates that the new home receivers will cost approximately $700.

SECTION 5 – ORBITAL ARC CONSIDERATIONS

Loral Space respectfully requests that it be assigned the 81° W.L. orbital location. This location optimizes Loral Space's coverage to CONUS, Alaska, Hawaii, Puerto Rico and the Virgin Islands, and Central and South America and ensures that Loral Space will provide the maximum operational, economic and public interest benefits to the proposed service area.

In addition to its high elevation angles and efficient coverage to both North and South America, Loral Space has chosen the 81° orbital location because it is located in a portion of the orbital arc that currently is not occupied by satellites that propose to provide service to Latin America, thereby facilitating coordination. Loral Space understands that the Commission has historically treated orbital locations as fungible. That is, it considers all orbital locations to be more or less equivalent. Given, however, the recent influx of satellite applications and related filings at both the FCC and international regulatory bodies, potential coordination concerns may present obstacles that may influence the fungibility of orbital locations. Loral Space has incorporated these coordination concerns into its decision to apply for the 81° orbital location, and requests that the Commission recognizes these concerns in determining the fungibility of the 81° orbital location.

Of course, as required, Loral will coordinate earth stations in the fixed satellite service through the Government/non-Government frequency assignment subcommittee process to ensure that interference to Tracking and Data Relay Satellite System is minimized.[1]

1 See Extended Band Order, at ¶ 11.

SECTION 6 - SATELLITE SYSTEM DESCRIPTION

The Loral Space spacecraft is based upon a three-axis, FS-1300 class satellite built by Space Systems/Loral ("SS/L"). The design is for a Ku-band repeater that provides four times frequency reuse. The satellite will contain 48 standard Ku-band and 24 extended Ku-band transponders operating with 36 MHz and 27 MHz bandwidth channels, respectively. The Ku-band power is provided through 120-watt TWTAs which are combinable to give 240 W.

The satellite design conforms to the International Radio Regulations technical standards, Part 25 of the Commission's Rules and Regulations, and CC Docket No. 81-704's Report and Order. The design is fully compatible with the Commission Docket's 2-degree orbital separation plan. Table 6-1 summarizes the major spacecraft characteristics. The following subsections describe the satellite design in more detail.

Table 6-1. Spacecraft Characteristics Summary

Parameter	Value
General	
Mission Life	12 years
Stabilization	Three-axis
Stationkeeping	±0.05° N-S, E-W
Eclipse capability	100%
Antenna pointing accuracy	Within 0.13°, half cone
Launch vehicle	Compatible with Atlas 2 and Ariane 4 series
Communications	
Frequency band	Standard and extended Ku-bands
Antenna coverage	a) Ku-band (standard and extended) - Countries of South America except for interior and Northern areas of Brazil and the Guyanas, b) Ku-band (standard and extended) - CONUS, Puerto Rico and the Virgin Islands, Canada, Mexico and the countries of Central America except Panama.
Polarization	Orthogonal linear
Number of transponders	48 standard Ku-band 24 extended Ku-band
Usable bandwidth	1944 MHz in Ku-band
Transmitter RF power	
Redundancy	
Receivers	6-for-4 at Ku-band
Channel amplifiers and TWTAs	Six rings of 16-for-12 at Ku-band
Tracking, Telemetry, and Command (TT&C)	
Frequency	Ku-band
Ground station locations	Two: one in the western United States, one in the eastern United States

6.1 COMMUNICATIONS SUBSYSTEM

6.1.1 Ku-Band Communication

6.1.1.1 Capacity

Seventy-two Ku-band transponders, 48 standard band and 24 extended, will provide full frequency reuse with 1944 MHz usable bandwidth (2160 MHz, including guard bands). The satellite has 72 27-MHz transponders that provide 120 watts at saturation. A power combined mode permits up to 240 watts on any selected channel. The transponders will contain commandable gain step attenuators and automatic gain control (AGC) to mitigate the effects of uplink rain fade. The power subsystem is sized to provide simultaneous operation of all transponders at saturation for a minimum of 12 years with 100% eclipse operation.

6.1.1.2 Transponder Frequency and Polarization Plan

Linear polarization will be used. A transponder's uplink and downlink polarizations will be orthogonal. Cross-polarization isolation within the proposed coverage areas will be a minimum of 30 dB.

The Ku-band transponders will transmit (downlink) in the 11450-11700 MHz and 11700-12200 MHz bands and receive (uplink) in the 13750-14000 MHz and 14000-14500 MHz bands. Seventy-two transponders, each having a 27-MHz bandwidth, are provided. The proposed frequency and polarization plan for the 81 W orbital location is illustrated in Figures 6-1(a) and 6-1(b) and TablesI6-2(a) and 6-2(b).

Spurious emissions outside the usable bandwidth of each transponder will be attenuated by filtering as follows:

Percent of authorized bandwidth	Attenuation in any 4 kHz band
1. for any frequency removed from the assigned frequency by 50 to 100%	>25 dB
2. for any frequency removed from the assigned frequency by 100 to 250%	>35 dB
3. for any frequency removed from the assigned frequency by more than 250%	>60 dB

6.1.1.3 Subsystem Configuration

The block diagram of the Ku-band communications subsystem is shown in Figures 6-2(a) and (b). Six antennas will be used. The antennas will be shaped reflector,

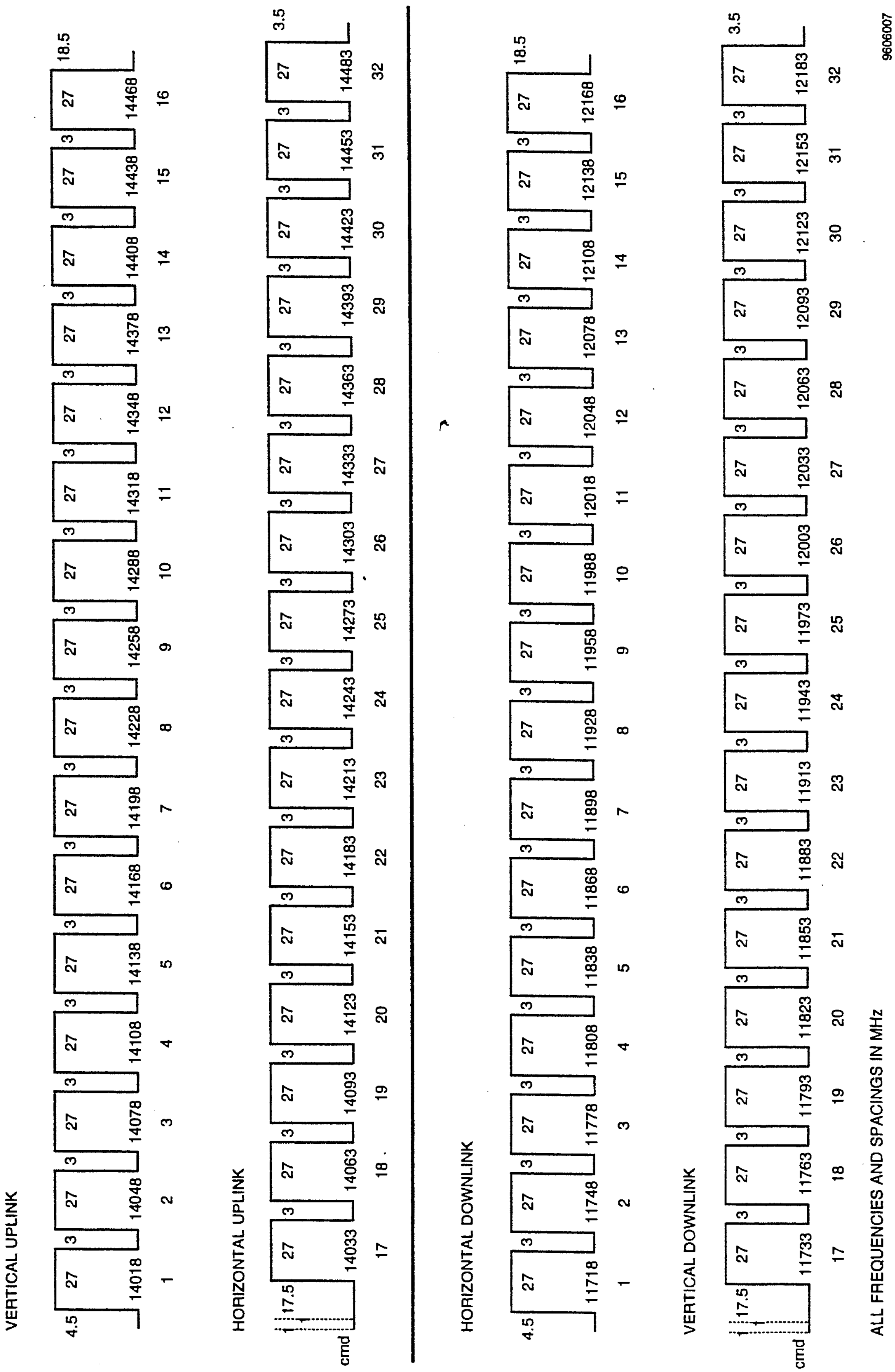


Figure 6-1(a). Standard Ku-Band Frequency Plan

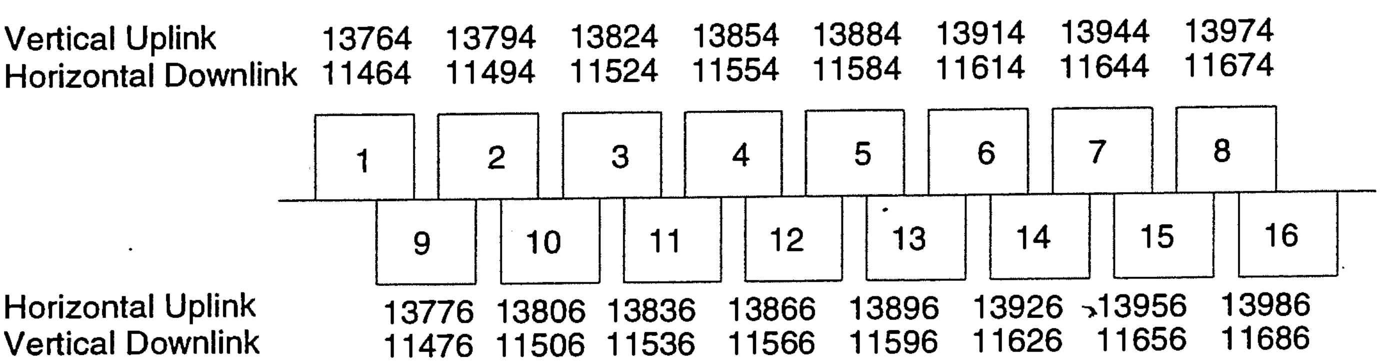


Figure 6-1(b). Extended Ku-Band Frequency Plan

Table 6-2(a). Standard Ku-Band Frequency and Polarization Plan

Channel	Bandwidth (MHz)	Polarization (Up/Down)	Uplink Center Frequency (MHz)	Downlink Center Frequency (MHz)
1	27	V/H	14018	11718
2	27	V/H	14048	11748
3	27	V/H	14078	11778
4	27	V/H	14108	11808
5	27	V/H	14138	11838
6	27	V/H	14168	11868
7	27	V/H	14198	11898
8	27	V/H	14228	11928
9	27	V/H	14258	11958
10	27	V/H	14288	11988
11	27	V/H	14318	12018
12	27	V/H	14348	12048
13	27	V/H	14378	12078
14	27	V/H	14408	12108
15	27	V/H	14438	12138
16	27	V/H	14468	12168
17	27	H/V	14033	11733
18	27	H/V	14063	11763
19	27	H/V	14093	11793
20	27	H/V	14123	11823
21	27	H/V	14153	11853
22	27	H/V	14183	11883
23	27	H/V	14213	11913
24	27	H/V	14243	11943
25	27	H/V	14273	11973
26	27	H/V	14303	12003
27	27	H/V	14333	12033
28	27	H/V	14363	12063
29	27	H/V	14393	12093
30	27	H/V	14423	12123
31	27	H/V	14453	12153
32	27	H/V	14483	12183

H: Horizontal Polarization
V: Vertical Polarization

Table 6-2(b). Extended Ku-Band Frequency and Polarization Plan

Channel	Bandwidth (MHz)	Polarization (Up/Down)	Uplink Center Frequency (MHz)	Downlink Center Frequency (MHz)
1	27	V/H	13764	11464
2	27	V/H	13794	11494
3	27	V/H	13824	11524
4	27	V/H	13854	11554
5	27	V/H	13884	11584
6	27	V/H	13914	11614
7	27	V/H	13944	11644
8	27	V/H	13974	11674
9	27	H/V	13776	11476
10	27	H/V	13806	11506
11	27	H/V	13836	11536
12	27	H/V	13866	11566
13	27	H/V	13896	11596
14	27	H/V	13926	11626
15	27	H/V	13956	11656
16	27	H/V	13986	11686

H: Horizontal Polarization
V: Vertical Polarization

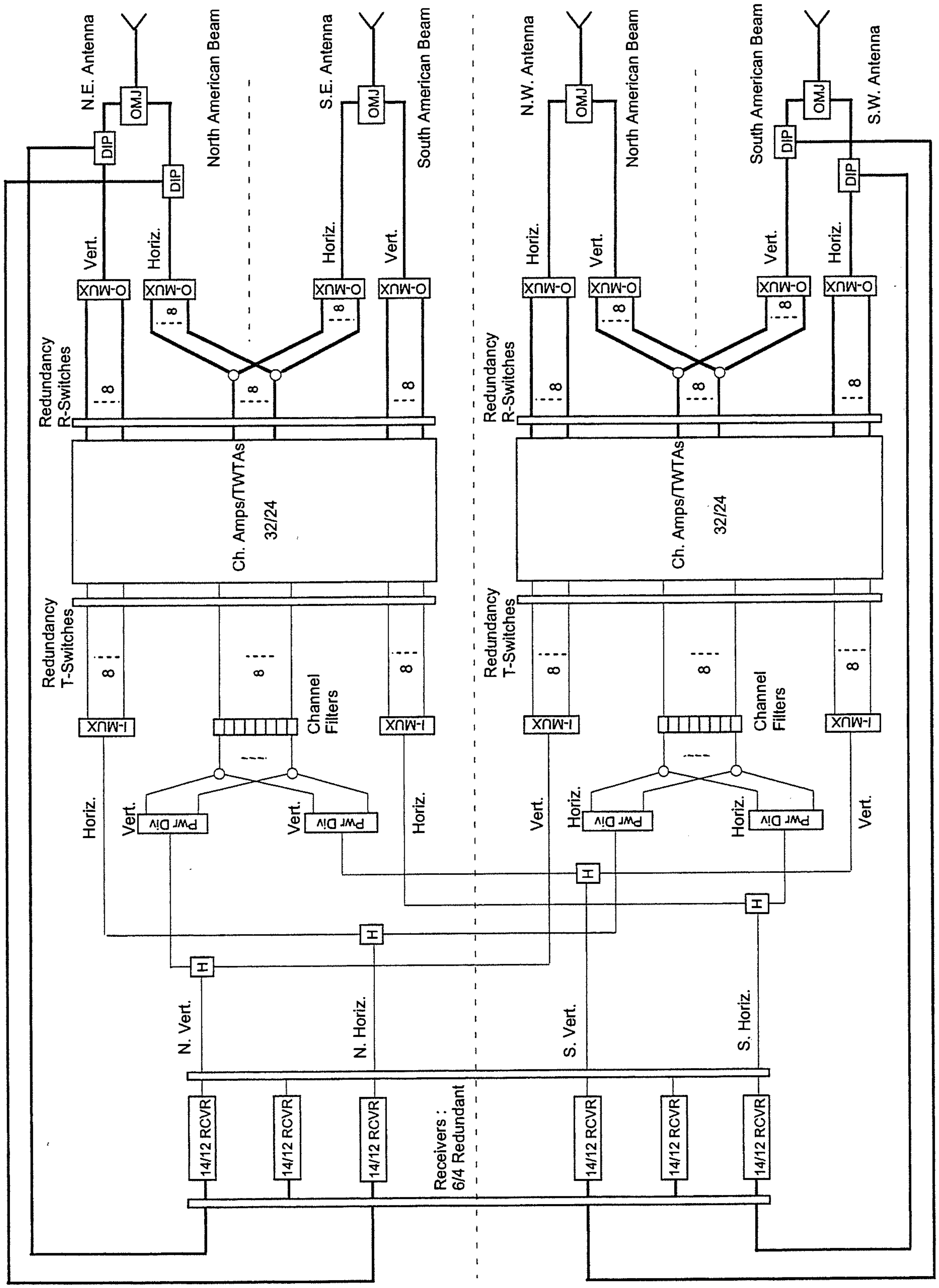


Figure 6-2(a). Standard Ku-Band Communications Subsystem Block Diagram

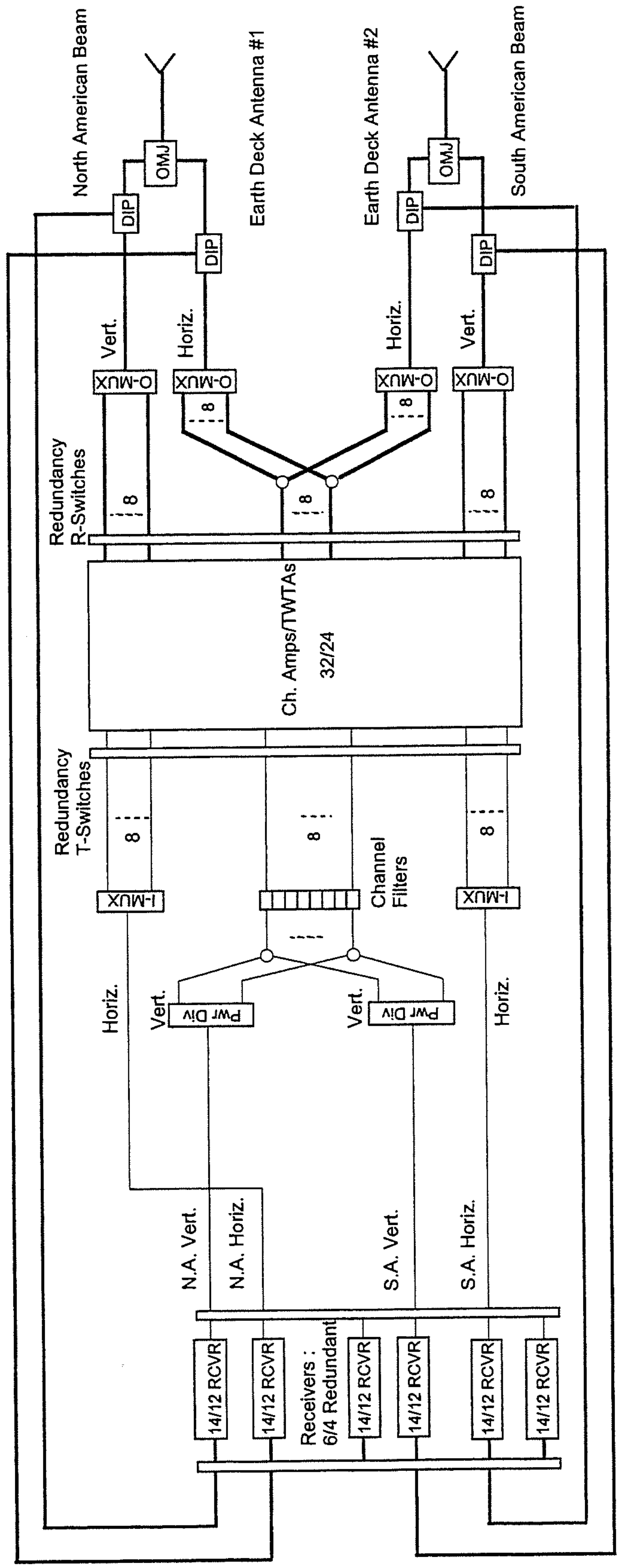


Figure 6-2(b). Extended Ku-Band Communications Subsystem Block Diagram

Gregorian optics designs with a single corrugated-horn feed, fed via an orthomode junction with the two orthogonal polarizations. This approach provides nearly identical performance for both senses of polarization and provides excellent cross-polarization isolation performance. The antenna reflectors will be nominally 1.8 meters in diameter.

Signals on each uplink polarization are independently received via orthogonal antenna ports and processed through separate paths. The input section comprises a diplexer, test coupler, switches, and receivers. The receivers amplify the input signals and downconvert them to the transmit frequency. The signals are then separated by transponders via the input channel filters. The transponders, following channelization, are routed to channel amplifier/TWTA redundancy rings. The channel amplifiers provide additional gain. They contain commandable gain step attenuators and automatic gain control (AGC) to protect the TWTA from overdrive. Each channel amplifier drives an associated TWTA. Following amplification, the transponder output signals are combined and filtered in an output multiplexer, then routed through a test coupler to the transmit antenna. The estimated net loss from the TWTAs to the antenna terminal is 2 dB.

The telemetry transmitter will be used to provide a beacon for earth station use in polarization tracking and rain fade compensation.

6.1.1.4 Transmission Modes and Emission Designators

The communication subsystem is capable of providing a wide variety of transmission modes, including QAM, M-ary QPSK, SCPC, and TDMA. These modes can be accommodated in any combination with complete flexibility in transponder assignment without significant interference to other transponders.

Table 6-3 presents the emission designators and the predicted maximum power flux density levels for representative transmission modes. The emission designators for telemetry and command are 66K0G2D and 800KD2D.

6.1.2.5 Technical Parameters

The transponders will have nominal RF output powers of 120/240 watts. All specifications will be met over the entire usable bandwidth.

EIRP and G/T Performance

Tables 6-4 and 6-5 summarize the predicted EIRP and G/T performance.

Table 6-3. Ku-Band Maximum Power Flux Density (PFD) Levels

Parameter	TDMA	SCPC
Emission Designator	M7W	F3W
Number of Carriers	1	640
EIRP (dBW)(1)	53.0	49.0
Power/Carrier (dB)	53.0	20.9
Spreading Factor (dB)	162.5	162.5
Energy Dispersal (dB)(2)	34.8	3.5
PFD ($dBW/m^2/4$ kHz)	-144.3	-145.0

Notes

(1) Maximum EIRPs of 53 dBW for Ku-band have been used in all cases except SCPC, where 4 dB output backoff is assumed. These values are the predicted peak EIRPs over the proposed coverage area.

(2) Assumes energy spread over 24 MHz with a 3 dB peak near the carrier for TDMA and an energy spread of 18 kHz with a 3 dB peak near the carrier for SCPC.

Table 6-4. Ku-Band EIRP Summary

	North American Beam (EOC)	South American Beam (EOC)
Amplifier output power (watts)	240	240
Amplifier output power (dBW)	23.8	23.8
Net output losses (dB)	-2.0	-2.0
Antenna input power (dBW)	21.8	21.8
Antenna gain at EOC (dBi)	26.4	27.4
EIRP (dBW)	48.2	49.2

Table 6-5. Ku-Band G/T Summary

	North American Beam (EOC)	South American Beam (EOC)
Antenna Gain, EOC (dBi)	26.4	27.4
Transponder noise figure, dB (1)	3.4	3.4
Transponder noise temperature (dB-K) (2)	28.0	28.0
G/T (dB/K)	-1.6	-0.6

(1) Includes input losses
(2) Referred to antenna output: Antenna temperature = 290K

Saturation Flux Density and Transponder Gain

The transponders will have individual commandable gain control. The transponder gain can be varied by 21 dB in 3 dB steps. Table 6-6 illustrates the transponder saturation flux densities and overall gain versus the different channel gain attenuator settings for the minimum EOC gain.

Transponder Receive Channel Filter Response Characteristics

The receive out-of-band response is defined as the response from the input antenna to the input of the final amplifier. The receive response will be a minimum of 3 dB below center frequency response for signals greater than ±13.5 MHz from center

Table 6-6. Ku-Band Transponder Saturation Flux Density and Gain

North America Beam								
Gain step attenuator setting, dB	0	3	6	9	12	15	18	21
Transponder sat. gain, dB (1,2)	132	129	126	123	120	117	114	111
Saturation flux density, dBW/m^2	-90	-87	-84	-81	-78	-75	-72	-69
South America Beam								
Gain step attenuator setting, dB	0	3	6	9	12	15	18	21
Transponder sat. gain, dB (1,2)	131	128	125	122	119	116	113	110
Saturation flux density, dBW/m^2	-91	-88	-85	-82	-79	-76	-73	-70

Notes:

(1) Gain is from output of receiving antenna to input of transmit antenna.

(2) Attenuator setting selectable by ground command.

(3) Gains and SFDs rounded to nearest dB.

frequency and greater than 30 dB below center frequency response for signals greater than ±16.5 MHz from center frequency.

Transponder Transmit Channel Filter Response Characteristics

The transmit response is defined as the response from the input of the final amplifier to the output of the transmit antenna. The transmit response will be greater than 1 dB below center frequency response for signals greater than ±13.5 MHz from center frequency and greater than 20 dB below center frequency response for signals greater than ±16.5 MHz from center frequency.

6.2 TRACKING, TELEMETRY, AND COMMAND (TT&C) SUBSYSTEM

The TT&C subsystem will operate at Ku-band. Two geographically dispersed TT&C ground stations at sites to be selected will control the satellites.

The command uplink will be frequency modulated by a command subcarrier or ranging tones. The nominal carrier deviation will be ±400 kHz peak. The redundant command receivers on the satellite are connected to near-omnidirectional antennas. The demodulated command subcarrier is routed to the redundant command processors. The ranging tones are connected to the telemetry transmitter for retransmission to the TT&C ground station.

The addressed command processor decodes and processes the command. Commands can be executed autonomously or stored, verified by ground command and executed by a subsequent command. Commands can also be time-tagged for autonomous execution at a future time.

The command link can be operated in either a clear or secure mode. Command decrypters are provided in each command processor. When in the secure mode, a fail-safe timer will revert the system to clear mode operation if a valid encrypted command has not been received within a predetermined period of time.

The telemetry data biphase modulates a subcarrier. This subcarrier and/or ranging tones phase modulate the telemetry transmitter. During orbit raising operations the telemetry is transmitted by broadbeam antennas with a nominal 10 watts RF power. In normal on-station operations, a low-level (nominally -5 dBW) telemetry signal is routed to a communications multiplexer and transmitted via a communications transmit antenna.

6.3 ATTITUDE CONTROL AND STATIONKEEPING SUBSYSTEM

The attitude control and stationkeeping (ACS) subsystem will provide satellite attitude control beginning with spacecraft separation from the launch vehicle and continuing through transfer to geosynchronous orbit. The ACS will also provide station acquisition and on-station attitude control. The ACS design will incorporate sun and earth sensors, momentum wheels, and thrusters to perform its required functions.

6.3.1 Accuracy for Orbital Inclination, Antenna Axis Attitude, and Longitudinal Drift

The spacecraft will be maintained within ±0.05°, in both the north/south and east/west directions, of its assigned orbital location. The stationkeeping will be performed by ground-commandable reaction control thrusters located on the body of the spacecraft.

The spacecraft communications antenna will be maintained within ±0.13° in both east/west (pitch) and north/south (roll) directions of its nominal boresight position during both normal spacecraft operations and stationkeeping maneuver operations.

6.4 ELECTRICAL POWER SUBSYSTEM

The electrical power subsystem (EPS) will consist of solar arrays for converting solar energy into the electrical energy required for normal operations, nickel-hydrogen batteries for supplying 100% of the required electrical energy during eclipse periods, power supply electronics for charging the batteries and limiting the maximum bus voltage, and solar array drives for rotating the solar arrays. The power output of the EPS will be sufficient to provide the electrical power required to operate 100% of the spacecraft payload and all other subsystems for the full spacecraft design life.

6.5 PROPULSION

The satellite propulsion subsystem will include all propellants/pressurants, components and assemblies associated with storing, conditioning, routing, controlling, and expelling propellant, required to change the spacecraft's attitude and its angular or linear velocity to meet the mission requirements, from the moment of separation from the launch vehicle, through and including the final orbit raising maneuver.

The propulsion subsystem provides perigee augmentation and apogee injection velocities as well as providing on-orbit reaction control using the integrated bipropellant propulsion system. This integrated bipropellant propulsion concept combines high thruster efficiency with performance flexibility.

6.6 SPACECRAFT DESCRIPTION

The proposed satellite configuration consists of a light-weight graphite-reinforced epoxy central cylinder and the surrounding equipment mounting panels that form a cube of approximately three meters on a side. Solar panels extend from the north and south faces and antenna reflectors are mounted on the east and west faces. The structure will also provide a stable platform for preserving the alignment of the critical elements of the spacecraft system, such as earth sensors.

The major heat dissipating units, such as RF power amplifiers, batteries, etc., are located on the north and south equipment panels to radiate their heat efficiently. To provide maximum thermal efficiency, the outside of the north and south panels will be covered with optical solar reflectors (OSRs), and the panels contain heat pipes for spreading the heat over the maximum area.

The system design fits comfortably within the constraints imposed by several launch vehicles. The satellite is compatible with the launch requirements of both the Atlas 2 and Ariane 4 launch vehicles.

Figure 6-3 presents a conceptual view of the spacecraft. The dry mass of the satellite is 2,280 kg and provides 2,200 kg of propellant capacity, as shown in Table 6-7. The power budget is approximately 16,000 watts, as shown in Table 6-8.

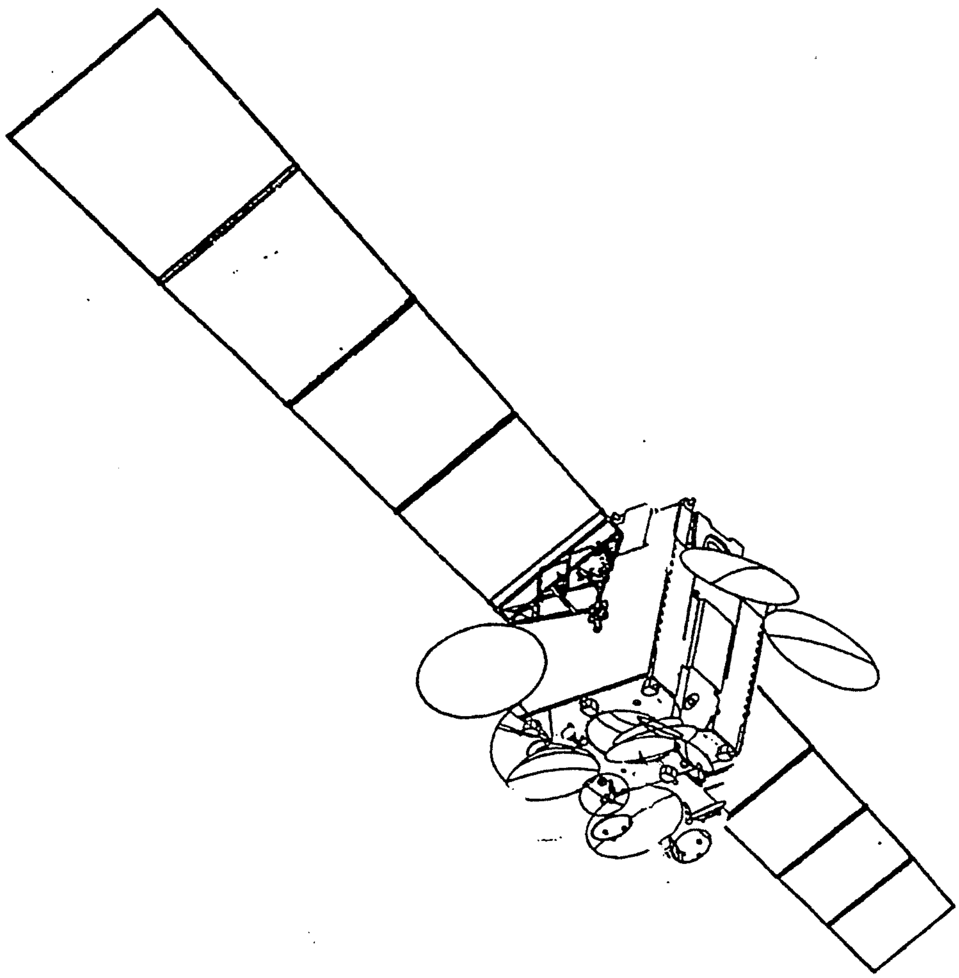


Figure 6-3. Spacecraft Configuration

Table 6-7. Mass Budget

Component	Mass (kg)
Payload	720
Bus	1460
Subtotal	2180
Margin	100
Total	2,280
PropellantPressurant	2,220
Separation mass	4,450

Table 6-8. End of Life (12 Years) Synchronous Power

Unit	Autumnal Equinox
Payload	14,394
Bus	980
Spacecraft total	15,374
Power Supplied	16,000

6.7 RELIABILITY AND OPERATIONAL LIFE

The design life of 15 years was chosen as a design criteria to meet a mission life of 12 years. Because the satellite design is a well-proven design, it is expected that the actual satellite longevity will far exceed the design life.

The calculated probability of survival of all the satellite bus subsystems will be greater than 0.75. The satellite subsystems shall be designed to include fail-safe features wherever possible. A failure within a unit or subsystem will not disable or degrade the performance of the remainder of the satellite. The calculated probability of survival for the on-board communication subsystem will be greater than 0.80.

6.8 LAUNCH VEHICLE

The spacecraft design is compatible with multiple launch vehicles. The satellites can be deployed during the standard launch window for all launch vehicles. The deployment window compatibility is made possible by the digital integrating rate assembly control system incorporated into the spacecraft design. The restartable bipropellant main satellite thruster combines high Isp with operational flexibility. The three-axis operation during transfer orbit is identical to on-station operation which ensures operational deployment flexibility. Loral Space will enter into a final contract for launch after receiving construction approval.

SECTION 7 – LEGAL, FINANCIAL, AND TECHNICAL QUALIFICATIONS

7.1 LEGAL QUALIFICATIONS

Loral Space is a corporation organized under the laws of Bermuda. Loral Space's legal qualifications are demonstrated in its FCC Form 430, "Licensee Qualification Report," which was filed with the Commission on April 29, 1996.

7.1.1 Construction and Launch Schedules

Loral Space is expected to purchase the satellite from Space Systems/Loral, its satellite manufacturing subsidiary. It is expected that spacecraft construction will begin concurrent with approval of this application and that delivery of the spacecraft to the launch site will occur 33 months after approval. Launch of the satellite will occur one month after delivery to the launch site and checkout will be completed two months later. Key milestone dates are indicated in Table 7-1.

Table 7-1. Milestone Dates

Milestone	Spacecraft
Construction application approval	Month 0
Construction start	Month 0
Construction complete	Month 34
Delivery to launch site	Month 35
Launch	Month 36
Checkout complete	Month 38

7.2 FINANCIAL QUALIFICATIONS

7.2.1 System Costs

Costs for the construction and launch of the satellite, and the first year operation will total approximately $207 million, based on present projections, as outlined in Table 7-2.

Table 7-2. Total Investment Requirements

Segment	Costs (in millions)
Satellite Design and Construction, Launch and Insurance	$205
Satellite Operations Control Center	$1
Operating Costs through First Year	$1
Total	$207

The estimated cost to design, construction, launch, and insure the satellite is $205 million.

The estimated operating costs for the satellite system for its first year is approximately $1 million.

The proposed ground system will consist of converting existing TT&C earth stations in the eastern and western regions of the country for Loral Space's use. Loral Space's total investment requirements are itemized in Table 7-2. A calendarization is provided in Table 7-3.

Table 7-3. Calendarized Cost – $M

	Year												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Satellite/Launch and Insurance	50	100	55										
TT&C	-	-	1	-	-	-	-	-	-	-	-	-	-
Operation, maintenance, and general expenses	-	-	-	1	2	2	3	3	3	3	3	3	3
Total	50	100	56	1	2	2	3	3	3	3	3	3	3

7.2.2 System Financing

Appendix C contains Loral Space's financial statements. The financial statements were prepared in connection with the merger of Loral Corporation with Lockheed Martin Corporation, a Maryland corporation, and LAC Acquisition Corporation, a New York corporation. Pursuant to the merger, Loral Space was formed to hold the space and telecommunications businesses of Loral Corporation. As a newly-created company, Loral Space does not have financial statements for the lastest fiscal year. The attached financial statements, from Loral Space's Information Statement filed with the Securities and Exchange Commission, represent the financial position as of April 12, 1996. The financial statements demonstrate sufficient financial ability to satisfy the costs of the satellite.

7.2.3 Revenue Requirements

As a non-common carrier, Loral Space need not address revenue requirements.

7.3 TECHNICAL QUALIFICATIONS

Space Systems/Loral (SS/L), the satellite manufacturer, is one of the world's premier manufacturer of communications and meteorological satellites. To date, SS/L has built more than 90 satellites, for use all over the world. Its customers include the United States Air Force, the United Kingdom, Japan, and INTELSAT. In addition, SS/L is presently designing and building the high-power television broadcast satellites for TEMPO and MCI, and communications satellites for PanAmSat, as well as global satellites for Pacific Rim coverage areas. SS/L has also contracted to supply 48 satellites and 8 in-orbit spares for the Globalstar system.

SECTION 8 - WAIVER PURSUANT TO SECTION 304 OF THE ACT

Loral Space hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

SECTION 9 - ANTI-DRUG ABUSE ACT OF 1988

The Applicant hereby certifies under penalty of perjury that neither the Applicant nor any party to this application is subject to a denial of federal benefits by Federal and/or state courts under authority granted in 21 U.S.C. § 853(a).

SECTION 10 - CERTIFICATION

Loral Space & Communications Ltd. acknowledges that all of the statements in this application and in the exhibits and associated attachments are considered material representations, and that all the exhibits and attachments are a material part hereof. and are incorporated herein as if set out in full in this application.

The undersigned certifies individually and for Loral Space & Communications Ltd. that the statements made in this application are true, complete, and correct to the best of his knowledge and belief, and are made in good faith.

Wherefore, Loral Space & Communications Ltd. requests that the Commission authorize the construction, launch and operation of the Loral satellite in accordance with this application.

Respectfully submitted,

Loral Space & Communications Ltd.

By:

Michael B. Targoff
President and Chief Operating Officer

LORAL

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION CONTAINED IN THIS APPLICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this Application and the exhibits attached hereto; that I am familiar with Part 25 of the Commission's Rules and Appendix B to the 1983 Orbital Processing Order; that I have either prepared or reviewed the engineering information contained in this application and the exhibits attached hereto; and that it is complete and true to the best of my knowledge.

By: [signature]

Michael J. Malone
Space Systems/Loral Engineering
3825 Fabian Way
Palo Alto, CA 94303
(415) 852-6832

Signed and sworn before me this 7th day of June 1996.

Notary Public:
Marie A. Cannon

MARIE A. CANNON
COMM. #1046416
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Comm. Exp. Dec. 12, 1998

LORAL

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING FINANCIAL INFORMATION CONTAINED IN THIS APPLICATION

I hereby certify that I am the technically qualified person responsible for preparation of the financial information contained in this Application; that I am familiar with the financial requirements of Appendix B to the 1983 Orbital Processing Order; that I have either prepared or reviewed the financial information contained in this application and that it is complete and true to the best of my knowledge.

By: [signature]

Michael B. Targoff
President and Chief Operating Officer
Loral Space & Communications Ltd.
600 Third Avenue
New York, NY 10016
(212) 697-1105

Signed and sworn before me this 4th day of June 1996

Notary Public: [signature]

RENEE M. YARZIG
Notary Public, State of New York
No. 01YA5067332
Certificate Filed in New York County
Commission Expires March 18, 98

APPENDIX A

ADJACENT SATELLITE INTERFERENCE ANALYSIS

APPENDIX A – ADJACENT SATELLITE INTERFERENCE ANALYSIS

In 1983, the FCC authorized an orbital spacing of 2° for geostationary satellites, based on an analysis of adjacent satellite interference by George Sharp. His analysis showed that it was possible to keep the effect of adjacent satellite interference at an acceptable level, provided there was coordination among the services offered by adjacent satellites. For example, narrowband SCPC services, both digital and analog, suffer degradation due to interference from adjacent satellites carrying FM/TV, unless the central 6 MHz or so of the transponder carrying SCPC traffic is left unused. This type of coordination is called micro-segmentation.

Another type of coordination consists of macro-segmentation, whereby the one portion of the 500 MHz satellite bandwidth could be reserved for FM/TV and another portion for narrowband and other susceptible services (such as CSSB/AM).

Yet another type of coordination consists of assigning orthogonal polarizations to the interfering TV/FM and SCPC services.

The existing and proposed satellites within a 4 degree range of the Loral Space satellite at 81 °W are shown in Table A-1. In some cases for the Loral Space satellite, coordination techniques such as those mentioned above will be necessary to achieve the desired interference degradation goals. The proposed Loral Space satellite system uses dual polarization in both C and Ku bands and offers a sufficiently large number of transponders and services so that such coordination will be feasible.

It should be recognized that the Telstar 401 satellite with a 120-watt Ku-band transponder while carrying analog video has operated successfully. Loral Space satellite systems will coordinate the use of analog video (FM/TV) with adjacent satellite operators.

APPENDIX B

CHARACTERISTICS OF TYPICAL EARTH STATIONS

APPENDIX B – CHARACTERISTICS OF TYPICAL EARTH STATIONS

Characteristics of representative earth stations which will be used with the Loral satellite system are given Tables B-1 through B-4.

Table B-1. Characteristics of a Typical 7.7-Meter Ku-Band Earth Station

Parameter	Value
Antenna	
Size, Type	7.7-Meter, shaped Paraboloid
Type of Mount	Elevation/Azimuth
Type of Tracking System	Manual
Type of Feed	Cassegrainian
Loss Bet. HPA & Antenna	2.5 dB (nominal)
Transmit Beamwidth	0.20° at 3-dB pts. (14.25 GHz)
Receive Beamwidth	0.23° at 3-dB pts. (11.45 GHz)
Sidelobe Characteristics	Meets FCC Requirement 25.209
Transmit Gain	58.6 dBi at 14.2 GHz
Receive Gain	57.1 dBi at 12 GHz
Transmitter	
Type	TWTA
Power	300 W
Frequency Range	14.0 to 14.5 GHz
Instantaneous Bandwidth	500 MHz at 1 dB pts.
Frequency Stability	Two parts in 107 par Year
Emission Control	Limited per FCC Rules 25.202
Receiver	
LNA Type	GaAs FET
LNA Noise Temperature	225 K
Frequency Range	11.7 to 12.2 GHz
Bandwidth	500 MHz
G/T (Clear Weather)	32.5 dB/K at 30° Elev.; 12 GHz
EIRP	
Main Beam	80.9 dBW Max. (80.9 dBW Operational)
Horizon	*

* This number depends on earth station location.

Table B-2. Characteristics of a Typical 3.5-Meter Ku-Band Earth Station

Parameter	Value
Antenna	
Size, Type	3.5-Meter, shaped Paraboloid
Type of Mount	Elevation/Azimuth
Type of Tracking System	Manual
Type of Feed	Cassegrainian
Loss Bet. HPA & Antenna	2.5 dB (nominal)
Transmit Beamwidth	0.42° at 3-dB pts. (14.25 GHz)
Receive Beamwidth	0.50° at 3-dB pts. (11.45 GHz)
Sidelobe Characteristics	Meets FCC Requirement 25.209
Transmit Gain	51.7 dBi at 14.2 GHz
Receive Gain	50.3 dBi at 12 GHz
Transmitter	
Type	TWTA
Power	300 W
Frequency Range	14.0 to 14.5 GHz
Instantaneous Bandwidth	500 MHz at 1 dB pts.
Frequency Stability	Two parts in 107 par Year
Emission Control	Limited per FCC Rules 25.202
Receiver	
LNA Type	GaAs FET
LNA Noise Temperature	225 K
Frequency Range	11.7 to 12.2 GHz
Bandwidth	500 MHz
G/T (Clear Weather)	26.3 dB/K at 30° Elev.; 12 GHz
EIRP	
Main Beam	64.5 dBW Max. (64.5 dBW Operational)
Horizon	*

* This number depends on earth station location.

Table B-3. Characteristics of a Typical 2.4-Meter Ku-Band Earth Station

Parameter	Value
Antenna	
Size, Type	2.4-Meter, shaped Paraboloid
Type of Mount	Elevation/Azimuth
Type of Tracking System	Manual
Type of Feed	Cassegrainian
Loss Bet. HPA & Antenna	1.0 dB (nominal)
Transmit Beamwidth	0.62° at 3-dB pts. (14.25 GHz)
Receive Beamwidth	0.73° at 3-dB pts. (11.45 GHz)
Sidelobe Characteristics	Meets FCC Requirement 25.209
Transmit Gain	48.5 dBi at 14.2 GHz
Receive Gain	47.1 dBi at 12 GHz
Transmitter	
Type	SSPA
Power	2.5 W
Frequency Range	14.0 to 14.5 GHz
Instantaneous Bandwidth	500 MHz at 1 dB pts.
Frequency Stability	Two parts in 107 par Year
Emission Control	Limited per FCC Rules 25.202
Receiver	
LNA Type	GaAs FET
LNA Noise Temperature	225 K
Frequency Range	11.7 to 12.2 GHz
Bandwidth	500 MHz
G/T (Clear Weather)	22.6 dB/K at 30° Elev.; 12 GHz
EIRP	
Main Beam	51.5 dBW Max. (33.5 dBW/4 kHz Operational)
Horizon	*

* This number depends on earth station location.

Table B-4. Characteristics of a Typical 1.8-Meter Ku-Band Earth Station

Parameter	Value
Antenna	
Size, Type	1.8-Meter, shaped Paraboloid
Type of Mount	Elevation/Azimuth
Type of Tracking System	Manual
Type of Feed	Offset
Loss Bet. HPA & Antenna	1.0 dB (nominal)
Transmit Beamwidth	0.80° at 3-dB pts. (14.25 GHz)
Receive Beamwidth	0.95° at 3-dB pts. (11.45 GHz)
Sidelobe Characteristics	Meets FCC Requirement 25.209
Transmit Gain	46.2 dBi at 14.2 GHz
Receive Gain	44.8 dBi at 12 GHz
Transmitter	
Type	SSPA
Power	2.5 W
Frequency Range	14.0 to 14.5 GHz
Instantaneous Bandwidth	500 MHz at 1 dB pts.
Frequency Stability	Two parts in 107 par Year
Emission Control	Limited per FCC Rules 25.202
Receiver	
LNA Type	GaAs FET
LNA Noise Temperature	225 K
Frequency Range	11.7 to 12.2 GHz
Bandwidth	500 MHz
G/T (Clear Weather)	20.1 dB/K at 30° Elev.; 12 GHz
EIRP	
Main Beam	50 dBW Max. (32 dBW/4 kHz Operational)
Horizon	*

* This number depends on earth station location.