Eutelsat 115 West B

ATTACHMENT A
Technical Information to Supplement Schedule S

A.1 SCOPE

The purpose of this Attachment is to provide the Commission with the technical characteristics of the C- and Ku-band payloads on the Eutelsat 115 West B satellite. This Attachment contains additional information required by 47 C.F.R. §25.114 and other sections of FCC Part 25 that cannot be entered into the Schedule S submission.

A.2 GENERAL DESCRIPTION OF SYSTEM FACILITIES, OPERATIONS AND SERVICES

The Eutelsat 115 West B satellite, formerly known as "Satmex 7," is a Boeing built BSS-702SP satellite and is designed to operate at the 114.9° W.L. orbital location. Once on station it will replace Satmex 5, currently operating at that location. It is scheduled for launch on or about February 27, 2015 and will be put into service Q4-2015. It will be operated by Eutelsat Americas under ITU networks MEXSAT-114.9 C-KU and CANSAT-17.

Eutelsat 115 West B consists of conventional 4/6 GHz C-band and 12/14 GHz Ku-band FSS payloads, and will provide FSS and DTH services to countries within ITU Region 2. The Eutelsat 115 West B payload consists of twelve (12) C-band transponders and thirty-four (34) Ku-band transponders using horizontal and vertical polarizations.

The satellite's C-band payload uses twelve (12) 72 MHz transponders. Six transponders uplink horizontal polarization and downlink vertical polarization, and six transponders uplink vertical polarization and downlink horizontal polarization. The C-band transponders are numbered 01C through 12C.

The payload transmits over a hemispheric beam that covers North and South America, with service areas including Alaska, Miami, Mexico, South America, and the Galapagos. The 5925-6425 MHz uplink band will be connected to the 3700-4200 MHz downlink band.

The Ku band payload consists of eleven (11) 54 MHz transponders, twenty-one (21) 36 MHz transponders, and two (2) 56 MHz transponders. Four transponders are switchable between the KU1 and KU3 beams, and six transponders are switchable between the KU1 and KU4 beams. The Ku-band transponders are numbered 1K through 35K, with no transponder numbered 34K.

The payload transmits over three downlink beams - KU1, KU3 and KU4. KU1 serves Mexico and parts of the southern United States. KU3 serves South America exclusively, and KU4 serves Canada and the U.S. The 14.0-14.5 GHz uplink band will be connected to the 11.7-12.2 GHz downlink band.

Eutelsat 115 West B's primary mission is to replace the Satmex 5/Eutelsat 115 West A satellite. It will provide FSS and DTH services in the Ku-band (14.0-14.5 GHz (Earth-to-space); 11.7-12.2 GHz (space-to-Earth)) to territories in ITU Region 2. Both senses of linear polarization will be supported in each direction. The Ku-band payload will support FSS and DTH services.

A.3 PREDICTED SPACE STATION ANTENNA GAIN CONTOURS

The antenna gain contours for the beams associated with the C- and Ku-band payloads as required by §25.114(c)(4)(vi)(A), are given in GXT format and embedded in the Schedule S.

A.4 TELEMETRY, TRACKING &CONTROL

All tracking, telemetry and control (TT&C) operations for Eutelsat 115 West B will be performed at C-band and will take place from a satellite control center and TT&C earth stations located in Mexico. Eutelsat Americas does not seek Commission authorization for TT&C operations. Frequency and beam information is provided in Table 1 below but no additional information is included in the Schedule S.

Table 1. Eutelsat 115 West B TT&C Characteristics

	Frequency, MHz	Polarization	Beam ID
CMD 1 (on-station)	6423.5	Vertical	CRV
CMD 2 (backup	6421.5	LHCP	Bicone (omni)
TM1 (on-station)	4199.0	Horizontal	CTH
TM2 (on-station)	4199.8	Horizontal	CTH
TM3 (backup)	4199.0	LHCP	Bicone (omni)
TM4 (backup)	4199.8	LHCP	Bicone (omni)

A.5 MAXIMUM EIRP DENSITY

In accordance with §25.114(c)(4)(ii), the maximum EIRP and maximum EIRP density for each Eutelsat 115 West B transmit antenna beam is provided in Table 2 below:

Table 2. Eutelsat 115 West B Maximum EIRP and EIRP Densities

Beam ID	Max EIRP, dBW	Signal BW, MHz	Max EIRP Density, dBW/4kHz
CTH	47.1	36	7.6
CTV	47.1	36	7.6
KU1T	55.3	36	15.8
KU3T	54.0	36	14.5
KU4T	53.4	36	13.9

A.6 POWER FLUX DENSITY AT THE EARTH'S SURFACE

§25.208(a) contains PFD limits that apply in the 3650-4200 MHz band. These PFD limits are as follows:

- -152 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- -152+(δ-5)/2 dB(W/m^2) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

- -142 dB(W/m^2) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

Peak EIRP of the C-band payload is 47.1 dBW in a 36 MHz transponder corresponding to an EIRP density level of 7.6 dBW/4kHz. This level of EIRP density, even if directed toward the sub-satellite point (which is the shortest distance to surface of the Earth), would produce a PFD level of -154.5 dB(W/m^2/4 kHz) at the Earth's surface. Therefore the PFD levels for all locations on the Earth and for all angles of arrival are in compliance with the §25.208(a) PFD limits.

A.7 C-BAND INTERFERENCE ANALYSIS

The only C-band satellites within two degrees of Eutelsat 115 West B are Eutelsat 113 West A (formerly known as Satmex 6) at 113.0° W.L. and Eutelsat 117 West A (formerly known as Satmex 8) at 116.8° W.L. C/I analyses were performed for each of these satellites for Los Angeles, a large city in all three satellites service areas. Uplink and downlink EIRP values were obtained from public filings or from the Eutelsat website.

Table 3 provides technical parameters of the C-band carriers that should be taken into account for interference analysis. Tables 4 and 5 provide C/I summaries of satellites +/- 2 degrees of Eutelsat 115 West B.

Table 3. Eutelsat 115 West B Typical C-Band transmission parameters

Emission Designator	Bandwidth (MHz)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Receive E/S G/T (dB/K)
36M0G7W	36	68.9	47.1	18.7
1M40G7W	1.40	41.1	10.9	25.9
4M16G7W	4.16	50.7	20.5	25.9

Table 4. C-Band C/I Summary of Eutelsat 115 West B into Eutelsat 117 West A

E117WA (Satmex 8)		Interference from E115WB into E117WA								
C-Band										
E117WA satellite position	116.80	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	3.5	m								
	Satmex 8	Satmex 7	Satmex 8	Satmex 7						
Los Angeles	E117WA U/L EIRP	E115WB U/L EIRP	E117WA D/L EIRP	E115WB D/L EIRP	E/S TX Peak Gain	E/S TX off-axis Gain	E/S Rcv. off-axis	U/L C/I	D/L C/I	Total C/I
36M0G7W	74.4	68.9	40.7	41.1	53.4	20.84	-20.7	38.1	20.3	**20.2**
1M40G7W	42.7	41.1	9.0	10.9	53.4	20.84	-20.7	34.2	18.8	**18.7**
4M16G7W	57.1	50.7	23.4	20.5	53.4	20.84	-20.7	39.0	23.6	**23.5**

Table 5. C-Band C/I Summary of Eutelsat 115 West B into Eutelsat 113 West A

E113WA (Satmex 6)		Interference from E115WB into E117WA								
C-Band										
E113WA satellite position	113.00	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	3.50	m								
	Satmex 6	Satmex 7	Satmex 6	Satmex 7						
Los Angeles	E113WA U/L EIRP	E115WB U/L EIRP	E113WA D/L EIRP	E115WB D/L EIRP	E/S TX Peak Gain	E/S TX off-axis Gain	E/S Rcv. off-axis	U/L C/I	D/L C/I	Total C/I
36M0G7W	72.0	68.9	42.0	41.1	53.4	20.84	-20.7	35.7	21.6	**21.4**
1M40G7W	43.0	41.1	11.5	10.9	53.4	20.84	-20.7	34.5	21.3	**21.1**
4M16G7W	55.0	50.7	22.0	20.5	53.4	20.84	-20.7	36.9	22.2	**22.1**

Typical satellite and earth-station operating parameters provide ample C/I so as not to cause harmful interference into Eutelsat 115 West B's immediate neighbors. It should also be noted that Eutelsat 113 West A and Eutelsat 117 West A are also owned and operated by Eutelsat Americas, and will be internally coordinated with Eutelsat 115 West B to avoid unacceptable interference.

A.8 KU-BAND INTERFERENCE ANALYSIS

The only Ku-band satellites within two degrees of Eutelsat 115 West B are Eutelsat 113 West A (formerly known as Satmex 6) at 113.0° W.L. and Eutelsat 117 West A (formerly known as Satmex 8) at 116.8° W.L. C/I analyses were performed for each of these satellites for Los Angeles, a large city in all three satellites service areas. Uplink and downlink EIRP values were obtained from public filings or from the Eutelsat website.

Table 6 provides technical parameters of the Ku band carriers that should be taken into account for interference analysis. Tables 7 through 10 provide C/I summaries of satellites +/- 2 degrees of Eutelsat 115 West B.

Table 6. Eutelsat 115 West B Typical Ku-Band transmission parameters

Emission Designator	Bandwidth (MHz)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Receive E/S G/T (dB/K)
36M0G7W	36	72.0	52.2	21.1
48K6G7W	0.0486	41.3	22.8	34.0
1M34G7W	1.34	52.4	34.0	34.0
6M33G7W	6.33	59.3	39.1	34.2

Table 7. Ku-Band KU1 Beam C/I Summary of E115WB into E117WA

E117WA (Satmex 8)		**Interference from E115WB into E117WA**								
Ku Band KU1										
E117WA satellite position	116.80	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	1.20	m								
	Satmex 8	Satmex 7	Satmex 8	Satmex 7						
Los Angeles	E117WA U/L EIRP	E115WB U/L EIRP	E117WA D/L EIRP	E115WB D/L EIRP	E/S TX Peak Gain	E/S TX off-axis Gain	E/S Rcv. off-axis	U/L C/I	D/L C/I	Total C/I
36M0G7W	74.0	72.0	48.4	51.3	53.4	20.84	-20.9	34.6	18.0	17.9
48K6G7W	45.3	41.3	21.7	22.8	53.4	20.84	-20.9	36.6	19.8	19.7
1M34G7W	59.7	52.4	31.5	34.0	53.4	20.84	-20.9	39.9	18.4	18.3
6M33G7W	66.5	59.3	37.9	40.8	53.4	20.84	-20.9	39.8	18.0	17.9

Table 8. Ku-Band KU4 Beam C/I Summary of E115WB into E117WA

E117WA (Satmex 8)		**Interference from E115WB into E117WA**								
Ku Band KU4										
E117WA satellite position	116.80	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	1.20	m								
	Satmex 8	Satmex 7	Satmex 8	Satmex 7						
Los Angeles	**E117WA U/L EIRP**	**E115WB U/L EIRP**	**E117WA D/L EIRP**	**E115WB D/L EIRP**	**E/S TX Peak Gain**	**E/S TX off-axis Gain**	**E/S Rcv. off-axis**	**U/L C/I**	**D/L C/I**	**Total C/I**
36M0G7W	74.0	69.6	48.4	45.2	53.4	20.84	-20.9	37.0	24.1	**23.8**
48K6G7W	45.3	44.3	21.7	21.1	53.4	20.84	-20.9	33.6	21.5	**21.2**
1M34G7W	59.7	55.4	31.5	32.3	53.4	20.84	-20.9	36.9	20.1	**20.0**
6M33G7W	66.5	62.3	37.9	39.1	53.4	20.84	-20.9	36.8	19.7	**19.6**

Table 9. Ku-Band KU1 Beam C/I Summary of E115WB into E113WA

E113WA (Satmex 6)		Interference from E115WB into E113WA								
Ku Band KU1										
E113WA satellite position	113.00	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	1.20	m								
	Satmex 6	Satmex 7	Satmex 6	Satmex 7						
Los Angeles	E113WA U/L EIRP	E115WB U/L EIRP	E113WA D/L EIRP	E115WB D/L EIRP	E/S TX Peak Gain	E/S TX off-axis Gain	E/S Rcv. off-axis	U/L C/I	D/L C/I	Total C/I
36M0G7W	72.0	72.0	51.9	51.3	53.4	20.84	-20.9	32.6	21.5	**21.1**
48K6G7W	43.3	41.3	20.2	22.8	53.4	20.84	-20.9	34.6	18.3	**18.2**
1M34G7W	57.7	52.4	34.6	34.0	53.4	20.84	-20.9	37.9	21.5	**21.4**
6M33G7W	64.5	59.3	41.4	40.8	53.4	20.84	-20.9	37.8	21.5	**21.4**

Table 10. Ku-Band KU4 Beam C/I Summary of E115WB into E113WA

E113WA (Satmex 6)		Interference from E115WB into E113WA								
Ku Band KU4										
E113WA satellite position	113.00	W.L.								
E115WB satellite position	114.90	W.L.								
Nominal orbital separation	1.90	Deg.								
Station-keeping	0.05	Deg.								
Receive antenna size	1.20	m								
	Satmex 6	Satmex 7	Satmex 6	Satmex 7						
Los Angeles	E113WA U/L EIRP	E115WB U/L EIRP	E113WA D/L EIRP	E115WB D/L EIRP	E/S TX Peak Gain	E/S TX off-axis Gain	E/S Rcv. off-axis	U/L C/I	D/L C/I	Total C/I
36M0G7W	72.0	69.6	51.9	45.2	53.4	20.84	-20.9	35.0	27.6	**26.8**
48K6G7W	43.3	44.3	20.2	21.1	53.4	20.84	-20.9	31.6	20.0	**19.7**
1M34G7W	57.7	55.4	34.6	32.3	53.4	20.84	-20.9	34.9	23.2	**22.9**
6M33G7W	64.5	62.3	41.4	39.1	53.4	20.84	-20.9	34.8	23.2	**22.9**

Typical satellite and earth-station operating parameters for both Ku-band beams that cover the U.S. provide ample C/I so as not to cause harmful interference into Eutelsat 115 West B's immediate neighbors. As noted above, Eutelsat 113 West A and Eutelsat 117 West A are also owned and operated by Eutelsat Americas, and will be internally coordinated with Eutelsat 115 West B to avoid unacceptable interference.

A.9 KU-BAND COORDINATION

All three Ku band satellite transmit beams exceed the "routine processing" limit of 10 dBW/4kHz under 25.134(g)(3), which is generally applicable to routinely licensed VSAT terminal operations, and therefore require coordination with satellite operators +/- 6 degrees of 114.9° W.L. The following Ku band satellites are within +/- 6 degrees of Eutelsat 115 West B:

- Anik F2 at 111.0°W
- Eutelsat 113 West A (Satmex 6) at 113.0°W
- Eutelsat 117 West A (Satmex 8) at 116.8°W
- Anik F3 at 118.7°W
- Galaxy 23/EchoStar 9 at 121.0°W

Eutelsat Americas has coordinated its transmitting parameters with the operators of these satellites to ensure that no harmful interference occurs to its neighboring satellites.

A.10 LINK PERFORMANCE

Representative link budgets for C- and Ku-band are provided in Annex 1. These link budgets demonstrate that Eutelsat 115 West B will operate with sufficient margin to provide high availability service. A full set of links is attached to the Schedule S filing. Table 11 provides the link budget names and their corresponding emission designators.

Table 11. Link Budget File Names

Band	Emission Designator	Link Budget File Name
C	1M40G7W	C_1M40G7W
C	4M16G7W	C_4M16G7W
C	36M0G7W	C_36M0G7W
Ku	1M34G7W	KU_1M34G7W
Ku	6M33G7W	KU_6M33G7W
Ku	36M0G7W	KU_36M0G7W
Ku	48K6G7W	KU_48K6G7W

A.11 FREQUENCY RE-USE

Section 25.210(f) of the Commission's rules requires that space stations in the FSS employ full frequency re-use by either polarization or spatial discrimination. Eutelsat 115 West B complies with this requirement. The 4/6 GHz C-band payload utilizes horizontal and vertical polarization over the full 500 MHz spectrum on both the uplink and downlink. The 12/14 GHz Ku-band payload also uses horizontal and vertical polarization over the full 500 MHz spectrum on both

the uplink and downlink. For both payloads, the uplink polarization sense is always orthogonal to the downlink polarization sense.

A.12 DATA NOT ABLE TO BE INPUT TO SCHEDULE S SOFTWARE

Section 25.114(c)(4)(v) requires that the minimum and maximum saturation flux density (SFD) be provided for each space station receive beam. The minimum values are provided in Schedule S S7p. However, it is not possible to input the maximum values. They are provided in Table 12 below.

Table 12. Maximum Saturation Flux Densities

E115WB Receive Beam	Maximum Saturation Flux Density, dBW/m^2
CRH	-71.0
CRV	-71.0
KU1R	-71.0
KU3R	-71.0
KU4R	-71.0

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/

David A. Pattillo
Telecomm Strategies LLP

February 27, 2015

Annex 1

Link Budgets

Ku-Band

E115WB KU4	36M0G7W	Clear Sky	Rain Down
Uplink (Hamilton, ONT)	Transmit power, dBW	12.9	12.9
	Transmit losses, dB	-0.5	-0.5
	Ground antenna gain, dB	57.4	57.4
	Antenna pointing loss, dB	-0.2	-0.2
	Uplink EIRP	69.6	69.6
	Free space loss, dB	-207.4	-207.4
	Atmospheric loss, dB	-0.2	-0.2
	Uplink rain loss, dB	0.0	0.0
	Satellite G/T, dB/K	6.6	6.6
	Bandwidth, dB-Hz	-74.0	-74.0
	Boltzmann's constant, dBW/Hz K	228.6	228.6
Uplink C/N (thermal)		**23.3**	**23.3**
	Downlink		
Downlink (Los Angeles)	Satellite EIRP, dBW	45.2	45.2
	Free space loss, dB	-205.5	-205.5
	Gaseous		-0.11
	Cloud		-0.06
	Scintillation		-0.14
	Downlink rain loss, dB	0.0	-0.78
	Rain temp increase, dB	0.0	-1.2
	Rain + Atmos Loss, dB	-0.2	-1.0
	Rcv. antenna pointing loss, dB	-0.5	-0.5
	Ground G/T, dB/K	27.3	27.3
	Bandwidth, dB-Hz	-74.0	-74.0
	Boltzmann's constant, dBW/Hz K	228.6	228.6
Downlink C/N (thermal)		**21.0**	**19.0**
		Clear Sky	**Rain Down**
Totals	Uplink C/N (thermal), dB	23.3	23.3
	Downlink C/N (thermal), dB	21.0	19.0
	X-pol interference, dB	22.0	22.0
	C/I (ASI, Adj Ch, co-freq, IM)	21.9	21.9
	Total C/(N+I), dB	**15.9**	**15.2**
	Required C/(N+I), dB	**12.4**	**12.4**
	Margin, dB	**3.5**	**2.8**

C-Band

E115WB C-Band	36M0G7W	Clear Sky	Rain Down
Uplink (Steele Valley, US)	Transmit power, dBW	15.6	15.6
	Transmit losses, dB	-0.3	-0.3
	Ground antenna gain, dB	53.4	53.4
	Antenna pointing loss, dB	-0.2	-0.2
	Uplink EIRP	68.5	68.5
	Free space loss, dB	-199.5	-199.5
	Atmospheric loss, dB	-0.1	-0.1
	Uplink rain loss, dB	0.0	0.0
	Satellite G/T, dB/K	1.0	1.0
	Bandwidth, dB-Hz	-74.0	-74.0
	Boltzmann's constant, dBW/Hz K	228.6	228.6
Uplink C/N (thermal)		**24.6**	**24.6**
	Downlink		
Downlink (Barbados)	Satellite EIRP, dBW	35.0	35.0
	Free space loss, dB	-195.9	-195.9
	Gaseous		-0.05
	Cloud		-0.03
	Scintillation		-0.29
	Downlink rain loss, dB	0.0	-1.7
	Rain temp increase, dB	0.0	-2.0
	Rain + Atmos Loss, dB	-0.1	-1.8
	Rcv. antenna pointing loss, dB	0.0	0.0
	Ground G/T, dB/K	18.7	18.7
	Bandwidth, dB-Hz	-74.0	-74.0
	Boltzmann's constant, dBW/Hz K	228.6	228.6
Downlink C/N (thermal)		**12.3**	**8.6**
		Clear Sky	**Rain Down**
Totals	Uplink C/N (thermal), dB	24.6	24.6
	Downlink C/N (thermal), dB	12.3	8.6
	X-pol interference, dB	26.0	26.0
	C/I (ASI, Adj Ch, co-freq, IM)	21.9	21.9
	Total C/(N+I), dB	**11.5**	**8.2**
	Required C/(N+I), dB	**6.6**	**6.6**
	Margin, dB	**4.9**	**1.6**