

SECTION 25.114 (c) TECHNICAL INFORMATION

SECTION 25.114 (c) INFORMATION FOR HISPASAT 30W-6 SPACE STATION

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

HISPASAT
C/ Paseo de la Castellana, 39
28046, MADRID, SPAIN
TEL: + 91 710 25 40

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

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(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 HISPASAT 30W-6 satellite nominally at 30°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 and also requests a declaratory ruling permitting the use of the extended 13.75-14.0 GHz Ku-band capacity¹, 6725-7025/4500-4800 MHz² and 13.0-13.25/11.2-11.45 GHz capacity on HISPASAT 30W-6.

HISPASAT 30W-6 will replace HISPASAT 30W-4 and will incorporate additional frequencies in the C and Ku bands as detailed in Tables 1 and 4.

(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 HISPASAT 30W-6 transponders which will provide service to USA in C and Ku bands are shown in Figures 1 and 2 and Tables 1 and 4.

¹ HISPASAT acknowledges that earth station operators seeking to access HISPASAT 30W-6 using the extended Ku-band frequencies must still obtain a specific earth station license that includes HISPASAT 30W-6 as an authorized point of communication or modify an existing license to add HISPASAT 30W-6 as a point of communication. See, e.g., *In the Matter of Telesat Canada*, 17 FCC Rcd 25287, at ¶ 1 (Int'l Bur. 2002).

² HISPASAT acknowledges that earth stations seeking access HISPASAT 30W-6 using frequency ranges specified in US245 are subject to case-by-case electromagnetic compatibility analysis.

C Band

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 C-band transponders providing service to USA in the HISPASAT 30W-6 satellite is 10, which can be selected by ground command.

Ku Band

The bandwidth of each transponder is given in Table 4.

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 transponders providing service to USA operating Ku-band in the HISPASAT 30W-6 satellite is 25, which can be selected individually by ground command.

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

TM/Ranging 1: 10701 MHz horizontal polarization.

TM/Ranging 2: 11448 MHz vertical polarization.

TC 1: 13249 MHz horizontal polarization.

TC 2: 13997.5 MHz horizontal polarization.

Beacon: 11702 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),

C Band

Emission designators: 14K0G7W-- to 54M0G7W--

Allocated bandwidth: 14 KHz to 54 MHz

Final amplifier output power AMERICA C beam: 15 dBW (net losses between output of final amplifier and input of antenna: 1.3 dB)

Maximum EIRP at saturation in each transmit beam:

- AMERICA C transmit beam: 41.4 dBW

Ku Band

Emission designators: 14K0G7W-- to 54M0G7W--

Allocated bandwidth: 14 KHz to 54 MHz

Final amplifier output power AMERICA Ku beam: 18.8 dBW (net losses between output of final amplifier and input of antenna: 1.8 dB)

Maximum EIRP at saturation in each transmit beam:

- AMERICA Ku transmit beam: 49.2 dBW

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

C Band

The HISPASAT 30W-6 satellite uses for the C-Band payload a fixed receive beam over the AMERICAN beam and a fixed transmit beam over the AMERICAN beam for the Fixed Satellite Service.

The C-Band coverage zone is:

- AMERICA.

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

Ku Band

The HISPASAT 30W-6 satellite uses for the Ku-Band payload a fixed receive beam over the AMERICAN beam and a fixed transmit beam over the AMERICAN beam for the Fixed Satellite Service.

The Ku-Band coverage zone is:

- AMERICA.

Figure 2 and Table 4 show which receive beam and transmit beam can be connected to each transponder.

(iv) Receiving system noise temperature,

- 542K for AMERICA, receive antenna in C band.
- 457K for AMERICA, receive antenna in Ku band.

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

C Band

The G/T beam peak for the AMERICAN C receive beam is 0.39 dB/K.

Saturation flux density for AMERICAN C receive beam is:

- $(80.0 + X)$ dBW/m² at maximum minimum gain setting (see 4 (vi) below)
- $(100.0 + X)$ dBW/m² at minimum gain setting (see 4 (vi) below)

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

Ku Band

The G/T beam peak for the AMERICAN Ku receive beam is 4.7 dB/K.

Saturation flux density for AMERICAN Ku receive beam is:

- $(80.0 + X)$ dBW/m² at maximum minimum gain setting
- $(100.0 + X)$ dBW/m² at minimum gain setting

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,

C Band

The gain of each transponder channel, between output of receiving antenna and input of transmitting antenna, will be adjustable by lower than 0.8 dB steps, between a minimum gain of 105.5 dB and a maximum gain of 125.5 dB for AMERICA – AMERICA receive-transmit connectivity.

Ku Band

The gain of each transponder channel, between output of receiving antenna and input of transmitting antenna, will be adjustable by lower than 0.5 dB steps, between a minimum gain of 107.7 dB and a maximum gain of 127.7 dB for AMERICA – AMERICA receive-transmit connectivity.

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

Channel filter response characteristics are described in tables 2, 3, 5 and 6.

(5) For satellites in geostationary-satellite orbit,

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

The HISPASAT 30W-6 satellite will be operated at the 30°W.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 granted by the Administration of Spain. The HISPASAT 30W-6 will operate pursuant the following ITU filings:

HISPASAT-1E (Ap30B), HISPASAT-1E-M (Ap30B), HISPASAT-2D KU (conventional Ku band) and HISPASAT-2C3 KU (conventional and extended Ku bands).

All traffic on HISPASAT 30W-6 will be in accordance with HISPASAT's coordination agreements at 30° W.L. orbital location.

It is worth to mention that according to provision 6.5 of Ap 30B of ITU Radio Regulations, any USA frequency assignment has not been identified as affected.

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

The HISPASAT 30W-6 satellite will be maintained at 30° 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 HISPASAT 30W-6 satellite will be maintained at 30° 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.

- (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;**

C Band

In all the C 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 -162 dBW/m² 4 KHz over the US territory and all the Americas:

-62.3 dBW/Hz max psd + 26.4 (max gain dBi) – 162.1 spreading losses (dB) (worst case).

Ku Band

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 -128 dBW/m² 1 MHz over the US territory and all the Americas:

-56.7 dBW/Hz max psd + 30.4 (max gain dBi) – 162.1 spreading losses (dB) (worst case).

(9) Arrangement for tracking, telemetry and control;

TTC functions are performed at Arganda, Spain (Longitude -3.38°E, Latitude -40.27°N) and at Rio de Janeiro, Brazil (Longitude -43.28°E, Latitude -22.88°N).

(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 HISPASAT 30W-6 satellite:

Dimensions Deployed:	6.9m x 8.9m x 26.1m
Mass on ground	2623Kg
at launch	6092Kg
Power beginning of life	17.98 Kw (Equinox)
end of life	16.11 Kw (Equinox)
Estimated operational lifetime	15 years
Reliability	0.64 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 HISPASAT 30W-6 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 HISPASAT 30W-6 construction was commenced on April 2014.

The HISPASAT 30W-6 satellite is foreseen to be launched between 1st of march 2017 and 30th of June 2017. Its foreseen date of placement into service will be around 30 – 45 days after the day of launch.

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

Polarization V and H, used in C and Ku bands, 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

C Band

Transponder	UPLINK				DOWNLINK			
	Central Frequency (MHz)	BW(MHz)	Polarization Uplink	Coverage Uplink	Central Frequency (MHz)	BW(MHz)	Polarization Downlink	Coverage Downlink
C1	6755	54	H	AMERICA	4532.5	54	V	AMERICA
C2	6815	54	H	AMERICA	4592.5	54	V	AMERICA
C3	6875	54	H	AMERICA	4652.5	54	V	AMERICA
C4	6935	54	H	AMERICA	4712.5	54	V	AMERICA
C5	6995	54	H	AMERICA	4772.5	54	V	AMERICA
C6	6755	54	V	AMERICA	4532.5	54	H	AMERICA
C7	6815	54	V	AMERICA	4592.5	54	H	AMERICA
C8	6875	54	V	AMERICA	4652.5	54	H	AMERICA
C9	6935	54	V	AMERICA	4712.5	54	H	AMERICA
C10	6995	54	V	AMERICA	4772.5	54	H	AMERICA

Table 1.- HISPASAT 30W-6 C-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 C-band response

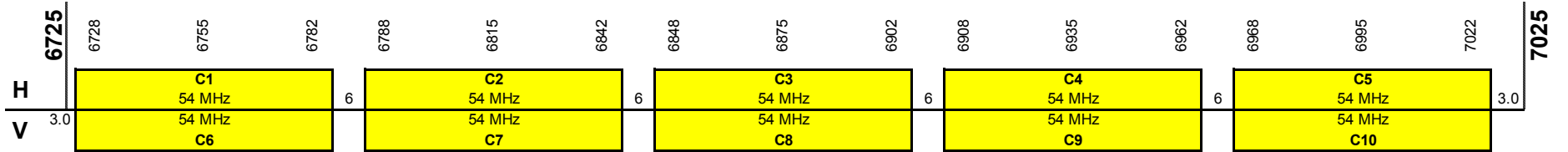
Frequency Spacing from Fc ($\pm$ MHz)	BW·0.6	BW·0.83	BW·1.25
Input Demultiplexer (dB)	18	35	40
Output Multiplexer (dB) (contiguous channels)	11	25	30
Output Multiplexer (dB) (non contiguous channels)	5	20	27
Overall Out of Band Response(dB)	23	50	65

NOTES: BW means transponder bandwidth

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

HISPASAT 30W-6 FREQUENCY PLAN

UPLINK



DOWNLINK

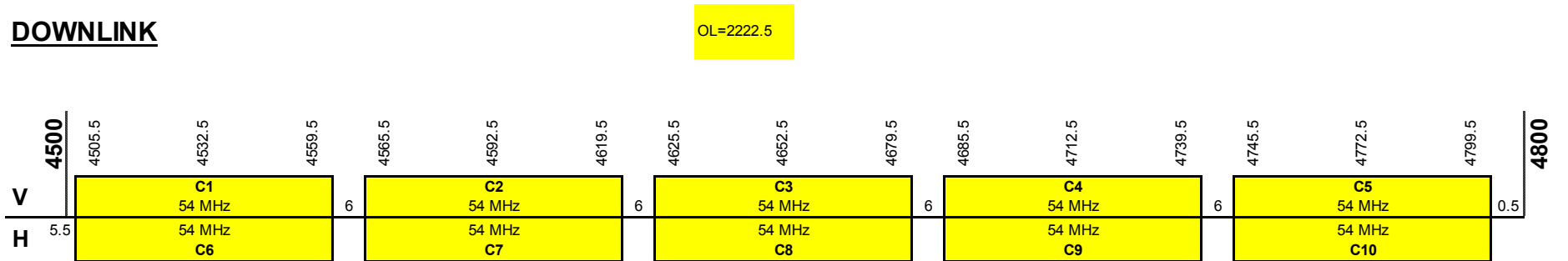


Figure 1.- HISPASAT 30W-6 C-Band Frequency Plan

Ku Band

Transponder	UPLINK				DOWNLINK			
	Central Frequency (MHz)	BW(MHZ)	Polarization Uplink	Coverage Uplink	Central Frequency (MHz)	BW(MHZ)	Polarization Downlink	Coverage Downlink
1	13020	36	H	AMERICA	11220	36	V	AMERICA
2	13060	36	H	AMERICA	11260	36	V	AMERICA
3	13100	36	H	AMERICA	11300	36	V	AMERICA
4	13140	36	H	AMERICA	11340	36	V	AMERICA
5	13180	36	H	AMERICA	11380	36	V	AMERICA
6	13220	36	H	AMERICA	11420	36	V	AMERICA
7	13020	36	V	AMERICA	11220	36	H	AMERICA
8	13060	36	V	AMERICA	11260	36	H	AMERICA
9	13100	36	V	AMERICA	11300	36	H	AMERICA
10	13140	36	V	AMERICA	11340	36	H	AMERICA
11	13180	36	V	AMERICA	11380	36	H	AMERICA
12	13220	36	V	AMERICA	11420	36	H	AMERICA
13	13932	36	H	AMERICA	12132	36	V	AMERICA
14	13972	36	H	AMERICA	12172	36	V	AMERICA
15	13932	36	V	AMERICA	12132	36	H	AMERICA
16	13972	36	V	AMERICA	12172	36	H	AMERICA
17	14286	54	V	AMERICA	11486	54	H	EUROPE
18	14337	36	V	AMERICA	11537	36	H	EUROPE
19	14466	50	V	AMERICA	11666	50	H	EUROPE
20	14031	36	H	AMERICA	11724	36	V	AMERICA
21	14071	36	H	AMERICA	11764	36	V	AMERICA
22	14111	36	H	AMERICA	11804	36	V	AMERICA
23	14151	36	H	AMERICA	11844	36	V	AMERICA
24	14191	36	H	AMERICA	11884	36	V	AMERICA
25	14231	36	H	AMERICA	11924	36	V	AMERICA

Table 4.- HISPASAT 30W-6 Ku-band Frequency Plan Definition planned to be used over USA territory..

% 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 5.- Amplitude in Ku-band response

Frequency Spacing from Fc ($\pm$ MHz)	BW·0.6	BW·0.83	BW·1.25
Input Demultiplexer (dB)	18	35	40
Output Multiplexer (dB) (contiguous channels)	11	25	30
Output Multiplexer (dB) (non contiguous channels)	5	20	27
Overall Out of Band Response(dB)	23	50	65

NOTES: BW means transponder bandwidth

Table 6.- Minimum out of band rejection (dB) for Ku band

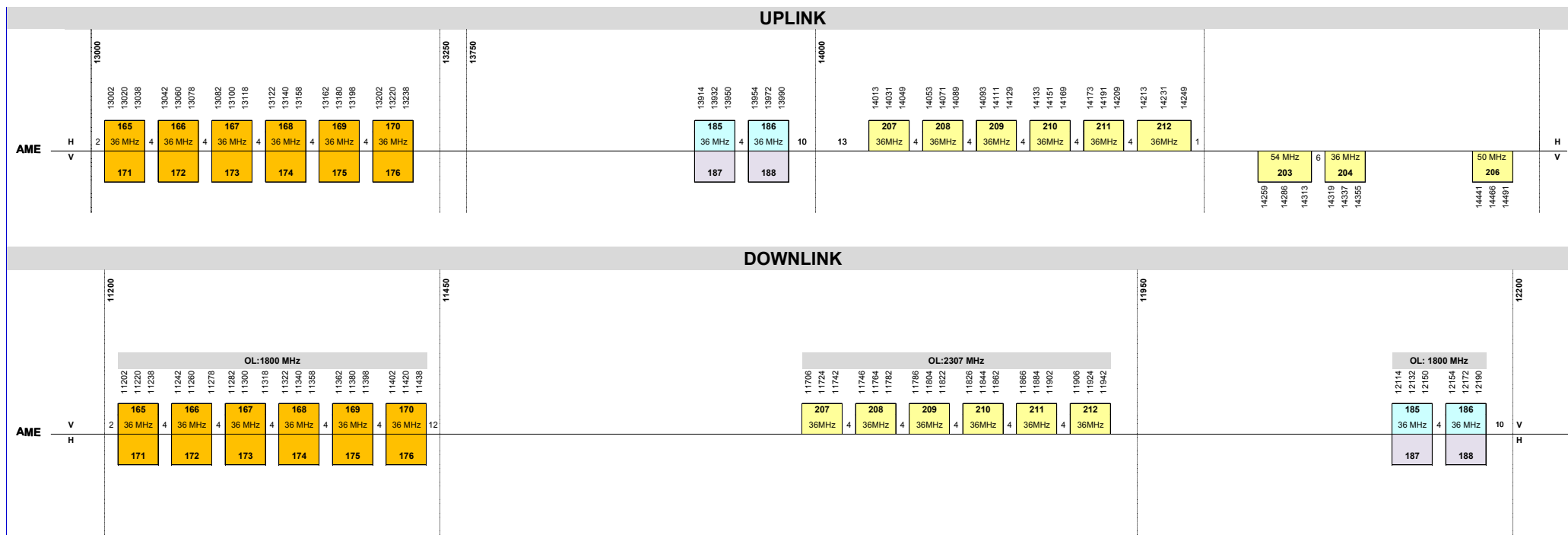


Figure 2.- HISPASAT 30W-6 Ku-Band Frequency Plan. American transponders.