

FEDERAL COMMUNICATIONS COMMISSION
SATELLITE SPACE STATION AUTHORIZATIONS
(Technical and Operational Description)

S1. GENERAL INFORMATION Complete for all satellite applications.

a. Space Station or Satellite Network Name: VIASAT-89W		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): 15 Years		j. Number of transponders offered on a common carrier basis:	
c. Construction Completion Date:		g. Total Number of Transponders: 16		k. Total Common Carrier Transponder Bandwidth: MHz	
d1. Est Launch Date Begin:	d2. Est Launch Date End:	h. Total Transponder Bandwidth (no. transponders x Bandwidth) 1760 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)		
28100	M	28600	M	R	Fixed Satellite Service
29500	M	30000	M	R	Fixed Satellite Service
18300	M	18800	M	T	Fixed Satellite Service
19700	M	20200	M	T	Fixed Satellite Service

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 88.9 W		b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: The 88.9 W.L. location has been selected in order to avoid physical collision with an operational satellite at the 89 W.L. orbital location. It is also creates a two degree separation with a proposed Ka-band network at 90.9 W.L.	
Longitudinal Tolerance or E/W Station-Keeping:		f. Inclination Excursion or N/S Station-Keeping Tolerance:			
d. Toward West: 0.05 Degrees		e. Toward East: 0.05 Degrees			
g. Westernmost:		h. Easternmost:			
i. Reason for service are selection (Optional):					

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Page 2: NGSO Orbits

S4. ORBITAL INFORMATION FOR NON-GEOSTATIONARY SATELLITES ONLY

S4a. Total Number of Satellites in Network or System:

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

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

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 initial phase angle.

(a) Orbital Plane No.	(b) Satellite Number	(c) Initial Phase Angle (Degrees)
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NO NGSO DATA FILED

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Page 3: Service Areas

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.
SA1	S		-6 dB contour of the uplink CONUS beam.
SA2	S		-6 dB contour of the downlink CONUS beam.
SA3	S		-6 dB contour of the uplink South American beam.
SA4	S		-6 dB contour of the downlink South American beam.
SA5	S		Visible Earth.

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Page 4: Antenna Beams

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 Noise Temp (k)	(o) G/T Max. Gain Pt. (db/K)	(p) Min. Saturation Flux Density (dBW/m2)	Input Attenuator (dB)	
																(q) Max. Value	(r) Step Size
NAR	R	35.5	29.5	0.12	0.12	30	N		SA1				795	6.5	-98.2	25	1
SAR	R	35.5	29.5	0.12	0.12	30	N		SA3				795	6.5	-98.2	25	1
SARL	R	35.5	29.5	0.12	0.12	30	N		SA3				795	6.5	-98.2	25	1
NATL	T	35	29	0.12	0.12	30	N		SA2	1	417	61.2					
SAT	T	35	29	0.12	0.12	30	N		SA4	1	417	61.2					
SATL	T	35	29	0.12	0.12	30	N		SA4	1	417	61.2					
OMNI	R	3	0	0.12	0.12	30	N		SA5				1585	-29			
OMNI	T	3	0	0.12	0.12	30	N		SA5	3	12.6	14					

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Page 5: Beam Diagrams

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
NAR	R	C	-88.9		NARR.gxt					
SAR	R	C	-88.9		SARR.gxt					
SARL	R	C	-88.9		SARL.gxt					
NATL	T	C	-88.9		NATL.gxt	-138.6	-139.1	-135.3	-130.1	-126.4
SAT	T	C	-88.9		SATR.gxt	-133.5	-132	-129.8	-127.4	-125
SATL	T	C	-88.9		SATL.gxt	-133.5	-132	-129.8	-127.4	-125
OMNI	T	C	-88.9			-144.1	-144.1	-144.1	-144.1	-144.1

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Page 6: Channels and Transponders

S9. SPACE STATION CHANNELS For each frequency channel provide: S10. SPACE STATION TRANSPONDERS For each transponder 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)
UL01	110000	R	28164	R	C
UL02	110000	R	28286	R	C
UL03	110000	R	28414	R	C
UL04	110000	R	28538	R	C
UL05	110000	R	28164	L	C
UL06	110000	R	28286	L	C
UL07	110000	R	28414	L	C
UL08	110000	R	28538	L	C
UL09	110000	R	29567	R	C
UL10	110000	R	29689	R	C
UL11	110000	R	29811	R	C
UL12	110000	R	29933	R	C
UL13	110000	R	29567	L	C
UL14	110000	R	29689	L	C
UL15	110000	R	29811	L	C
UL16	110000	R	29933	L	C
DL01	110000	T	18364	L	C
DL02	110000	T	18486	L	C
DL03	110000	T	18614	L	C
DL04	110000	T	18736	L	C
DL05	110000	T	18364	R	C
DL06	110000	T	18486	R	C
DL07	110000	T	18614	R	C
DL08	110000	T	18736	R	C
DL09	110000	T	19767	L	C
DL10	110000	T	19889	L	C
DL11	110000	T	20011	L	C
DL12	110000	T	20133	L	C
DL13	110000	T	19767	R	C
DL14	110000	T	19889	R	C

(a) Transponder ID	(b) Transponder Gain (dB)	Receive Band		Transmit Band	
		(c) Channel No.	(d) Beam ID	(e) Channel No.	(f) Beam ID
T0001	139.5	UL01	NARR	DL01	NATL
T0002	139.5	UL02	NARR	DL02	NATL
T0003	139.5	UL03	NARR	DL03	NATL
T0004	139.5	UL04	NARR	DL04	NATL
T0005	139.5	UL05	SARL	DL05	SATR
T0006	139.5	UL06	SARL	DL06	SATR
T0007	139.5	UL07	SARL	DL07	SATR
T0008	139.5	UL08	SARL	DL08	SATR
T0009	139.5	UL01	NARR	DL05	SATR
T0010	139.5	UL02	NARR	DL06	SATR
T0011	139.5	UL03	NARR	DL07	SATR
T0012	139.5	UL04	NARR	DL08	SATR
T0013	139.5	UL05	SARL	DL01	NATL
T0014	139.5	UL06	SARL	DL02	NATL
T0015	139.5	UL07	SARL	DL03	NATL
T0016	139.5	UL08	SARL	DL04	NATL
T0017	139.9	UL09	SARR	DL09	SATL
T0018	139.9	UL10	SARR	DL10	SATL
T0019	139.9	UL11	SARR	DL11	SATL
T0020	139.9	UL12	SARR	DL12	SATL
T0021	139.9	UL13	SARL	DL13	SATR
T0022	139.9	UL14	SARL	DL14	SATR
T0023	139.9	UL15	SARL	DL15	SATR
T0024	139.9	UL16	SARL	DL16	SATR
CMD1		CMD1	NARR		
CMD2		CMD2	NARR		
CMD3		CMD1	OMNIR		
CMD4		CMD2	OMNIR		
TLM1				TLM1	NATL
TLM2				TLM2	NATL

DL15	110000	T	20011	R	C
DL16	110000	T	20133	R	C
CMD1	1000	R	28597	R	T
CMD2	1000	R	28599	R	T
TLM1	1000	T	18797	L	T
TLM2	1000	T	18799	L	T

TLM3				TLM1	OMNIL
TLM4				TLM2	OMNIL

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Page 7: Digital Modulation

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)
D1	110MG7D	110000	4	1217680	0.797		5.1	17.3
D2	110MG7D	110000	8	2032480	0.8869		11.2	23.4
D3	2M75G7D	2750	4	2853	0.747		4.4	16.6
D4	2M07G7D	2065	4	1905	0.6642		3.5	15.7
D5	1M38G7D	1380	4	952.5	0.497		1.4	13.6
D6	900KG7D	900	2	312.5	0.5		-0.4	11.8

Page 8: Analog Modulation

[illegible]

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Page 9: Typical Emissions

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)			
		(c) Digital (Table S11)	(d) Analog (Table S12)					(i) Assoc. Stn. Max. Antenna Gain (dBi)	Assoc. Station Transmit Power (dBW)		EIRP (dBW)		(n) Max. Power Flux Density (dBW/m ² /Hz)	(o) Assoc. Stn Rec. G/T (dB/K)
(a) Start	(b) End								(j) Min.	(k) Max.	(l) Min.	(m) Max.		
T0001	T0016	D1		1		LB1.doc		64.9	10.2	16.2	55.2	61.2	-120.7	18.4
T0001	T0016	D2		1		LB2.doc		64.9	10.2	16.2	55.2	61.2	-120.7	38
T0001	T0016	D3		34	3235	LB3.doc		47.1	4	7	34.9	40.9	-125	38
T0001	T0016	D4		46	2391	LB4.doc		47.1	2.7	5.7	33.6	39.6	-125.1	38
T0001	T0016	D5		69	1594	LB5.doc		44.1	1	4	31.8	37.8	-125.1	38
T0001	T0016	D6		106	1037	LB6.doc		44.1	-1	2	29.9	35.9	-125.1	38
T0017	T0024	D1		1		LB7.doc		65.3	9.8	15.8	55.2	61.2	-121	19
T0017	T0024	D2		1		LB8.doc		65.3	9.8	15.8	55.2	61.2	-121	38.6
T0017	T0024	D3		34	3235	LB9.doc		47.6	4	7	34.9	40.9	-125.3	38.6
T0017	T0024	D4		46	2391	LB10.doc		47.6	2.7	5.7	33.6	39.6	-125.4	38.6
T0017	T0024	D5		69	1594	LB11.doc		44.5	1	4	31.8	37.8	-125.4	38.6
T0017	T0024	D6		106	1037	LB12.doc		44.5	-1	2	29.9	35.9	-125.4	38.6
CMD1	CMD2		A1	1		CMD1.doc		64.9	-14.6	1.4				6.5
CMD3	CMD4		A1	1		CMD2.doc		66.8	15.5	20.5				-29
TLM1	TLM2		A2	1		TLM1.doc					21	27	-131.3	38
TLM3	TLM4		A2	1		TLM2.doc					11	14	-144.1	44

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Page 10: TT and C

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

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**Page 11:
Characteristics and
Certifications**

S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a. Mass of spacecraft without fuel (kg): 3350	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 5193		
S15c. Mass of spacecraft and fuel at launch (kg): 8543	S15f. Length (m): 8.6	S15i. Payload: 0.882
S15d. Mass of fuel, in orbit, at beginning of life (kg): 1560	S15g. Width (m): 4.3	S15j. Bus: 0.858
S15e. Deployed Area of Solar Array (square meters): 86.7	S15h. Height (m): 8.6	S15k. Total: 0.757

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): 14560	(f): 14560	(k): 14560	(p): 14560
Bus (Watts):	(b): 2500	(g): 1350	(l): 2500	(q): 1350
Total (Watts):	(c): 17060	(h): 15910	(m): 17060	(r): 15910
Solar Array (Watts):	(d): 22596	(i): 20174	(n): 20357	(s): 18340
Depth of Battery Discharge (%):	(e) 73.2 %	(j) %	(o) 76.3 %	(t) %

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.