FCC 312 Schedule S	FEDERAL COMMUNICATIONS COMMISSION SATELLITE SPACE STATION AUTHORIZATIONS (Technical and Operational Description)	Page 1: General, Frequency Bands, and GSO Orbit

S1. GENERAL INFORMATION Complete for all satellite applications.

a. Space Station or Satellite Network Name: ECHOSTAR-113W	e. Estimated Date of Placement into Service:	i Will the space station(s) operate on a Common Carrier Basis: N
b. Construction Commencement Date:	f. Estimated Lifetime of Satellite(s): 12 Years	j. Number of transponders offered on a common carrier basis: 0
c. Construction Completion Date:	g. Total Number of Transponders: 64	k. Total Common Carrier Transponder Bandwidth: 0 MHz
d. Estimated Launch Date:	h. Total Transponder Bandwidth (no. transponders x Bandwidth) 7360 MHz	l. Orbit Type: Mark all boxes that apply: ☐ **GSO** ☐ **NGSO**

S2. OPERATING FREQUENCY BANDS Identify the frequency range and transmit/receive mode for all frequency bands in which this station will oper
Also indicate the nature of service(s) for each frequency band.

Frequency Band Limits				e. T/R Mode	f. Nature of Service(s): List all that apply to this band
Lower Frequency (_Hz)		Upper Frequency (_Hz)			
a. Numeric	b. Unit (K/M/G)	c. Numeric	d. Unit (K/M/G)		
28.35	G	28.6	G	R	Fixed Satellite Service
29.25	G	30.0	G	R	Fixed Satellite Service
18.3	G	18.8	G	T	Fixed Satellite Service
19.7	G	20.2	G	T	Fixed Satellite Service

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 113 W	b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: This orbital location has been selected because, among other things, it provides high elevation angles to all of North America, which is very important for satellite services to large numbers of small and inexpensive consumer earth stations. The high elevation minimizes the risk of signal blockage due to buildings and foliage, and also minimizes the atmospheric and rain attenuation.
Longitudinal Tolerance or E/W Station-Keeping: d. Toward West: 0.05 Degrees e. Toward East: 0.05 Degrees	f. Inclination Excursion or N/S Station-Keeping Tolerance: 0.05 Degrees	Range of orbital are in which adequate service can be provided (Optional): Degrees E/W g. Westernmost: h. Easternmost:	
i. Reason for service are selection (Optional):			

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S4. ORBITAL INFORMATION FOR NON-GEOSTATIONARY SATELLITES ONLY

S4a. Total Number of Satellites in Network or System:

S4b. Total Number of Orbital Planes in Network or System:

S4c. Celestial Reference Body (Earth, Sun, Moon, etc.):

S4d. Orbit Epoch Date:

For each Orbital Plane Provide:

(e) Orbital Plane No.	(f) No. of Satellites in Plane	(g) Inclination Angle (degrees)	(h) Orbital Period (Seconds)	(i) Apogee (km)	(j) Perigee (km)	(k) Right Ascension of the Ascending Node (Deg.)	(l) Argument of Perigee (Degrees)	Active Service Arc Range (Degrees)		
								(m) Begin Angle	(n) End Angle	(o) Other

S5. INITIAL SATELLITE PHASE ANGLE For each satellite in each orbital plane, provide the intital phase angle.

(a) Orbital Plane No.	(b) Satellite Number	(c) Initial Phase Angle (Degrees)

NO NGSO DATA FILED

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S6. SERVICE AREA CHARACTERISTICS for each service area provide:

(a) Service Area ID	(b) Type of Associated Station (Earth or Space)	(c) Service Area Diagram File Name (GXT File)	(d) Service Area Description. Provide list of geographic areas (state postal codes or ITU 3-ltr codes), satellites or Figure No. of Service Area Diagram.
NA	S		CONUS, ALASKA, HAWAII, CANADA, MEXICO

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S7. SPACE STATION ANTENNA BEAM CHARACTERISTICS For each antenna beam provide:

(a) Beam ID	(b) T/R Mode	Isotropic Antenna Gain		(e) Pointing Error (Degrees)	(f) Rotational Error (Degrees)	(g) Min. Cross-Polar Iso-lation (dB)	(h) Polar-ization Switch-able? (Y/N)	(i) Polarization Alignment Rel. Equatorial Plane (Degrees)	(j) Service Area ID	Transmit			Receive				
		(c) Peak (dBi)	(d) Edge (dBi)							(k) Input Losses (dB)	(l) Effective Output Power (W)	(m) Max. EIRP (dBW)	(n) System Noice Temp (k)	(o) G/T Max. Gain Pt.	(p) Min. Saturation Flux Density (dBW/m2)	Input Attenuator (dB)	
																(q) Max. Value	(r) Step Size
KAR	R	45.5	41.5	0.12	0.12	30	N		NA				790	16.5	-105	20	1
KAR	R	45.5	41.5	0.12	0.12	30	N		NA				790	16.5	-105	20	1
KAT	T	45.5	41.5	0.12	0.12	30	N		NA	2	78.9	64.5					
KATL	T	45.5	41.5	0.12	0.12	30	N		NA	2	78.9	64.5					

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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/W)	(e) NGSO Antenna Gain Contour Description (Figure/Table/ Exhibit)	(f) GSO Antenna Gain Contour Data (GXT File)	Max. Power Flux Density (dBW/M2/Hz) At Angle of Arrival above horizontal (for emission with highest PFD)				
						(g) 5 Deg	(h) 10 Deg	(i) 15 Deg	(j) 20 Deg	(k) 25 Deg
KAR	R	C	-113		KARR.GXT					
KAR	R	C	-113		KARL.GXT					
KAT	T	C	-113		KATR.GXT	-118	-118	-118	-118	-118
KATL	T	C	-113		KATL.GXT	-118	-118	-118	-118	-118

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S9. SPACE STATION CHANNELS For each frequency channel provide:

(a) Channel No.	(B) Assigned Bandwidth (kHz)	(c) T/R Mode	(d) Center Frequency (MHz)	(e) Polarization (H, V, L, R)	(f) TTC or Comm Channel (T or C)
U001	115000	R	29312.5	L	C
U003	115000	R	29437.5	L	C
U005	115000	R	28412.5	L	C
U007	115000	R	28537.5	L	C
U009	115000	R	29562.5	L	C
U011	115000	R	29687.5	L	C
U013	115000	R	29812.5	L	C
U015	115000	R	29937.5	L	C
U002	115000	R	29312.5	R	C
U004	115000	R	29437.5	R	C
U006	115000	R	28412.5	R	C
U008	115000	R	28537.5	R	C
U010	115000	R	29562.5	R	C
U012	115000	R	29687.5	R	C
U014	115000	R	29812.5	R	C
U016	115000	R	29937.5	R	C
D0001	115000	T	18362.5	R	C
D0003	115000	T	18487.5	R	C
D0005	115000	T	18612.5	R	C
D0007	115000	T	18737.5	R	C
D0009	115000	T	19762.5	R	C
D0011	115000	T	19887.5	R	C
D0013	115000	T	20012.5	R	C
D0015	115000	T	20137.5	R	C
D0002	115000	T	18362.5	L	C
D0004	115000	T	18487.5	L	C
D0006	115000	T	18612.5	L	C
D0008	115000	T	18737.5	L	C
D0010	115000	T	19762.5	L	C
D0012	115000	T	19887.5	L	C

S10. SPACE STATION TRANSPONDERS For each transponder provide:

(a) Transponder ID	(b) Transponder Gain (dB)	Receive Band		Transmit Band	
		(c) Channel No.	(d) Beam ID	(e) Channel No.	(f) Beam ID
T0001	129.5	U001	KARL	D0001	KATR
T0002	129.5	U003	KARL	D0003	KATR
T0003	129.5	U005	KARL	D0005	KATR
T0004	129.5	U007	KARL	D0007	KATR
T0005	129.5	U009	KARL	D0009	KATR
T0006	129.5	U011	KARL	D0011	KATR
T0007	129.5	U013	KARL	D0013	KATR
T0008	129.5	U015	KARL	D0015	KATR
T0009	129.5	U002	KARR	D0002	KATL
T0010	129.5	U004	KARR	D0004	KATL
T0011	129.5	U006	KARR	D0006	KATL
T0012	129.5	U008	KARR	D0008	KATL
T0013	129.5	U010	KARR	D0010	KATL
T0014	129.5	U012	KARR	D0012	KATL
T0015	129.5	U014	KARR	D0014	KATL
T0016	129.5	U016	KARR	D0016	KATL

D0014	115000	T	20012.5	L	C
D0016	115000	T	20137.5	L	C

S11. DIGITAL MODULATION PARAMETERS For each digital emission provide:

(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)
D001	51K2G7W	51.2	4	56	0.691		8.4	20.6
D002	102KG7W	102	4	104	0.691		8.4	20.6
D003	500KG7W	500	4	512	0.691		8.4	20.6
D004	2M00G7W	2000	4	2048	0.691		8.4	20.6
D005	6M80G7W	6800	4	6968	0.691		8.4	20.6
D006	115MG7W	115000	4	117760	0.691		8.4	20.6

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S12. ANALOG MODULATION PARAMETERS For each analog emission provide:

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

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S13. TYPICAL EMISSIONS For each planned type of emission provide:

Associated Transponder ID Range		Modulation ID		(e) Carriers per Transponder	(f) Carrier Spacing (kHz)	(g)Noise Budget Reference (Table No.)	(h) Energy Dispersal Bandwidth (kHz)	Receive Band (Assoc. Transmit Stn)			Transmit Band (This Space Station)			
								(i)Assoc. Stn. Max. Antenna Gain (dBi)	Assoc. Station Transmit Power (dBW)		EIRP (dBW)		(n) Max. Power Flux Density (dBW/m2/Hz)	(o)Assoc. Stn Rec. G/T (dB/K)
(a) Start	(b) End	(c) Digital (Table S11)	(d) Analog (Table S12)						(j) Min.	(k) Max.	(l) Min.	(m) Max.		
T0001	T0016	D001		1790	64	Ka1 LB.doc		43.9	-15.2	-11.2				16.5
T0001	T0016	D002		1000	125	Ka2 LB.doc		43.9	-8.2	-12.2				16.5
T0001	T0016	D003		200	575	Ka3 LB.doc		43.9	-6	-2				16.5
T0001	T0016	D004		50	2300	Ka4 LB.doc		43.9	0	4				16.5
T0001	T0016	D005		16	7187	Ka5 LB.doc		47.7	1.8	5.8				16.5
T0001	T0016	D006		1		Ka6 LB.doc					60.5	64.5	-118	17.5

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S14. Is the space station(s) controlled and monitored remotely? If Yes, provide the location and telephone number of the TT and C control point(s): Yes

Remote Control (TT C) Location(s):

S14a: Street Address: 530 Echostar Drive			
S14b. City: Cheyenne	S14c. County: Larmie	S14d. State/Country WY	S14e. Zip Code: 82007
S14f. Telephone Number: 307-633-5227	S14g. Call Sign of Control Station (if appropriate): E030038		

Remote Control (TT C) Location(s):

S14a: Street Address:			
S14b. City:	S14c. County:	S14d. State/Country	S14e. Zip Code:
S14f. Telephone Number:	S14g. Call Sign of Control Station (if appropriate):		

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S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a: Mass of spacecraft without fuel (kg): 2400	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 3400		
S15c. Mass of spacecraft and fuel at launch (kg): 5800	S15f. Length (m): 55	S15i. Payload: 0.75
S15d. Mass of fuel, in orbit, at beginning of life (kg): 1400	S15g. Width (m): 4	S15j. Bus: 0.83
S15e. Deployed Area of Solar Array (square meters): 110	S15h. Height (m): 5	S15k. Total: 0.62

S16. SPACECRAFT ELECTRICAL CHARACTERISTICS:

Spacecraft Subsystem	Electrical Power (Watts) At Beginning of Life		Electrical Power (Watts) At End of Life	
	At Equinox	At Solstice	At Equinox	At Solstice
Payload (Watts):	(a): 14000	(f): 14000	(k): 14000	(p): 14000
Bus (Watts):	(b): 1800	(g): 925	(l): 1800	(q): 925
Total (Watts):	(c): 15800	(h): 14925	(m) 15800	(r): 14925
Solar Array (Watts):	(d): 18200	(i): 17400	(n): 16300	(s): 15500
Depth of Battery Discharge (%):	(e) 75 %	(j) 75 %	(o) 75 %	(t) 75 %

S17. CERTIFICATIONS:

a. Are the power flux density limits of § 25.208 met?:	YES	NO	N/A
b. Are the appropriate service area coverage requirements of § 25.143(b)(ii) and (iii), or § 25.145(c)(1) and (2) met?	YES	NO	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	NO	N/A

In addition to the information required in this Form, the space station applicant is required to provide all the information specified in Section 25.114 of the Commission's rules, 47 C.F.R § 25.114.