

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: SKYTERRA 2		e. Estimated Date of Placement into Service: 6/30/2011		i. Will the space station(s) operate on a Common Carrier Basis: N	
b. Construction Commencement Date: 5/25/2008		f. Estimated Lifetime of Satellite(s): 15 Years		j. Number of transponders offered on a common carrier basis:	
c. Construction Completion Date: 12/15/2010		g. Total Number of Transponders: 1		k. Total Common Carrier Transponder Bandwidth: MHz	
d1. Est Launch Date Begin: 12/31/2010	d2. Est Launch Date End: 6/15/2011	h. Total Transponder Bandwidth (no. transponders x Bandwidth) 34 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)		
1525	M	1559	M	T	Mobile-Satellite Service
1626.5	M	1660.5	M	R	Mobile-Satellite Service
12.75	G	13.25	G	R	Fixed Satellite Service
10.7	G	10.95	G	T	Fixed Satellite Service
11.2	G	11.45	G	T	Fixed Satellite Service

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 107.3 W		b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: SkyTerra 2 will operate its feederlinks in the Appendix 30B Ku-band frequencies at the 107.3 degrees W longitude orbital location that is allocated internationally to Canada."
Longitudinal Tolerance or E/W Station-Keeping:		f. Inclination Excursion or N/S Station-Keeping Tolerance: 6 Degrees	Range of orbital are in which adequate service can be provided (Optional): g. Westernmost: h. Easternmost:	
d. Toward West:	0.05 Degrees			
e. Toward East:	0.05 Degrees			
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.
SAL1	S	SkyT2-L SA.gxt	Figure: Service Area SAL1
SAL2	S	SkyT2-HawaiiSA.gxt	Figure: Service Area SAL2
SAKU	S	SkyT2-Ku-SA.gxt	Figure: Service Area SAKU
OMNI	S	SkyT2- Omni SA.gxt	Figure: Service Area OMNI

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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
TKU1	T	42	40	0.12		25	N		SAKU	3.2	25	52.8					
RKU	R	42	40	0.12		25	N		SAKU				800	11	-89.6	15	1
TKU2	T	42	40	0.12		25	N		SAKU	3.2	25	52.8					
RKU	R	42	40	0.12		25	N		SAKU				800	11	-89.6	15	1
TKU3	T	42	40	0.12		25	N		SAKU	3.2	25	52.8					
RKU	R	42	40	0.12		25	N		SAKU				800	11	-89.6	15	1
TKU4	T	42	40	0.12		25	N		SAKU	3.2	25	52.8					
RKU	R	42	40	0.12		25	N		SAKU				800	11	-89.6	15	1
TL1	T	46.5	33.5	0.12		17	N		SAL1	1.52	246	69.16					
RL1	R	47	33.5	0.12		17	N		SAL1				300	21	-116.7	15	1
TLHI	T	33	30	0.12		17	N		SAL2	1.52	62	47.58					
RLHI	R	33	30	0.12		17	N		SAL2				300	7	-102.7	15	1
TOM	T	2	2	0.12		9	N		OMNI	2	1	0					
ROM	R	2	2	0.12		12	N		OMNI				800	-30		15	1
TLTP	T	46.5	43.5	0.12		17	N		SAL1	1.52	246	69.16					
RLTP	R	47	44	0.12		17	N		SAL1				300	21	-116.7	15	1
TLE	T	33	30	0.12		20	N		SAL1	1.52	500	57.3					
RLE	R	33	30	0.12		20	N		SAL1				300	7	-102.7	15	1

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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
TL1	T	C	-107.3		TKu2-SkyT2.gxt	-113	-112.5	-112	-111.8	-111.7
RL1	R	C	-107.3		BeamRL1.gxt					
TLHI	T	C	-107.3		BeamTLHI.gxt	-126	-125.5	-125	-124.8	-124.7
RLHI	R	C	-107.3		BeamRLHI.gxt					
TLE	T	C	-107.3		BeamTLEM.gxt	-137.2	-137	-136.8	-136.7	-136.6
RLE	R	C	-107.3		BeamRLEM.gxt					
TKU1	T	C	-107.3		TKu1-SkyT2.gxt	-150.4	-150	-149.6	-149.4	-149.2
RKU	R	C	-107.3		RKu1-SkyT2.gxt					
TKU2	T	C	-107.3		TKu2-SkyT2.gxt	-150.4	-150	-149.6	-149.4	-149.2
RKU	R	C	-107.3		RKu2-SkyT2.gxt					
TKU3	T	C	-107.3		TKu3-SkyT2.gxt	-150.4	-150	-149.6	-149.4	-149.2
RKU	R	C	-107.3		RKu3-SkyT2.gxt					
TKU4	T	C	-107.3		TKu4-SkyT2.gxt	-150.4	-150	-149.6	-149.4	-149.2
RKU	R	C	-107.3		RKu4-SkyT2.gxt					
TLTP	T	C	-107.3		TLTP1-M2.gxt	-113	-112.5	-112	-111.8	-111.7
RLTP	R	C	-107.3		RLTP1-M2.gxt					
TOM	T	C	-107.3		TOMNI-M2.gxt	-159.9	-159.7	-159.5	-159.4	-159.3
ROM	R	C	-107.3		ROMNI-M2.gxt					

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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)
KUD1L	250000	T	10825	L	C
KUD1R	250000	T	10825	R	C
KUD2L	250000	T	11325	L	C
KUD2R	250000	T	11325	R	C
KUUL	500000	R	13000	L	C
KUUR	500000	R	13000	R	C
LD	34000	T	1542	R	C
LUL	34000	R	1643.5	L	C
LUR	34000	R	1643.5	R	C
LEMD	34000	T	1542	R	C
LEMU	34000	R	1643.5	R	C
BEAC	1	T	11448.75	L	C
CMD1	1000	R	13249.0	R	T
CMD2	1000	R	12751.0	R	T
TLM1	100	T	11201	R	T
TLM2	100	T	11202	R	T
CMD3	1000	R	13249	L	T
TLM3	100	T	11201	L	T
TLM4	100	T	11202	L	T
BEAC2	1	T	11448.75	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
FWD1	132	KUUL	RKU1	LD	TL1
FWD2	132	KUUR	RKU1	LD	TL1
FWD3	132	KUUL	RKU1	LD	TLHI
FWD4	132	KUUR	RKU1	LD	TLHI
FWD5	129	KUUL	RKU1	LEMD	TLEM1
FWD6	129	KUUR	RKU1	LEMD	TLEM1
RTN1	126	LUL	RL1	KUD1R	TKU1
RTN2	126	LUL	RL1	KUD1L	TKU1
RTN3	126	LUL	RL1	KUD2R	TKU1
RTN4	126	LUL	RL1	KUD2L	TKU1
RTN5	126	LUR	RL1	KUD1R	TKU1
RTN6	126	LUR	RL1	KUD1L	TKU1
RTN7	126	LUR	RL1	KUD2R	TKU1
RTN8	126	LUR	RL1	KUD2L	TKU1
RTN9	126	LUL	RLHI	KUD1R	TKU1
RTN10	126	LUL	RLHI	KUD1L	TKU1
RTN11	126	LUL	RLHI	KUD2R	TKU1
RTN12	126	LUL	RLHI	KUD2L	TKU1
RTN13	126	LUR	RLHI	KUD1R	TKU1
RTN14	126	LUR	RLHI	KUD1L	TKU1
RTN15	126	LUR	RLHI	KUD2R	TKU1
RTN16	126	LUR	RLHI	KUD2L	TKU1
RTN17	120	LUL	RLEM1	KUD1R	TKU1
RTN18	120	LUL	RLEM1	KUD1L	TKU1
RTN19	120	LUL	RLEM1	KUD2R	TKU1
RTN20	120	LUL	RLEM1	KUD2L	TKU1
RTN21	120	LUR	RLEM1	KUD1R	TKU1
RTN22	120	LUR	RLEM1	KUD1L	TKU1
RTN23	120	LUR	RLEM1	KUD2R	TKU1
RTN24	120	LUR	RLEM1	KUD2L	TKU1

CMOM1		CMD1	ROMNI		
CMHG		CMD3	RKU3		
CMOM2		CMD2	ROMNI		
TLOM1				TLM1	TOMNI
TLOM2				TLM2	TOMNI
TLHG1				TLM3	TKU3
TLHG2				TLM4	TKU3
TBEAC				BEAC	TKU3
TBEA2				BEAC2	TKU3

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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)
CW1	1K00N	1	1			0	9.8	22
FESC	6K00G1D	6	4	3.375	1	0	9.9	22.1
MMS	5K00G1D	5	2	0.6	0.5	0	4.2	16.4
PNCOD	2M50G1W	2500	2				-9	3.2
GMSAF	1M25G7W	1250	4	2.4	0.25	27.2	-1.9	10.3
GMSAH	1M25G7W	1250	4	614.4	0.5	3.1	0.5	12.7
GMSV1	6K4G1W	6.4	4	4.8	0.5	0	1.4	13.6
GMSR1	6K4G1W	6.4	4	9.6	0.5		5.2	17.4
GMSR2	12K8G1W	12.8	4	19.2	0.5		9.6	21.8
GMSR3	1M25G7W	1250	4	38.4	0.5	15.1	-12.4	-0.2
GMSR4	1M25G7W	1250	4	460.8	0.5	4.3	-1.2	11
G3GFV	31K3G7W	31.25	2	4	0.5		-6.4	5.8
G3G3G	62K5G7W	62.5	4	56	0.7		17	4.8
G3GF2	62K5G7W	62.5	4	64	0.8		6.2	18.4
G3GF3	156KG7W	156.25	4	160	0.83		5.2	17.4
G3GR1	31K3G7W	31.25	4	21	0.6		3.7	15.9
G3GR2	62K5G7W	62.5	2	47	0.7		2.9	15.1
G3GR3	156KG7W	156.25	4	160	0.83		4.4	16.6
G3GRV	31K3G7W	31.25	2	31.25	0.5		-6.4	5.8
GMSAM	1M25G7W	1250	4	614.4	0.5	4.3	0.5	12.7

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.		
FWD3	FWD6	CW1		1		Noise Budget-E		61	-20	-19.3	26	28	-136	-16
FWD3	FWD6	FESC		1		Noise Budget-E		61	-20	-19.3	26	28	-136.8	-16
FWD3	FWD6	MMS		1		Noise Budget-E		61	-20	-20	22	24	-140	-21
CMOM1	CMOM1		CMD	1		Noise Budget-C		61	30	30				36.5
CMOM2	CMOM2		CMD	1		Noise Budget-C		61	30	30				36.5
CMHG	CMHG		CMD	1		Noise Budget-C		61	8	28				36.5
TLOM1	TLOM1		TELEM	1		Noise Budget-T					0	0	-177	36.5
TLOM2	TLOM2		TELEM	1		Noise Budget-T					0	0	-177	36.5
TLHG1	TLHG1		TELEM	1		Noise Budget-T					20	20	-157	36.5
RTN13	RTN24	FESC		1		Noise Budget-E		8	5.5	9.5	12.7	14.7	-150.1	36.5
RTN13	RTN24	MMS		1		Noise Budget-E		4	-4.5	1.5	5.2	7.2	-156.8	36.5
TLHG2	TLHG2		TELEM	1		Noise Budget-T					20	20	-157	36.5
TBEAC	TBEA2	PNCOD		1		Noise Budget-S					20	20	-157	36.5
FWD1	FWD4	GMSAF		1		D1 GMSA Acce		61	-8.7	4	56.8	60.8	-127.1	-31
FWD1	FWD4	GMSAH		1		D2 GMSA PC		61	-8.7	4	56.8	60.8	-127.1	-15
RTN1	RTN16	GMSV1		1		D4 GMSA Voic		-4	-17	-2	-6.7	-2.7	-167.7	36.5
RTN1	RTN16	GMSR1		1		D5 GMSA 9.6 k		3	-21	-6	-3.4	0.6	-164.4	36.5
RTN1	RTN16	GMSR2		1		D6 GMSA 19.2		12	-16	4	7.6	11.6	-156.5	36.5
RTN1	RTN16	GMSR3		1		D7 GMSA CDM		3	-21	-6	-3.6	0.4	-187.5	36.5
RTN1	RTN16	GMSR4		1		D8 GMSA CDM		12	-16	4	10.1	14.1	-173.8	36.5
FWD1	FWD4	G3GFV		1		D9 GMR3G Voi		61	-24.7	-12	46.3	50.3	-121.6	-31
FWD1	FWD4	G3G3G		1		D11 GMR3G 5		61	-21.7	-9	51	55	-119.9	-31
FWD1	FWD4	G3GF2		1		D13 GMR3G 4		61	-21.7	-9	51	55	-119.9	-26
FWD1	FWD4	G3GF3		1		D15 GMR3G 1		61	-17.7	-5	53	57	-121.9	-17
RTN1	RTN16	G3GR1		1		D12 GMR3G 2		-4	-3.3	2.7	0.85	4.85	-167.1	37
RTN1	RTN16	G3GR2		1		D14 GMR3G 4		1	-6	0	3.16	7.16	-167.8	37
RTN1	RTN16	G3GR3		1		D16 GMR3G 1		12	-5	0	15.4	19.4	-159.5	37
RTN1	RTN16	G3GRV		1		D10 GMR3G V		-4	-10	-2	-4	0	-172	37
FWD1	FWD4	GMSAM		1		D3 GMSA Forw		61	-8.7	4	56.8	60.8	-127.1	-26

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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

Remote Control (TT C) Location(s):

S14a: Street Address: 1601 Telesat Court			
S14b. City: Ottawa	S14c. County:	S14d. State/Country	S14e. Zip Code: K1B 1B9
S14f. Telephone Number: 888-835-3728 x3315		S14g. Call Sign of Control Station (if appropriate):	

Remote Control (TT C) Location(s):

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

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**Page 11:
Characteristics and
Certifications**

S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a. Mass of spacecraft without fuel (kg): 3253	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 2180		
S15c. Mass of spacecraft and fuel at launch (kg): 5433	S15f. Length (m): 40.5	S15i. Payload: 0.8541
S15d. Mass of fuel, in orbit, at beginning of life (kg): 2175	S15g. Width (m): 29.1	S15j. Bus: 0.8357
S15e. Deployed Area of Solar Array (square meters): 64.5	S15h. Height (m): 18.4	S15k. Total: 0.71

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): 10650	(f): 10650	(k): 10650	(p): 10650
Bus (Watts):	(b): 750	(g): 880	(l): 750	(q): 880
Total (Watts):	(c): 11400	(h): 11530	(m): 11400	(r): 11530
Solar Array (Watts):	(d): 14200	(i): 13360	(n): 12900	(s): 12145
Depth of Battery Discharge (%):	(e) 63 %	(j) 0 %	(o) 73 %	(t) 0 %

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.