SECTION 25.114 (c) TECHNICAL INFORMATION

SECTION 25.114 (c) INFORMATION FOR AMAZONAS-1 SPACE STATION

(1) Name, address, and telephone number of the applicant;

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TEL: + 91 710 25 40

(2) Name, address, and telephone number of the person(s), to whom inquiries or correspondence should be directed;

(3) Type of authorization requested (e.g., launch authority, station license, modification of authorization);

HISPASAT, S.A. (hereinafter HISPASAT) requests the Commission to add the AMAZONAS-1 satellite nominally at 55.5 W.L. on the "Permitted Space Station List" created by the Commission in *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States* for the Ku band.

The AMAZONAS-1 satellite was relocated from 36 W.L. to 55.5 W.L. on March 2014.

(4) (i) Radio frequencies and polarization plan (including beacon, telemetry and telecommand functions); center frequency and polarization of transponders (both receiving and transmitting frequencies);

The receive and transmit center frequencies and polarizations of the AMAZONAS-1 transponders which will provide service to America in Ku band are shown in Figure 1 and Table 1.

The bandwidth of each transponder is given in Table 1.

Polarization V and H are orthogonal linear polarizations and are defined as follows:

- Horizontal polarization (H) is defined as being parallel to the equatorial plane.
- Vertical polarization (V) is orthogonal to that of polarization H

The total number of operating Ku-band transponders in the Amazonas-1 satellite is 32 (as a maximum 16 of them could provide service to USA), which can be selected individually by ground command.

The following frequencies and polarizations will be used for the telecommand and telemetry and beacon functions:

TC-Brazil frequency: 14498 MHz, horizontal polarization;
TC- Europe frequency: 13999.5 MHz, horizontal polarization;
TM/Ranging frequency (BRAZIL/NORTH-AMERICA/SOUTH-AMERICA): 11701.25 MHz, vertical polarization.
TM/Ranging frequency (EUROPE): 12746.75 MHz, vertical polarization

(ii) Emission designators and allocated bandwidth of emission; final amplifier output power (identify any net losses between output of final amplifier and input of antenna and specify the maximum EIRP for each antenna beam),

Emission designators: 14K0G7W-- to 54M0G7X--
Allocated bandwidth: 14 KHz to 54 MHz

Final amplifier output power NORTH AMERICA beam: 18.1 dBW (net losses between output of final amplifier and input of antenna: 1.9 dB)

Maximum EIRP at saturation in each transmit beam:

- NORTH AMERICA transmit beam:48 dBW

(iii) Identification of which antenna beams are connected or switchable to each transponder and TT&C function,

The AMAZONAS-1 satellite uses for the Ku-Band payload 4 fixed receive beams over North America, South America, Brazil and Europe and 4 fixed transmit beams over North America, South America, Brazil and Europe for the Fixed Satellite Service.

The Ku-Band coverage zone is:

- South America
- North America
- Brazil
- Part of Europe.

Figure 1 and Table 1 show which receive beam and transmit beam can be connected to each transponder.

(iv) Receiving system noise temperature,

428K for NORTH AMERICA, receive antenna in Ku band.

(v) Relationship between satellite receive antenna gain patter and gain-to-temperature ratio and saturation flux density for each antenna beam (may be indicated on antenna gain plot),

The G/T beam peak for the NORTH AMERICA receive beam is 4.7 dB/K.

Saturation flux density for NORTH AMERICA receive beam is:

-(74.0 + X) dBW/m^2 at maximum minimum gain setting (see 4 (vi) below)
-(94.0 + X) dBW/m^2 at minimum gain setting (see 4 (vi) below)

where X is the G/T value in the direction considered

(vi) Gain of each transponder channel (between output of receiving antenna and input of transmitting antenna) including any adjustable gain step capabilities,

The gain of each transponder channel, between output of receiving antenna and input of transmitting antenna, will be adjustable by lower than 1 dB between a minimum gain of 107.1 dB and a maximum gain of 127.1 dB for NORTH AMERICA –NORTH AMERICA receive-transmit connectivity.

(vii) Predicted receiver and transmitted channel filter response characteristics;

Channel filter response characteristics are described in tables 2 and 3.

(5) For satellites in geostationary-satellite orbit,

(i) Orbital location, or locations if alternatives are proposed, requested for the satellite,

The AMAZONAS-1 satellite will be operated nominally at the 55.5ºW.L. orbital location.

(ii) The factors that support the orbital assignment or assignments proposed in paragraph (c)(5)(i) of this section,

This position was licensed by the Administration of Spain. The relevant filing information for AMAZONAS-1 at 55.5º W.L. location has been submitted to the International Telecommunications Union (ITU). The AMAZONAS-1 satellite will operate pursuant to the HISPASAT 22A satellite network. All traffic on AMAZONAS-1 will be in accordance with HISPASAT´s coordination agreements at the 55.5º W.L. orbital location.

(iii) Longitudinal tolerance or east-west station-keeping capability;

The AMAZONAS-1 satellite will be maintained nominally at 55.5º W.L. with an accuracy of +/-0.05 degree.

(iv) Inclination incursion or north-south station-keeping capability.

Its orbital inclination will be maintained within +/- 0.07 degree.

(6) For satellites in non-geostationary-satellite orbit,
(i) The number of space stations and applicable information relating to the number of orbital planes,
(ii) The inclination of the orbital plane(s),
(iii) The orbital period,
(iv) The apogee,
(v) The perigee,
(vi) The argument(s) of perigee,
(vii) Active service arc(s), and
(viii) Right ascension of the ascending node(s).

(N/A)

(7) For satellite in geostationary-satellite orbit, accuracy with which the orbital inclination, the antenna axis attitude, and longitudinal drift will be maintained;

The AMAZONAS-1 satellite will be maintained nominally at 55.5º W.L. with an accuracy of +/-0.05 degree. Its orbital inclination will be maintained within +/- 0.05 degree.

Antenna axis stability: 0.05 degree for Ku band.

(8) Calculation of power flux density levels within each coverage area and of the energy dispersal, if any, needed for compliance with Sec.25.208;

In all the Ku downlink frequency range, the power flux density at the Earth's surface produced by emissions from a space station for all conditions and for all methods will not exceed -132.5 dBW/m^2 1 MHz over the US territory and all the Americas:

-60.4 dBW/Hz max psd + 29.9 (max gain dBi) - 162 spreading losses (dB) (worst case).

(9) Arrangement for tracking, telemetry and control;

TTC functions are performed at Rio de Janeiro, Brazil (Longitude -43.28ºE, Latitude -22.88ºN) and at Arganda, Spain (Longitude -3.38ºE, Latitude -40.27ºN)

(10) Physical characteristics of the space station including weight and dimensions of spacecraft, detailed mass (on ground and in-orbit) and power (beginning and end of life) budgets, and estimated operational lifetime and reliability of the space station and the basis for that estimate;

Physical characteristics of the AMAZONAS-1 satellite:

Dimensions	stowed:	6.74m x 3.43m x 3.67m
	Deployed:	6.74m x 7.89m x 36.1m
Mass	on ground	2121 Kg
	at launch	4536 Kg
Power	beginning of life	11.5 KW (Equinox)
	end of life	9.7 KW (Equinox)
Estimated operational lifetime		16.8 years
Reliability		0.67 for 15 years

(11) Clear and detailed statement of whether the space station is to be operated on a common carrier basis, or whether non-common carrier transactions are proposed. If non-common carrier transactions are proposed, describe the nature of the transactions and specify the number of transponders to be offered on a non-common carrier basis;

The AMAZONAS-1 satellite will be operated on a non-common carrier basis and all the transponders will be available for use on a non-common carrier basis. HISPASAT leases capacity pursuant to commercial contracts.

It is not HISPASAT's customary practice to hold itself out as a common carrier for hire, and HISPASAT does not intend to make capacity available on a common carrier basis.

(12) Dates by which construction will be commenced and completed, launch date, and estimated date of placement into service;

The AMAZONAS-1 was launched on August 2004 and it was located at 61ºO. It´s replacement, the AMAZONAS-3, was successfully launched on 7th February 2013. Once all the services were transferred to the new AMAZONAS-3 satellite, AMAZONAS-1 was relocated from 61 WL to 36 WL. However, later on, Hispasat reached an agreement with Intelsat for operations at 55.5ºWL until IS-34 is launched. This is the main reason why AMAZONAS-1 has been relocated from 36 WL to 55.5 WL.

(13) The polarization information specified in §§25.210(a)(1), (a)(3), and (i), to the extent applicable.

Polarization V and H are orthogonal linear polarizations and are defined as follows:

- Horizontal polarization (H) is defined as being parallel to the equatorial plane.
- Vertical polarization (V) is orthogonal to that of polarization H

ANNEX

(Tables and Figures)

TRANSPONDER	BW(MHZ)	UPLINK	DOWNLINK	UPLINK	DOWNLINK	UPLINK	DOWNLINK
1	36	13772	11972	H	V	NA/SA/EU	NA/SA
2	36	13812	12012	H	V	NA/SA/EU	NA/SA
3	36	13852	12052	H	V	NA/SA/EU	NA/SA
4	36	13892	12092	H	V	NA/SA/EU	NA/SA
5	36	13932	12132	H	V	NA/SA/EU	NA/SA
6	36	13972	12172	H	V	NA/SA/EU	NA/SA
7	36	13772	11972	V	H	NA/SA/EU	NA/SA
8	36	13812	12012	V	H	NA/SA/EU	NA/SA
9	36	13852	12052	V	H	NA/SA/EU	NA/SA
10	36	13892	12092	V	H	NA/SA/EU	NA/SA
11	36	13932	12132	V	H	NA/SA/EU	NA/SA
12	36	13972	12172	V	H	NA/SA/EU	NA/SA
1	36	13772	12522.3	H	V	NA/SA	EU
2	36	13812	12562.3	H	V	NA/SA	EU
3	36	13852	12602.3	H	V	NA/SA	EU
4	36	13892	12642.3	H	V	NA/SA	EU
5	36	13932	12682.3	H	V	NA/SA	EU
6	36	13972	12722.3	H	V	NA/SA	EU
7	36	13772	12522.3	V	H	NA/SA	EU
8	36	13812	12562.3	V	H	NA/SA	EU
9	36	13852	12602.3	V	H	NA/SA	EU
10	36	13892	12642.3	V	H	NA/SA	EU
11	36	13932	12682.3	V	H	NA/SA	EU
12	36	13972	12722.3	V	H	NA/SA	EU
13	54	14034	11738	H	V	NA/SA/B	NA/SA/B
14	54	14095	11799	H	V	NA/SA/B	NA/SA/B
15	54	14034	11738	V	H	NA/SA/B	NA/SA/B
16	54	14095	11799	V	H	NA/SA/B	NA/SA/B
17	54	14156	11860	H	V	B	B
18	54	14217	11921	H	V	B	B
19	54	14156	11860	V	H	B	B
20	54	14217	11921	V	H	B	B
21	36	14271	10975	H	V	B	B
22	36	14311	11015	H	V	B	B
23	36	14351	11055	H	V	B	B
24	36	14391	11095	H	V	B	B
25	36	14431	11135	H	V	B	B
26	36	14471	11175	H	V	B	B
27	36	14271	10975	V	H	B	B
28	36	14311	11015	V	H	B	B
29	36	14351	11055	V	H	B	B
30	36	14391	11095	V	H	B	B
31	36	14431	11135	V	H	B	B
32	36	14471	11175	V	H	B	B

NA = North America; SA = South America; B=Brazil

Table 1.- AMAZONAS-1 Ku-band Frequency Plan Definition.

% OF CHANNEL BANDWIDTH		55%	85%	90%	100%
INPUT SECTION GAIN FLATNESS	dBpp	0.65	0.7	1.2	2.3
TOTAL GAIN FLATNESS	dBpp	0.85	1.3	2.4	4.6
INPUT SECTION GAIN SLOPE	dB/MHz	0.15	0.2	0.5	1.3
TOTAL GAIN SLOPE	dB/MHz	0.25	0.4	1.0	2.9

Table 2.- Amplitude in Ku-band response

Frequency Spacing from Fc (± MHz)	BW·0.61	BW·0.83	BW·1.25	TM/Beacon
Input Demultiplexer (dB)	18	35	40	>25
Output Multiplexer (dB) (contiguous channels)	11	25	30	>25
Output Multiplexer (dB) (non contiguous channels)	5	20	27	>25
Overall Out of Band Response(dB)	11	25	30	>25

NOTES: BW means transponder bandwidth

Table 3.- Minimum out of band rejection (dB) for Ku band

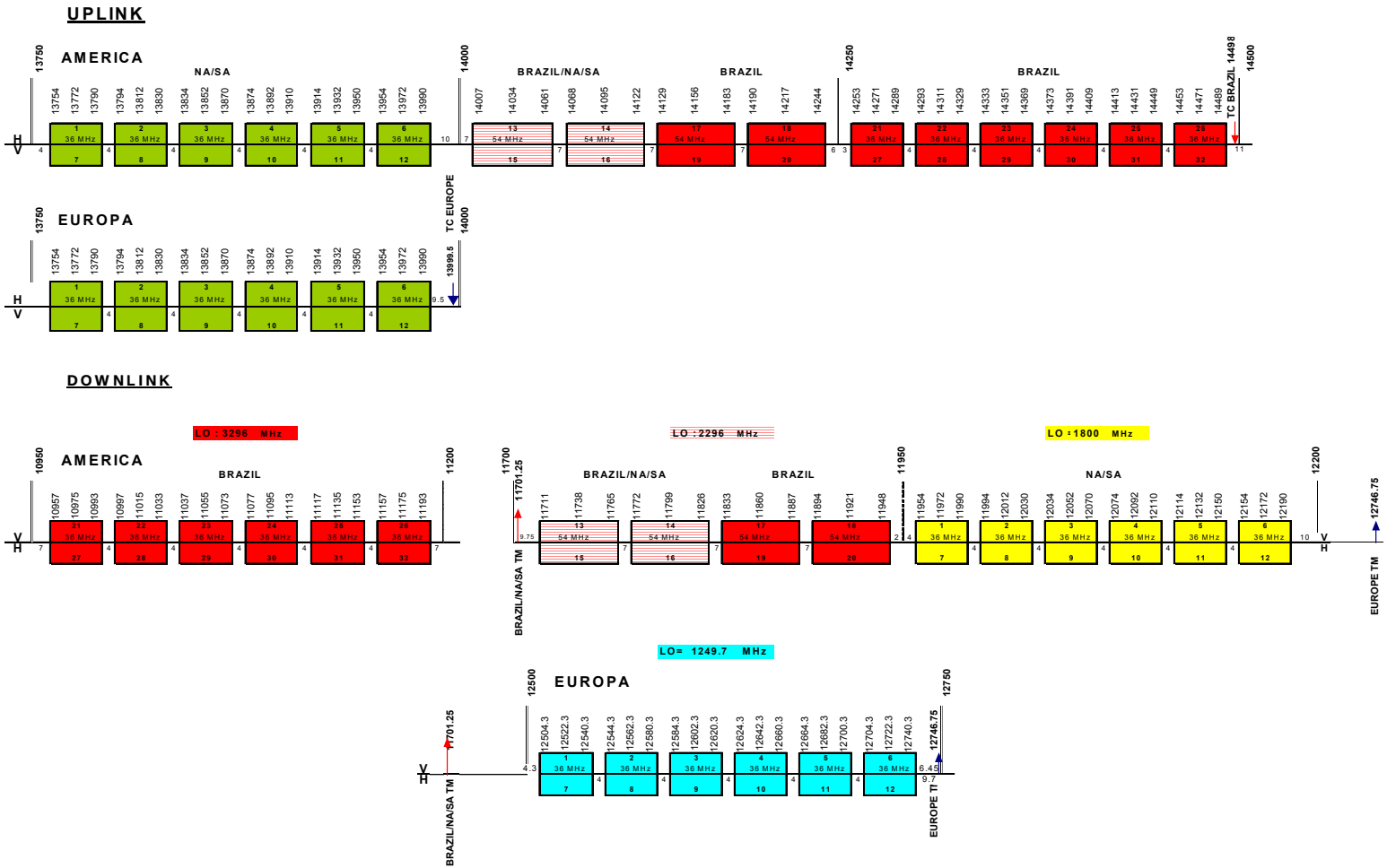

Figure 1.- AMAZONAS-1 Ku-Band Frequency Plan