EXHIBIT A – JUSTIFICATION FOR STA & INDEX

1.0 - Description of Filing

NewCom International ("NewCom"), pursuant to section 25.120 of the Commission's Rules, 47 C.F.R. § 25.120, hereby requests Special Temporary Authority ("STA") to operate a transmit/receive C-band satellite earth station in Miami, Florida, communicating with the Express AM44 ("AM44") satellite on a non-common carrier basis. Specifically, NewCom International, Inc ("NewCom") seeks to communicate with the AM44 using an already authorized Andrew Corp. 7.3 meter antenna ("7.3a") operated under Call Sign E040267. STA is sought for a period of 60 days.

The AM44 is a Russian licensed satellite positioned at 11.0 degrees west longitude in the geostationary arc. The AM44 has been coordinated and approved as a replacement satellite by the Russian administration and International Telecommunications Union ("ITU"). Pursuant to Section 23.137 of the Commission's Rules, 47 C.F.R. § 25.137, the underlying application and complementary exhibits seeking to add the AM44 as a point of communication to Call Sign E040267 demonstrate that the satellite complies with all applicable Commission requirements and service rules for non-U.S. licensed satellite systems.

With regard to this request for STA, NewCom seeks to transmit earth-to-space to the AM44 in the extended C-band from 6425-6525 MHz. Fixed satellite service operations are co-primary in this band, and NewCom has conducted a frequency coordination that demonstrates no other licensed entity will be affected by the proposed operations.[1] NewCom also seeks authority to receive space-to-earth transmissions from the AM44 in the extended C-band from 3650-3700 MHz. NewCom understands that fixed satellite service downlink operations in the 3650-3700 MHz band are permitted only on a secondary basis, and that terrestrial services licensed under Part 90 of the Commission's rules have priority in the 3650-3700 MHz band. NewCom agrees to accept interference from the aforementioned higher priority, terrestrial spectrum users.

Grant of this request for STA will serve the public interest by allowing NewCom to continue providing lifeline communications to underserved parts of the world, including the provision of telemedicine applications and Internet backbone access to remote customer stations in Africa and Latin America. In many instances the aforementioned end users have communicated with the circular polarized C-band Intersputnik satellite that has historically populated the 11 West Longitude position in the geostationary arc for many years. Given that these end users generally lack the resources to construct new earth station facilities, and are without access to competitively priced alternative circular polarized C-band satellites, the AM44 is the only viable transmission medium for lifeline services. Were NewCom unable to serve these customers using the AM44, many critical services would be disrupted, including applications used by humanitarian agencies, hospitals, schools, heavy industry and the financial community.

[1] Pursuant to 47 C.F.R. § 25.203, a frequency coordination has been included as Exhibit No. F with the underlying modification application.

NewCom anticipates filing a modification application seeking authority to add the AM44 permanently as a point of communication to Call Sign E040267 in the immediate future, and recognizes that any authority granted pursuant to this request is subject to cancellation or modification upon notice, but without a hearing.

2.0 - Exhibit Table of Contents

EXHIBIT B – SCHEDULE B REPLACEMENT TABLES

ANTENNA

Site ID	Antenna ID	Quantity	Manufacturer	Model	Antenna Size (Meters)	Antenna (dBi/GHz)
1	7.3a	1	Andrew	ESA73-46A	7.3	48.5 dBi at 4.0
1	7.3a	1	Andrew	ESA73-46A	7.3	51.7 dBi at 6.1

Above Ground Level (meters)	Above Sea Level (meters)	Building Height	Antenna Height Above Rooftop	Total Input at Antenna Flange (W)	Total EIRP for All Carriers (dBW)
7.9	9.73	N/A	N/A	157.0	73.6

FREQUENCY & EMISSIONS

Frequency Bands (MHz)	Mode (Tx or Rx)	Polarization	Emission Designator	Maximum EIRP per Carrier (dBW)	Maximum EIRP Density per Carrier (dBW/4kHz)
3650-4200	Rx	Circular	128KG7D	0.0	0.0
3650-4200	Rx	Circular	40M0G7W	0.0	0.0
5980-6425	Tx	Circular	128KG7D	52.3	37.3
5980-6425	Tx	Circular	40M0G7W	72.3	32.1
6020-6047	Tx	Circular	128KG7D	64.1	49.0
6020-6047	Tx	Circular	27M0G7W	72.6	34.3
6079-6107	Tx	Circular	128KG7D	64.1	49.0
6079-6107	Tx	Circular	28M0G7W	72.6	34.2
6168-6240	Tx	Circular	128KG7D	64.1	49.0
6168-6240	Tx	Circular	40M0G7W	72.6	32.1
6331-6359	Tx	Circular	128KG7D	64.1	49.0
6331-6359	Tx	Circular	28M0G7W	72.6	34.2
6391-6425	Tx	Circular	128KG7D	64.1	49.0
6391-6425	Tx	Circular	34M0G7W	72.6	33.3
6425-6525	Tx	Circular	128KG7D	64.1	49.0
6425-6525	Tx	Circular	40M0G7W	73.0	33.0

FREQUENCY COORDINATION

Satellite Orbit	Frequency Limits (MHz)	Range of Satellite Arc (E/W)	Azimuth Angle Eastern Limit	Elevation Angle Eastern Limit	Azimuth Angle Western Limit	Elevation Angle Western Limit	Maximum EIRP Density Toward Horizon (dBW/4kHz)
Geo	3650 3700	11.0 11.0	99.4	10.0	99.4	10.0	0.0
Geo	6020 6047	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	6079 6107	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	6168 6240	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	6331 6359	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	6391 6425	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	6425 6525	11.0 11.0	99.4	10.0	99.4	10.0	-5.0
Geo	5980 6425	11.0 11.0	99.4	10.0	99.4	10.0	-16.7

EXHIBIT C – AM44 TECHNICAL NARRATIVE

This exhibit demonstrates compliance with applicable Commission requirements for non-United States licensed systems.[1]

1.0 - Introduction

NewCom International ("NewCom") proposes to serve the United States market using a new satellite designated as the Express AM44 ("AM44"). The AM44 operates from the orbital location of 11.0 degrees west longitude. The AM44 will serve North America in the frequency bands 5980 – 6520 MHz and 3650 – 4200 MHz. The AM44 replaces the Express 3A spacecraft, which previously served the U.S. market from the same orbital location pursuant to special temporary authority.[2] NewCom will use the AM44 to provide customers in underserved areas with data services, including Internet backbone access. NewCom's proposed services will be exclusively non-common carrier and configured Single Channel Per Carrier ("SCPC").

The technical characteristics and parameters of the AM44 spacecraft as well as its compliance with the various provisions of Part 25 of the Commission's rules are provided in the remainder of this Technical Narrative.

[1] *See* 47 C.F.R. § 25.137(d); *see also* 47 C.F.R. § 25.114(d).

[2] *See* FCC File Nos. SES-STA-20081110-01467 and SES-STA-20081010-01314.

2.0 - Spacecraft Overview

The AM44 is a 3-axis stabilized spacecraft with a sealed, cylinder shaped body ("platform" or "structure") that supports electronic, electrical and other subsystems. The AM44 utilizes two deployable solar array wings and a propulsion system that consists of SPT-M100 xenon based plasma thrusters for orbital maneuvers and hydrazine fueled electro-thermocatalytic thrusters for attitude adjustments. The telecommunications payload module is integrated on the forward section of the platform. A summary of the physical characteristics of the spacecraft is provided in **Table 1.0** below.

GENERAL SPACECRAFT CHARACTERISTICS	
Spacecraft Name	AM44
Orbital Location	11.0º W.L.
Spacecraft Type	3-Axis Stabilized
Spacecraft Dimensions	
Length	26.532 meters
Width	6.625 meters
Depth	5.062 meters
Spacecraft Mass	
Mass w/o fuel	2,327 kg
Mass w/fuel	2,532 kg
Spacecraft Expected Lifetime	>12 years
Eclipse Capability	100%
Station-keeping	
North-South	+/- 0.05º
East-West	+/- 0.05º
Propulsion Type	Orbit control and maneuvers: SPT M-100 plasma thrusters Fuel: Xenon Attitude control: Electro-thermocatalytic thrusters Fuel: Hydrazine
Maximum Solar Array Power	
Beginning of Life	8,354 Watts
End of Life	6,766 Watts
Deployed Area of Solar Array	61.2 meters

TABLE 1.0

2.1 Structure

The AM44's structure provides mechanical support for all subsystems. It also provides a stable platform for preserving the alignment of critical elements of the spacecraft.

Electronic subsystems and complementary electronic and electrical components are located within the sealed, pressurized cylinder. Batteries, fuel tanks, solar arrays and structural elements that interconnect the telecommunications module with the cylinder platform are mounted externally in ruggedized modules.

The forward section of the cylinder structure supports the telecommunications module. Commercial communications antennas, telecommand and telemetry antennas, repeaters and optical sensors are mounted externally to the telecommunications module.

The AM44 utilizes the following antennas:

- C-, Ku- and L-band communications antennas.
- Omnidirectional antennas for Telemetry, Telecommand and Control ("TT&C") during routine and emergency maneuvers.

The spacecraft utilizes two deployable solar arrays, which are mounted to the aft of the primary cylinder structure. The solar arrays provide the mounting surface for the solar cells. The solar arrays are connected to the main spacecraft platform through a dedicated solar array drive assembly.

The AM44's mass is provided below in **Table 2.0** and in the complementary **Schedule S**.

MASS BUDGET	
Mass of Spacecraft without Fuel (kg)	2,327
Mass of Fuel and Disposables (kg)	205
Launch Mass (kg)	2,532
Mass of Fuel, Beginning of Life, In Orbit (kg)	205

TABLE 2.0

2.2 Thermal Subsystem

Thermal control is accomplished through a combination of optical solar reflectors ("OSRs"), fluid loop equipment, insulation blankets and electrical heaters. The outer surface of the telecommunications payload module and the platform's radiator are covered with OSRs to maximize the heat rejection to space while minimizing the absorbed solar energy. The heat generated by high power sub-systems (*e.g.*, TWTAs) is removed by a fluid loop and dissipated in a radiator. Insulation blankets cover the majority of external surfaces areas, with the exception radiating components and solar arrays. Heaters limit the effects of extreme low temperatures on electronics, thrusters and propellant lines.

2.3 Power Subsystem

The power subsystem generates, conditions, stores and protects the AM44's electrical power. It also provides the energy required to operate the satellite during all modes of operation. The

power subsystem consists of the solar arrays, batteries, associated electronics, and power harnesses that interconnect and control the systems.

The AM44 utilizes two deployable solar array wings, which are mounted to the aft section of the primary cylinder structure. Each solar array is composed of multiple solar panels. Each panel supports an array of solar cells. Subsequent to launch, both arrays were successfully unfurled. The AM44's solar arrays are designed to provide power to the spacecraft for at least 12 years.

Power from the solar arrays is transferred to the spacecraft through the use of a solar array drive assembly. During eclipse periods, rechargeable multiple cell batteries are the primary source of power to the spacecraft.

The AM44's power subsystem has been designed so that no single failure in the subsystem will cause a spacecraft failure. The subsystem will provide sufficient power to the spacecraft throughout its design life to support commercial communications, as well as all housekeeping activities. The beginning-of-life and end-of-life power budgets for the AM44 are provided below in **Table 3.0** and in the complementary Schedule S.

POWER BUDGET				
	BEGINNING OF LIFE		END OF LIFE	
	Autumn Equinox	Summer Solstice	Autumn Equinox	Summer Solstice
Payload (Watts)	4,410	4,410	4,410	4,410
Bus (Watts)	1,183	1,095	1,183	1,095
Total Power (Watts)	5,593	5,505	5,593	5,505
Solar Array Power (Watts)	8,354	7,443	6,766	6,029
Battery Discharge in Eclipse (W)	2,350	2,350	2,350	2,350

TABLE 3.0

2.4 Attitude Control Subsystem

The attitude control subsystem will maintain the spacecraft's attitude during geostationary operations. Additionally, the attitude control subsystem will be responsible for reacquisition of the spacecraft in case of emergency.

The attitude control subsystem employs redundant sun and earth sensors and inertial reference units to perform all attitude determination functions. Physical control of the spacecraft's attitude is accomplished through the use of redundant gyrostabilizers and pulsed or continuous firing of selected thrusters.

2.5 Propulsion Subsystem

The propulsion subsystem will provide impulse for the spacecraft maneuvering during all phases of the mission beginning with launch vehicle separation and continuing throughout the satellite's

operational life. The spacecraft will employ a propulsion system utilizing plasma thrusters and electro-thermocatalytic thrusters. The primary components of the propulsion system are:

- xenon tanks
- hydrazine tanks
- plasma thrusters
- eletro-thermocatalytic thrusters
- orbit control propulsion subsystem management unit
- attitude control propulsion subsystem management unit
- inter-unit pipes

The AM44 was successfully placed into geostationary orbit by a direct injection launch. Orbit control thrusters maintain the orbital position of the satellite and are mounted at various sites on the primary cylinder structure.

The architecture of the propulsion sub-system is an evolution of the 727 Express M bus utilizing space-proven components. The system incorporates full redundancy for all critical components.

2.6 *Satellite Station-Keeping*

The AM44 will maintain an operational orbit within 0.05º of its nominal orbital position in both east-west and north-south directions in full compliance with the provisions of Section 25.210(j) of the Commission's Rules.

The attitude of the AM44 will be maintained consistent with industry best practices. Satellite attitude will satisfy all performance obligations after incorporating potential error sources (*i.e.*, attitude perturbations, misalignments, orbital tolerances, thermal distortions and thruster perturbations).

2.7 *Satellite Lifetime*

The AM44 is designed to provide commercial communications from its nominal orbital position for a period of 12 years. To enhance the probability of survival, component redundancy is incorporated into the spacecraft design where possible. Materials and processes were selected so that aging and natural wearing will not adversely affect spacecraft performance during the estimated life of the AM44.

2.8 Satellite Reliability

Reliability is maximized by incorporating flight proven components to the greatest extent possible. All subsystems and components have a minimum design life of 12 years. All critical components are redundant. All single points of failure have been eliminated, except for the tanks and tubes of the propulsion subsystem.

3.0 - Telecommunications Payload

The AM44 has 10 active transponders operating in C-band frequencies.[3] All C-band transponders support 40 MHz channels and employ circular polarization.[4] The AM44 is the replacement spacecraft for a series of circular polarized satellites, the most recent of which is the Express 3A. The use of circular polarization will allow long-standing, legacy customers with limited resources to continue utilizing the 11.0° W.L. orbital slot without retrofitting earth station facilities. C-band transponder assignments are provided below in **Table 4.0**.

TRANSPONDER ASSIGNMENTS							
Transponder No.	Uplink Center Freq. (MHz)	Downlink Center Freq. (MHz)	Transponder Output Power (W)	Transponder Operating Bandwidth (MHz)	Uplink Service Area	Uplink Polarization	Downlink Polarization
6	6000	3675	100	40	Global	LHCP	RHCP
7	6050	3725	100	40	Zone	LHCP	RHCP
8	6100	3775	100	40	Zone	LHCP	RHCP
9	6150	3825	100	40	Zone	LHCP	RHCP
10	6200	3875	100	40	Global	LHCP	RHCP
11	6250	3925	100	40	Global	LHCP	RHCP
15	6350	4025	100	40	Zone	LHCP	RHCP
16	6400	4075	100	40	Zone	LHCP	RHCP
17	6450	4125	100	40	Zone	LHCP	RHCP
18	6500	4175	100	40	Zone	LHCP	RHCP

Table 4.0

The AM44's C-band transponders are not capable of switching polarizations.[5] With regard to neighboring satellites, the Russian Satellite Communications Company ("RSCC") operates the AM44 in a manner that is compliant with existing coordination agreements and within the same levels that were utilized on the Express 3A. Hence, the lack of C-band polarization switching capability aboard the AM44 does not affect compatibility with the co-frequency operation of the following:

[3] In addition, the AM44 incorporates 16 Ku-band transponders. The AM44's Ku-band transponders do not radiate over the conterminous United States or U.S. territories. NewCom accordingly seeks a waiver of the obligation in Section 25.137 to provide technical specifics regarding these transponders. Please see Exhibit D.

[4] The AM44 is not strictly in compliance with the provisions of Section 25.210(a)(1) of the Commission's Rules that require orthogonal linear polarization in the 5980 – 6425 MHz and 3700 – 4200 MHz frequency bands. Section 25.210(a)(1), however, applies to satellites providing "domestic service." The AM44 is designed to provide intercontinental communications and will not provide "domestic service." In fact, the low look angle from the satellite physically prevents inland ground stations in the conterminous U.S. from using the AM44 as a point of communication.

[5] The AM44 is not strictly compliant with Section 25.210(a)(3) of the Commission's Rules. As discussed above, the satellite will not provide domestic service.

Inmarsat 3F2 @ 15.5W
Telstar 12 @ 15W (Ku only)
Express 4A @ 14W (same operator)
Gorizont 32 @.13W
Atlantic Bird 1 @ 12.5W (Ku only)
Atlantic Bird 2 @ 8W (Ku only)
Telecom 2D @ 8W
HotBird 10 @ 7.4W
Nilesat 101 and Nilesat 102 @ 7W (Ku only)
Syracuse 3B @ 5W (X and EHF only)
Atlantic Bird 3 @ 5W

Further, the footprint of the AM44 is optimized for 11.0° W.L. Unlike satellites designed to operate from different orbital locations in the U.S. domestic arc, the AM44 cannot be readily relocated to another orbital location. Given that many satellites operating outside the U.S. arc do not have identical beam coverage or homogeneous channel bandwidth and/or spacing, the need to switch polarization in order to minimize the level of interference to other nearby satellites is not expected to arise. Accordingly, incorporation of polarization switching on the AM44 would not have the same benefits as it would have in the case of a satellite designed to operate in the U.S domestic orbital arc. See **Table 5.0** below for general communications payload characteristics.

COMMUNICATIONS PAYLOAD	
Frequency Bands	
Uplink	C-band: 5980 - 6520 MHz
Downlink	C-band: 3650 - 4200 MHz
Polarization	
Uplink	C-band: Left Hand Circular
Downlink	C-band: Right Hand Circular
Coverage Area	
Uplink	C-band: Africa, Asia, Europe and North America
Downlink	C-band: Africa, Asia, Europe and North America
Beam Cross-Polarization Isolation	
Uplink	> 33 dB at beam peak > 30 dB within service area
Downlink	> 33 dB at beam peak > 30 dB within service area
Number of Channels	10
Channel Bandwidth	40 MHz
Maximum Downlink EIRP	

COMMUNICATIONS PAYLOAD	
North America (C-band)	47 dBW
Maximum Uplink G/T	
North America (C-band)	3.5 dB/K
Uplink SFD Range @ Maximum G/T	
North America (C-band)	-76 to -100 dBW/m^2
Transponder Range	
Fixed Gain Mode	16 dB in 1 dB steps
Automatic Level Control Mode	16 dB
Maximum Power of Last Amplifier Stage	100 Watts of TWTA output power
Transmit Frequency Stability	< 0.002%

TABLE 5.0

3.1 Antennas and Beam Coverage

The AM44 will utilize a 4º x 10º C-band transmit/receive antenna to generate longitudinal zone beam coverage, and a 17º x 17º C-band receive antenna coupled with a 15º x 15º C-band transmit antenna to generate global beam coverage. The coverage provided by these antennas is shown below in the format prescribed in Section 25.114(d)(3) of the Commission's Rules. The peak Equivalent Isotropic Radiated Power ("EIRP") of the C-band transmit beams is 47 dBW for zone beams and 39 dBW for global beams. The peak G/T of the C-band receive beams is +3.5 dB/K for the zone beams and -7 dB/K for the global beams. The minimum saturation flux density ("SFD") corresponding to the peak G/T point of the C-band receive beams is -94 dBW/m2. SFD at any G/T contours may be determined using the following formula:

$SFD_D = SFD_P + [(G/T)_P - (G/T)_D] + A$
where

SFD_D: SFD at desired G/T level (dBW/m^2)
SFD_P: Minimum SFD at peak G/T (dBW/m^2)
$(G/T)_D$: Desired G/T level (dB/K)
$(G/T)_P$: Peak G/T (dB/K)
A = Transponder attenuated setting (dB), ranging from 0 to 16 dB in 1 dB steps

The AM44 transmit and receive beams are designed to have a minimum cross-polarization of 30 dB or greater within the primary coverage area and are fully compliant with Section 25.210(i).

The contour maps below illustrate the coverage and EIRP for the zone and global beams described above.

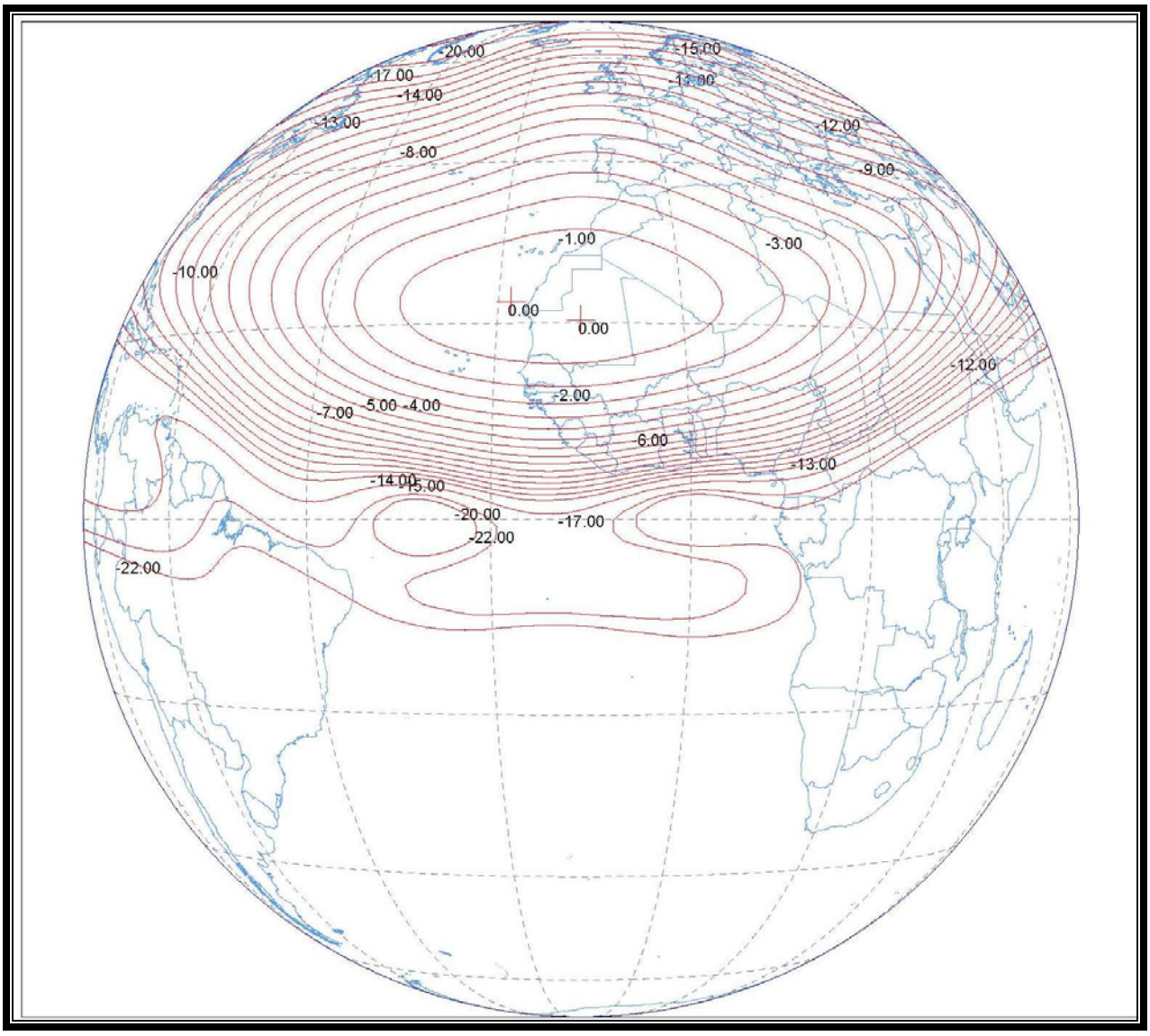

FIGURE 1.0

Figure 1.0 above represents the coverage of a zone beam space to earth.[6]

[6] Note: All zone beams have identical footprints.

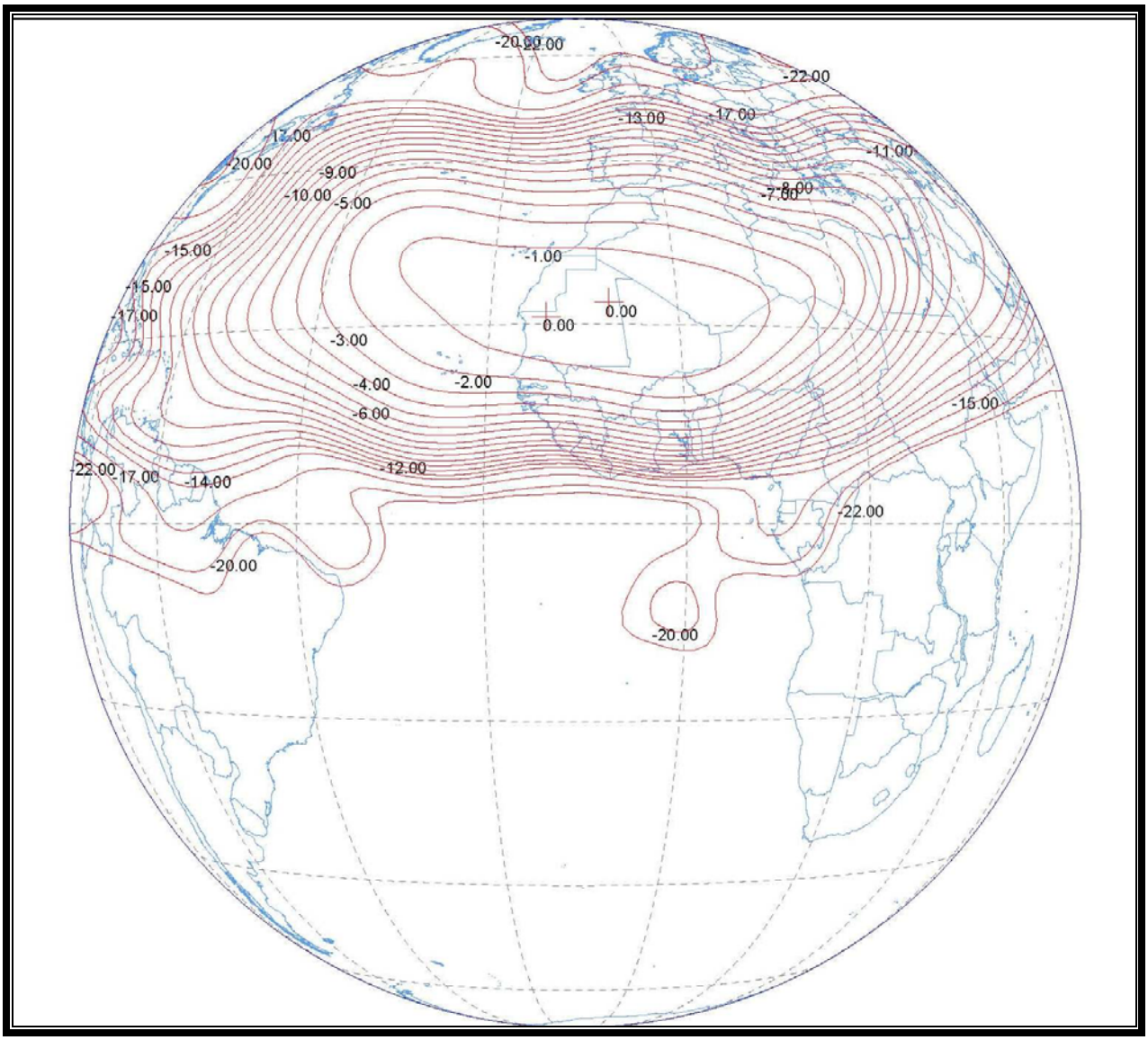

FIGURE 2.0

Figure 2.0 above represents the coverage of a zone beam earth-to-space.

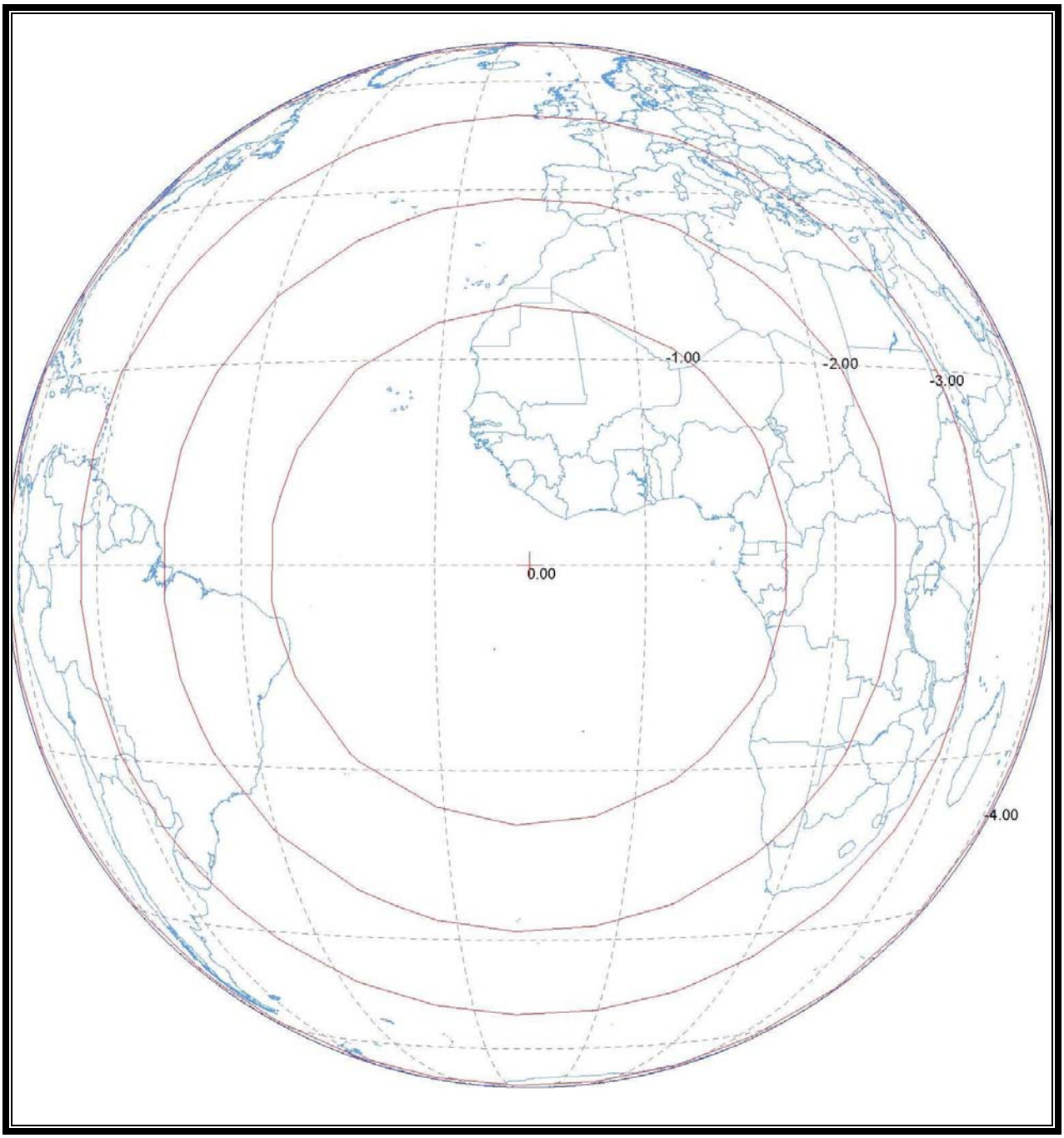

FIGURE 3.0

Figure 3.0 above represents the coverage of a global beam space-to-earth.[7]

[7] Note: Both global beams have identical footprints.

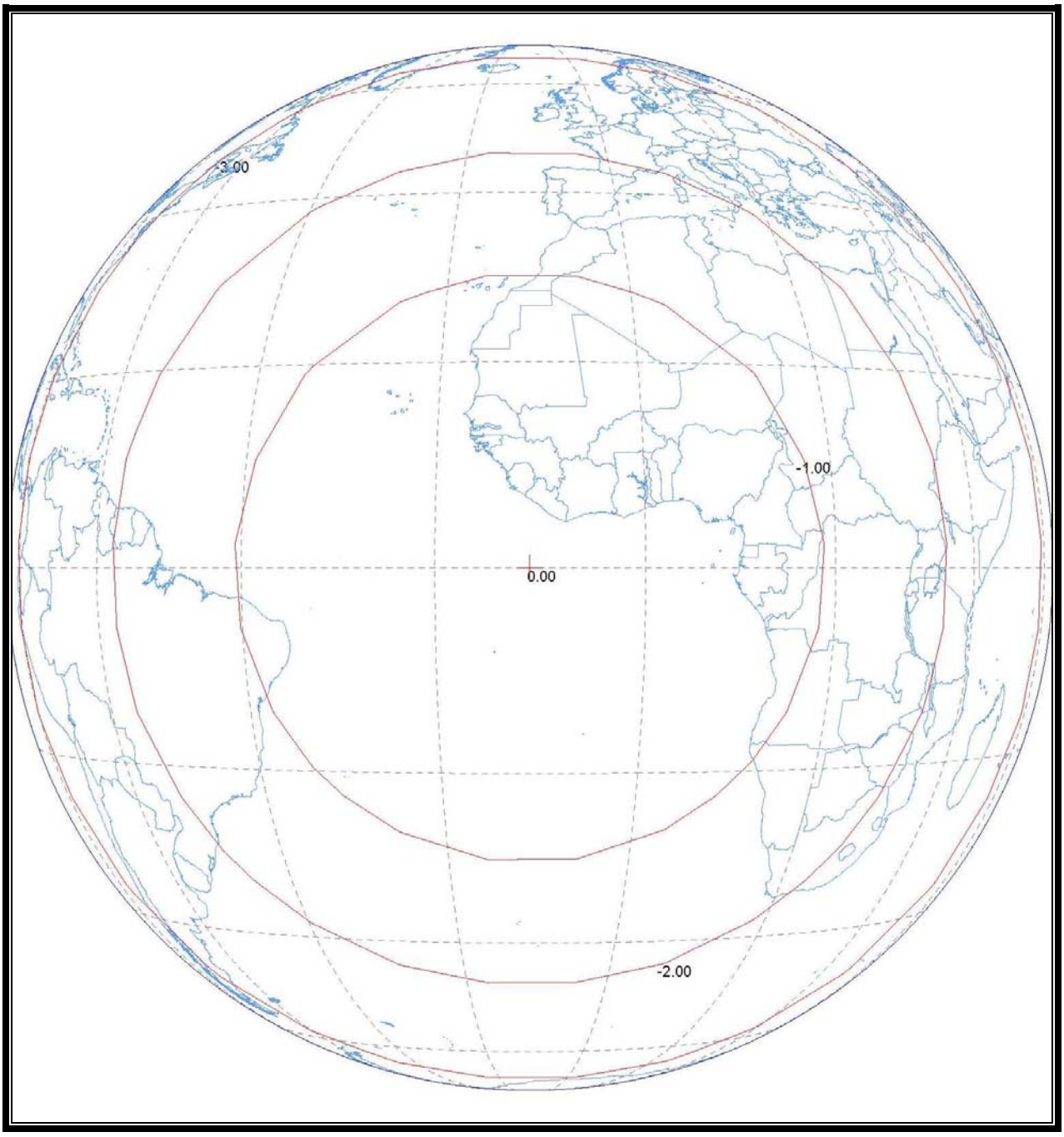

FIGURE 4.0

Figure 4.0 above represents the coverage of a global beam earth-to-space.

3.2 C-band Transponder Description

Earth-to-space signals in the 5980 – 6520 MHz frequency band are received by a left-hand polarized receive antenna horn. The output of the receive antenna is routed through, a diplexer, a test coupler, a band-pass filter and then to a set of wide-band receivers.

The receivers are arranged in a redundant ring, and each uplink can access redundant receivers by ground command. The receivers establish the system noise figure and down-convert the received signal to the transmit frequency band. Each receiver operates over the entire 5980 – 6520 MHz band and is designed to have high sensitivity (*i.e.*, good noise performance) and low cross-talk coefficients (*i.e.*, good linearity characteristics). The AM44 C-band receiver is able to maintain the frequency of the transmitted (downconverted) signal to within 0.002% of the desired value over the life of the spacecraft. Accordingly, AM44 C-band transponders are compliant with the provisions of Section 25.202(e) of the Commission's rules.

The output of the receivers is distributed to a bank of Input Multiplexors ("IMUXs") through a switching network. The IMUXs are filters that provide frequency band separation for each channel. The output of each IMUX is connected to a dedicated Traveling Wave Tube Amplifier ("TWTA") equipped with a linearizer and channel amplifier ("LCTWTA") through a bank of redundancy switches. The redundancy switching permits the output of the IMUX to be routed to a redundant TWTA should the primary unit fail or malfunction.

Each C-band LCTWTA utilizes a TWTA that produces nominal output power of 100 Watts. The LCTWTAs are configured in redundancy rings. Each LCTWTA may operate in Fixed Gain Mode ("FGM") or in Automatic Level Control ("ALC") mode. When operating in FGM, the gain of each channel (and its associated transponder saturation flux density) may be independently adjusted by changing the attenuation of its designated LCTWTA by ground command. Consequently, the output of each LCTWTA may be varied by ground command over a range of 16 dB in 1 dB increments. Accordingly, the C-band channels of the AM44 are compliant with the provisions of Section 25.210(c) of the Commission's rules. When operating in ALC mode, the input power into the LCTWTA may be maintained at a specific level chosen within a range of 16 dB, in 1 dB increments.

The output of each LCTWTA is routed through a bank of switches to redundant Output Multiplexors ("OMUXs"). The switching network also allows the output of a redundant LCTWTA to be forwarded to the appropriate OMUX should the primary pair of units fail or malfunction. The output of the OMUX is connected to the transmit antenna (feed) via a band-pass filter, a test coupler and a diplexer.

3.3 Power Flux Density

The power flux density limits for space stations are specified in Section 25.208 of the Commission's Rules for the 3650 – 4200 MHz frequency band. For this band the power flux density ("PFD") level at the Earth's surface produced by AM44 was calculated for a 40 MHz digital carrier, using worst case parameters. As shown in **Table 6.0**, the downlink PFD levels of this carrier do not exceed the limits specified in Section 25.208(a) of the FCC's rules. No

contemplated space-to-earth emission will produce PFD levels that exceed the levels created by the proposed 40 MHz carrier.

POWER FLUX DENSITY							
40M0G7W / 3650-4200 MHz							
Elevation Angle (degrees)	0	5	10	15	20	25	90
EIRP (dBW)	47.0	47.0	47.0	47.0	47.0	47.0	47.0
Carrier Occupied Bandwidth (kHz)	40000	40000	40000	40000	40000	40000	40000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.3
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-156.4	-156.3	-156.2	-156	-155.9	-155.8	-155.3
FCC Limit (dBW/m^2/4 kHz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	4.4	4.3	6.7	9.0	11.4	13.8	13.3

TABLE 6.0

3.4 Emissions Limitations

The AM44 transmitter channel filter response characteristics are provided in **Table 7.0**, as required under Section 25.114(c)(4)(vii) of the Commission's Rules.

The AM44 will comply with the provisions of 25.202(f) of the Commission's Rules with regard to emissions.

CHANNEL FREQUENCY RESPONSE CHARACTERISTICS	
FREQUENCY OFFSET RELATIVE TO CHANNEL CENTER FREQUENCY (MHz)	ATTENUATION LEVEL RELATIVE TO PEAK LEVEL (dB) OUTPUT SECTION
+/- 12 MHz	0.8
+/- 16 MHz	1
+/- 18 MHz	1.5

TABLE 7.0

3.5 Service Area

The AM44's C-band transponders primarily serve Africa, Asia, Europe and South America. The AM44 has partial C-band coverage of North America and the Caribbean.

3.6 Orbital Location

The AM44 is licensed under the Russian administration and is located at 11.0º W.L. The AM44 has been fully coordinated in the conventional C- and Ku-band at 11.0º W.L., as well as in

certain extended C- and Ku-band frequencies. The ITU Master Register may be consulted to confirm successful coordination of the AM44 in these frequency bands.

3.7 Services and Emission Designators

The AM44 is a general purpose communications satellite and has been designed to support a variety of services. The C-band transponders on the AM44 can accommodate data and voice applications. NewCom will use the satellite exclusively to offer the following service:

- High speed digital data
- Digital SCPC data channels

Emission designators and allocated bandwidths for representative communication carriers are provided in **Table 8.0** below.

EMISSION DESIGNATORS		
SIGNAL TYPE	EMISSION DESIGNATOR	ALLOCATED BANDWIDTH (kHz)
Digital SCPC or MCPC	40M0G7W	40000
Digital SCPC or MCPC	34M0G7W	34000
Digital SCPC or MCPC	28M0G7W	28000
Digital SCPC or MCPC	27M0G7W	27000
Digital SCPC or MCPC	4M00G7W	4000
Digital SCPC or MCPC	3M55G7W	3555
Digital SCPC Carrier	128KG7D	128
Digital SCPC Carrier	45K0G7D	45

TABLE 8.0

3.8 Link Analysis

In the frequency bands of 5980 – 6520 MHz and 3650 – 4200 MHz, the AM44 will operate in accordance with existing coordination agreements without generating interference that adversely affects the operation of adjacent satellites. All ITU coordination obligations in the C-band have been satisfied.

The results of the C-band analyses are shown in Exhibit H and demonstrate that operation of the AM44 satellite from 11.0º W.L., within a two-degree environment, would permit the intended SCPC services to achieve their respective performance objectives while maintaining sufficient link margin. Additionally, the EIRP density levels of the carriers listed in Exhibit H comply with the limits contained in Section 25.212(d) of the Commission's Rules.

3.9 Adjacent Satellite Link Analysis

The AM44 will operate in accordance with existing coordination agreements. Operation of the AM44 will be compatible with the operation of existing and planned adjacent satellites.

3.10 Schedule S Submission

Pursuant to Section 25.114(a) of the Commission's Rules, NewCom has provided a Schedule S with data for each C-band transponder that will serve the U.S. market.

4.0 - Telemetry

The telemetry, telecommand and control ("TT&C") subsystem provides the following functions:

- Collection, processing and transmission of spacecraft telemetry data.
- Reception, processing and distribution of telecommands.
- Reception and retransmission of ground station generated ranging signals.

4.1 Antennas

At all times telemetry and command signals are transmitted and received through omnidirectional antennas mounted at redundant points on the spacecraft.[8]

4.2 Telemetry

During normal on-station operations, telemetry data is transmitted by the AM44 via redundant, space-to-earth carriers. Specifically, telemetry data from the various subsystems is collected, processed, aggregated and encoded onto subcarriers. Each encoded subcarrier is modulated onto the primary space-to-earth carriers. The telemetry transmission is received and decoded at RSCC's TT&C operations center.

During transfer orbit maneuvers and emergencies, telemetry data is collected, processed and encoded in an identical manner to when the satellite is functioning normally, on-station; however, the output from the telemetry transmitters is routed to a dedicated amplifier. The amplified signal is then transmitted space-to-earth via an omnidirectional antenna.

4.3 Ranging

The slant range of the AM44 will be measured throughout the operational life of the spacecraft using a multiple tone ranging system. The ranging tones are combined with normal command data and modulated onto the primary command carrier and transmitted to the spacecraft. Upon reception at the spacecraft the signal is routed to the command receiver where it is separated from the normal command data and routed directly to the telemetry transmitter for retransmission to the TT&C operations center on the ground. At RSCC's TT&C operations center, the ranging tones are separated from the telemetry data, demodulated and compared with that of the transmitted signal to determine the range of the satellite.

[8] RSCC policy prohibits the disclosure of telemetry and telecommand frequencies or antenna parameters. NewCom has applied for a partial waiver of Section 25.137. See Exhibit D.

5.0 - Orbital Debris Mitigation Plan

This exhibit demonstrates compliance with Section 25.114(d) of the Commission's Rules concerning design and operational strategies to mitigate orbital debris.[9]

5.1 Spacecraft Hardware Design

The AM44 was designed and manufactured by NPO Prikladnoy Mekhaniki ("NPO PM") in cooperation with Alcatel Alenia Space France ("AASF"). Specifically, the satellite platform (727 Express M bus) and subsystems were manufactured by NPO-PM, while the telecommunications payload module was manufactured by AASF. The 727 Express M bus is a 3-axis stabilized platform that uses a combination of hydrazine and xenon propellants for stationkeeping and orbit raising maneuvers.

The AM44 spacecraft was designed so that during normal operation debris is not released. RSCC has assessed the probability of a collision between the spacecraft and meteoroids or small debris less than one centimeter in diameter ("<1cm debris"). RSCC has taken the following steps to limit the probability of the AM44 becoming a source of debris due to a collision with <1cm debris that causes loss of control and prevents post-mission disposal. Specifically:

- The AM44 has been ruggedized and all critical components are located inside the protective outer body of the spacecraft or within ruggedized modules interconnected to the body.
- All AM44 subsystems are redundant, with no single point of failure, except for the tanks and tubes associated with the propulsion subsystem.

Based on the architecture of the spacecraft, a single collision with <1cm debris is unlikely to reach critical subsystems or the satellite's propulsion system, and to the extent the satellite was affected by such an event, subsystem redundancy dramatically reduces the probability that RSCC loses control or is prevented from properly disposing of the spacecraft post-mission.

5.2 Prevention of Accidental Explosions

RSCC has assessed and limited the probability of accidental explosions during and after completion of mission operations. In designing the AM44, NPO-PM took appropriate measures to ensure that debris will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. Specifically:

- Propellant tanks and thrusters are isolated using redundant valves.
- Electrical systems are shielded and excessive battery charging or discharging is prevented by carefully monitored automated systems.
- Pressure in batteries and fuel tanks is remotely monitored, and there is significant margin between operating pressure levels and burst levels.

[9] A copy of Russian State Standard R 52925-2008 concerning orbital debris mitigation is attached. An unofficial English translation is also attached. See Exhibit E.

- During stationkeeping maneuvers thruster temperatures, impulse and duration are remotely monitored and may be discontinued by closing redundant valves.

At the end of the AM44's mission, and upon reaching final disposal orbit, all energy sources and pressurized systems on the spacecraft will be depleted. Residual chemical propellant will be vented in a controlled manner to maintain perigee height of the final disposal orbit. Batteries will be left in a permanent state of discharge.

5.3 Safe Flight Profiles

RSCC has assessed and limited the probability of the spacecraft becoming a source of debris as a result of collisions with large debris or other operational space stations. Specifically, RSCC has evaluated operational and planned ITU coordinated space stations in proximity to the AM44's operational orbital position at 11 degrees west longitude. Based on this review, RSCC has concluded that the AM44's station keeping volume will not overlap with the volume of another space station. As a result, at this time there is no requirement to physically coordinate the AM44 with another satellite operator.

5.4 Post Mission Disposal

Upon the conclusion of its mission, RSCC will dispose of the AM44 by raising it to a minimum altitude of 235 kilometers above the geostationary arc. This final orbit raising maneuver will ensure that the AM44 achieves an altitude that exceeds the requirements of the Inter-Agency Space Debris Coordination Committee ("IADC") formula.[10]

RSCC has reserved 1.74 kilograms of fuel for the AM44's final orbit raising maneuver. RSCC has assessed fuel gauging uncertainty, and the above referenced volume of propellant provides a sufficient margin of reserve fuel to address the uncertainty.

[10] The IADC recommended minimum increase in perigee altitude at the end of re-orbiting, which takes into account all orbital perturbations, is: 235 km + (1000·*Cr x*·*A/m*), where *Cr*: solar radiation pressure coefficient (typical values are between 1 & 2), *A/m*: Aspect area to dry mass ratio [m^2/kg].

Radiation Hazard Report

Analysis of Non-Ionizing Radiation for a 7.3-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 7.3-meter earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	1.0
300-1500	Frequency (MHz)*(4.0/1200)
1500-100,000	5.0

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	7.3	m
Antenna Surface Area	$A_{surface}$	$\pi D^2 / 4$	41.85	m^2
Subreflector Diameter	D_{sr}	Input	106.7	cm
Area of Subreflector	A_{sr}	$\pi D_{sr}{}^2/4$	8941.67	cm^2
Frequency	F	Input	6175	MHz
Wavelength	λ	300 / F	0.048583	m
Transmit Power	P	Input	157.00	W
Antenna Gain (dBi)	G_{es}	Input	51.7	dBi

Radiation Hazard Report

Antenna Gain (factor)	G	$10^{Ges/10}$	147910.8	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.66	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:

Distance to the Far Field Region

$$R_{ff} = 0.60\ D^2 / \lambda \quad (1)$$
$$= 658.1 \text{ m}$$

The maximum main beam power density in the far field can be determined from the following equation:

On-Axis Power Density in the Far Field

$$S_{ff} = G\ P / (4\ \pi\ R_{ff}^{\ 2}) \quad (2)$$
$$= 4.266 \text{ W/m}^2$$
$$= 0.427 \text{ mW/cm}^2$$

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

Extent of the Near Field

$$R_{nf} = D^2 / (4\ \lambda) \quad (3)$$
$$= 274.2 \text{ m}$$

The maximum power density in the Near Field can be determined from the following equation:

Near Field Power Density

$$S_{nf} = 16.0\ \eta\ P / (\pi\ D^2) \quad (4)$$
$$= 9.960 \text{ W/m}^2$$
$$= 0.996 \text{ mW/cm}^2$$

3. Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions

away from the antenna. The power density at a distance R_t can be determined from the following equation:

Transition Region Power Density

$$S_t = S_{nf} R_{nf} / R_t = 0.996 \text{ mW/cm}^2 \quad (5)$$

4. Region between the Main Reflector and the Subreflector

Transmissions from the feed assembly are directed toward the subreflector surface, and are reflected back toward the main reflector. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the subreflector and the reflector surfaces can be calculated by determining the power density at the subreflector surface. This can be determined from the following equation:

Power Density at the Subreflector

$$S_{sr} = 4000 P / A_{sr} = 70.233 \text{ mW/cm}^2 \quad (6)$$

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the subreflector. The area is now the area of the main reflector aperture and can be determined from the following equation:

Power Density at the Main Reflector Surface

$$S_{surface} = 4 P / A_{surface} = 15.005 \text{ W/m}^2 = 1.500 \text{ mW/cm}^2 \quad (7)$$

6. Region between the Main Reflector and the Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and the ground can be determined from the following equation:

Power Density between Reflector and Ground

$$S_g = P / A_{surface} = 3.751 \text{ W/m}^2 = 0.375 \text{ mW/cm}^2 \quad (8)$$

7. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region		Calculated Maximum Radiation Power Density Level (mW/cm^2)	Hazard Assessment
1. Far Field (R_{ff} = 658.1 m)	S_{ff}	0.427	Satisfies FCC MPE
2. Near Field (R_{nf} = 274.2 m)	S_{nf}	0.996	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.996	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	S_{sr}	70.233	Potential Hazard
5. Main Reflector	$S_{surface}$	1.500	Potential Hazard
6. Between Main Reflector and Ground	S_g	0.375	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region		Calculated Maximum Radiation Power Density Level (mW/cm^2)	Hazard Assessment
1. Far Field (R_{ff} = 658.1 m)	S_{ff}	0.427	Satisfies FCC MPE
2. Near Field (R_{nf} = 274.2 m)	S_{nf}	0.996	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.996	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	S_{sr}	70.233	Potential Hazard
5. Main Reflector	$S_{surface}$	1.500	Satisfies FCC MPE
6. Between Main Reflector and Ground	S_g	0.375	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

8. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4 and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

The earth station will be located in a Gated and Fenced facility with secured access in and around the proposed antenna. Since the proposed earth station will not transmit at an antenna elevation of less than 10.0 degrees, and since one diameter removed from the center of main beam the levels are down at least 20 dB, or by a factor of 100, public safety will be ensured for the near and far field regions.

Radiation Hazard Report

Finally, occupational exposure will be limited, and the transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mw/cm**2 will be complied with for those regions in close proximity to the main reflector, and subreflector, which could be occupied by operating personnel.

EXHIBIT E – FREQUENCY COORDINATION

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for

Newcom International, Inc.
Miami, Florida
Call Sign: E040267

Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Virginia 20147
February 20, 2012

TABLE OF CONTENTS

1. CONCLUSIONS

An interference study considering all existing, proposed and prior coordinated microwave facilities within the coordination contours of the proposed earth station demonstrates that this site will operate satisfactorily with the common carrier microwave environment. Further, there will be no restrictions of its operation due to interference considerations.

2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the proposed transmit-receive earth station.

Company

None

No carriers reported potential interference cases.

3. SUPPLEMENTAL SHOWING

Pursuant to Part 25.203(c) of the FCC Rules and Regulations, the satellite earth station proposed in this application was coordinated by Comsearch using computer techniques and in accordance with Part 25 of the FCC Rules and Regulations.

Expedited coordination data for this earth station was emailed and sent to the below listed carriers with a letter dated January 4, 2012.

Company

Alltel Wireless Holdings, LLC. - S FL
Embarq Florida, Inc.
FLORIDA POWER AND LIGHT COMPANY
Florida RSA No. 2B (Indian River) LP
Harris Corporation - Orlando, FL
LEE COUNTY - BOCC
METROPOLITAN AREA NETWORKS, INC.
Miami-Dade County
New Cingular Wireless PCS LLC - N FL
New Cingular Wireless PCS LLC - S FL
Palm Beach County Facilities Dev & Ops
Saint Lucie, County of
South Florida Water Management District
Sun Broadcasting, Inc.
T-MOBILE USA, INC.
Verizon Wireless Personal Comm, LP(S FL)
BROWARD COUNTY BOARD OF COMMISSIONERS
BROWARD COUNTY TELECOMMUNCATIONS DIV
COLLIER, COUNTY OF
City of West Palm Beach
FLORIDA, STATE OF
Florida, State of
Fort Lauderdale City Florida
Indian River, County of
Industrial Tower and Wireless, LLC
MARTIN COUNTY FLORIDA
MARTIN COUNTY SHERIFFS OFFICE
Miami City of
PALM BEACH COUNTY OF
RIVIERA BEACH CITY OF
Telcom Systems, Ltd.
AERIAL VIDEO SYSTEMS
ALASCOM, INC.
Alltel Communications, LLC
AT&T California
Ascent Media Network Services, LLC

Company (Continued)

BARRY TELECOMMUNICATIONS, INC.
BFI Licenses, LLC
BROADCAST COMMUNICATIONS INC
Bellsouth Telecommunications, Inc.
Borgeson, Tom R.
Broadcast Sports Inc.
CBS Television Stations
CNG Communications, Inc.
Carolina Telephone and Telegraph Co
Casper, John
CenturyTel of the Southwest, Inc.
Chicago Comnet Corp
Cincinnati Bell Wireless LLC
Citywide News Network, Inc.
Cohen, Elana
Cowboys Stadium LP
CP Communications PA, LLC
DCI II, INC.
Direct Broadcast Services, Inc.
GOODYEAR TIRE AND RUBBER COMPANY
GSN News, Inc
HF Enterprises, Inc
Hallco Unlimited, Inc.
Hawaiian Telcom, Inc.
Heiden Mr., William
Global Microwave Systems, Inc.
INDIANA BELL TELEPHONE COMPANY INC
Illinois Bell Telephone Company
Information & Display Systems, Inc.
Information Super Station, LLC
International Communications Group, Inc.
Kentucky RSA #3 Cellular General Partner
Kentucky RSA #4 Cellular General Partner
MARTIN COUNTY SHERIFFS OFFICE
MERCURY COMMUNICATIONS
Manatee County Sheriff's Office
Metro Networks Communications, Inc.
Metrosat Communications, Inc.
Miami City Police Department
Michigan Bell Telephone Company
Moreen, Steven K
NBC TELEMUNDO LICENSE LLC
NEW ENGLAND DIGITAL DISTRIBUTION, INC.
NEW ENGLAND SATELLITE SYSTEMS INC
NSM Surveillance
Navajo Communications Company
NorthWest Suburbs Community Access Corp
Ohio Bell Telephone Company
On Scene Video Production
Onboard Images

Company (Continued)

Palm Beach County Facilities Dev & Ops
Palm Beach County School Board
Penn Service Microwave Co., Inc.
Plateau Telecommunications, Inc.
Plum TV, LLC
Post-Newsweek Stations Florida - WPLG-TV
Production & Satellite Services, Inc.
Public Television Communications Center
QUICK LINK CONNECTIONS INC
QWEST CORPORATION
RCC Minnesota Inc. - MN NE ND SD
REMOTE FACILITIES CONSULTING SERVICES
RF Central, LLC
RF Film, Inc
RF Technology, LLC
Radiofone, Inc.
Randy Hermes Production
Regulus Media Services, Inc.
Remote Broadcasts, Inc.
SCHOOL BOARD OF BROWARD COUNTY
Sarasota County Sheriffs Office
Seminole County Sheriff Dept
Southwestern Bell Telephone L.P.
Speedshotz, Inc
Sunbeam Television Corp.
3G Wireless, LLC
Total RF Marketing Inc
Unisat, Inc.
United Telephone - Southeast
VERIZON SOUTH INC.
Verizon California Inc.
Verizon Delaware, Inc.
Verizon Maryland, Inc.
Verizon New England Inc.
Verizon New Jersey, Inc.
Verizon New York, Inc.
Verizon North Inc.
Verizon Northwest Inc.
Verizon Pennsylvania, Inc.
Verizon Virginia, Inc.
Verizon Washington DC, Inc.
Village Video Productions Inc
Vyvx, LLC
WPB TV LICENSEE CORP.
Westar Satellite Services LP
Western Technical Services
Wexler Video, Inc.
Winged Vision
Wisconsin Bell, Inc.
Wolfe Air Aviation

Society of Broadcast Engineers (SBE) Representatives

Florida: Central & Gainesville
Ft Myers – Radio
Ft Myers – TV
Miami
Palm Beach
Tampa

4. EARTH STATION COORDINATION DATA

This section presents the data pertinent to frequency coordination of the proposed earth station that was circulated to all carriers within its coordination contours.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 http://www.comsearch.com

Date: 02/20/2012
Job Number: 120104COMSJC12

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	E040267
Licensee Code	NCOMIN
Licensee Name	Newcom International, Inc.

Site Information — MIAMI, FLORIDA

Venue Name	
Latitude (NAD 83)	25° 54' 59.3" N
Longitude (NAD 83)	80° 13' 29.2" W
Climate Zone	B
Rain Zone	1
Ground Elevation (AMSL)	1.83 m / 6.0 ft

Link Information

Satellite Type	Geostationary
Mode	TR - Transmit-Receive
Modulation	Digital
Satellite Arc	11° W to 12° West Longitude
Azimuth Range	99.4° to 99.9°
Corresponding Elevation Angles	10.0° / 11.0°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information	Receive	Transmit
Manufacturer	Andrew Corporation	Andrew Corporation
Model	7.3 Meter	7.3 Meter
Gain / Diameter	48.5 dBi / 7.3 m	51.7 dBi / 7.3 m
3-dB / 15-dB Beamwidth	0.70° / 1.30°	0.42° / 0.84°

		45K0G7D	128KG7D	40M0G7W
Max Available RF Power	(dBW/4 kHz)	-2.7	-2.7	-18.7
	(dBW/MHz)	7.8	12.4	5.3
Maximum EIRP	(dBW/4 kHz)	49.0	49.0	33.0
	(dBW/MHz)	59.5	64.1	57.0
	(dBW)	59.5	64.1	73.0

		Receive		Transmit	
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%

Frequency Information	Receive 4.0 GHz	Transmit 6.0 GHz
Emission / Frequency Range (MHz)	45K0G7D / 3700.0 - 4200.0 128KG7D / 3700.0 - 4200.0 40M0G7W / 3700.0 - 4200.0	45K0G7D / 6425.0 - 6525.0 128KG7D / 6425.0 - 6525.0 40M0G7W / 6425.0 - 6525.0
Max Great Circle Coordination Distance	682.8 km / 424.2 mi	318.2 km / 197.7 mi
Precipitation Scatter Contour Radius	626.3 km / 389.1 mi	135.6 km / 84.3 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 http://www.comsearch.com

Coordination Values	**MIAMI, FL**			
Licensee Name	Newcom International, Inc.			
Latitude (NAD 83)	25° 54' 59.3" N			
Longitude (NAD 83)	80° 13' 29.2" W			
Ground Elevation (AMSL)	1.83 m / 6.0 ft			
Antenna Centerline (AGL)	5.49 m / 18.0 ft			
Antenna Model	Andrew Corporation 7.3 Meter			
Antenna Mode	Receive 4.0 GHz		Transmit 6.0 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power			-2.7 (dBW/4 kHz)	

			Receive 4.0 GHz		Transmit 6.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	99.27	-10.00	412.20	-10.00	200.77
5	0.00	94.35	-10.00	412.20	-10.00	200.77
10	0.00	89.43	-10.00	412.20	-10.00	200.77
15	0.00	84.50	-10.00	412.20	-10.00	200.77
20	0.00	79.58	-10.00	412.20	-10.00	200.77
25	0.00	74.66	-10.00	412.20	-10.00	200.77
30	0.00	69.75	-10.00	412.20	-10.00	200.77
35	0.00	64.84	-10.00	412.20	-10.00	200.77
40	0.00	59.93	-10.00	412.20	-10.00	200.77
45	0.00	55.04	-10.00	412.20	-10.00	200.77
50	0.00	50.16	-10.00	412.20	-10.00	200.77
55	0.00	45.31	-9.40	419.67	-9.40	204.20
60	0.00	40.47	-8.18	435.44	-8.18	211.37
65	0.00	35.68	-6.81	453.80	-6.81	219.62
70	0.00	30.94	-5.26	474.83	-5.26	229.24
75	0.00	26.28	-3.49	500.91	-3.49	240.63
80	0.00	21.77	-1.45	532.79	-1.45	254.29
85	0.00	17.51	0.92	572.02	0.92	269.34
90	0.00	13.73	3.56	618.72	3.56	289.60
95	0.00	10.96	6.01	664.35	6.01	310.04
100	0.00	10.06	6.94	682.77	6.94	318.24
105	0.00	11.47	5.51	654.70	5.51	305.75
110	0.00	14.55	2.93	607.33	2.93	284.62
115	0.00	18.47	0.34	562.15	0.34	265.12
120	0.00	22.78	-1.94	524.97	-1.94	250.97
125	0.00	27.24	-3.88	495.08	-3.88	238.10
130	0.00	31.85	-5.58	470.33	-5.58	227.26
135	0.00	36.55	-7.07	450.21	-7.07	218.02
140	0.00	41.32	-8.40	432.51	-8.40	210.04
145	0.00	46.13	-9.60	417.21	-9.60	203.07
150	0.00	50.96	-10.00	412.20	-10.00	200.77
155	0.00	55.82	-10.00	412.20	-10.00	200.77
160	0.00	60.69	-10.00	412.20	-10.00	200.77
165	0.00	65.58	-10.00	412.20	-10.00	200.77
170	0.00	70.47	-10.00	412.20	-10.00	200.77
175	0.00	75.37	-10.00	412.20	-10.00	200.77
180	0.00	80.28	-10.00	412.20	-10.00	200.77
185	0.00	85.18	-10.00	412.20	-10.00	200.77

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
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Coordination Values	**MIAMI, FL**			
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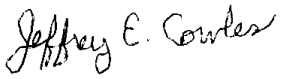
Longitude (NAD 83)	80° 13' 29.2" W			
Ground Elevation (AMSL)	1.83 m / 6.0 ft			
Antenna Centerline (AGL)	5.49 m / 18.0 ft			
Antenna Model	Andrew Corporation 7.3 Meter			
Antenna Mode	Receive 4.0 GHz		Transmit 6.0 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power			-2.7 (dBW/4 kHz)	

			Receive 4.0 GHz		Transmit 6.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	90.09	-10.00	412.20	-10.00	200.77
195	0.00	95.00	-10.00	412.20	-10.00	200.77
200	0.00	99.91	-10.00	412.20	-10.00	200.77
205	0.00	104.81	-10.00	412.20	-10.00	200.77
210	0.00	109.71	-10.00	412.20	-10.00	200.77
215	0.00	114.61	-10.00	412.20	-10.00	200.77
220	0.00	119.49	-10.00	412.20	-10.00	200.77
225	0.00	124.36	-10.00	412.20	-10.00	200.77
230	0.00	129.22	-10.00	412.20	-10.00	200.77
235	0.00	134.06	-10.00	412.20	-10.00	200.77
240	0.00	138.86	-10.00	412.20	-10.00	200.77
245	0.00	143.63	-10.00	412.20	-10.00	200.77
250	0.00	148.33	-10.00	412.20	-10.00	200.77
255	0.00	152.93	-10.00	412.20	-10.00	200.77
260	0.00	157.39	-10.00	412.20	-10.00	200.77
265	0.00	161.58	-10.00	412.20	-10.00	200.77
270	0.00	165.27	-10.00	412.20	-10.00	200.77
275	0.00	168.01	-10.00	412.20	-10.00	200.77
280	0.00	169.05	-10.00	412.20	-10.00	200.77
285	0.00	167.93	-10.00	412.20	-10.00	200.77
290	0.00	165.15	-10.00	412.20	-10.00	200.77
295	0.00	161.43	-10.00	412.20	-10.00	200.77
300	0.00	157.19	-10.00	412.20	-10.00	200.77
305	0.00	152.64	-10.00	412.20	-10.00	200.77
310	0.00	147.96	-10.00	412.20	-10.00	200.77
315	0.00	143.21	-10.00	412.20	-10.00	200.77
320	0.00	138.40	-10.00	412.20	-10.00	200.77
325	0.00	133.56	-10.00	412.20	-10.00	200.77
330	0.00	128.70	-10.00	412.20	-10.00	200.77
335	0.00	123.82	-10.00	412.20	-10.00	200.77
340	0.00	118.92	-10.00	412.20	-10.00	200.77
345	0.00	114.02	-10.00	412.20	-10.00	200.77
350	0.00	109.11	-10.00	412.20	-10.00	200.77
355	0.00	104.19	-10.00	412.20	-10.00	200.77

5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



Jeffrey E. Cowles
Engineer III, Telecommunications
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Va. 20147

DATED: February 20, 2012

EXHIBIT F – FAA NOTIFICATION

Pursuant to 47. C.F.R. §17.14 (a) and (b), FAA notification is not necessary because (1) the proposed 7.3 meter antenna is shielded by existing permanent structures of a substantial character, and (2) because the antenna is located in a heavily congested area of Miami where it does not adversely affect safety in air navigation.

EXHIBIT G - LINK BUDGETS

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For technical issues: tel./fax: +7 (499) 241 45 90 e-mail: technical@intersputnik.com

LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	15	
Maximum G/T	3.5	dBi/K
Maximum (saturated) EIRP	47.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-98.3	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6350	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	4025	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	20	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	14.7	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.4	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	0.23	W
	-6.5	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	8.2	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	38.1	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	50	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	67	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	1.00	dB
Required C/N_0	52.0	dB*Hz
Required C/N	6.8	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	33	kHz
Occupied bandwidth	45	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	43.5	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-120.1	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	59.9	dB*Hz
	9.7E+05	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	75.2	dB
	3.3E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	59.7	dB*Hz
	9.4E+05	(factor)
Carrier to noise ratio (C/N+I)	14.5	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	12.4	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-153.5	dBW
Carrier to noise spectral density ratio (C/N_0)	56.2	dB*Hz
	4.1E+05	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	75.2	dB
	3.3E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	56.1	dB*Hz
	4.1E+05	(factor)
Carrier to noise ratio (C/N+I)	10.9	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	54.2	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.2	dB
Carrier to noise ratio (C/N+I)	8.9	dB
Clear sky margin	**2.17**	**dB**

Capacity utilization

Total occupied bandwidth	45	kHz
Total EIRP utilized	12.4	dBW
Power-equivalent BW	35	kHz
Bandwidth utilization	0.11	%
Power utilization	0.09	%
Allocated capacity	**0.045**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	33.9	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	11G	
Maximum G/T	-7.0	dBi/K
Maximum (saturated) EIRP	39.0	dBW
Output backoff (OBO)	4.4	dB
Input backoff (IBO)	7.0	dB
Saturation flux density (SFD)	-87.5	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6250	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	3925	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	18	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	3.0	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.3	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	0.18	W
	-7.4	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	0.7	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	37.9	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Channel parameters

Data bitrate	50	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	67	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	1.00	dB
Required C/N_0	52.0	dB*Hz
Required C/N	6.8	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	33	kHz
Occupied bandwidth	45	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	42.4	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-121.2	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	60.2	dB*Hz
	1.0E+06	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	75.2	dB
	3.3E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	60.0	dB*Hz
	1.0E+06	(factor)
Carrier to noise ratio (C/N+I)	14.8	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	5.0	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-153.5	dBW
Carrier to noise spectral density ratio (C/N_0)	56.2	dB*Hz
	4.1E+05	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	75.2	dB
	3.3E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	56.1	dB*Hz
	4.1E+05	(factor)
Carrier to noise ratio (C/N+I)	10.9	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	54.0	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.1	dB
Carrier to noise ratio (C/N+I)	8.8	dB
Clear sky margin	**2.05**	**dB**

Capacity utilization

Total occupied bandwidth	45	kHz
Total EIRP utilized	5.0	dBW
Power-equivalent BW	43	kHz
Bandwidth utilization	0.11	%
Power utilization	0.11	%
Allocated capacity	**0.045**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	31.9	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	15	
Maximum G/T	3.5	dBi/K
Maximum (saturated) EIRP	47.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-98.3	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6350	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	4025	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	20	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	14.7	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.4	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	0.64	W
	-1.9	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	8.2	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	38.1	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	142	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	189	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	1.00	dB
Required C/N_0	56.5	dB*Hz
Required C/N	6.8	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	95	kHz
Occupied bandwidth	128	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	48.0	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-115.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	64.4	dB*Hz
	2.8E+06	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	79.8	dB
	9.5E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	64.3	dB*Hz
	2.7E+06	(factor)
Carrier to noise ratio (C/N+I)	14.5	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	17.0	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-149.0	dBW
Carrier to noise spectral density ratio (C/N_0)	60.7	dB*Hz
	1.2E+06	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	79.8	dB
	9.5E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	60.6	dB*Hz
	1.2E+06	(factor)
Carrier to noise ratio (C/N+I)	10.9	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	58.7	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.2	dB
Carrier to noise ratio (C/N+I)	8.9	dB
Clear sky margin	**2.17**	**dB**

Capacity utilization

Total occupied bandwidth	128	kHz
Total EIRP utilized	17.0	dBW
Power-equivalent BW	100	kHz
Bandwidth utilization	0.32	%
Power utilization	0.25	%
Allocated capacity	**0.128**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite		
Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder		
Name	11G	
Maximum G/T	-7.0	dBi/K
Maximum (saturated) EIRP	39.0	dBW
Output backoff (OBO)	4.4	dB
Input backoff (IBO)	7.0	dB
Saturation flux density (SFD)	-87.5	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6250	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	3925	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	18	dB
Carrier to cross-polarization interference ratio	30	dB

Channel parameters		
Data bitrate	142	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	189	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	1.00	dB
Required C/N_0	56.5	dB*Hz
Required C/N	6.8	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	95	kHz
Occupied bandwidth	128	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Earth Station "A"		
Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	3.0	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.3	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	0.52	W
	-2.8	dBW
Uplink power control range	0.00	dB

Earth Station "B"		
Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	0.7	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	37.9	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Clear sky uplink		
Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	46.9	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-116.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	64.7	dB*Hz
	3.0E+06	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	79.8	dB
	9.5E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	64.6	dB*Hz
	2.9E+06	(factor)
Carrier to noise ratio (C/N+I)	14.8	dB

Clear sky downlink		
Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	9.5	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-148.9	dBW
Carrier to noise spectral density ratio (C/N_0)	60.7	dB*Hz
	1.2E+06	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	79.8	dB
	9.5E+07	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	60.7	dB*Hz
	1.2E+06	(factor)
Carrier to noise ratio (C/N+I)	10.9	dB

Clear sky total link		
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	58.6	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.1	dB
Carrier to noise ratio (C/N+I)	8.8	dB
Clear sky margin	2.05	dB

Capacity utilization		
Total occupied bandwidth	128	kHz
Total EIRP utilized	9.5	dBW
Power-equivalent BW	123	kHz
Bandwidth utilization	0.32	%
Power utilization	0.31	%
Allocated capacity	**0.128**	**MHz**

Availability		
Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	11G	
Maximum G/T	-5.9	dBi/K
Maximum (saturated) EIRP	39.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-89.0	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6250	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	3925	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	18	dB
Carrier to cross-polarization interference ratio	30	dB

Channel parameters

Data bitrate	4444	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	5925	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	0.80	dB
Required C/N_0	71.3	dB*Hz
Required C/N	6.6	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	2963	kHz
Occupied bandwidth	4000	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	3.0	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.3	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	12.42	W
	10.9	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	0.7	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	37.9	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	60.7	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-102.9	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	79.6	dB*Hz
	9.1E+07	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	94.7	dB
	3.0E+09	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	79.4	dB*Hz
	8.8E+07	(factor)
Carrier to noise ratio (C/N+I)	14.7	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	24.2	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-134.3	dBW
Carrier to noise spectral density ratio (C/N_0)	75.4	dB*Hz
	3.4E+07	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	94.7	dB
	3.0E+09	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	75.3	dB*Hz
	3.4E+07	(factor)
Carrier to noise ratio (C/N+I)	10.6	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	73.3	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	6.9	dB
Carrier to noise ratio (C/N+I)	8.6	dB
Clear sky margin	**2.05**	**dB**

Capacity utilization

Total occupied bandwidth	4000	kHz
Total EIRP utilized	24.2	dBW
Power-equivalent BW	3283	kHz
Bandwidth utilization	10.00	%
Power utilization	8.21	%
Allocated capacity	**4.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**15**	
Maximum G/T	**3.5**	dBi/K
Maximum (saturated) EIRP	**47.0**	dBW
Output backoff (OBO)	**4.0**	dB
Input backoff (IBO)	**6.0**	dB
Saturation flux density (SFD)	**-98.3**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6350**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**4025**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**20**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**14.7**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.4	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**19.03**	W
	12.8	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**8.2**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	38.1	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	**4444**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	5925	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	71.3	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.20**	(factor)
Noise bandwidth	2963	kHz
Occupied bandwidth	3555	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	62.7	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-100.9	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	79.1	dB*Hz
	8.2E+07	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	94.7	dB
	3.0E+09	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	79.0	dB*Hz
	7.9E+07	(factor)
Carrier to noise ratio (C/N+I)	14.3	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	31.7	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-134.2	dBW
Carrier to noise spectral density ratio (C/N_0)	75.4	dB*Hz
	3.5E+07	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	94.7	dB
	3.0E+09	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	75.4	dB*Hz
	3.5E+07	(factor)
Carrier to noise ratio (C/N+I)	10.7	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	73.4	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.0	dB
Carrier to noise ratio (C/N+I)	8.7	dB
Clear sky margin	**2.17**	dB

Capacity utilization

Total occupied bandwidth	3555	kHz
Total EIRP utilized	31.7	dBW
Power-equivalent BW	2980	kHz
Bandwidth utilization	8.89	%
Power utilization	7.45	%
Allocated capacity	**3.555**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	11G	
Maximum G/T	-5.9	dBi/K
Maximum (saturated) EIRP	39.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-89.0	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6250	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	3925	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	18	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	3.0	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.3	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	83.83	W
	19.2	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	0.7	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	37.9	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Channel parameters

Data bitrate	30000	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	40000	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	0.80	dB
Required C/N_0	79.6	dB*Hz
Required C/N	6.6	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	20000	kHz
Occupied bandwidth	27000	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	69.0	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-94.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	87.9	dB*Hz
	6.1E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.0	dB
	2.0E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.7	dB*Hz
	5.9E+08	(factor)
Carrier to noise ratio (C/N+I)	14.7	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	32.4	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-126.0	dBW
Carrier to noise spectral density ratio (C/N_0)	83.7	dB*Hz
	2.3E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.0	dB
	2.0E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	83.6	dB*Hz
	2.3E+08	(factor)
Carrier to noise ratio (C/N+I)	10.6	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	81.6	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	6.9	dB
Carrier to noise ratio (C/N+I)	8.6	dB
Clear sky margin	**2.05**	**dB**

Capacity utilization

Total occupied bandwidth	27000	kHz
Total EIRP utilized	32.4	dBW
Power-equivalent BW	22162	kHz
Bandwidth utilization	67.50	%
Power utilization	55.41	%
Allocated capacity	**27.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**15**	
Maximum G/T	**3.5**	dBi/K
Maximum (saturated) EIRP	**47.0**	dBW
Output backoff (OBO)	**4.0**	dB
Input backoff (IBO)	**6.0**	dB
Saturation flux density (SFD)	**-98.3**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6350**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**4025**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**20**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**14.7**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.4	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**128.46**	W
	21.1	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**8.2**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	38.1	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	**30000**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	40000	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	79.6	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.35**	(factor)
Noise bandwidth	20000	kHz
Occupied bandwidth	27000	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	71.0	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-92.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	87.4	dB*Hz
	5.5E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.0	dB
	2.0E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.3	dB*Hz
	5.4E+08	(factor)
Carrier to noise ratio (C/N+I)	14.3	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	40.0	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-125.9	dBW
Carrier to noise spectral density ratio (C/N_0)	83.7	dB*Hz
	2.4E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.0	dB
	2.0E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	83.7	dB*Hz
	2.3E+08	(factor)
Carrier to noise ratio (C/N+I)	10.7	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	81.7	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.0	dB
Carrier to noise ratio (C/N+I)	8.7	dB
Clear sky margin	**2.17**	dB

Capacity utilization

Total occupied bandwidth	27000	kHz
Total EIRP utilized	40.0	dBW
Power-equivalent BW	20116	kHz
Bandwidth utilization	67.50	%
Power utilization	50.29	%
Allocated capacity	**27.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	11G	
Maximum G/T	-5.9	dBi/K
Maximum (saturated) EIRP	39.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-89.0	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6250	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	3925	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	18	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	3.0	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.3	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	86.93	W
	19.4	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	0.7	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	37.9	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Channel parameters

Data bitrate	31111	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	41481	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	0.80	dB
Required C/N_0	79.7	dB*Hz
Required C/N	6.6	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	20741	kHz
Occupied bandwidth	28000	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	69.2	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-94.4	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	88.0	dB*Hz
	6.3E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.2	dB
	2.1E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.9	dB*Hz
	6.2E+08	(factor)
Carrier to noise ratio (C/N+I)	14.7	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	32.6	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-125.8	dBW
Carrier to noise spectral density ratio (C/N_0)	83.8	dB*Hz
	2.4E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.2	dB
	2.1E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	83.8	dB*Hz
	2.4E+08	(factor)
Carrier to noise ratio (C/N+I)	10.6	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	81.8	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	6.9	dB
Carrier to noise ratio (C/N+I)	8.6	dB
Clear sky margin	**2.05**	**dB**

Capacity utilization

Total occupied bandwidth	28000	kHz
Total EIRP utilized	32.6	dBW
Power-equivalent BW	22983	kHz
Bandwidth utilization	70.00	%
Power utilization	57.46	%
Allocated capacity	**28.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	Express-AM44	
Nominal longitude	-11	degrees East
Station keeping accuracy	0.05	degrees

Transponder

Name	15	
Maximum G/T	3.5	dBi/K
Maximum (saturated) EIRP	47.0	dBW
Output backoff (OBO)	4.0	dB
Input backoff (IBO)	6.0	dB
Saturation flux density (SFD)	-98.3	dBW/m^2
Bandwidth	40	MHz
Central uplink frequency	6350	MHz
Uplink polarization	C	H/V/C
Central downlink frequency	4025	MHz
Downlink polarization	C	H/V/C
Central intermediate frequency	70	MHz
Carrier to intermodulation products interference ratio	20	dB
Carrier to cross-polarization interference ratio	30	dB

Earth Station "A"

Name	Miami	
Longitude	-80.18	degrees East
Latitude	25.77	degrees North
Altitude	0	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	14.7	dB
Antenna diameter	7.3	m
Tx antenna efficiency	60	%
Tx gain	51.4	dB
Tx WG attenuation	1.5	dB
Tx mispointing loss	0.15	dB
HPA power	133.21	W
	21.2	dBW
Uplink power control range	0.00	dB

Earth Station "B"

Name	Abuja2	
Longitude	7.2	degrees East
Latitude	9.2	degrees North
Altitude	0	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	8.2	dB
Antenna diameter	2.4	m
Rx antenna efficiency	65	%
Rx gain	38.1	dB
Rx WG attenuation	0.2	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	45	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	31111	kb/s
FEC	0.7500	(factor)
Coding	Turbo	(lookup name)
	1	(factor)
Transmitted bitrate	41481	kb/s
Modulation	QPSK	(lookup name)
	2	(factor)
Required E_b/N_0	4.0	dB
System margin	0.80	dB
Required C/N_0	79.7	dB*Hz
Required C/N	6.6	dB
Required total availability	99.70	%
1 + Roll-off factor	1.35	(factor)
Noise bandwidth	20741	kHz
Occupied bandwidth	28000	kHz
Carrier intermediate frequency	0.000	MHz
Number of identical carriers of this type	1	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	71.2	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-92.4	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	87.6	dB*Hz
	5.7E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.2	dB
	2.1E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.4	dB*Hz
	5.6E+08	(factor)
Carrier to noise ratio (C/N+I)	14.3	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	40.2	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-125.8	dBW
Carrier to noise spectral density ratio (C/N_0)	83.9	dB*Hz
	2.5E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	30.000	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	103.2	dB
	2.1E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	83.8	dB*Hz
	2.4E+08	(factor)
Carrier to noise ratio (C/N+I)	10.7	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	81.9	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.0	dB
Carrier to noise ratio (C/N+I)	8.7	dB
Clear sky margin	**2.17**	**dB**

Capacity utilization

Total occupied bandwidth	28000	kHz
Total EIRP utilized	40.2	dBW
Power-equivalent BW	20861	kHz
Bandwidth utilization	70.00	%
Power utilization	52.15	%
Allocated capacity	**28.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**11G**	
Maximum G/T	**-5.9**	dBi/K
Maximum (saturated) EIRP	**39.0**	dBW
Output backoff (OBO)	**4.0**	dB
Input backoff (IBO)	**6.0**	dB
Saturation flux density (SFD)	**-89.0**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6250**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**3925**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**18**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**3.0**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.3	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**105.56**	W
	20.2	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**0.7**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	37.9	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Channel parameters

Data bitrate	**37778**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	50371	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	80.6	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.35**	(factor)
Noise bandwidth	25185	kHz
Occupied bandwidth	34000	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	70.0	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-93.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	88.9	dB*Hz
	7.7E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	104.0	dB
	2.5E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	88.7	dB*Hz
	7.5E+08	(factor)
Carrier to noise ratio (C/N+I)	14.7	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	33.4	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-125.0	dBW
Carrier to noise spectral density ratio (C/N_0)	84.7	dB*Hz
	2.9E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	104.0	dB
	2.5E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	84.6	dB*Hz
	2.9E+08	(factor)
Carrier to noise ratio (C/N+I)	10.6	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	82.6	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	6.9	dB
Carrier to noise ratio (C/N+I)	8.6	dB
Clear sky margin	**2.05**	dB

Capacity utilization

Total occupied bandwidth	34000	kHz
Total EIRP utilized	33.4	dBW
Power-equivalent BW	27908	kHz
Bandwidth utilization	85.00	%
Power utilization	69.77	%
Allocated capacity	**34.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**15**	
Maximum G/T	**3.5**	dBi/K
Maximum (saturated) EIRP	**47.0**	dBW
Output backoff (OBO)	**4.0**	dB
Input backoff (IBO)	**6.0**	dB
Saturation flux density (SFD)	**-98.3**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6350**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**4025**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**20**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**14.7**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.4	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**161.76**	W
	22.1	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**8.2**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	38.1	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	**37778**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	50371	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	80.6	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.35**	(factor)
Noise bandwidth	25185	kHz
Occupied bandwidth	34000	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	72.0	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-91.6	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	88.4	dB*Hz
	6.9E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	104.0	dB
	2.5E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	88.3	dB*Hz
	6.7E+08	(factor)
Carrier to noise ratio (C/N+I)	14.3	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	41.0	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-124.9	dBW
Carrier to noise spectral density ratio (C/N_0)	84.7	dB*Hz
	3.0E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	104.0	dB
	2.5E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	84.7	dB*Hz
	2.9E+08	(factor)
Carrier to noise ratio (C/N+I)	10.7	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	82.7	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.0	dB
Carrier to noise ratio (C/N+I)	8.7	dB
Clear sky margin	**2.17**	dB

Capacity utilization

Total occupied bandwidth	34000	kHz
Total EIRP utilized	41.0	dBW
Power-equivalent BW	25331	kHz
Bandwidth utilization	85.00	%
Power utilization	63.33	%
Allocated capacity	**34.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

Международная организация космической связи
Organisation Internationale des Telecommunications Spatiales
Organizacion Internacional de Telecomunicaciones Cosmicas

INTERSPUTNIK
INTERNATIONAL ORGANIZATION
OF SPACE COMMUNICATIONS

2nd Smolensky per., 1/4, 121099, Moscow, Russia
tel.: +7 (495) 244 0333, fax: +7 (499) 241 0784
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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**11G**	
Maximum G/T	**-5.9**	dBi/K
Maximum (saturated) EIRP	**39.0**	dBW
Output backoff (OBO)	**0.5**	dB
Input backoff (IBO)	**1.0**	dB
Saturation flux density (SFD)	**-90.0**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6250**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**3925**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**18**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Channel parameters

Data bitrate	**50000**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	66667	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	81.8	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.20**	(factor)
Noise bandwidth	33333	kHz
Occupied bandwidth	40000	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**3.0**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.3	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**152.07**	W
	21.8	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**0.7**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	37.9	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.7	dBi/K

Clear sky uplink

Carrier transmission frequency	6180.000	MHz
Wavelength	0.049	m
ES EIRP	71.6	dBW
Mispointing loss	0.15	dB
Free space loss	200.4	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-92.0	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	90.5	dB*Hz
	1.1E+09	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	105.2	dB
	3.3E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	90.3	dB*Hz
	1.1E+09	(factor)
Carrier to noise ratio (C/N+I)	15.1	dB

Clear sky downlink

Carrier transmission frequency	3855.000	MHz
Wavelength	0.078	m
Satellite EIRP	34.5	dBW
Mispointing loss	0.01	dB
Free space loss	195.4	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-123.9	dBW
Carrier to noise spectral density ratio (C/N_0)	85.7	dB*Hz
	3.8E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	105.2	dB
	3.3E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	85.7	dB*Hz
	3.7E+08	(factor)
Carrier to noise ratio (C/N+I)	10.5	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	83.8	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	6.9	dB
Carrier to noise ratio (C/N+I)	8.6	dB
Clear sky margin	**2.05**	dB

Capacity utilization

Total occupied bandwidth	40000	kHz
Total EIRP utilized	34.5	dBW
Power-equivalent BW	16005	kHz
Bandwidth utilization	100.00	%
Power utilization	40.01	%
Allocated capacity	**40.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	32.0	K
Rx system G/T degradation due to precipitation	1.5	dB
Rx system G/T (w/precipitation)	17.2	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

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LINK BUDGET CALCULATION

Satellite

Name	**Express-AM44**	
Nominal longitude	**-11**	degrees East
Station keeping accuracy	**0.05**	degrees

Transponder

Name	**15**	
Maximum G/T	**3.5**	dBi/K
Maximum (saturated) EIRP	**47.0**	dBW
Output backoff (OBO)	**0.5**	dB
Input backoff (IBO)	**1.0**	dB
Saturation flux density (SFD)	**-103.0**	dBW/m^2
Bandwidth	**40**	MHz
Central uplink frequency	**6350**	MHz
Uplink polarization	**C**	H/V/C
Central downlink frequency	**4025**	MHz
Downlink polarization	**C**	H/V/C
Central intermediate frequency	**70**	MHz
Carrier to intermodulation products interference ratio	**20**	dB
Carrier to cross-polarization interference ratio	**30**	dB

Earth Station "A"

Name	**Miami**	
Longitude	**-80.18**	degrees East
Latitude	**25.77**	degrees North
Altitude	**0**	km
Elevation	10.1	degrees
Azimuth	99.4	degrees East
Distance to satellite	40577	km
G/T contour	**14.7**	dB
Antenna diameter	**7.3**	m
Tx antenna efficiency	**60**	%
Tx gain	51.4	dB
Tx WG attenuation	**1.5**	dB
Tx mispointing loss	0.15	dB
HPA power	**136.02**	W
	21.3	dBW
Uplink power control range	**0.00**	dB

Earth Station "B"

Name	**Abuja2**	
Longitude	**7.2**	degrees East
Latitude	**9.2**	degrees North
Altitude	**0**	km
Elevation	66.2	degrees
Azimuth	244.1	degrees East
Distance to satellite	36258	km
EIRP contour	**8.2**	dB
Antenna diameter	**2.4**	m
Rx antenna efficiency	**65**	%
Rx gain	38.1	dB
Rx WG attenuation	**0.2**	dB
Rx mispointing loss	0.01	dB
Antenna noise temperature	20	K
Rx WG noise temperature	13	K
LNA noise temperature	**45**	K
Total Rx system noise temperature (clear sky)	78	K
Total Rx system noise temperature (clear sky)	18.9	dB(K)
G/T (clear sky)	18.9	dBi/K

Channel parameters

Data bitrate	**50000**	kb/s
FEC	**0.7500**	(factor)
Coding	**Turbo**	(lookup name)
	1	(factor)
Transmitted bitrate	66667	kb/s
Modulation	**QPSK**	(lookup name)
	2	(factor)
Required E_b/N_0	**4.0**	dB
System margin	**0.80**	dB
Required C/N_0	81.8	dB*Hz
Required C/N	6.6	dB
Required total availability	**99.70**	%
1 + Roll-off factor	**1.20**	(factor)
Noise bandwidth	33333	kHz
Occupied bandwidth	40000	kHz
Carrier intermediate frequency	**0.000**	MHz
Number of identical carriers of this type	**1**	(factor)

Clear sky uplink

Carrier transmission frequency	6280.000	MHz
Wavelength	0.048	m
ES EIRP	71.2	dBW
Mispointing loss	0.15	dB
Free space loss	200.6	dB
Atmospheric loss	0.3	dB
Power flux density at satellite	-92.3	dB(W/m^2)
Carrier to noise spectral density ratio (C/N_0)	87.7	dB*Hz
	5.8E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	105.2	dB
	3.3E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.6	dB*Hz
	5.7E+08	(factor)
Carrier to noise ratio (C/N+I)	12.4	dB

Clear sky downlink

Carrier transmission frequency	3955.000	MHz
Wavelength	0.076	m
Satellite EIRP	43.5	dBW
Mispointing loss	0.01	dB
Free space loss	195.6	dB
Atmospheric loss	0.0	dB
Total Rx system noise temperature	78	K
Noise spectral density (N_0)	-209.7	dBW/Hz
Carrier level at ES receiver input	-122.5	dBW
Carrier to noise spectral density ratio (C/N_0)	87.2	dB*Hz
	5.2E+08	(factor)
Carrier to interference from adjacent satellites ratio (C/I)	**30.000**	dB
Carrier to interference from adjacent satellites spectral density ratio (C/I_0)	105.2	dB
	3.3E+10	(factor)
Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$)	87.1	dB*Hz
	5.2E+08	(factor)
Carrier to noise ratio (C/N+I)	11.9	dB

Clear sky total link

Carrier to noise and interference spectral density ratio ($C/(N_0+I_0)$), total	84.0	dB*Hz
Bit energy to noise and interference spectral density ratio ($E_b/(N_0+I_0)$), total	7.0	dB
Carrier to noise ratio (C/N+I)	8.7	dB
Clear sky margin	**2.17**	dB

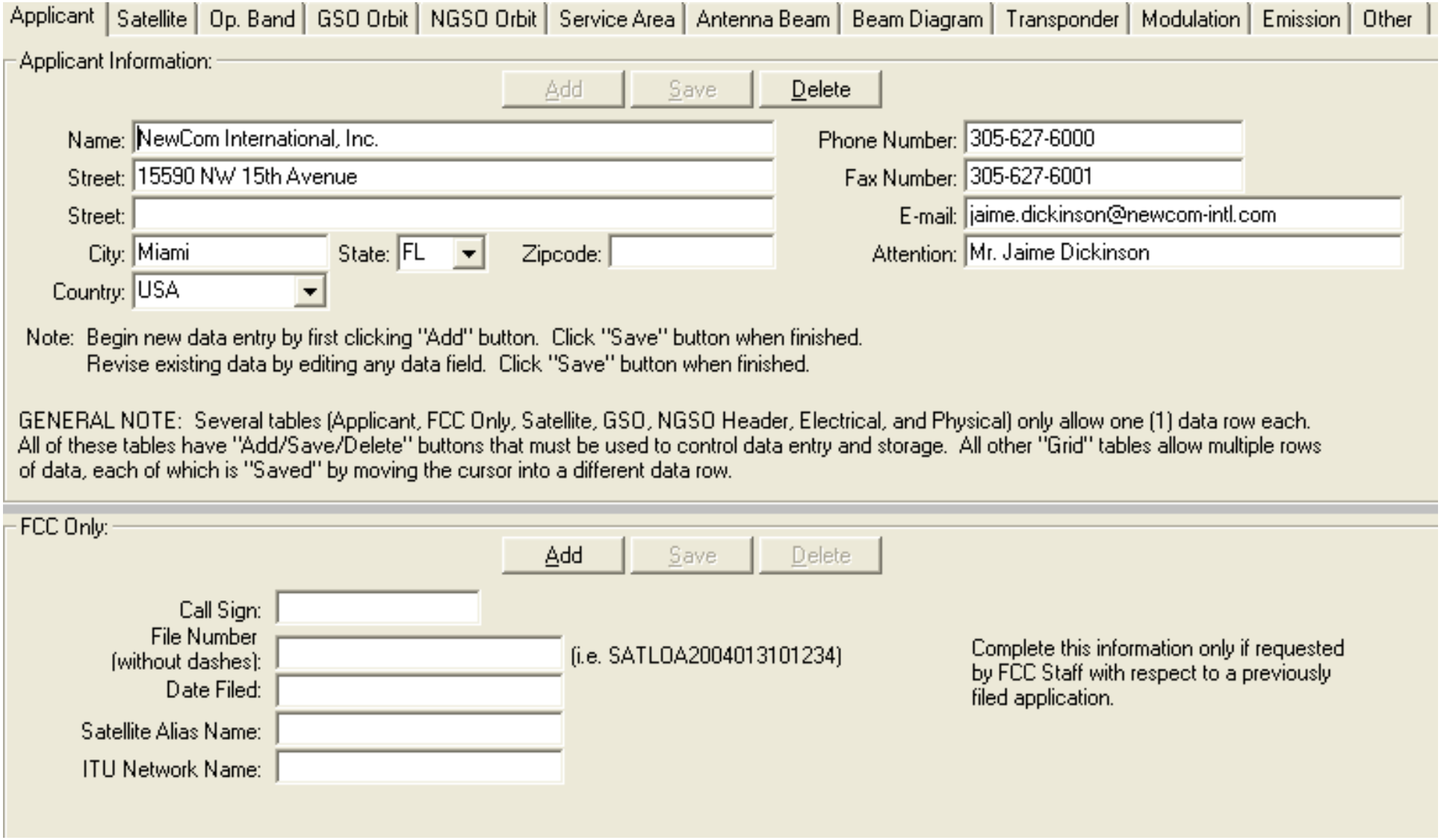
Capacity utilization

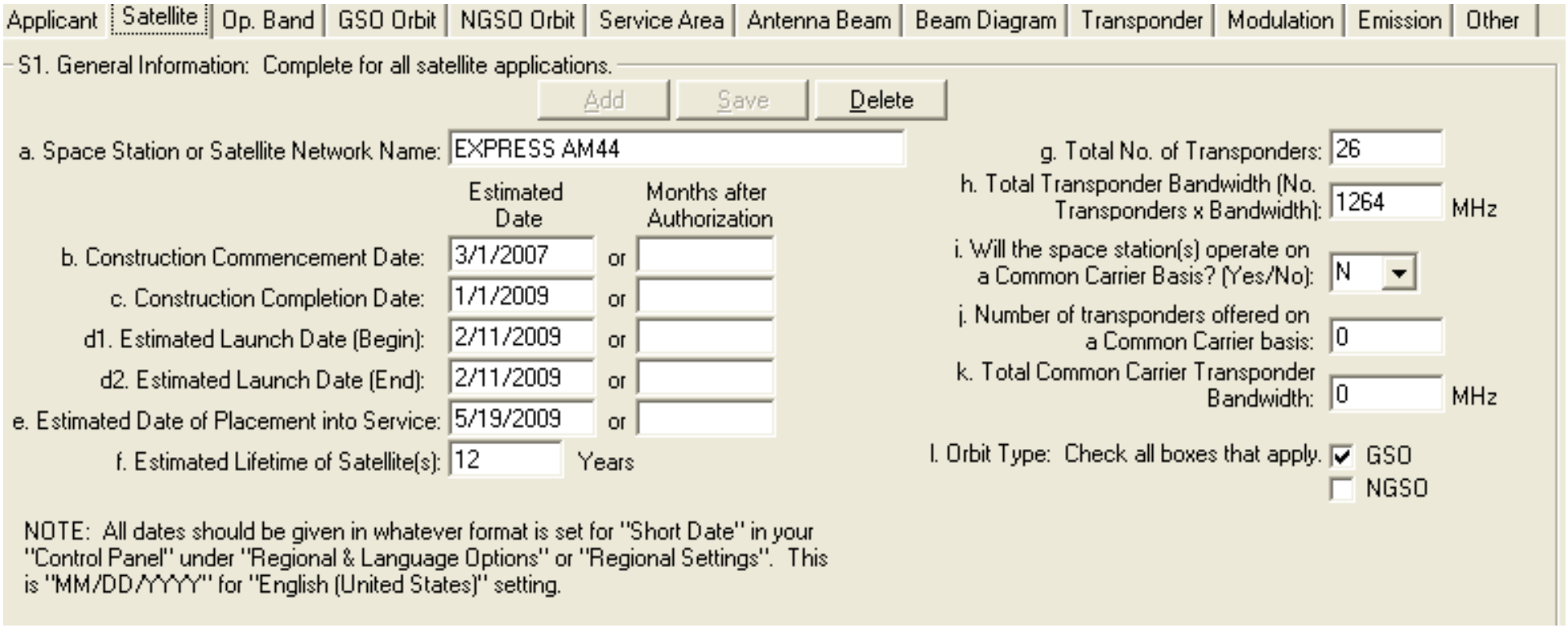
Total occupied bandwidth	40000	kHz
Total EIRP utilized	43.5	dBW
Power-equivalent BW	19878	kHz
Bandwidth utilization	100.00	%
Power utilization	49.70	%
Allocated capacity	**40.000**	**MHz**

Availability

Uplink availability	99.70	%
Downlink precipitation fade	0.6	dB
Rx system noise temperature increase due to precipitation	34.0	K
Rx system G/T degradation due to precipitation	1.6	dB
Rx system G/T (w/precipitation)	17.4	dBi/K
Downlink availability	100.00	%
Total availability	99.70	%

EXHIBIT H – SCHEDULE-S SCREENSHOTS


Applicant
Satellite
Op. Band
GSO Orbit
NGSO Orbit
Service Area
Antenna Beam
Beam Diagram
Transponder
Modulation
Emission
Other
Applicant Information:
Add
Save
Delete
Name: NewCom International, Inc.
Street: 15590 NW 15th Avenue
Street:
City: Miami
State: FL
Zipcode:
Country: USA
Phone Number: 305-627-6000
Fax Number: 305-627-6001
E-mail: jaime.dickinson@newcom-intl.com
Attention: Mr. Jaime Dickinson
Note: Begin new data entry by first clicking "Add" button. Click "Save" button when finished.
Revise existing data by editing any data field. Click "Save" button when finished.
GENERAL NOTE: Several tables (Applicant, FCC Only, Satellite, GSO, NGSO Header, Electrical, and Physical) only allow one (1) data row each. All of these tables have "Add/Save/Delete" buttons that must be used to control data entry and storage. All other "Grid" tables allow multiple rows of data, each of which is "Saved" by moving the cursor into a different data row.
FCC Only:
Add
Save
Delete
Call Sign:
File Number (without dashes):
(i.e. SATLOA20040131012345)
Date Filed:
Satellite Alias Name:
ITU Network Name:
Complete this information only if requested by FCC Staff with respect to a previously filed application.


Applicant
Satellite
Op. Band
GSO Orbit
NGSO Orbit
Service Area
Antenna Beam
Beam Diagram
Transponder
Modulation
Emission
Other
S1. General Information: Complete for all satellite applications.
Add
Save
Delete
a. Space Station or Satellite Network Name: EXPRESS AM44
Estimated Date
Months after Authorization
b. Construction Commencement Date: 3/1/2007 or
c. Construction Completion Date: 1/1/2009 or
d1. Estimated Launch Date (Begin): 2/11/2009 or
d2. Estimated Launch Date (End): 2/11/2009 or
e. Estimated Date of Placement into Service: 5/19/2009 or
f. Estimated Lifetime of Satellite(s): 12 Years
g. Total No. of Transponders: 26
h. Total Transponder Bandwidth (No. Transponders x Bandwidth): 1264 MHz
i. Will the space station(s) operate on a Common Carrier Basis? (Yes/No): N
j. Number of transponders offered on a Common Carrier basis: 0
k. Total Common Carrier Transponder Bandwidth: 0 MHz
l. Orbit Type: Check all boxes that apply.
GSO
NGSO
NOTE: All dates should be given in whatever format is set for "Short Date" in your "Control Panel" under "Regional & Language Options" or "Regional Settings". This is "MM/DD/YYYY" for "English (United States)" setting.

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

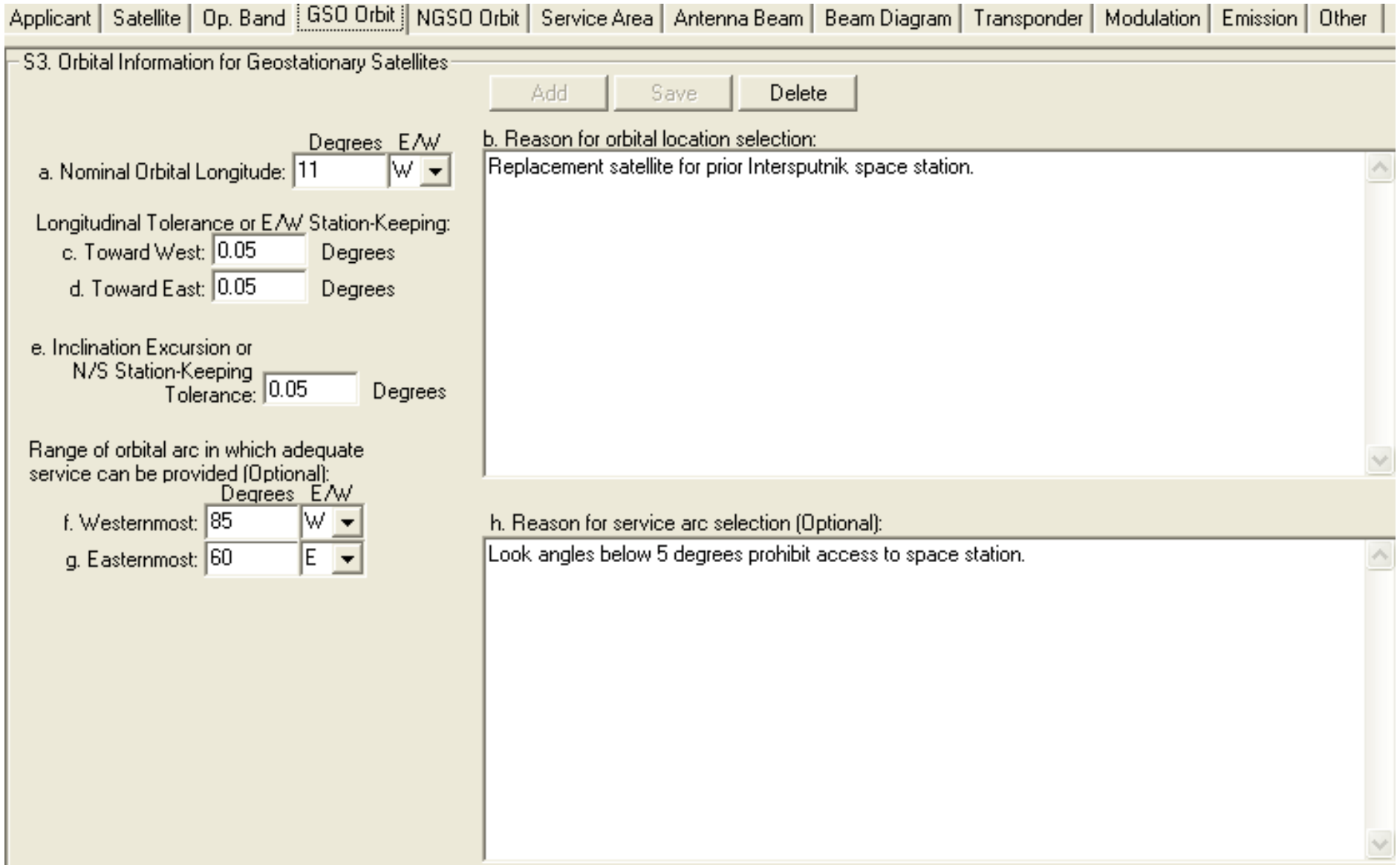
S2. OPERATING FREQUENCY BANDS

For each frequency band in which the satellite will operate, provide:

	a.Lower Frequency Limit (numeric)	b.Unit (_Hz)*	c.Upper Frequency Limit (numeric)	d.Unit (_Hz)*	e.T/R Mode **	f.Nature of Service
▶	3655	M	3695	M	T	
	5980	M	6020	M	R	
	3705	M	3745	M	T	
	6030	M	6070	M	R	
	3755	M	3795	M	T	
	6080	M	6120	M	R	
	3805	M	3845	M	T	
	6130	M	6170	M	R	
	3855	M	3895	M	T	
	6180	M	6220	M	R	
	3905	M	3945	M	T	
	6230	M	6270	M	R	
	4005	M	4045	M	T	
	6330	M	6370	M	R	
	4055	M	4095	M	T	
	6380	M	6420	M	R	
	4105	M	4155	M	T	
	6430	M	6470	M	R	
	4155	M	4195	M	T	
	6480	M	6520	M	R	
*						

S2f. Nature of Service(s): To edit, click button in column "f" of table S2

	Lower Frequency Limit (MHz)	Upper Frequency Limit (MHz)	T/R Mode	f.Nature of Service	Description
▶	6480	6520	T	FSS	Fixed Satellite Service
	5980	6020	R	FSS	Fixed Satellite Service
	3705	3745	T	FSS	Fixed Satellite Service
	6030	6070	R	FSS	Fixed Satellite Service
	3755	3795	T	FSS	Fixed Satellite Service
	6480	6520	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service
	3855	3895	T	FSS	Fixed Satellite Service
	6180	6220	R	FSS	Fixed Satellite Service
	3905	3945	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service
	6480	6520	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service
	4055	4095	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service
	6480	6520	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service
	6480	6520	T	FSS	Fixed Satellite Service
	6480	6520	R	FSS	Fixed Satellite Service


Applicant
Satellite
Op. Band
GSO Orbit
NGSO Orbit
Service Area
Antenna Beam
Beam Diagram
Transponder
Modulation
Emission
Other
S3. Orbital Information for Geostationary Satellites
Add
Save
Delete
Degrees E/W
a. Nominal Orbital Longitude: 11 W
Longitudinal Tolerance or E/W Station-Keeping:
c. Toward West: 0.05 Degrees
d. Toward East: 0.05 Degrees
e. Inclination Excursion or N/S Station-Keeping Tolerance: 0.05 Degrees
Range of orbital arc in which adequate service can be provided (Optional):
Degrees E/W
f. Westernmost: 85 W
g. Easternmost: 60 E
b. Reason for orbital location selection:
Replacement satellite for prior Intersputnik space station.
h. Reason for service arc selection (Optional):
Look angles below 5 degrees prohibit access to space station.

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S6. Service Area Characteristics

For each Service Area provide:

	a. Service Area ID	b. Type of Assoc. Station ('E'arth or 'S'pace)	c. Service Area Diagram File Name (GXT File)	d. Service Area Description. State Codes, ITU Codes, or Figure No.	Service Area Diagram File Name (Pdf File)
▶	1	E	Express AM44 Serv	Atlantic Ocean Region Satellite; Global C-band Coverage	AM44 Service Area
*					

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S7. Space Station Antenna Beam Characteristics

For each Antenna Beam provide:

	a. Beam ID	b. T/R Mode	c. Peak Gain (dBi)	d. Edge Gain (dBi)	e. Point-ing Error (Deg)	f. Rotational Error (Deg)	g. Min Cross-Polar Isolation (dB)	h. Polar-ization Switch-able? (Y/N)	i. Polarization Alignment Rel. Equatoral Plane (Deg)	j. Service Area ID	k. Xmt Input Losses (dB)	l. Xmt Effective Output Power (W)	m. Xmt Max EIRP (dBW)	n. Rec System Noise Temp (K)	o. G/T at Max Gain Pt. (dB/K)	p. Min Saturation Flux Density (dBW/m2)	q. Attenuator Max Value (dB)	r. Attenuato Step Size (dB)
▶	6	T	22	19	0.1		30	N		1	3	100	39					
	6R	R	20	17	0.1		30	N		1				500	-7	-92	16	1
	7	T	30	27	0.1		30	N		1	3	100	47					
	7R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	8	T	30	27	0.1		30	N		1	3	100	47					
	8R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	9	T	30	27	0.1		30	N		1	3	100	47					
	9R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	10	T	22	19	0.1		30	N		1	3	100	39					
	10R	R	20	17	0.1		30	N		1				500	-7	-92	16	1
	11	T	22	19	0.1		30	N		1	3	100	39					
	11R	R	20	17	0.1		30	N		1				500	-7	-92	16	1
	15	T	30	27	0.1		30	N		1	3	100	47					
	15R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	16	T	30	27	0.1		30	N		1	3	100	47					
	16R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	17	T	30	27	0.1		30	N		1	3	100	47					
	17R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
	18	T	30	27	0.1		30	N		1	3	100	47					
	18R	R	30.5	27.5	0.1		30	N		1				500	3.5	-94	16	1
*																		

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S8. ANTENNA BEAM DIAGRAMS

For each beam pattern provide the reference to the graphic image and numerical data:
Also provide the power flux density levels in each beam that result from the emission with the highest power flux density.

	a. Beam ID	b. T/R Mode	c. Co- or Cross-Polar Mode (C or X)	d. GSO Ref. Orbital Longitude (deg E)	e. NGSO Antenna Gain Contour Description (Figure/Table/ Exhibit)	f. GSO Antenna Gain Contour Data (GXT format)	g. Max PFD @ 5 deg* (dBW/m2 per ref. Bandwidth)	h. Max PFD @ 10 deg* (dBW/m2 per ref. Bandwidth)	i. Max PFD @ 15 deg* (dBW/m2 per ref. Bandwidth)	j. Max PFD @ 20 deg* (dBW/m2 per ref. Bandwidth)	k. Max PFD @ 25 deg* (dBW/m2 per ref. Bandwidth)	l. PFD Ref. Bandwidth (4kHz or 1MHz)
▶	6	T	C	-11		GLOBAL DN.ç	-164.3	-164.2	-164	-163.9	-163.8	4kHz
	6R	R	C	-11		GLOBAL UP.ç						4kHz
	7	T	C	-11		\M44 7 DN.gx	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	7R	R	C	-11		\M44 7 UP.gx						4kHz
	8	T	C	-11		\M44 8 DN.gx	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	8R	R	C	-11		\M44 8 UP.gx						4kHz
	9	T	C	-11		\M44 9 DN.gx	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	9R	R	C	-11		\M44 9 UP.gx						4kHz
	10	T	C	-11		GLOBAL DN.	-164.3	-164.2	-164	-163.9	-163.8	4kHz
	10R	R	C	-11		GLOBAL UP.¡						4kHz
	11	T	C	-11		GLOBAL DN.	-164.3	-164.2	-164	-163.9	-163.8	4kHz
	11R	R	C	-11		GLOBAL UP.¡						4kHz
	15	T	C	-11		.M44 15 DN.g:	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	15R	R	C	-11		.M44 15 UP.g›						4kHz
	16	T	C	-11		.M44 16 DN.g:	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	16R	R	C	-11		.M44 16 UP.g›						4kHz
	17	T	C	-11		.M44 17 DN.g:	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	17R	R	C	-11		.M44 17 UP.g›						4kHz
	18	T	C	-11		.M44 18 DN.g:	-156.3	-156.2	-156	-155.9	-155.8	4kHz
	18R	R	C	-11		.M44 18 UP.g›						4kHz

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S9. Space Station Channels

	a. Channel ID	b. Assigned Bandwidth (kHz)	c. T/R Mode	d. Center Frequency (MHz)	e. Polar-ization	f. TT&C or Comm
▶	1	40000	T	6000	L	C
	2	40000	R	3675	R	C
	3	40000	T	6050	L	C
	4	40000	R	3725	R	C
	5	40000	T	6100	L	C
	6	40000	R	3775	R	C
	7	40000	T	6150	L	C
	8	40000	R	3825	R	C
	9	40000	T	6200	L	C
	10	40000	R	3875	R	C
	11	40000	T	6250	L	C
	12	40000	R	3925	R	C
	13	40000	T	6350	L	C
	14	40000	R	4025	R	C
	15	40000	T	6400	L	C
	16	40000	R	4075	R	C
	17	40000	T	6450	L	C
	18	40000	R	4125	R	C
	19	40000	T	6500	L	C
	20	40000	R	4175	R	C
*						

S10. Space Station Transponders

	a. Trans-ponder ID	b. Trans-ponder Gain (dB)	c. Receive Channel ID	d. Receive Beam ID	e. Transmit Channel ID	f. Transmit Beam ID
▶	6	110	2	6R	1	6
	7	110	4	7R	3	7
	8	110	6	8R	5	8
	9	110	8	9R	7	9
	10	110	10	10R	9	10
	11	110	12	11R	11	11
	15	110	14	15R	13	15
	16	110	16	16R	15	16
	17	110	18	17R	17	17
	18	110	20	18R	19	18
*						

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S11. Digital Modulation Parameters

	a. Digital Mod. ID	b. Emission Designator	c. Assigned Bandwidth (kHz)	d. No. of Phases	e. Uncoded Data Rate (kbps)	f. FEC Error Correction Coding Rate	g. CDMA Processing Gain (dB)	h. Total C/N Performance Objective (dB)	i. Single Entry C/I Objective (dB)
	1	45K0G7D	45	4	67	0.75		6.8	30
	2	128KG7D	128	4	189	0.75		6.8	30
	3	40M0G7W	40000	4	66667	0.75		6.8	30
	4	4M00G7W	4000	4	5925	0.75		6.8	30
	5	27M0G7W	27000	4	40000	0.75		6.8	30
	6	28M0G7W	28000	4	41481	0.75		6.8	30
	7	34M0G7W	34000	4	50371	0.75		6.8	30
	8	3M55G7W	3555	4	4444	0.75		6.8	30
*									

S12. Analog Modulation Parameters

	a. Analog Mod. ID	b. Emission Designator	c. Assigned Bandwidth (kHz)	d. Signal Type	e. Channels per Carrier	f. Ave. Com-panded Talker Level (dBm0)	g. Telephony Bottom Baseband Freq (MHz)	h. Telephony & SCPC/FM Top Baseband Freq (MHz)	i. Telephony RMS Modulation Index	j. Video Standard (NTSC, PAL, etc.)	k. Video Noise Weighting (dB)	l. Video & SCPC/FM Modulation Index	m. SCPC/FM Compander, Pre-emphasis, & Noise Weighting (dB)	n. Total C/N Performance Objective (dB)	o. Sing Entry C Objecti (c
*															

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S13. TYPICAL EMISSIONS

For each planned type of emission provide:

	a. Assoc. Trans-ponder ID (Start)	b. Assoc. Trans-ponder ID (End)	c. Digital Mod. ID	d. Analog Mod. ID	e. Carriers per Trans-ponder	f. Carrier Spacing (kHz)	g. Noise Budget Reference	h. Disperal Band-width (kHz)	i. Assoc. XMT Stn Max Antenna Gain (dBi)	j. Assoc. Stn Min. XMT Power (dBW)	k. Assoc. Stn Max. XMT Power (dBW)	l. Min. EIRP (dBW)	m. Max. EIRP (dBW)	n. Max. PFD (dBW/ m2)	o. PFD Ref. BndWdth (4kHz or 1MHz)	p. Assoc Stn Rec G/T (dB/K
▶	6	6	1		1		Ex G, LB2		51.3	-8.9	-6.9	5	7	-166	4kHz	18.7
	10	10	1		1		Ex G, LB2		51.3	-8.9	-6.9	5	7	-166	4kHz	18.7
	11	11	1		1		Ex G, LB2		51.3	-8.9	-6.9	5	7	-166	4kHz	18.7
	6	6	2		1		Ex G, LB4		51.3	-4.4	-2.4	9.5	11.5	-166.1	4kHz	18.7
	10	10	2		1		Ex G, LB4		51.3	-4.4	-2.4	9.5	11.5	-166.1	4kHz	18.7
	11	11	2		1		Ex G, LB4		51.3	-4.4	-2.4	9.5	11.5	-166.1	4kHz	18.7
	6	6	3		1		Ex G, LB13		51.3	20.3	22.3	34.5	36.5	-166	4kHz	18.7
	10	10	3		1		Ex G, LB13		51.3	20.3	22.3	34.5	36.5	-166	4kHz	18.7
	11	11	3		1		Ex G, LB13		51.3	20.3	22.3	34.5	36.5	-166	4kHz	18.7
	6	6	4		1		Ex G, LB5		51.3	9.4	11.4	24.2	26.2	-166.3	4kHz	18.7
	10	10	4		1		Ex G, LB5		51.3	9.4	11.4	24.2	26.2	-166.3	4kHz	18.7
	11	11	4		1		Ex G, LB5		51.3	9.4	11.4	24.2	26.2	-166.3	4kHz	18.7
	6	6	5		1		Ex G, LB7		51.3	17.7	19.7	32.4	34.4	-166.4	4kHz	18.7
	10	10	5		1		Ex G, LB7		51.3	17.7	19.7	32.4	34.4	-166.4	4kHz	18.7
	11	11	5		1		Ex G, LB7		51.3	17.7	19.7	32.4	34.4	-166.4	4kHz	18.7
	6	6	6		1		Ex G, LB9		51.3	17.9	19.9	32.6	34.6	-166.4	4kHz	18.7
	10	10	6		1		Ex G, LB9		51.3	17.9	19.9	32.6	34.6	-166.4	4kHz	18.7
	11	11	6		1		Ex G, LB9		51.3	17.9	19.9	32.6	34.6	-166.4	4kHz	18.7
	6	6	7		1		Ex G, LB11		51.3	18.7	20.7	33.4	35.4	-166.4	4kHz	18.7
	10	10	7		1		Ex G, LB11		51.3	18.7	20.7	33.4	35.4	-166.4	4kHz	18.7
	11	11	7		1		Ex G, LB11		51.3	18.7	20.7	33.4	35.4	-166.4	4kHz	18.7
	15	15	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	16	16	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	17	17	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	18	18	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	15	15	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	16	16	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	17	17	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	18	18	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	15	15	3		1		Ex G, LB14		51.4	19.9	21.9	43.5	45.5	-157	4kHz	19.0

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S13. TYPICAL EMISSIONS

For each planned type of emission provide:

	a. Assoc. Trans-ponder ID (Start)	b. Assoc. Trans-ponder ID (End)	c. Digital Mod. ID	d. Analog Mod. ID	e. Carriers per Trans-ponder	f. Carrier Spacing (kHz)	g. Noise Budget Reference	h. Disperal Band-width (kHz)	i. Assoc. XMT Stn Max Antenna Gain (dBi)	j. Assoc. Stn Min. XMT Power (dBW)	k. Assoc. Stn Max. XMT Power (dBW)	l. Min. EIRP (dBW)	m. Max. EIRP (dBW)	n. Max. PFD (dBW/m2)	o. PFD Ref. BndWdth (4kHz or 1MHz)	p. Assoc. Stn Rec. G/T (dB/K)
	15	15	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	16	16	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
▶	17	17	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	18	18	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	15	15	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	16	16	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	17	17	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	18	18	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	15	15	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	16	16	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	17	17	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	18	18	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	15	15	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	16	16	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	17	17	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	18	18	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	15	15	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	16	16	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	17	17	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	18	18	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	15	15	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	16	16	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	17	17	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	18	18	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	7	7	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	8	8	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	9	9	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	7	7	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	8	8	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	9	9	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S13. TYPICAL EMISSIONS

For each planned type of emission provide:

	a. Assoc. Trans-ponder ID (Start)	b. Assoc. Trans-ponder ID (End)	c. Digital Mod. ID	d. Analog Mod. ID	e. Carriers per Trans-ponder	f. Carrier Spacing (kHz)	g. Noise Budget Reference	h. Disperal Band-width (kHz)	i. Assoc. XMT Stn Max Antenna Gain (dBi)	j. Assoc. Stn Min. XMT Power (dBW)	k. Assoc. Stn Max. XMT Power (dBW)	l. Min. EIRP (dBW)	m. Max. EIRP (dBW)	n. Max. PFD (dBW/m2)	o. PFD Ref. BndWdth (4kHz or 1MHz)	p. Assoc. Stn Rec. G/T (dB/K)
	15	15	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	16	16	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	17	17	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	18	18	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	15	15	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	16	16	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	17	17	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	18	18	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	7	7	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	8	8	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	9	9	1		1		Ex G, LB1		51.4	-7.9	-5.9	12.4	14.4	-158.6	4kHz	18.9
	7	7	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	8	8	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	9	9	2		1		Ex G, LB3		51.4	-3.4	-1.4	17	19	-158.6	4kHz	18.9
	7	7	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	8	8	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	9	9	3		1		Ex G, LB14		51.4	19.8	21.8	43.5	45.5	-157	4kHz	18.9
	7	7	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	8	8	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	9	9	4		1		Ex G, LB8		51.3	19.6	21.6	40	42	-158.8	4kHz	18.9
	7	7	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	8	8	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	9	9	5		1		Ex G, LB10		51.3	19.8	21.8	40.2	42.2	-158.8	4kHz	18.9
	7	7	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	8	8	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	9	9	6		1		Ex G, LB12		51.3	20.6	22.6	41	43	-158.8	4kHz	18.9
	7	7	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	8	8	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9
	9	9	7		1		Ex G, LB6		51.4	11.3	13.3	31.7	33.7	-158.3	4kHz	18.9

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S14. TT&C Station Locations

Is the space station(s) controlled and monitored remotely? Yes — Save

Complete Satellite Tab before responding to Yes/No Question S14.

	a1. Street1 Address	a2. Street2 Address	b. City	c. County	d1. State	d2. Country	e. Zip Code	f. Telephone No.	g. Call Sign of Control Station
▶	Octyabvskaya		Gus-Khrustalny	Russia			801501	+70959569526	
*									

S15. SPACECRAFT PHYSICAL CHARACTERISTICS

Add | Save | Delete

a. Mass of spacecraft w/o fuel: 2327 kg

b. Mass of fuel & disposables at launch: 205 kg

c. Mass of spacecraft & fuel at launch: 2532 kg

d. Mass of fuel, in orbit, at BOL: 205 kg

e. Deployed area of Solar Array: 61.2 sq. meters

Spacecraft Dimensions - Deployed on-orbit (meters)

f. Length: 26.532 m

g. Width: 6.625 m

h. Height: 5.062 m

Probability of Survival to End of Life (0-1)

i. Payload: 0.8565

j. Bus: 0.8544

k. Total: 0.7318

S16. SPACECRAFT ELECTRICAL CHARACTERISTICS

Add | Save | Delete

Spacecraft Subsystem	Electrical Power (Watts) @ BOL @ Equinox	@ Solstice	Electrical Power (Watts) @ EOL @ Equinox	@ Solstice
Payload (Watts):	a. 4410	f. 4410	k. 4410	p. 4410
Bus (Watts):	b. 1183	g. 1095	l. 1183	q. 1095
Total (Watts):	c. 5593	h. 5505	m. 5593	r. 5505
Solar Array (Watts):	d. 8354	i. 7443	n. 6766	s. 6029
Depth of Battery Discharge (%):	e.	j.	o.	t.

S17. CERTIFICATIONS

Save

Complete Satellite Tab before responding to S17 Certifications.

a. Are the power flux density limits of § 25.208 met? Yes

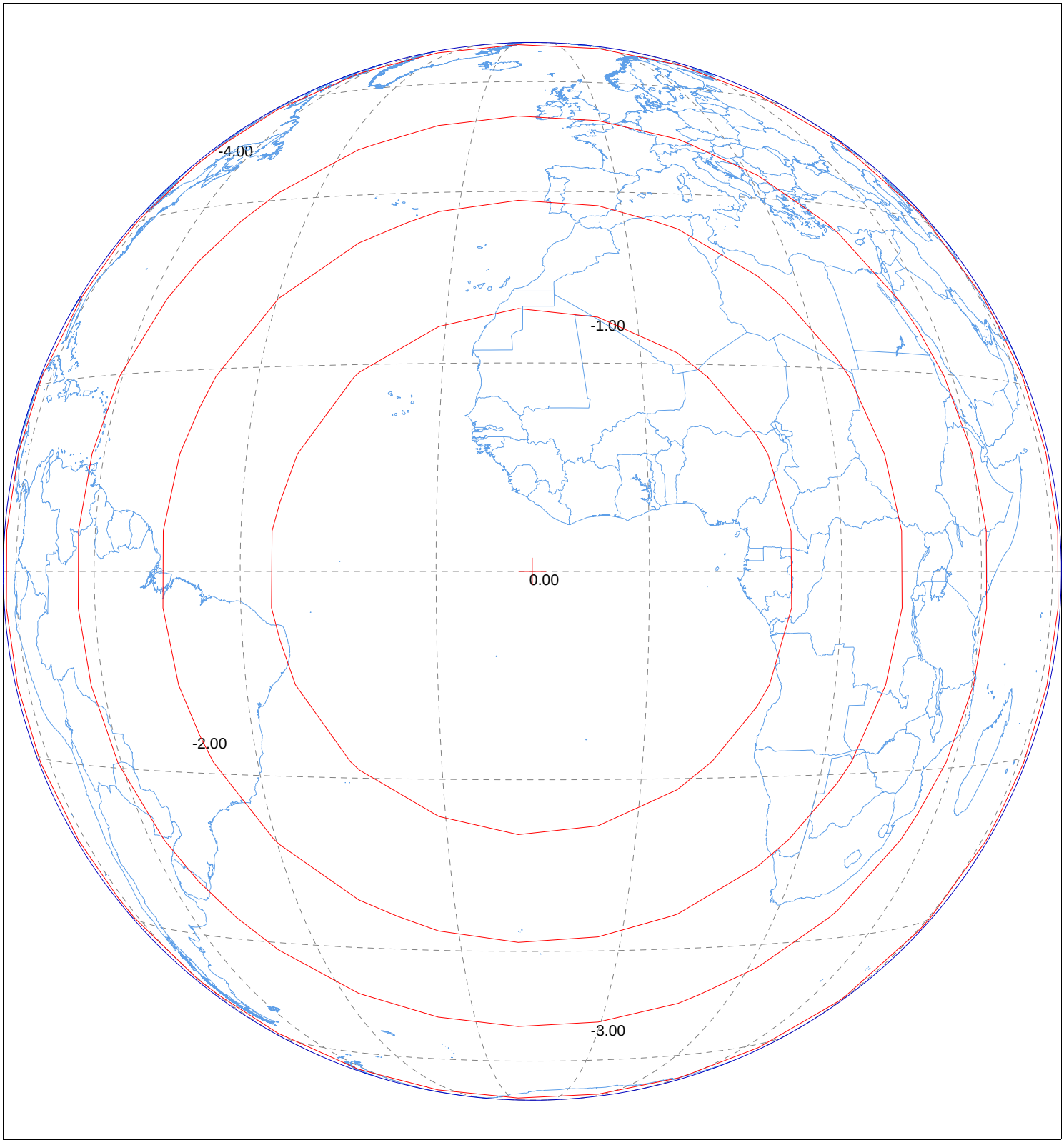
b. Are the appropriate service area coverage requirements of § 25.143(b)(ii) and (iii), or § 25.145(c)(1) and (2) met? n/a

c. Are the frequency tolerances of § 25.202(e) and the out-of-band emission limits of § 25.202(f)(1), (2), and (3) met? Yes

EXHIBIT K - PDF COPIES OF GXT DERIVED CONTOUR MAPS

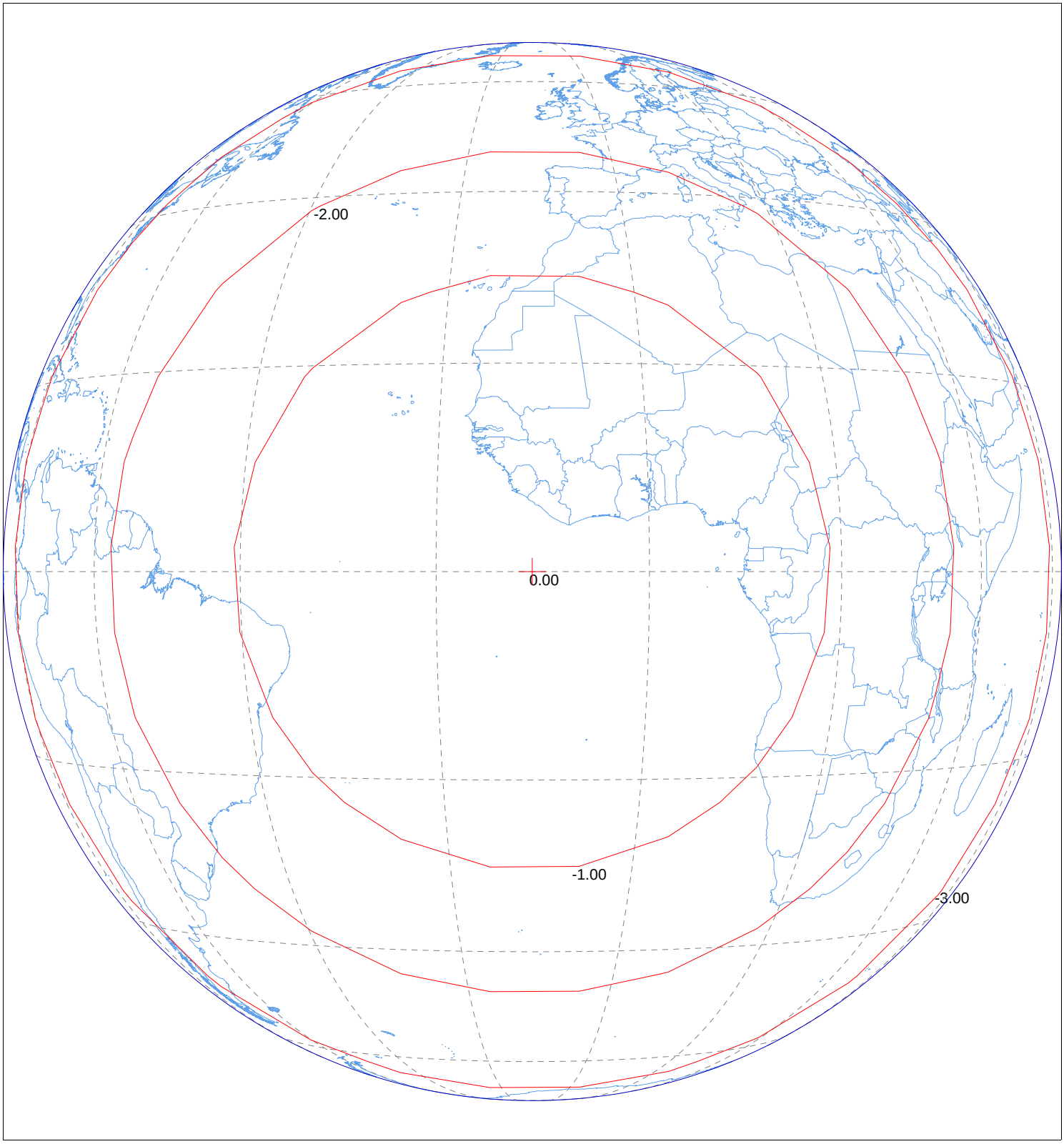
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 6
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB



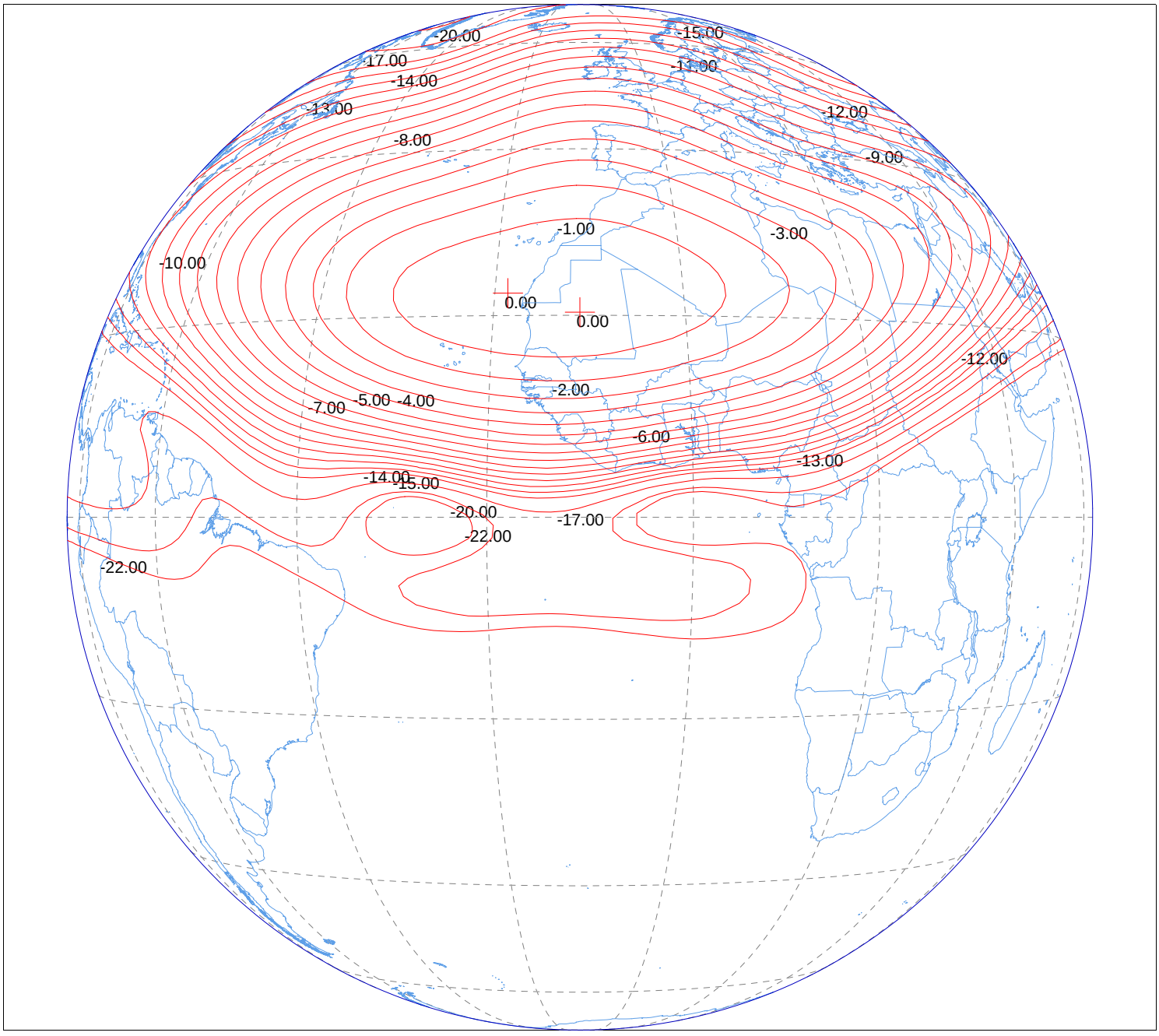
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 6
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB



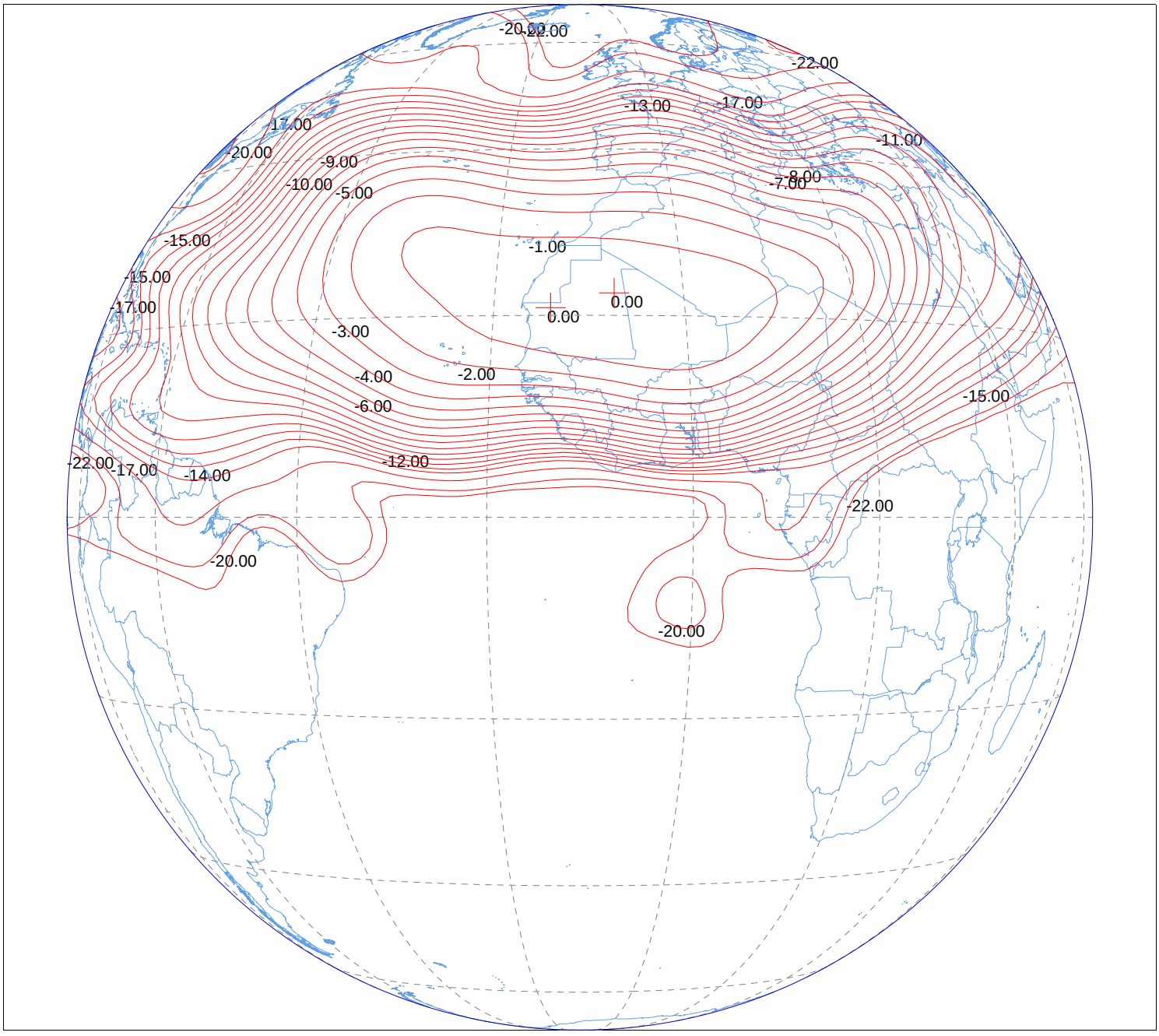
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 7
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



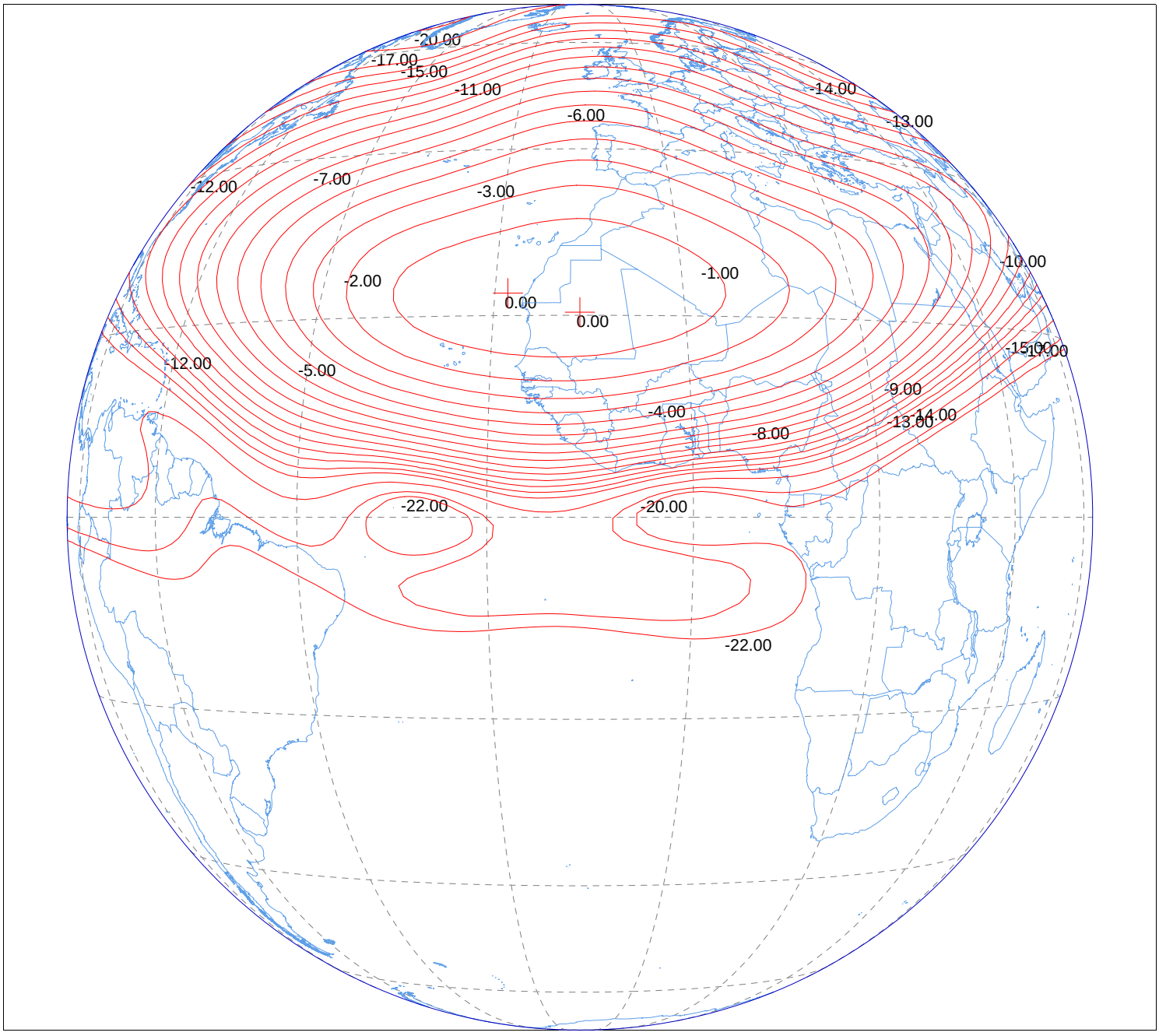
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 7
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



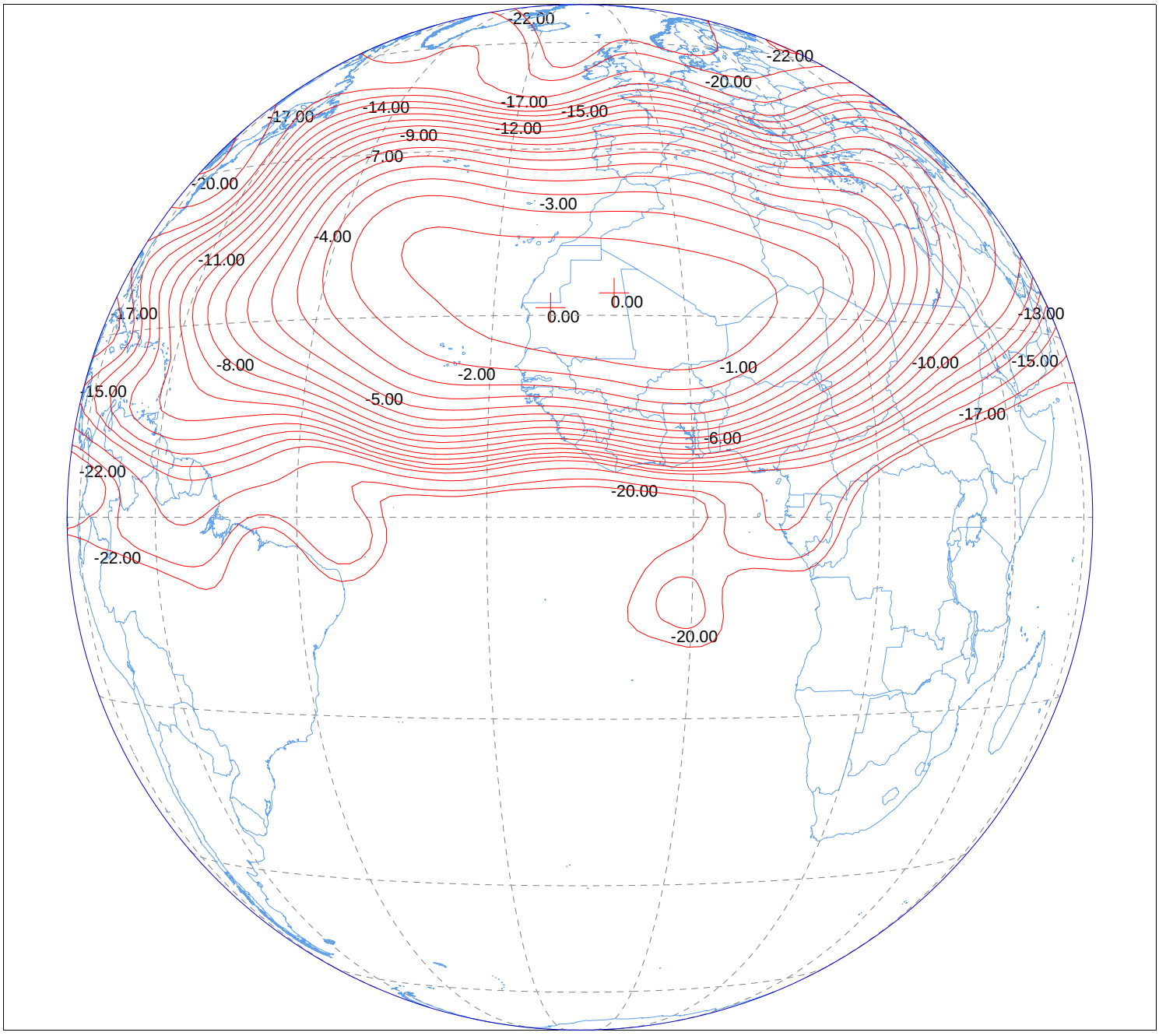
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 8
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



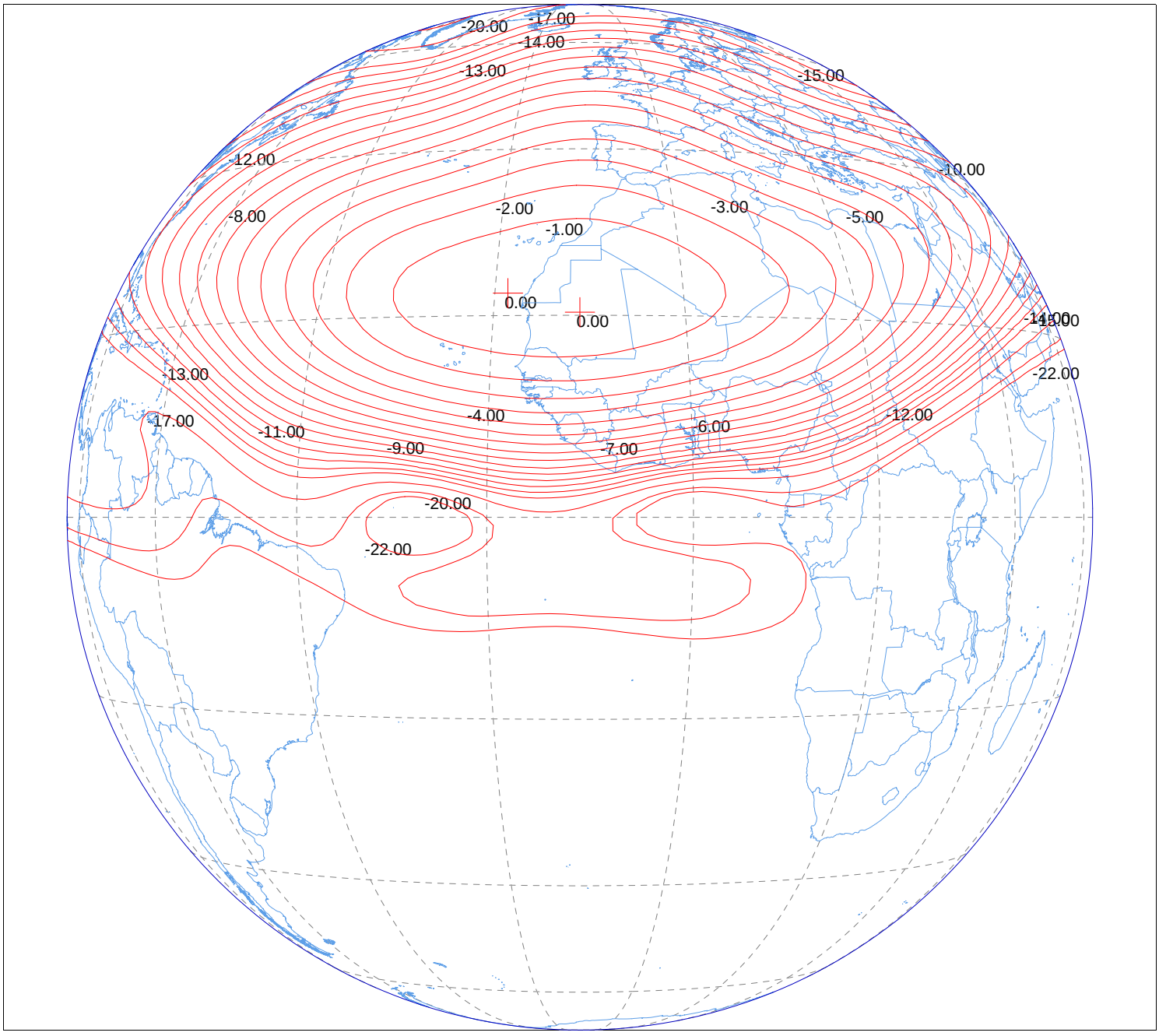
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 8
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



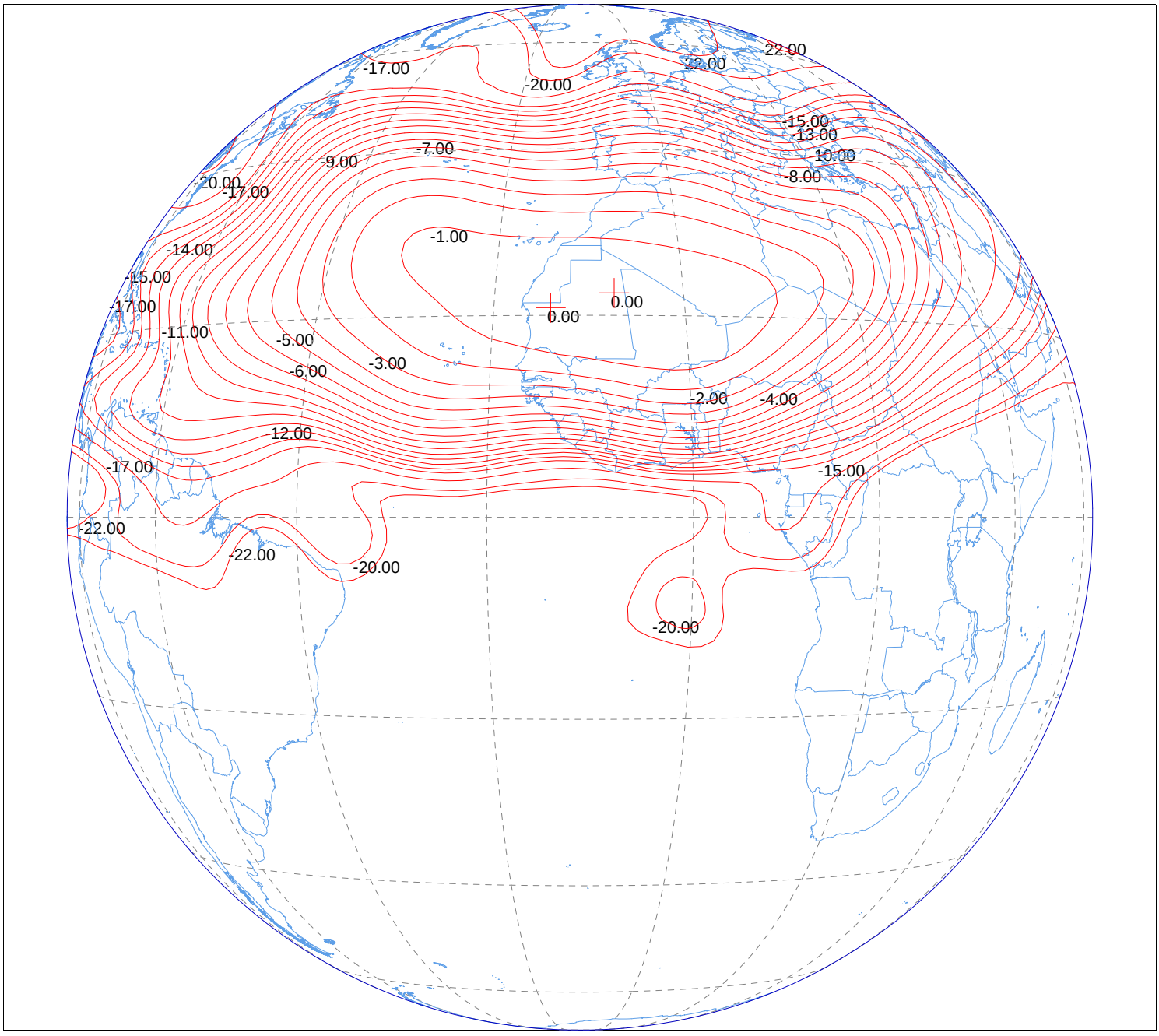
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 9
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB

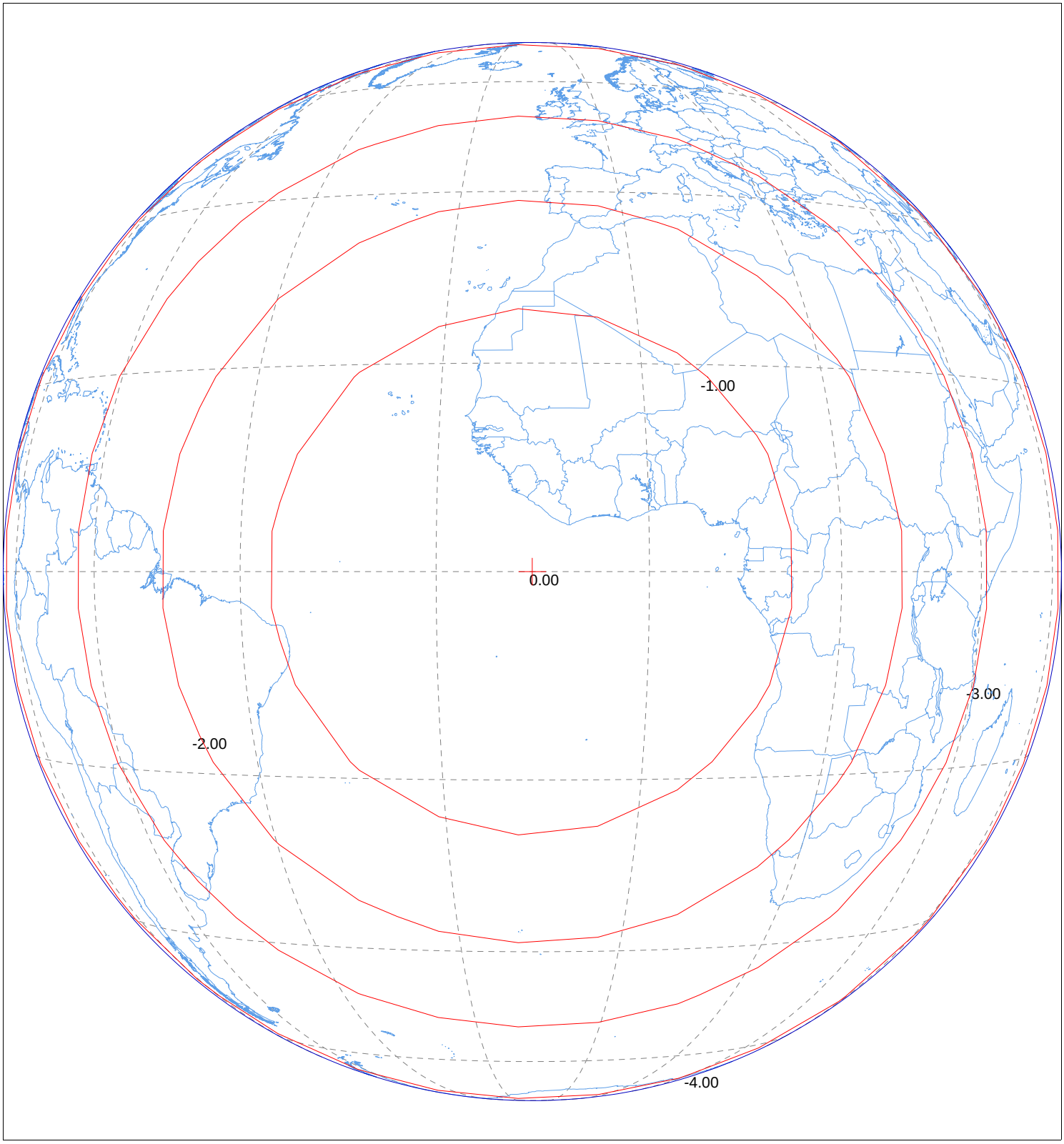


Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 9
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB

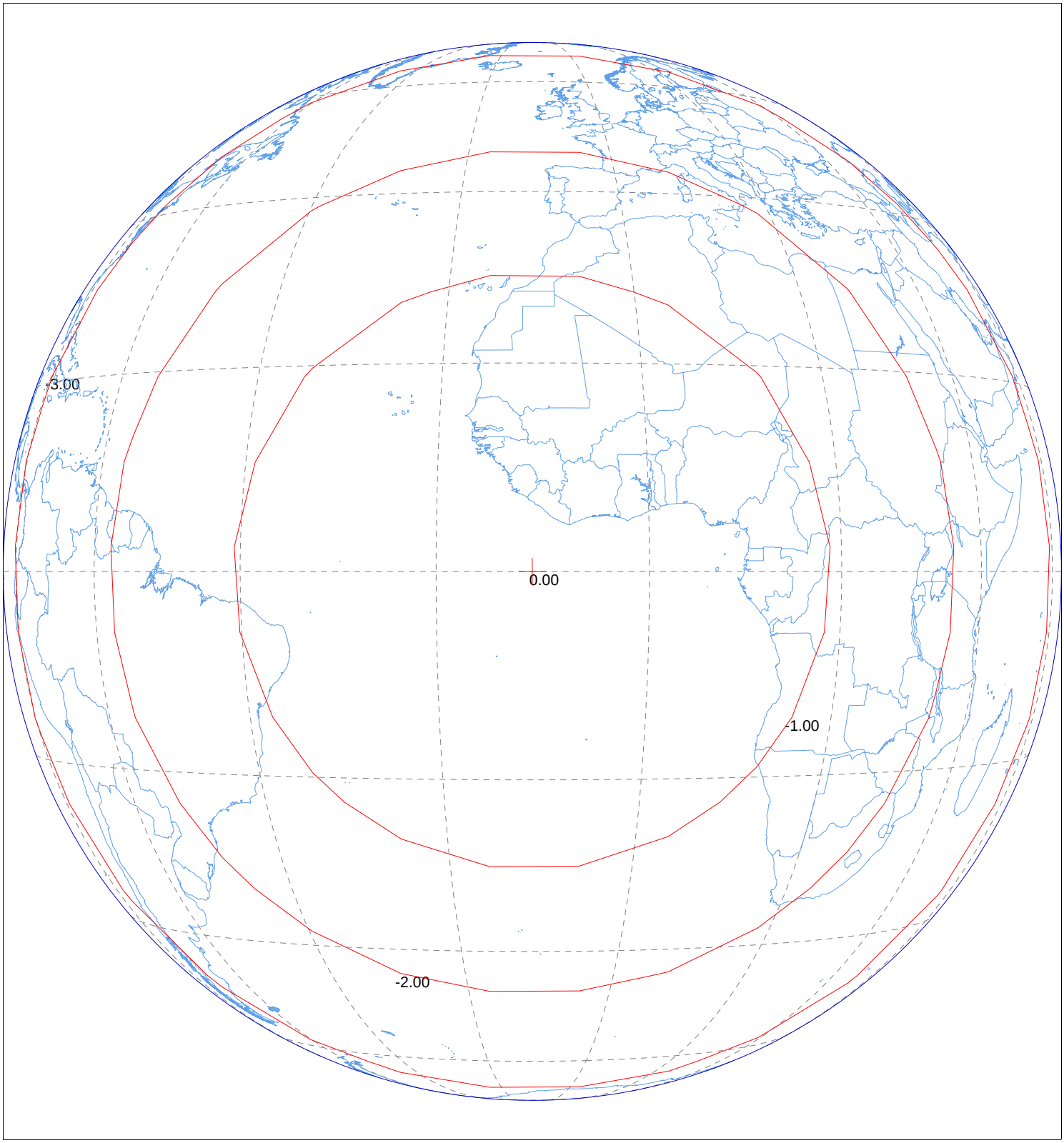


Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 10
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000



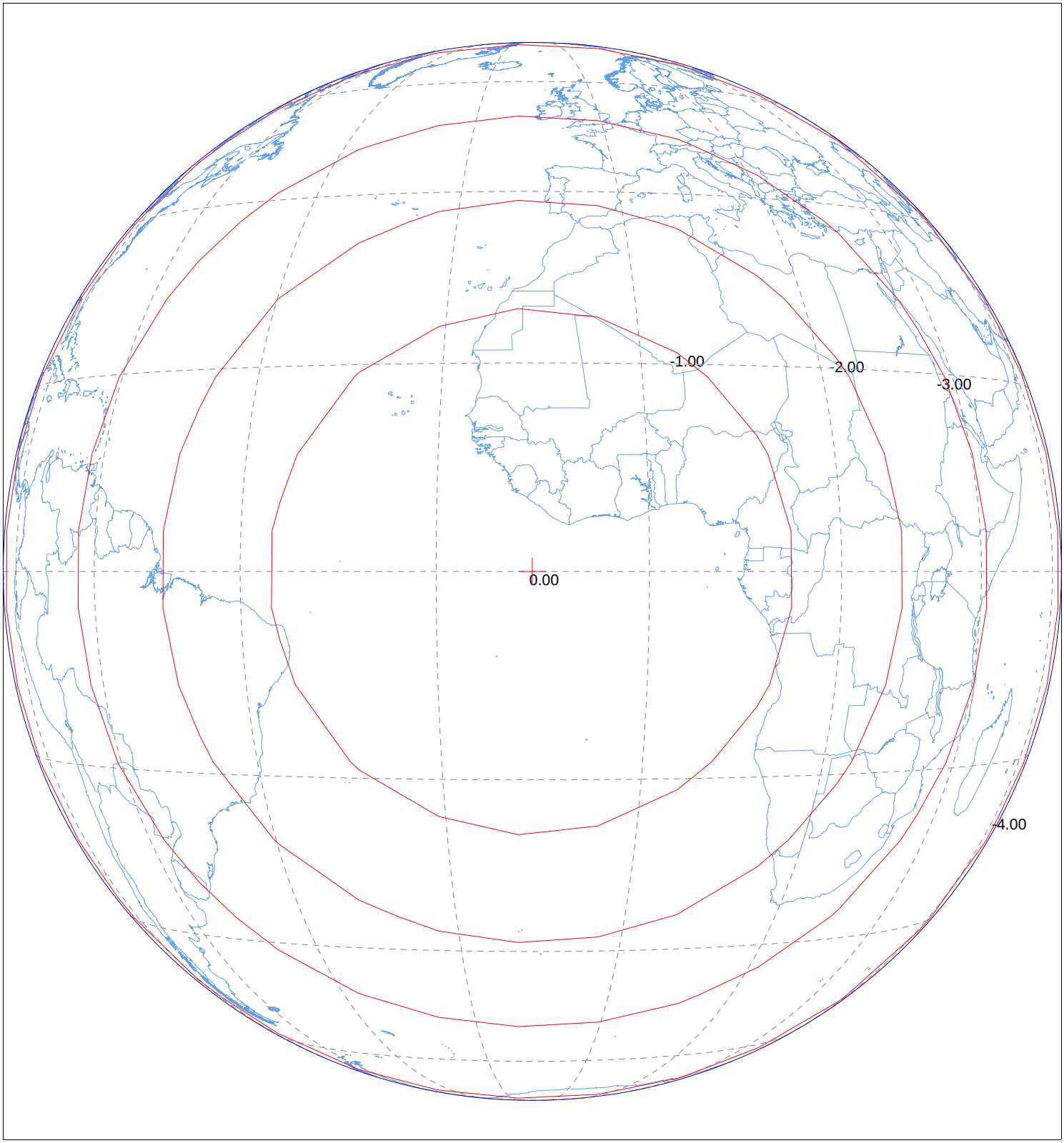
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 10
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB



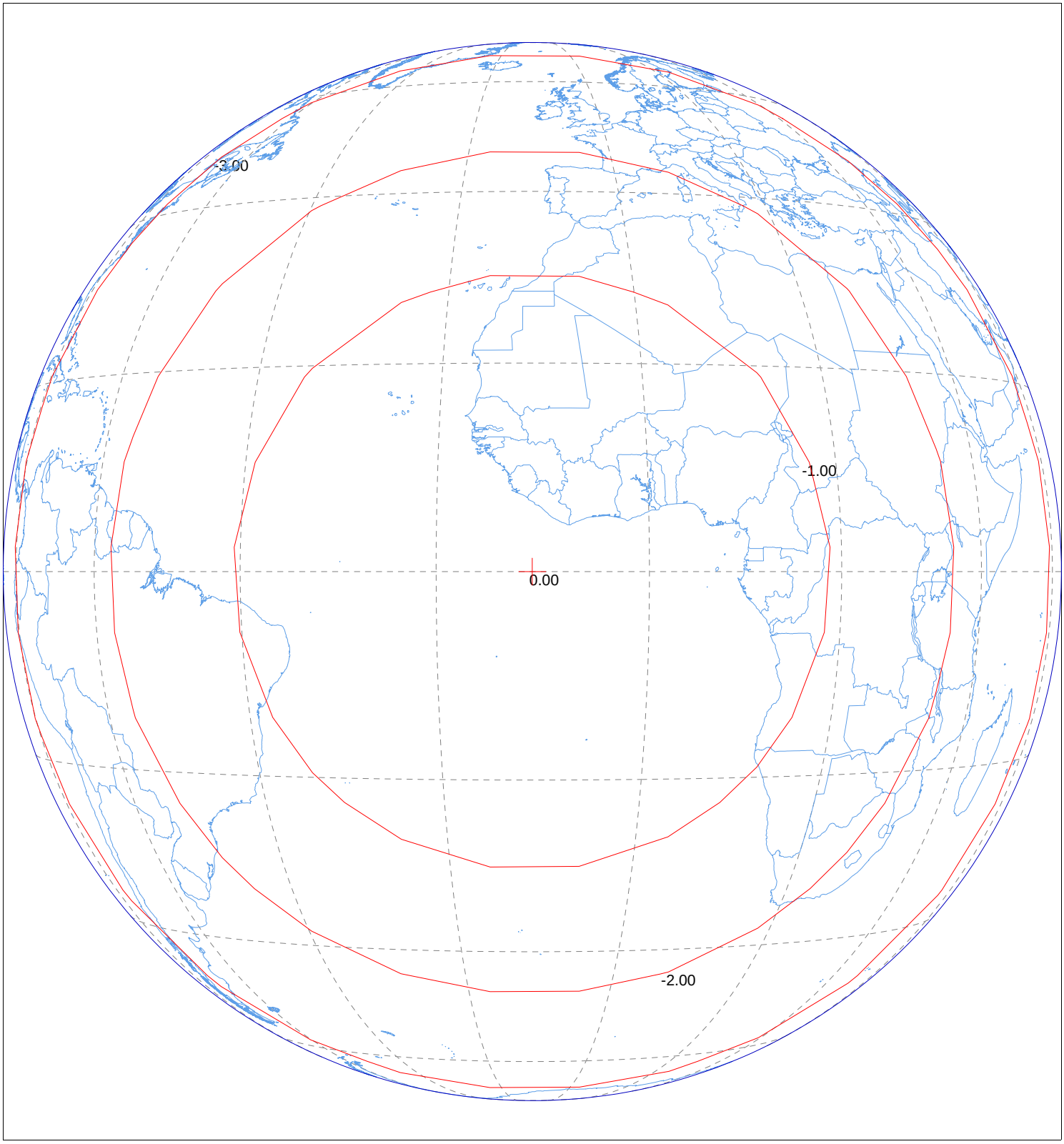
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 11
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB



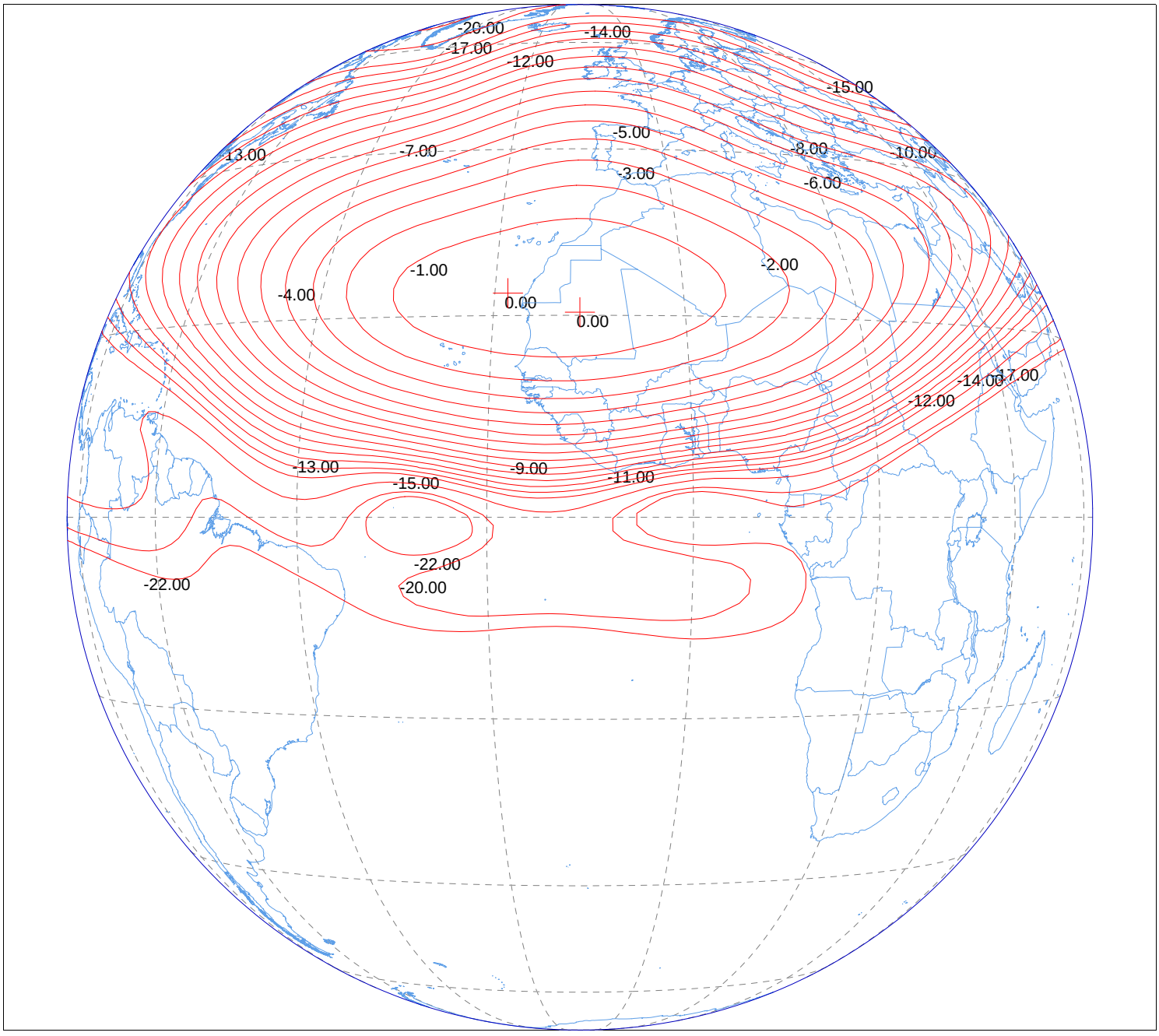
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 11
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB



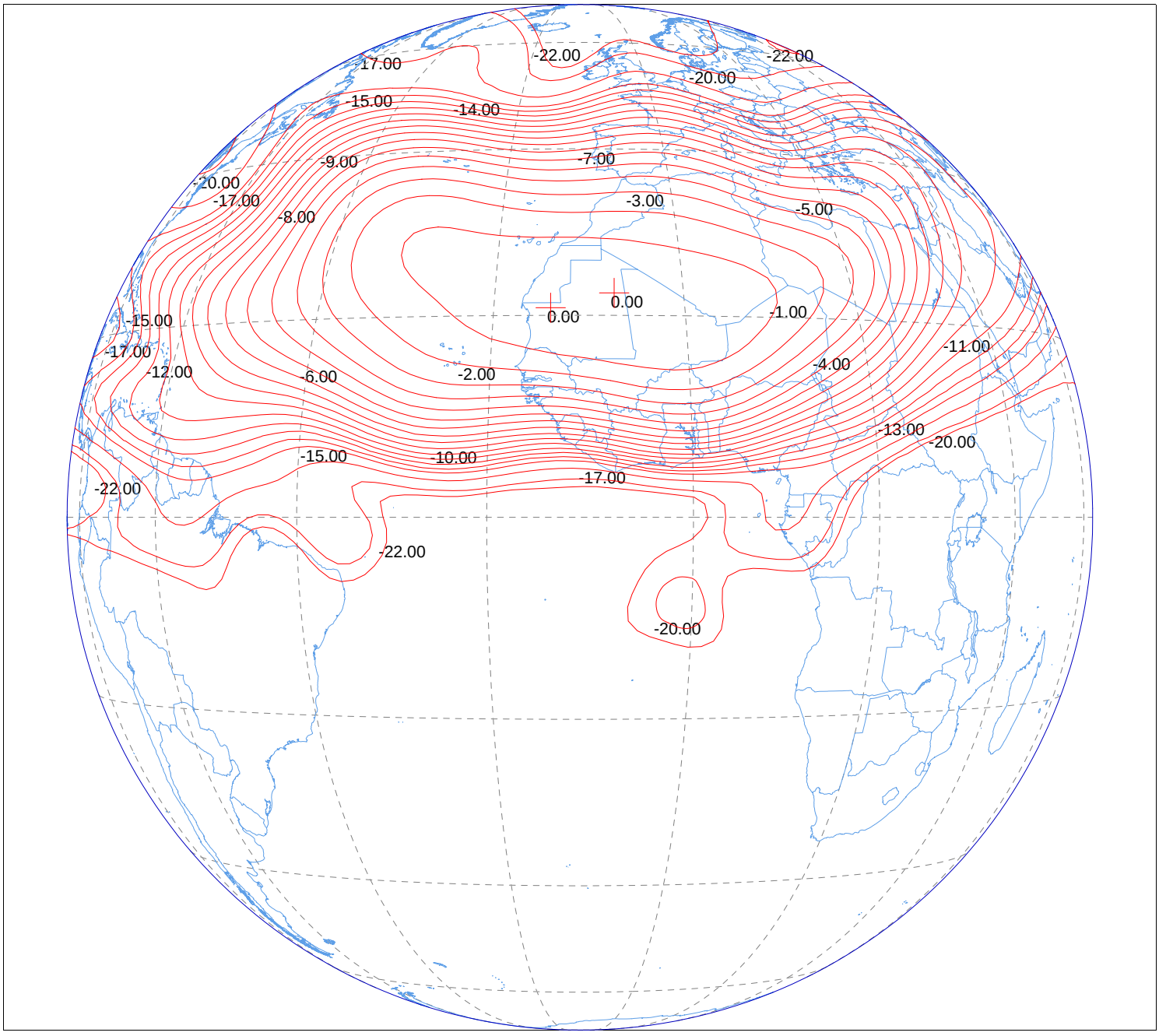
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 15
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



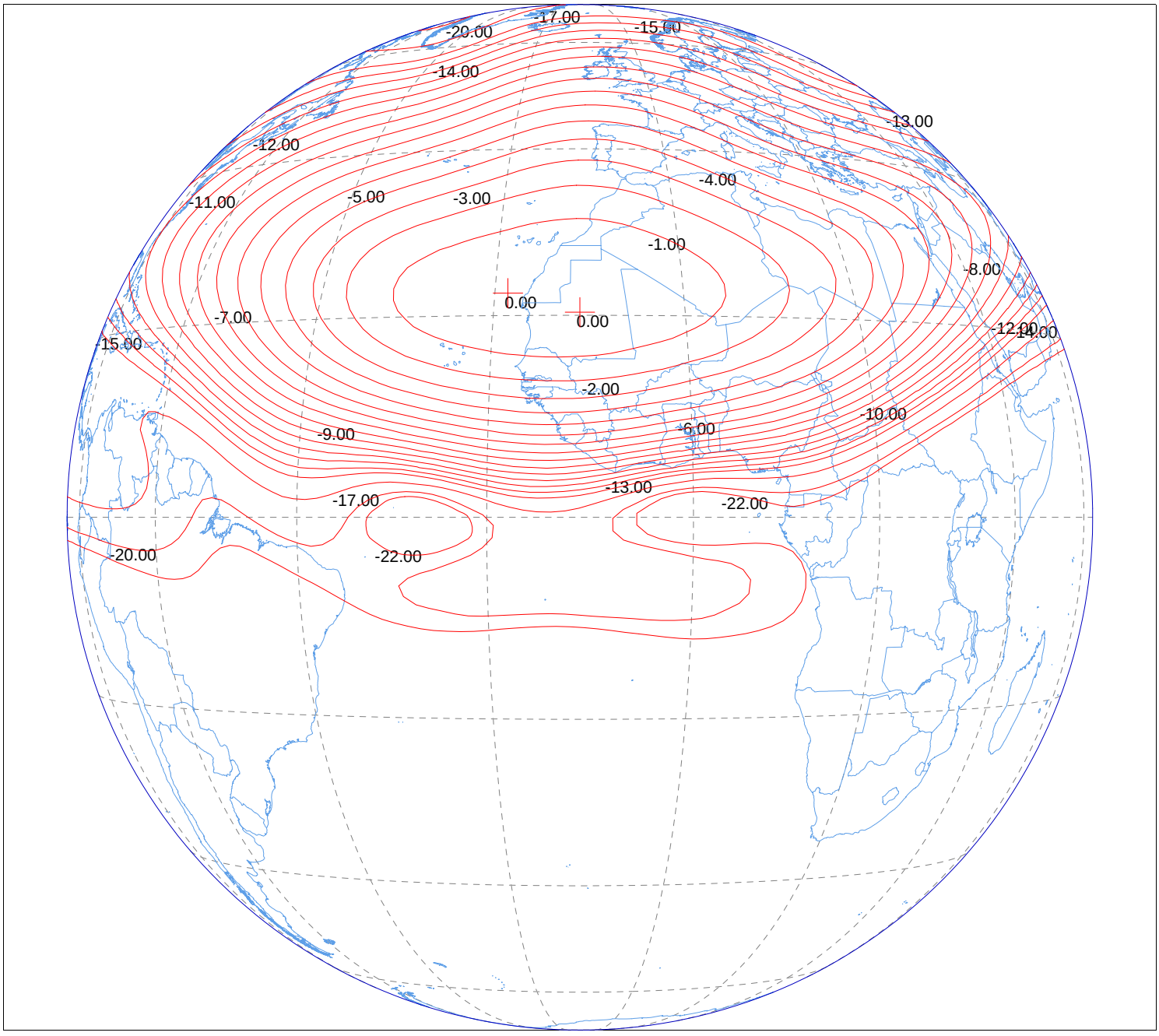
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 15
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



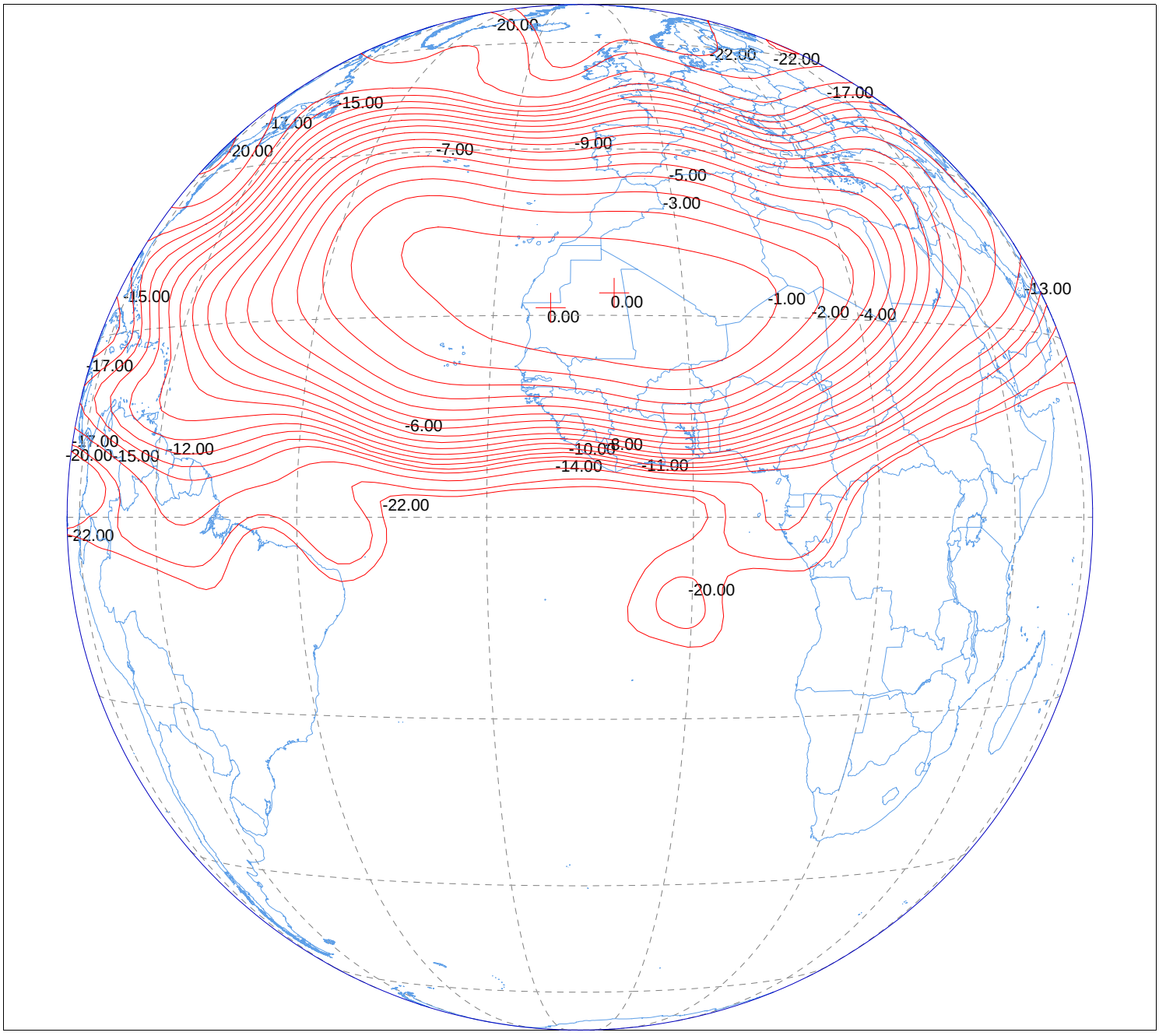
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 16
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



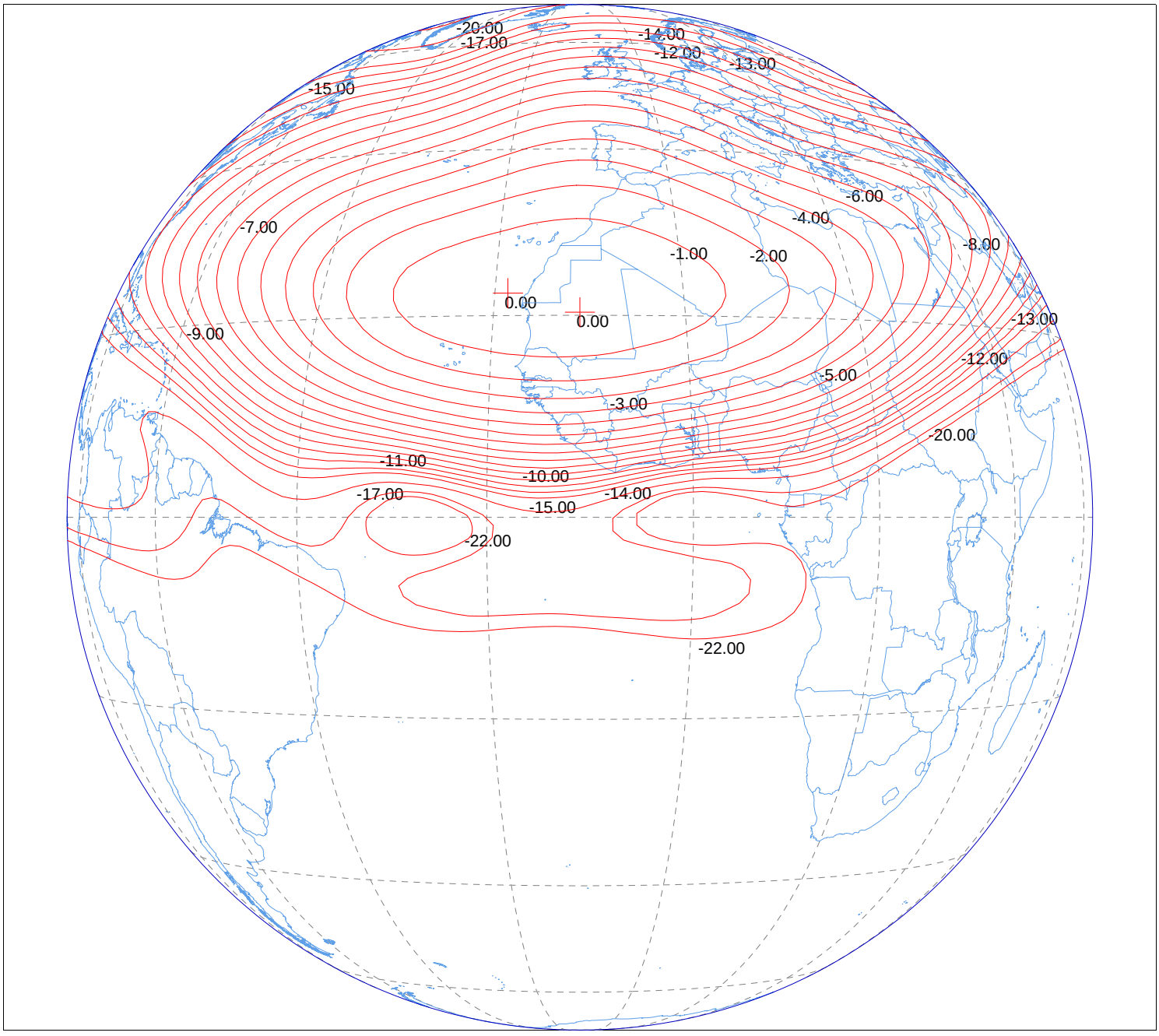
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 16
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



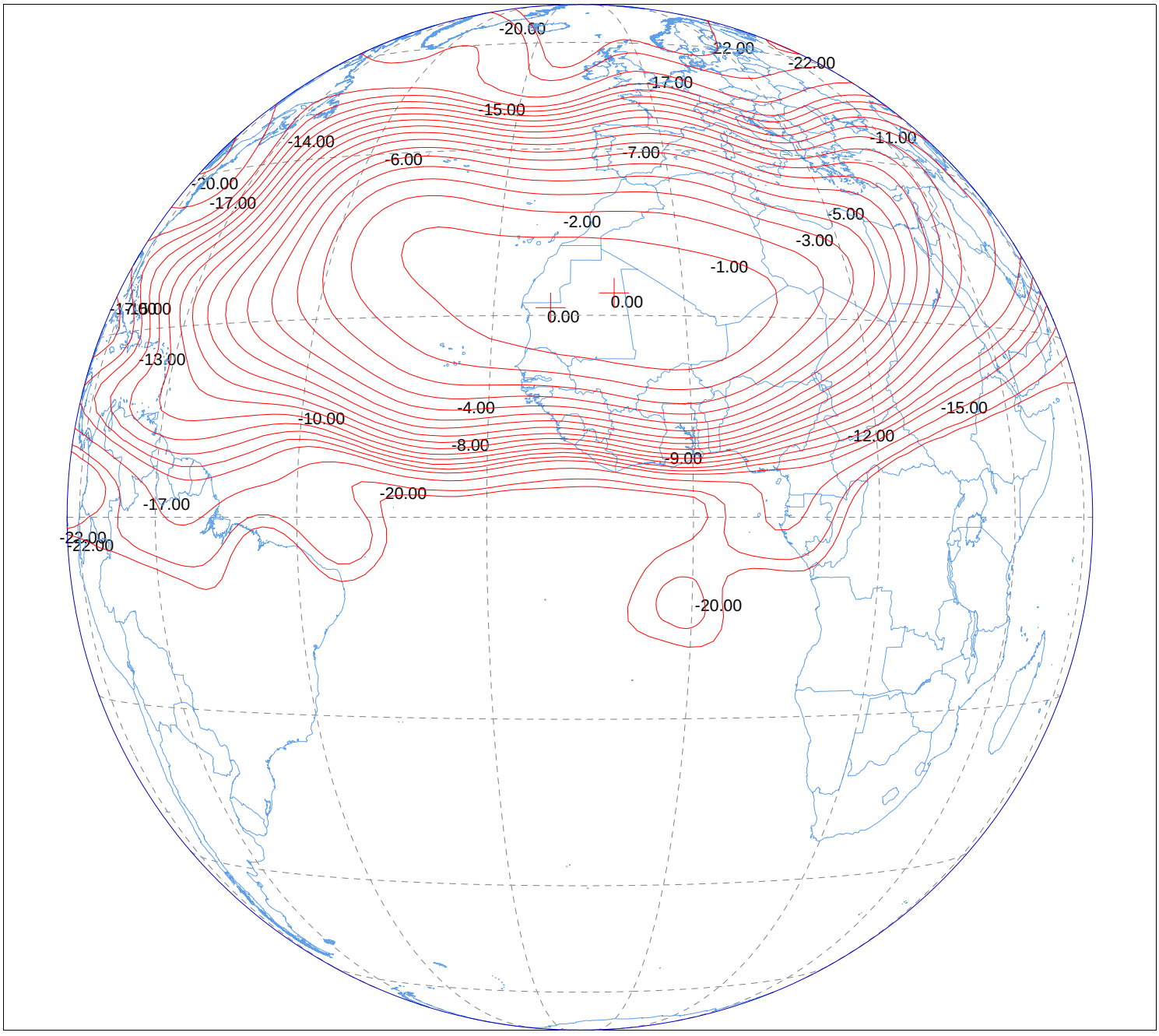
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 17
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



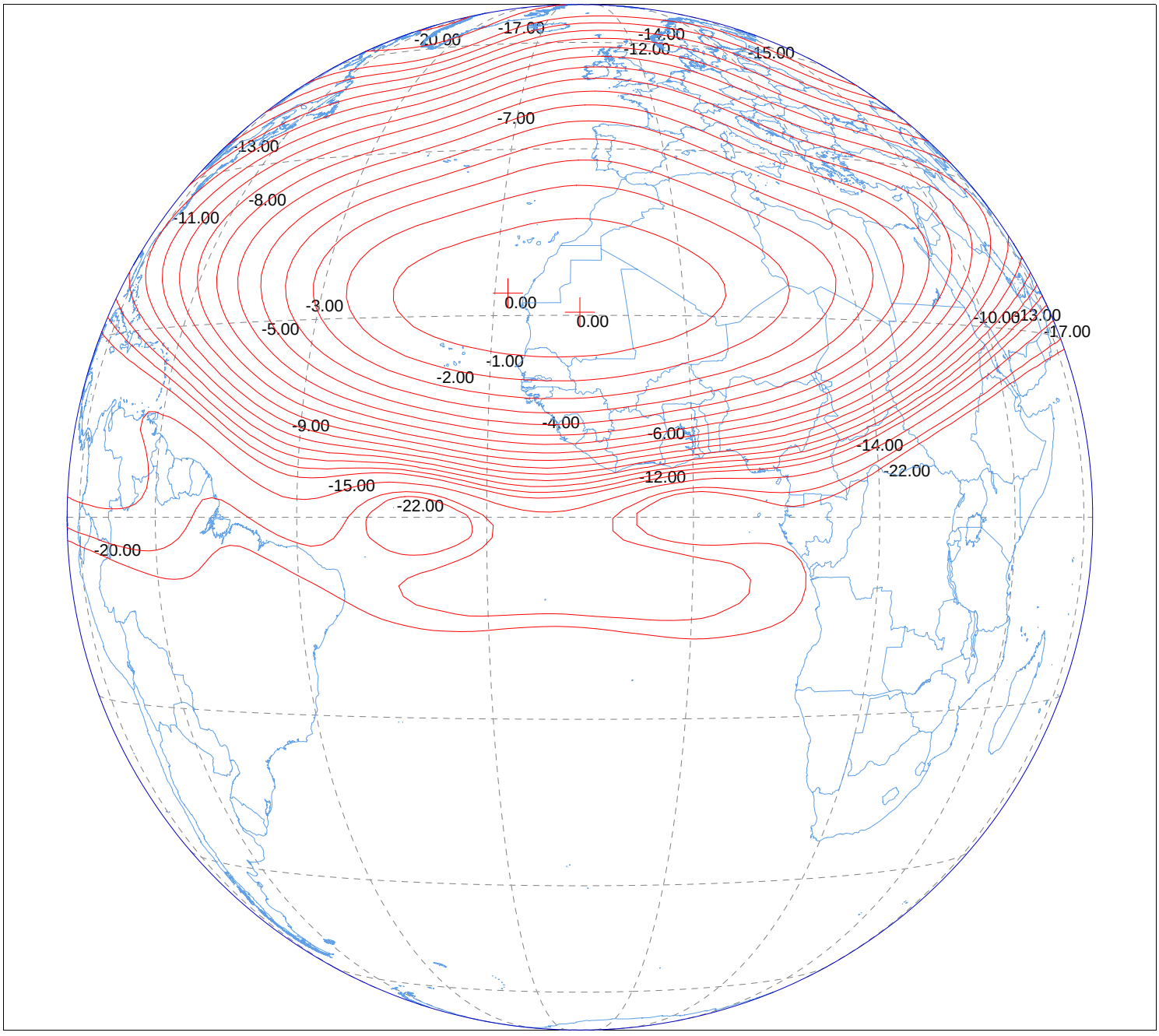
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 17
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



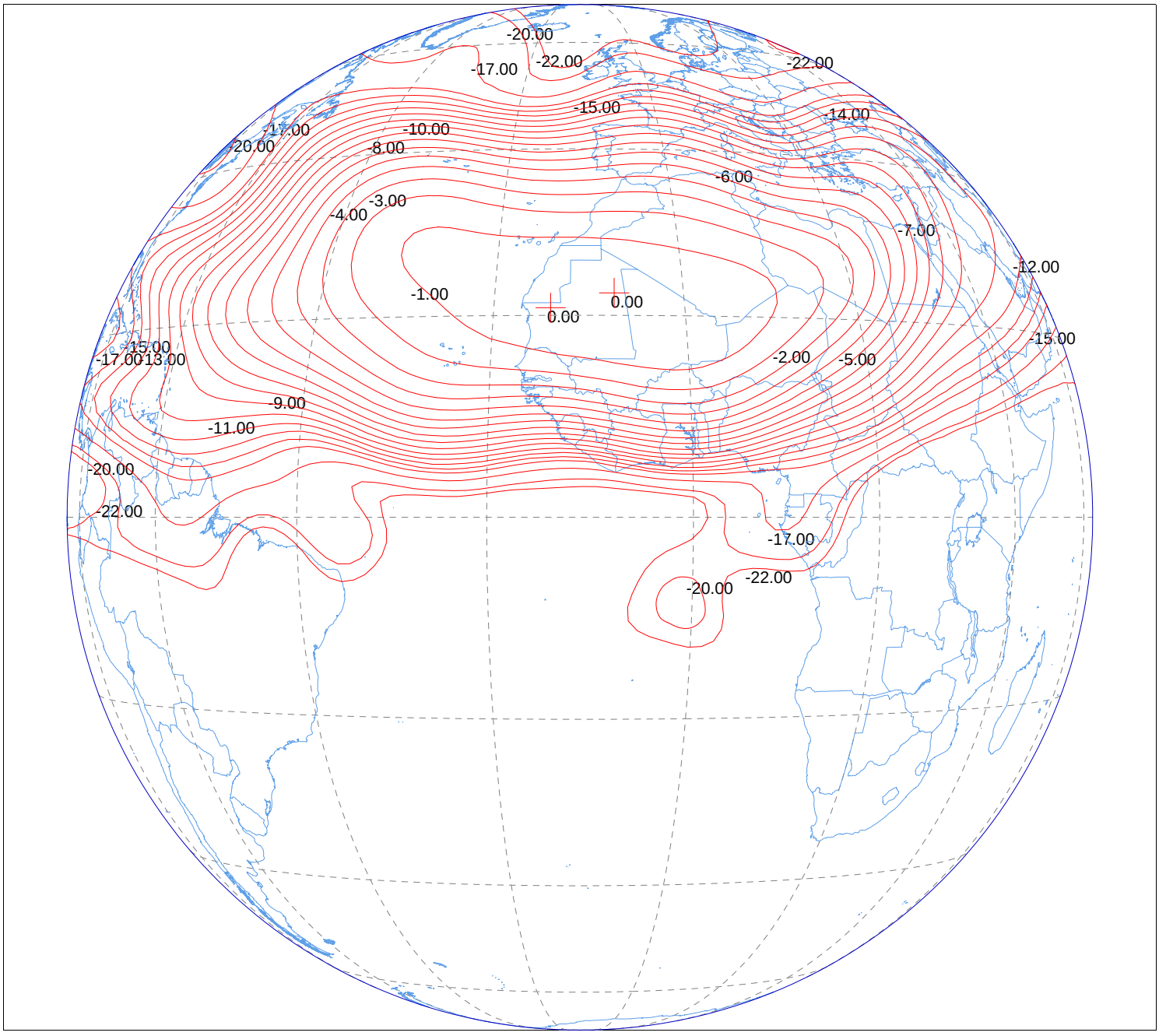
Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 18
Emission / Reception : E
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



Notice ID : 1
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : 18
Emission / Reception : R
Polarization : C
Service Area Number : 0
Service Area Name :
Reason : C
Satellite Position : -11.000

Antenna boresight
-1 dB
-2 dB
-3 dB
-4 dB
-5 dB
-6 dB
-7 dB
-8 dB
-9 dB
-10 dB
-11 dB
-12 dB
-13 dB
-14 dB
-15 dB
-17 dB
-20 dB
-22 dB



Notice ID : 97500286
Administration : RUS
Satellite Network : EXPRESS-AM44
Beam : ZER
Emission / Reception : E
Polarization : C
Service Area Number : 1
Service Area Name : ZER
Reason : N
Satellite Position : -11.000

Service point
Service Area Boundary

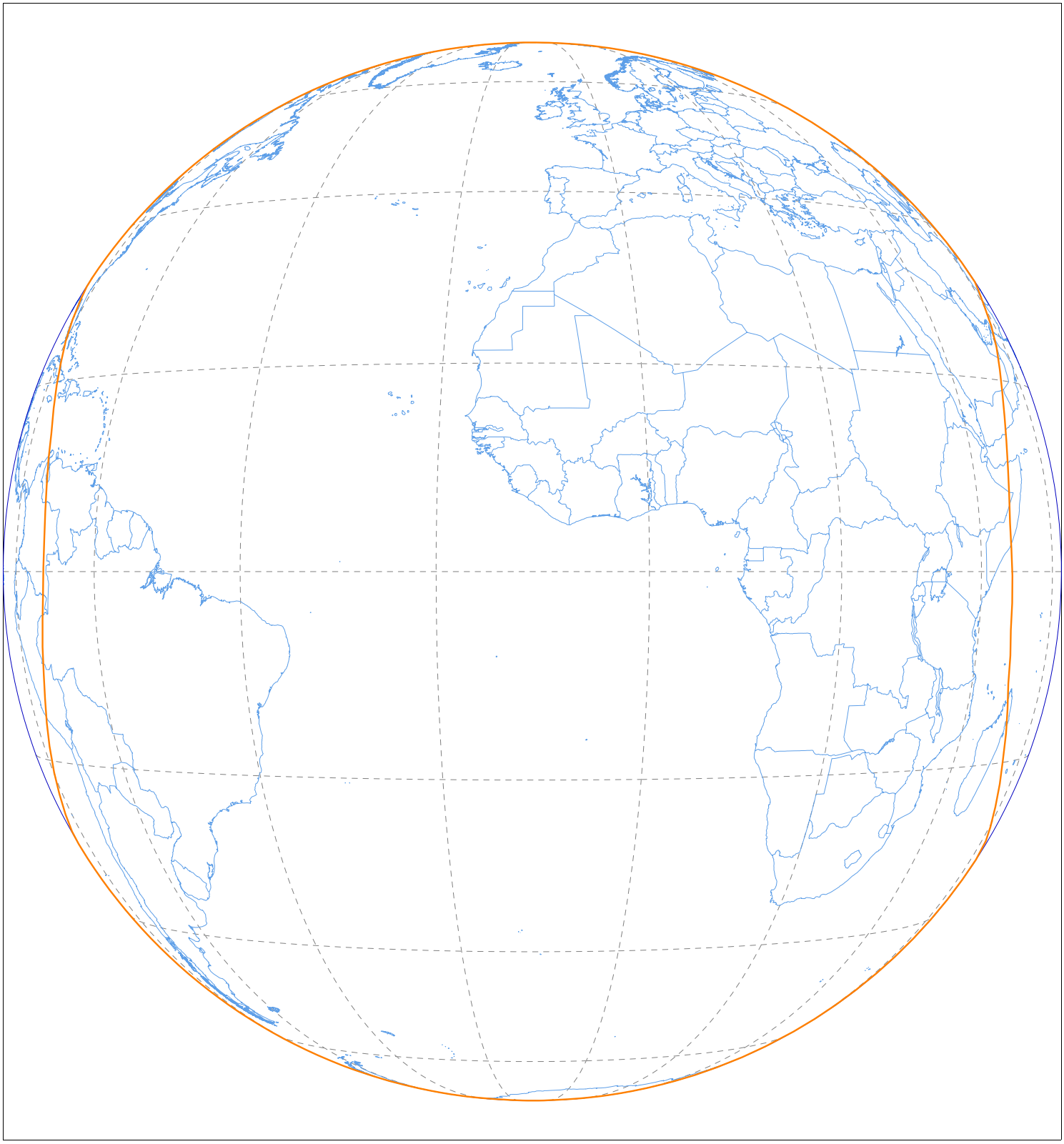


EXHIBIT L – SATELLITE INTERFERENCE ANALYSIS

Satellite Interference Analysis
Miami, FL Earth Station
Newcom International, Inc

May 5, 2012

Prepared by: Ken Ryan, P.E.
Skjei Telecom, Inc.
(703) 917-4020
Ken.ryan@skjeitelecom.com

Table of Contents

Adjacent Satellite Interference Analysis
Miami, FL Earth Station
Newcom International, Inc

1. Introduction

An adjacent satellite interference analysis has been performed to determine the impact of operating on the C-band GSO satellite Express AM44 at an orbital arc position of 11° West Longitude.[1] The purpose of this report is to demonstrate that the operation of Newcom International's digital service will not cause adjacent satellite interference into any proposed systems.

The Newcom system will transmit three digital channels from a 7.3m hub located in Miami, Fl to small diameter receive-only terminals located in Africa. The Newcom system will be referred to as the "interfering" or "Newcom" system throughout this report. The adjacent satellite victim in this study is an existing satellite at 14.0° West Longitude, Express A4. This satellite and associated earth stations will be referred to as the "victim" or "wanted" system throughout this report. Also, as a worst case analysis, a satellite at 2 degree spacing, or 13° W.L., has been considered.

2. Methodology

The analysis methodology involved calculating the interference from the Newcom system into a system operating at the nearest assigned orbital slot. In this case the nearest C-band satellite in operation is at 14.0° west longitude, Express A4 designated USA26G00. A worst case scenario involving a satellite at 13.0° W.L. is also included in this analysis.

Link analyses were performed to compare the operation of services on satellites at 14° and 13.0° W.L. with and without the presence of the Newcom service at 11.0° W.L. The Newcom carrier will be a 40.0 MHz digital video carrier using a 7.3m hub antenna in Miami, FL transmitting through the Express AM44 satellite to 2.4m remote terminals located throughout Africa. Since this analysis is concerned with interference from the Newcom service, the remote terminals will be located in Abuja, Nigeria. A like service analysis included in this report indicates that harmful interference from the Newcom service will not occur.

[1] This interference analysis is provided pursuant to CFR Section 25.140(b)(2) and International Bureau Satellite Division Information, Clarification of 47 C.F.R. § 25.140(b)(2), Space Station Application Interference Analysis, Public Notice No: SPB-195, DA 03-3863, released December 3, 2003.

The operational parameters of the interfering system are summarized in the following tables with additional details included with the link analyses studies included as Attachment 1.

Table 1 summarizes the assumed operational parameters for the interfering system:

Newcom Earth Station Operating Parameters				
Newcom Hub Location				
location			Miami, FL	
N Latitude	deg		25.92	
W longitude	deg		80.22	
Newcom Remote Location				
location			Abuja, Nigeria	
North Latitude	deg		9.2	
East longitude	deg		7.2	
Newcom Hub Antenna Systems				
antenna diameter	m		7.3	
boresight gain	dB		51.4	
Output Circuit Losses	dB		1.2	
Newcom Remote Antenna Systems				
antenna diameter	m		2.4	
boresight gain	dB		38.1	
G/T	dB/K		18.9	
Newcom Satellite Parameters				
Satellite Name			EXPRESS AM44	
Orbital Position	deg. W.L.		11.00	
Downlink EIRP (max)	dBW		47.0	
Usable Transponder BW	MHz		40	
Saturation Flux Density @ 0 dB/K	dBW/m²		-94.8	
Transponder Attenuator	dB		0	
Newcom Transmission Parameters				
Interfering Signal architecture				
Uplink frequency	GHz		6.280	
Downlink frequency	GHz		3.955	
Polarization			circular	
Information Rate	Mbits/s	50	0.142	0.05
occupied bandwidth	MHz	40	0.128	0.45
noise bandwidth	MHz	33.3	0.095	0.033
modulation			QPSK	
net code rate			0.75	

Symbol bit rate	Mbits/s	33.33	0.095	0.033
Emission Designator	40M0G7W	128KG7D	50K0G7D	
Eb/No (required)	dB	4 (+1 db system margin)		

Table 1 – Newcom (Interfering System) Digital Service Parameters

The sources of interfering noise to an adjacent satellite system derive from both the uplink and the downlink. As shown pictorially in Figure 1, the uplink interference is caused by emission of unwanted power through the side-lobes of a transmitting earth station. The downlink interference is, similarly, caused by the reception of unwanted signals through the receiving earth station's side-lobes.

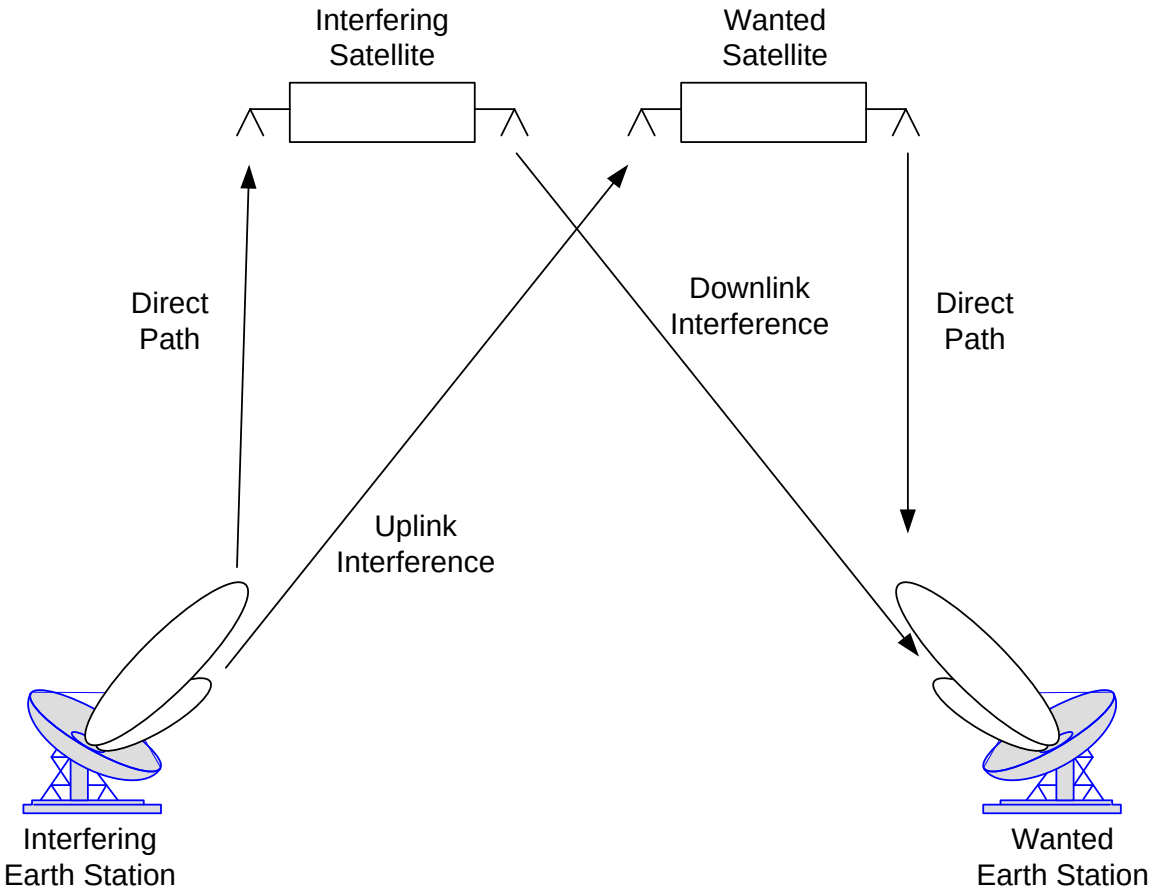


Figure 1 – Adjacent Satellite Interference Model

The Newcom network will consist of one broadband, 40 MHz, and two narrowband, 45 kHz and 128 kHz, digital carriers from a 7.3m hub to small diameter, 2.4m, receive terminals. The service will be provided to parts of Africa within the downlink EIRP contour of 38 dBW. This results in a downlink EIRP density of 3.3 dBW/4kHz, however, since the nearest proposed satellite in this receive band is separated by 3.0 degrees

there is no potential for harmful interference. The Newcom downlink EIRP contour is shown in Figure 2 below.

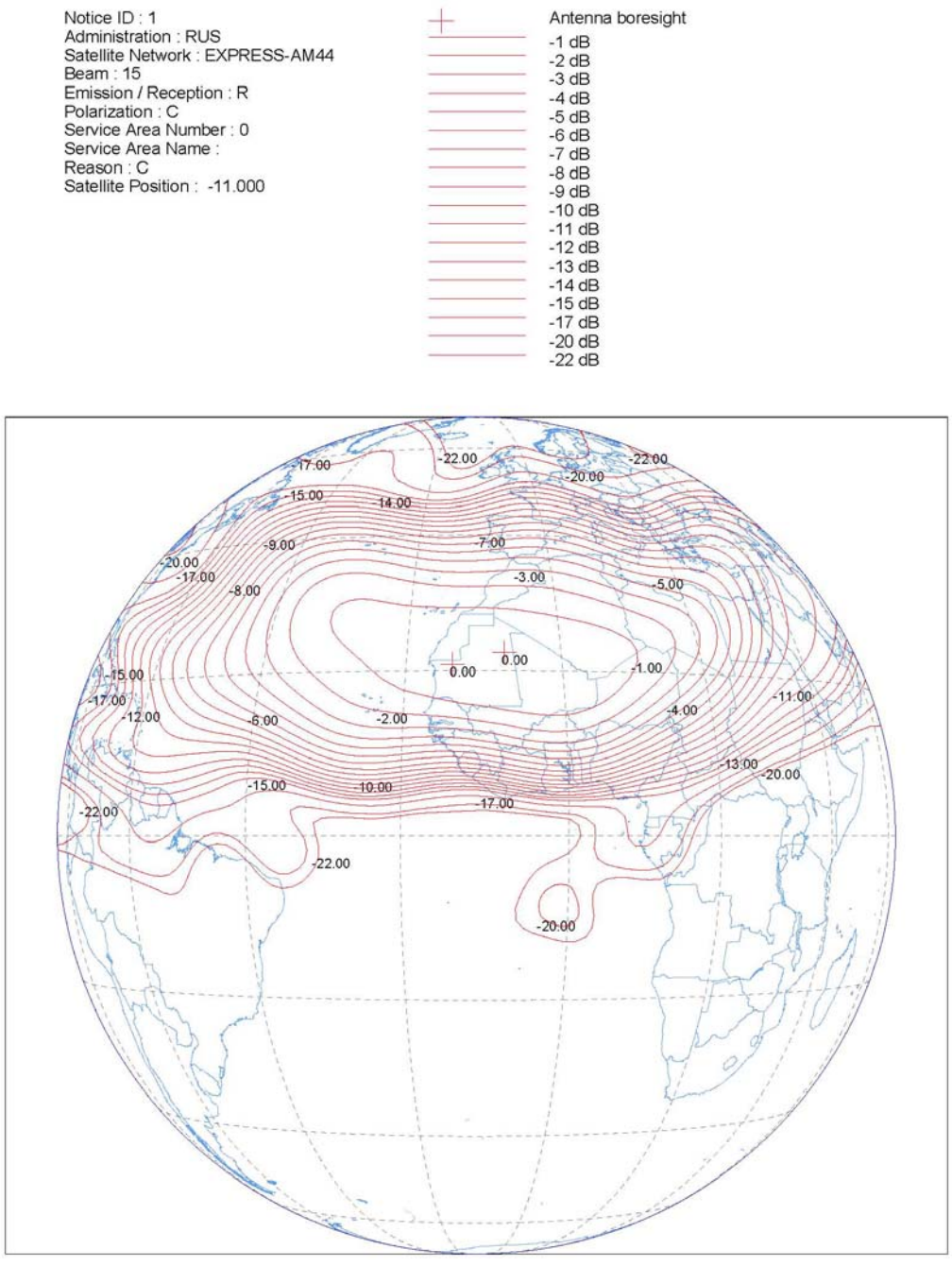


Figure 2 - Downlink EIRP coverage from Beam 15 Express AM44 at 11.0° W

3. Uplink Interference

The carrier-to-interference (C/Iu) for the uplink can be calculated as follows:

$C/Iu = Etw - Lw - Eti + Li + Gti - Gt(\theta) + A$

Where:

Ew = Transmit EIRP of the interfered with carrier at the interfered with satellite, dBW

E = Transmit EIRP of the interfering carrier, dBW

Lw = Atmospheric and pointing losses of the wanted carrier, dB

Li = Atmospheric and pointing losses of the interfering carrier in the direction of the victim satellite, dB

Gti = Gain of the interfering earth station, dBi

Gt(θ) = Gain of the interfering earth station toward the victim satellite, dBi

A = Bandwidth adjustment factor to account for power distribution of the interfering carrier bandwidth, Bi, and the interfered with carrier bandwidth, Bw:

$$A = \begin{cases} 10\log(Bi/Bw) \text{ in dB}, & \text{if } Bi > Bw \\ 0, & \text{if } Bw \geq Bi \end{cases}$$

Note that the carrier bandwidth is assumed to the 1.2 x (symbol rate)

4. Downlink Interference

The carrier to interference (C/Id) for the downlink can be calculated as follows:

Where:

$C/Id = Erw - Lw - Eri + Li + Grw - Gr(\theta) + A$

Erw = Downlink EIRP of the wanted carrier at the wanted receiver, dBW

Eri = Downlink EIRP of the interfering carrier at the victim receiver, dBW

Grw = Receive antenna on-axis antenna gain of the wanted earth station, dBi

Gr(θ) = Receive antenna gain toward the interfering satellite, dBi

A, Lw, Li are as defined previously.

5. Antenna Sidelobe Gain

In the calculations presented to support this report it is assumed that the interfered with earth stations have radiation patterns which behave according to 29-25*log(θ) rule. Also, the exact orbital separation between the wanted and the interfering satellites has been calculated for the earth station locations examined in the report. A victim wanted satellite is at 14.0° W.L[2]. and the interfering satellite is at 11.0° W.L.. For an interfering hub in Miami, FL the angular separation is 2.91 degrees and the off-axis antenna gain is 17.41 dBi. The downlink terminal in Abuja has an angular separation ranges from 3.25 degrees and the off-axis gain is 16.22 dBi .

For a non-inclined satellite positioned at 13.0° W.L. the uplink angular separation is 2.08 and the antenna gain is 21.06 dBi, the downlink angular separation is 2.32 degrees and the off-axis gain is 19.86 dBi.

6. Interfered with Carriers

Three adjacent satellite carrier types have been chosen for this study. The three carriers are identical to the carriers being uplinked by Newcom. They include a 50 kbit/s, a 142 kbit/s and a 40Mbits/s carrier from a hub in Miami into a small receive terminal in Abuja, Nigeria. Details regarding the victim earth station locations, the victim carrier parameters, and the victim earth station parameters are shown in tables below.

Wanted Signal Parameters Operating at 14° W.L. & 13° W.L.

Wanted Satellite Parameters		
Satellite Name		Express A4, 2Deg
Express A4 Orbital Position1	deg. W.L.	14
2Deg Orbital Position 2	deg. W.L	13.0
Downlink EIRP (max)	dBW	47
Usable Transponder BW	MHz	40
Saturation Flux Density @ 0 dB/K	dBW/m²	-94.8
Transponder Attenuator	dB	0

Table 2a – Victim Satellite Parameters

[2] Express 4A is in slightly inclined orbit, . In order to consider the worst cases effects of this +/- 1.7° north south inclination the assumed orbital position of Express 4A has been set to 13.8° W.L.

Wanted Carrier Up/Down Locations

Location		Miami, FL	Abuja, Nigeria
Latitude	deg	25.92N	9.2N
Longitude	deg	80.22W	7.2E

Table 2b – Victim Earth Station locations used in analysis

Wanted Uplink Antenna Systems		50 Mbits/s	142 kbits/s	50 kbits/s
antenna diameter	m	7.3	7.3	7.3
boresight gain	dB	51.3	51.3	51.3
Output Circuit Losses	dB	1.2	1.2	1.2
Wanted Downlink Antenna Systems				
antenna diameter	m	2.4	2.4	2.4
boresight gain	dB	38.1	38.1	38.1
G/T	dB/K	18.9	18.9	18.9
Wanted Signal architecture				
Uplink frequency	GHz	6.280	6.280	6.280
Downlink frequency	GHz	3.955	3.955	3.955
Polarization		circular	circular	circular
Information Rate	Mbits/s	50.0	0.142	0.05
occupied bandwidth	MHz	40.0	0.128	0.05
noise bandwidth	MHz	33.3	0.095	0.033
modulation		QPSK	QPSK	QPSK
net code rate		0.75	0.75	0.75
Symbol rate	Mbits/s	33.3	0.095	0.033
Eb/No (required)	dB	4	4	4

Table 2c – Victim transmit and receive antenna types and signal architectures

In general, since the wanted and interfering carriers are digital criteria the power density levels are fairly consistent and the results do not vary much for each type of carrier examined.

7. Summary of Results

The results show that operation of services at 14.0° W.L. or 13.0° W.L. will not be significantly affected by the Newcom services operation on an adjacent satellite at 11.0° W.L. The link degradation for all the service is less than 0.0045% percent on a worst case basis. This represents a 0.43 dB decrease in rain margin for the worst case analysis. A summary of the link degradation is shown in the Table 4 below. As can be seen the worst case degradation is 0.045 percent degradation in link availability for a 50 kbits/s carrier operating with a satellite at two (2) degree separation at 13° W.L.

Summary of Results		50K0G7W, Express A4 Victim	128KG7W, Express A4 Victim	40M0G7W, Express A4 Victim	50K0G7W, 2Deg Victim	128KG7W, 2Deg Victim	40M0G7W, 2Deg Victim
Victim location		Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL
N Latitude	deg	25.92	25.92	25.92	25.92	25.92	25.92
W longitude	deg	80.22	80.22	80.22	80.22	80.22	80.22
Victim Carrier C/N (net)	dB	9.5	9.6	9.6	9.5	9.6	9.6
Victim Carrier C/(N+I) (net)	dB	8.8	8.8	8.8	8.5	8.6	8.5
Victim Carrier Eb/No (net)	dB	7.0	7.1	7.0	6.7	6.8	6.8
Victim Carrier margin	dB	2.0	2.1	2.0	1.7	1.8	1.8
Victim downlink rain region		G	G	G	G	G	G
Victim Carrier availability with AM44	percent	99.698	99.699	99.698	99.695	99.696	99.695
Victim Carrier C/(N+I) w/o AM44W	dB	8.9	9.0	9.0	8.9	9.0	9.0
Victim Carrier availability without AM44W	percent	99.6994	99.6997	99.6996	99.6994	99.6998	99.6996
Victim Carrier decrease in availability	percent	-0.0013	-0.0012	-0.0012	-0.0044	-0.0040	-0.0042
Victim Carrier decrease in margin	dB	0.16	0.16	0.16	0.43	0.43	0.43

Table 4 – Adjacent Satellite Link Analyses Summary of Results for wanted satellite at 14° W.L. The overall link degradation due to the presence of Newcom's EXPRESS AM44 will be 0.027 percent or less.

8. Conclusions

Since the closest proposed satellite operating in the same band as the proposed Newcom service is separated by 3.0 degrees harmful interference will not occur. Even considering a satellite at 2 degrees separation the impact is negligible resulting in around 1 dB of C/N degradation and 0.1% link availability degradation. Newcom will work will all adjacent satellite operators to ensure that long term operation of all services will be interference free.

Attachment 1 – Adjacent Satellite Link Analysis Data Tables

Newcom ASI Interference Study		45K0G7D	1287DKG	40M0G7W	45K0G7D	1287DKG	40M0G7W
Newcom Hub							
location		Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL
N Latitude	deg	25.92	25.9	25.9	25.92	25.9	25.9
W longitude	deg	80.22	80.2	80.2	80.22	80.2	80.2
Newcom Carrier Up							
location		Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL
N Latitude	deg	25.92	25.92	25.92	25.92	25.92	25.92
W longitude	deg	80.22	80.22	80.22	80.22	80.22	80.22
Victim Satellite Parameters							
Satellite Name		Express A4	Express A4	Express A4	2Deg	2Deg	2Deg
Orbital Position	deg. W.L.	14	14	14	13	13	13
Transponder Type		150 W	150 W	150 W	150 W	150 W	150 W
Usable Transponder BW	MHz	40	40	40	40	40	40
Saturation Flux Density @ 0 dB/K	dBW/m²	-94.8	-94.8	-94.8	-94.8	-94.8	-94.8
Transponder Attenuator	dB	0.0	0.0	0.0	0.0	0.0	0.0
Newcom Satellite Parameters							
Satellite Name		Express AM44	Express AM44	Express AM44	Express AM44	Express AM44	Express AM44
Orbital Position	deg. W.L.	11	11	11	11	11	11
Transponder Type		100 W	100 W	100 W	100 W	100 W	100 W
Usable Transponder BW	MHz	40	40	40	40	40	40
Saturation Flux Density @ 0 dB/K	dBW/m²	-94.8	-94.8	-94.8	-94.8	-94.8	-94.8
Transponder Attenuator	dB	0.0	0.0	0.0	0.0	0.0	0.0
Victim Uplink Antenna							
Location		Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL
N Latitude	deg	25.9	25.9	25.9	25.9	25.9	25.9
W longitude	deg	80.2	80.2	80.2	80.2	80.2	80.2
antenna diameter	m	7.3	7.3	7.3	7.3	7.3	7.3

efficiency	fraction	0.60	0.60	0.60	0.60	0.60	0.60
boresight gain	dB	51.4	51.4	51.4	51.4	51.4	51.4
taper factor	deg	72.9	72.9	72.9	72.9	72.9	72.9
half power beamwidth	deg	0.48	0.48	0.48	0.48	0.48	0.48
Output Circuit Losses	dB	1.5	1.5	1.5	1.5	1.5	1.5
Newcom Uplink Antenna							
Location		Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL	Miami, FL
N Latitude	deg	25.92	25.92	25.92	25.92	25.92	25.92
W longitude	deg	80.22	80.22	80.22	80.22	80.22	80.22
antenna diameter	m	7.3	7.3	7.3	7.3	7.3	7.3
efficiency	fraction	0.60	0.60	0.60	0.60	0.60	0.60
boresight gain	dB	51.4	51.4	51.4	51.4	51.4	51.4
taper factor	deg	72.9	72.9	72.9	72.9	72.9	72.9
half power beamwidth	deg	0.48	0.48	0.48	0.48	0.48	0.48
Output Circuit Losses	dB	1.5	1.5	1.5	1.5	1.5	1.5
Victim Remote terminal antenna							
Location		Abuja	Abuja	Abuja	Abuja	Abuja	Abuja
latitude	deg	9.2	9.2	9.2	9.2	9.2	9.2
W longitude	deg	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2
antenna diameter	m	2.400	2.400	2.400	2.400	2.400	2.400
efficiency	fraction	0.65	0.65	0.65	0.65	0.65	0.65
boresight gain	dB	38.1	38.1	38.1	38.1	38.1	38.1
taper factor	deg	72.9	72.9	72.9	72.9	72.9	72.9
half power beamwidth	deg	2.30	2.30	2.30	2.30	2.30	2.30
clear sky antenna temperature	K	33.0	33.0	33.0	33.0	33.0	33.0
receiver noise figure	dB	0.62	0.62	0.62	0.62	0.62	0.62
receiver equivalent temperature	K	45	45	45	45	45	45
system temperature	K	78	78	78	78	78	78
	dBK	18.9	18.9	18.9	18.9	18.9	18.9
G/T	dB/K	18.9	18.9	18.9	18.9	18.9	18.9
Newcom Remote Downlink terminal antenna							

Location		Abuja	Abuja	Abuja	Abuja	Abuja	Abuja
latitude	deg	9.2	9.2	9.2	9.2	9.2	9.2
W longitude	deg	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2
antenna diameter	m	2.400	2.400	2.400	2.400	2.400	2.400
efficiency	fraction	0.65	0.65	0.65	0.65	0.65	0.65
boresight gain	dB	38.1	38.1	38.1	38.1	38.1	38.1
taper factor	deg	72.9	72.9	72.9	72.9	72.9	72.9
half power beamwidth	deg	2.30	2.30	2.30	2.30	2.30	2.30
clear sky antenna temperature	K	33.0	33.0	33.0	33.0	33.0	33.0
receiver noise figure	dB	0.62	0.62	0.62	0.62	0.62	0.62
receiver equivalent temperature	K	45	45	45	45	45	45
system temperature	K	78	78	78	78	78	78
	dBK	18.9	18.9	18.9	18.9	18.9	18.9
G/T	dB/K	18.9	18.9	18.9	18.9	18.9	18.9
Victim Signal architecture							
Uplink frequency	GHz	6.280	6.280	6.280	6.280	6.280	6.280
Uplink wavelength	m	0.0477	0.0477	0.0477	0.0477	0.0477	0.0477
Uplink polarization		circular	circular	circular	circular	circular	circular
Downlink frequency	GHz	3.955	3.955	3.955	3.955	3.955	3.955
Downlink wavelength	m	0.0758	0.0758	0.0758	0.0758	0.0758	0.0758
Downlink polarization		circular	circular	circular	circular	circular	circular
information (effective) bit rate	Mbits/s	0.05	0.142	50.000	0.05	0.142	50.000
	dBHz	47.0	51.5	77.0	47.0	51.5	77.0
percent of raised cosine filtering	percent	35	35	20	35	35	20
occupied bandwidth	MHz	0.045	0.128	40.000	0.045	0.128	40.000
	dBHz	46.5	51.1	76.0	46.5	51.1	76.0
noise bandwidth	MHz	0.033	0.095	33.333	0.033	0.095	33.333
modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
BER		1.0E-07	1.0E-07	1.0E-07	1.0E-07	1.0E-07	1.0E-07
inner convolutional code rate		3/4	3/4	3/4	3/4	3/4	3/4
outer RS code rate		1	1	1	1	1	1
net code rate		0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
coded (transmitted) symbol bit rate	Mbits/s	0.033	0.095	33.333	0.033	0.095	33.333

Eb/No (ideal)	dB	4.0	4.0	4.0	4.0	4.0	4.0
total implementation margin	dB	1.0	1.0	1.0	1.0	1.0	1.0
Eb/No (required)	dB	5.0	5.0	5.0	5.0	5.0	5.0
C/No (required)	dBHz	52.0	56.5	82.0	52.0	56.5	82.0
C/N (required)	dB	6.8	6.8	6.8	6.8	6.8	6.8
Newcom Signal architecture							
Uplink frequency	GHz	6.280	6.280	6.280	6.280	6.280	6.280
Uplink wavelength	m	0.0477	0.0477	0.0477	0.0477	0.0477	0.0477
Uplink polarization		circular	circular	circular	circular	circular	circular
Downlink frequency	GHz	3.955	3.955	3.955	3.955	3.955	3.955
Downlink wavelength	m	0.0758	0.0758	0.0758	0.0758	0.0758	0.0758
Downlink polarization		circular	circular	circular	circular	circular	circular
information (effective) bit rate	Mbits/s	0.05	0.14	50.00	0.05	0.14	50.00
	dBHz	47.0	51.5	77.0	47.0	51.5	77.0
percent of raised cosine filtering	percent	35	35	20	35	35	20
occupied bandwidth	MHz	0.045	0.128	40.000	0.045	0.128	40.000
	dBHz	46.5	51.1	76.0	46.5	51.1	76.0
noise bandwidth	MHz	0.033	0.095	33.333	0.033	0.095	33.333
modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
BER		1.0E-07	1.0E-07	1.0E-07	1.0E-07	1.0E-07	1.0E-07
inner convolutional code rate		3/4	3/4	3/4	3/4	3/4	3/4
outer RS code rate		1	1	1	1	1	1
net code rate		0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
coded (transmitted) bit rate	Mbits/s	0.033	0.095	33.333	0.033	0.095	33.333
Eb/No (ideal)	dB	4.0	4.0	4.0	4.0	4.0	4.0
total implementation margin	dB	1.0	1.0	1.0	1.0	1.0	1.0
Eb/No (required)	dB	5.0	5.0	5.0	5.0	5.0	5.0
C/No (required)	dBHz	52.0	56.5	82.0	52.0	56.5	82.0
C/N (required)	dB	6.8	6.8	6.8	6.8	6.8	6.8
Victim Carrier Uplink Carrier-to-Noise							
satellite		Express A4	Express A4	Express A4	2Deg	2Deg	2Deg
W longitude	deg	14.00	14.00	14.00	13.00	13.00	13.00

Carrier Input Backoff	dB	36.5	31.9	6.6	36.5	31.9	6.6
Uplink E/S G/T	dB/K	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2
Earth Station Uplink EIRP	dBW	43.4	48.0	73.3	43.4	48.0	73.3
Earth HPA OBO	dB	0.0	0.0	0.0	0.0	0.0	0.0
Uplink Power Control	dB	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station HPA Size	dBW	-6.5	-1.9	23.4	-6.5	-1.9	23.4
	W	0.2	0.6	219.5	0.2	0.7	220.6
earth central angle	deg	68.7	68.7	68.7	69.6	69.6	69.6
elevation angle	deg	12.8	12.8	12.8	11.9	11.9	11.9
slant range	km	40292	40292	40292	40388	40388	40388
free space loss	dB	200.5	200.5	200.5	200.5	200.5	200.5
atmospheric loss	dB	0.3	0.3	0.3	0.3	0.3	0.3
rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
antenna pointing error	deg	0.05	0.05	0.05	0.05	0.05	0.05
antenna pointing error loss	dB	0.13	0.13	0.13	0.13	0.13	0.13
carrier power at Satellite	dBW	-157.5	-152.9	-127.6	-157.5	-152.9	-127.6
Boltzmann's constant	dBW/(K Hz)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
noise bandwidth	dBHz	45.2	49.8	75.2	45.2	49.8	75.2
C/Nuo	dBHz	59.9	64.5	89.8	59.9	64.5	89.8
C/Nu	dB	14.7	14.7	14.6	14.7	14.7	14.6
Victim Carrier Downlink Carrier-to-Noise							
satellite		Express A4	Express A4	Express A4	2Deg	2Deg	2Deg
W longitude	deg	14.00	14.00	14.00	13.00	13.00	13.00
peak gain	dB	27.0	27.0	27.0	27.0	27.0	27.0
transmit RF power power	W	100	100	100	100	100	100
	dB	20.0	20.0	20.0	20.0	20.0	20.0
EIRP (center of coverage)	dBW	47.0	47.0	47.0	47.0	47.0	47.0
EIRP Roll-off from COC	dB	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2
EIRP (subscriber location)	dBW	38.8	38.8	38.8	38.8	38.8	38.8
Carrier Output Back Off	dB	34.6	30.0	4.5	34.6	30.0	4.5
Downlink antenna boresight gain	dB	38.1	38.1	38.1	38.1	38.1	38.1
earth central angle	deg	23.0	23.0	23.0	22.1	22.1	22.1

elevation angle	deg	63.0	63.0	63.0	64.1	64.1	64.1
slant range	km	36380	36380	36380	36335	36335	36335
free space loss	dB	195.6	195.6	195.6	195.6	195.6	195.6
atmospheric loss	dB	0.0	0.0	0.0	0.0	0.0	0.0
rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
antenna pointing error	deg	0.1	0.1	0.1	0.1	0.1	0.1
antenna pointing error loss	dB	0.02	0.0	0.0	0.02	0.0	0.0
Downlink carrier power	dBW	-153.3	-148.7	-123.2	-153.3	-148.7	-123.2
Boltzmann's constant	dBW/(K Hz)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
system temperature	dBK	18.9	18.9	18.9	18.9	18.9	18.9
noise bandwidth	dBHz	45.2	49.8	75.2	45.2	49.8	75.2
noise power	dBW	-164.5	-159.9	-134.5	-164.5	-159.9	-134.5
C/Ndo	dBHz	56.7	61.3	86.8	56.7	61.3	86.8
C/Nd	dB	11.1	11.2	11.2	11.1	11.2	11.2
Adjacent Satellite Interference Uplink Carrier-to-Noise							
satellite		Express AM44	Express AM44	Express AM44	Express AM44	Express AM44	Express AM44
W longitude	deg	11.00	11.00	11.00	11.00	11.00	11.00
Carrier Input Backoff	dB	36.5	31.9	6.6	36.5	31.9	6.6
Uplink E/S G/T	dB/K	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2
Earth Station Uplink EIRP	dBW	43.5	48.1	73.4	43.5	48.1	73.4
Earth HPA OBO	dB	0.0	0.0	0.0	0.0	0.0	0.0
Uplink Power Control	dB	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station HPA Size	dBW	-6.4	-1.8	23.5	-6.4	-1.8	23.5
	W	0.2	0.7	222.7	0.2	0.7	222.7
earth central angle	deg	71.4	71.4	71.4	71.4	71.4	71.4
elevation angle	deg	10.0	10.0	10.0	10.0	10.0	10.0
slant range	km	40582	40582	40582	40582	40582	40582
free space loss	dB	200.6	200.6	200.6	200.6	200.6	200.6
atmospheric loss	dB	0.3	0.3	0.3	0.3	0.3	0.3
rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
antenna pointing error	deg	0.05	0.05	0.05	0.05	0.05	0.05

antenna pointing error loss	dB	0.13	0.13	0.13	0.13	0.13	0.13
Uplink carrier power	dBW	-157.5	-152.9	-127.6	-157.5	-152.9	-127.6
Boltzmann's constant	dBW/(K Hz)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
noise bandwidth	dBHz	45.2	49.8	75.2	45.2	49.8	75.2
C/No	dBHz	59.9	64.5	89.8	59.9	64.5	89.8
C/N	dB	14.7	14.7	14.6	14.7	14.7	14.6
Adjacent Satellite Interference Downlink Carrier-to-Noise							
satellite		Express AM44	Express AM44	Express AM44	Express AM44	Express AM44	Express AM44
W longitude	deg	11.00	11.00	11.00	11.00	11.00	11.00
peak gain	dB	27.0	27.0	27.0	27.0	27.0	27.0
transmit RF power power	W	100	100	100	100	100	100
	dB	20.0	20.0	20.0	20.0	20.0	20.0
EIRP (center of coverage)	dBW	47.0	47.0	47.0	47.000	47.0	47.0
EIRP Roll-off from COC	dB	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2
EIRP (subscriber location)	dBW	38.8	38.8	38.8	38.8	38.8	38.8
Carrier Output Back Off	dB	34.6	30.0	4.5	34.6	30.0	4.5
Downlink antenna boresight gain	dB	38.1	38.1	38.1	38.1	38.1	38.1
earth central angle	deg	20.3	20.3	20.3	20.3	20.3	20.3
elevation angle	deg	66.2	66.2	66.2	66.2	66.2	66.2
slant range	km	36251	36251	36251	36251	36251	36251
free space loss	dB	195.6	195.6	195.6	195.6	195.6	195.6
atmospheric loss	dB	0.0	0.0	0.0	0.0	0.0	0.0
rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
antenna pointing error	deg	0.1	0.1	0.1	0.1	0.1	0.1
antenna pointing error loss	dB	0.0	0.0	0.0	0.0	0.0	0.0
Downlink carrier power	dBW	-153.3	-148.7	-123.2	-153.3	-148.7	-123.2
Boltzmann's constant	dBW/(K Hz)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
system temperature	dBK	18.9	18.9	18.9	18.9	18.9	18.9
noise bandwidth	dBHz	45.2	49.8	75.2	45.2	49.8	75.2
noise power	dBW	-164.5	-159.9	-134.5	-164.5	-159.9	-134.5
C/Ndo	dBHz	56.4	61.0	86.5	56.4	61.0	86.5

C/Nd	dB	11.2	11.2	11.3	11.2	11.2	11.3
Victim Satellite		Express A4	Express A4	Express A4	2Deg	2Deg	2Deg
W longitude	deg	14.00	14.00	14.00	13.00	13.00	13.00
antenna off-axis angle	deg	3.12	3.12	3.12	2.08	2.08	2.08
antenna off-axis gain	dB	16.66	16.66	16.66	21.06	21.06	21.06
earth central angle to victim satellite	deg	71.4	71.4	71.4	71.4	71.4	71.4
elevation angle to victim sat	deg	10.0	10.0	10.0	10.0	10.0	10.0
Uplink slant range to victim Sat	km	40582	40582	40582	40582	40582	40582
Uplink free space loss to victim Sat	dB	200.6	200.6	200.6	200.6	200.6	200.6
Uplink atmospheric loss to victim Sat	dB	0.3	0.3	0.3	0.3	0.3	0.3
Uplink rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
Uplink antenna pointing error	deg	0.05	0.05	0.05	0.05	0.05	0.05
Uplink antenna pointing error loss	dB	0.13	0.13	0.13	0.13	0.13	0.13
Uplink interference power at victim Sat	dBW	-192.3	-187.7	-162.4	-187.9	-183.3	-158.0
Uplink C/I(ASIu)	dB	34.8	34.8	34.8	30.4	30.4	30.4
Downlink EIRP to Victim Receiver	dBW	4.2	8.8	34.3	4.2	8.8	34.3
earth central angle to victim rx	deg	20.3	20.3	20.3	20.3	20.3	20.3
Downlink slant range to victim rx	km	36251	36251	36251	36251	36251	36251
antenna off-axis angle to victim rx	deg	3.48	3.48	3.48	2.32	2.32	2.32
antenna off-axis gain at victim rx	dBi	15.47	15.47	15.47	19.86	19.86	19.86
Downlink Free Space to victim rx	dB	195.6	195.6	195.6	195.6	195.6	195.6
Downlink atmospheric loss to victim rx	dB	0.1	0.1	0.1	0.1	0.1	0.1
Downlink rain attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0
Downlink antenna pointing error	deg	0.60	0.60	0.60	0.60	0.60	0.60
Downlink antenna pointing error loss	dB	0.8	0.8	0.8	0.8	0.8	0.8
Interfering Power at Victim Rx	dBW	-176.8	-172.2	-146.7	-172.4	-167.8	-142.3
Downlink C/I (ASId)	dB	23.5	23.5	23.5	19.1	19.1	19.1
Total ASI C/I	dB	23.2	23.2	23.2	18.8	18.8	18.8
Boltzmann's constant	dBW/(K Hz)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
system temperature	dBK	18.9	18.9	18.9	18.9	18.9	18.9
noise bandwidth	dBHz	0.0	0.1	33.3	0.0	0.1	33.3
noise power	dBW	-209.7	-209.6	-176.4	-209.7	-209.6	-176.4

Total Victim Link Results							
C/N (uplink)	dB	14.7	14.7	14.6	14.7	14.7	14.6
C/N (downlink)	dB	11.1	11.2	11.2	11.1	11.2	11.2
C/I (cross polarization)	dB	30.0	30.0	30.0	30.0	30.0	30.0
C/I (adjacent satellite AM44 11 WL)	dB	23.2	23.2	23.2	18.8	18.8	18.8
C/I Intermodulation	dB	18.0	18.0	18.0	18.0	18.0	18.0
C/I (net)	dB	16.6	16.6	16.6	15.2	15.2	15.2
C/N (net)	dB	9.5	9.6	9.6	9.5	9.6	9.6
C/(N+I) (net)	dB	8.8	8.8	8.8	8.5	8.6	8.5
C/(No + Io) (net)	dBHz	54.0	58.6	84.0	53.7	58.3	83.8
Eb/No (net)	dB	7.0	7.1	7.0	6.7	6.8	6.8
margin	dB	2.0	2.1	2.0	1.7	1.8	1.8
Downlink rain region		G	G	G	G	G	G
total allocated rain degradation	dB	2.0	2.1	2.0	1.7	1.8	1.8
rain attenuation	dB	0.5	0.6	0.5	0.5	0.5	0.5
decrease in G/T	dB	1.5	1.5	1.5	1.3	1.3	1.3
unavailability (downlink)	percent	0.006	0.005	0.006	0.009	0.008	0.009
availability (downlink) with AM44	percent	99.99404	99.99453	99.99432	99.99105	99.99178	99.99147
availability (uplink)	percent	99.70	99.70	99.70	99.70	99.70	99.70
Total Link Availability with AM44	percent	99.70	99.70	99.70	99.70	99.70	99.70
Uplink RF Power Density	dBW/4kHz	-17.2	-17.1	-17.3	-17.2	-17.1	-17.3
Downlink EIRP Density	dBW/4kHz	3.2	3.3	3.3	3.2	3.3	3.3
Link Performance without Express AM44							
rain region		G	G	G	G	G	G
C/(N+I) w/o AM44		8.9	9.0	9.0	8.9	9.0	9.0
C/(No + Io) w/o AM44		54.2	58.7	84.2	54.2	58.7	84.2
Eb/No w/o AM44		7.2	7.2	7.2	7.2	7.2	7.2
Margin w/o AM44		2.2	2.2	2.2	2.2	2.2	2.2
total allocated rain degradation	dB	2.2	2.2	2.2	2.2	2.2	2.2
rain attenuation	dB	0.6	0.6	0.6	0.6	0.6	0.6
decrease in G/T	dB	1.6	1.6	1.6	1.6	1.6	1.6

unavailability (downlink) without AM44	percent	0.005	0.004	0.004	0.005	0.004	0.004
availability downlink) without AM44	percent	99.9953	99.99574	99.99557	99.99542	99.99580	99.99564
Total Link Availability without AM44	percent	99.70	99.70	99.70	99.70	99.70	99.70
decrease in availability	**percent**	**-0.0013**	**-0.0012**	**-0.0012**	**-0.0044**	**-0.0040**	**-0.0042**
decrease in overall margin	**dB**	**0.2**	**0.2**	**0.2**	**0.4**	**0.4**	**0.4**