ATTACHMENT A

Technical Information to Supplement Schedule S

1 PURPOSE AND SCOPE

Satélites Mexicanos, S.A. de C.V. dba Eutelsat Americas ("Eutelsat Americas") has Commission-authorization to operate the E117WB satellite at 117° W.L. Specifically, Eutelsat Americas has been granted U.S. market access to provide radio navigation satellite service ("RNSS") using the following frequency bands: 6628.27-6650.27 MHz and 6679.42-6701.42 MHz (Earth-to-space), 4198-4198.4 MHz and 4199.6-4200 MHz (space-to-Earth), and the 1165.45-1187.45 MHz and 1564.42-1586.42 MHz (space-to-Earth).[1]

Eutelsat Americas seeks to modify its authorization to add the 13.75-14.0 GHz band (Earth-to-space) and the 11.45-11.7 GHz band (space-to-Earth) to its U.S. market access grant. These bands represent the uplink portion and part of the downlink portion of the "Extended Ku-band,"[2] which was recently included in the range of permissible frequencies for communications with satellites on the Permitted List because the Commission has adopted routine licensing provisions for earth station operating in these bands.[3]

The purpose of this Attachment and the associated Schedule S is to describe the technical and operational characteristics of the 13.75-14.0 GHz and 11.45-11.7 GHz band used by the E117WB satellite. Eutelsat Americas would note that any restrictions on future earth station access to the

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[1] *See* SAT-LOI-20140617-00070 and SAT-AMD-20141119-00123.

[2] *See* 47 C.F.R. § 25.103.

[3] *See* Comprehensive Review of Licensing and Operating Rules for Satellite Services, *Second Report and Order*, IB Dkt. 12-167 (Dec. 17, 2015) at ¶249 ("*Part 25 Second Report & Order*") (expanding the scope of Permitted List authority to the Extended Ku-band).

E117WB satellite in these bands (e.g., electromagnetic compatibility analyses associated with transmit operations) can be addressed in the context of appropriate earth station applications.[4]

2 GENERAL DESCRIPTION

The extended Ku-band payload of the E117WB satellite has a total of four beams, but only two of the four include parts of the U.S. within their service areas: beams K1 and K5.

There are a total of ten transponders with bandwidths of either 36 MHz or 54 MHz. Five transponders are individually switchable between the K1 and K5 beams.

3 FREQUENCY AND POLARIZATION PLAN

The E117WB satellite's extended Ku-band frequency and polarization plan, including beam connectivity options, are provided in the associated Schedule S form. The extended Ku-band payload provides full frequency reuse as required by Section 25.210(f) of the Commission's rules.

4 SPACE STATION TRANSMIT AND RECEIVE CAPABILITIES

The antenna gain contours of beams K1 and K5, in both uplink and downlink directions, are provided in GXT format and are embedded in the associated Schedule S form.

The maximum EIRP and EIRP densities for each of the two downlink beams are stated in Table 1. The maximum and minimum saturating flux-density ("SFD") levels in fixed gain mode, referenced at the beam peak, for both of the uplink beams is -72 and -94 dBW/m^2, respectively.

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[4] *See, e.g.*, United States Table of Allocations, 47 C.F.R. § 2.106, footnote US356. Eutelsat Americas would also note that, given E117WB's status as a foreign-licensed satellite providing services internationally and rules designed to facilitate access to the 11.45-11.7 GHz downlink band, adding this band to the E117WB satellite's market access grant would be consistent with footnote US52 and related requirements. *See id.* at footnote US52; *see also Part 25 Second Report & Order* at ¶249.

Table 1. Maximum Downlink EIRP and EIRP Densities.

Beam	Maximum Downlink EIRP (dBW)	Maximum Downlink EIRP Density (dBW/Hz)
K1DH and K1DV	55.6	-20.0
K5DH and K5DV	54.6	-20.0

5 POWER FLUX DENSITY ANALYSIS

Eutelsat Americas will operate the E117WB satellite such that all extended Ku-band downlink transmissions will comply with the PFD limits of §25.208(b). Tables 2 and 3 show the PFD levels that will occur at various angles of arrival for the two downlink beams when transmitting with a maximum downlink EIRP density of -20 dBW/Hz. Both these tables demonstrate compliance with the PFD limits of §25.208(b).

Table 2. Maximum PFD Levels of Beams K1DH and K1DV.

Angle of Arrival	**Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)**	**Spreading Loss (dBW/m^2)**	**Gain Contour (dB)**	**Worst Case PFD Level at Angle of Arrival (dBW/m^2/4 kHz)**	**PFD Margin (dB)**
0°	-150.0	-163.4	-18	-165.4	15.4
5°	-150.0	-163.3	-17	-164.3	14.3
10°	-147.5	-163.2	-16	-163.1	15.6
15°	-145.0	-163.0	-15	-162.0	17.0
20°	-142.5	-162.9	-15	-161.9	19.4
25°	-140.0	-162.8	-15	-161.8	21.8
51.1° (Peak)	-140.0	-162.1	0.0	-146.3	6.3

Table 3. Maximum PFD Levels of Beams K5DH and K5DV.

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4$ kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-15	-162.4	12.4
5°	-150.0	-163.3	-14	-161.3	11.6
10°	-147.5	-163.2	-12	-159.1	9.5
15°	-145.0	-163.0	-7.5	-154.5	8.3
20°	-142.5	-162.9	-3.9	-150.8	8.5
25°	-140.0	-162.8	-1.7	-148.5	6.0
44.5° (Peak)	-140.0	-162.2	0.0	-146.4	6.4

6 TWO-DEGREE COMPATIBILITY ANALYSIS

This section demonstrates that the E117WB satellite network's operations are two-degree compatible.

Currently there are no operational extended Ku-band satellites two degrees away from the nominal 117° W.L. location using the 13.75-14.0 GHz and 11.45-11.7 GHz bands, nor are there any pending applications before the Commission requesting to use the extended Ku-band at a location two degrees or less from the nominal 117° W.L. location. In order to demonstrate two-degree compatibility, the transmission parameters of the E117WB satellite network have been used as both the wanted and interfering transmissions.

Table 4 provides a summary of the typical transmission parameters used by the E117WB satellite network and which were used in the interference analysis.

Table 5 shows the results of the interference calculations in terms of the overall C/I margins. The interference calculations assume a 1 dB advantage for topocentric-to-geocentric conversion, all wanted and interfering carriers are co-polarized and all earth station antennas conform to a sidelobe pattern of $29-25\log(\theta)$. The C/I calculations were performed on a per Hz basis.

It can be seen that all the C/I margins are positive, thereby demonstrating the two-degree compatibility of the E117WB satellite network.

Table 4. Typical Transmission Parameters

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion (dB)
1	48K6G7W	0.0486	54.4	45.2	21.7	41.4	17.7
2	1M34G7W	1.34	54.4	53.7	36.2	47.4	17.7
3	6M33G7W	6.33	54.4	67.1	43.6	44.9	17.8
4	10M0G7W	10.0	57.9	68.3	44.8	44.9	17.7
5	36M0G7W	36.0	57.9	80.8	52.6	41.4	20.8

Table 5. Summary of the overall link C/I margins (dB).

		Interfering Carriers				
	Carrier ID	1	2	3	4	5
Wanted Carriers	1	3.1	3.1	2.3	3.2	0.8
	2	6.8	8.5	6.1	8.1	4.0
	3	7.0	7.2	6.2	7.2	4.6
	4	6.3	6.5	5.5	6.6	3.9
	5	2.3	2.3	1.6	2.4	0.1

7 ITU FILINGS

The extended Ku-band payload of the E117WB satellite network operates under the following Papua New Guinea ITU filings:

RAGGIANA-18 – CR/C/3415 published in IFIC 2757.

RAGGIANA-18 – CR/C/3415 MOD-1 published in IFIC 2788.

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules that I have either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge and belief.

/s/

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