

**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: ORBCOMM GENERATION 2		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): 5 Years	j. Number of transponders offered on a common carrier basis:
c. Construction Completion Date:		g. Total Number of Transponders: 3	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) 5.05 MHz	l. Orbit Type: Mark all boxes that apply: <input type="checkbox"/> GSO <input checked="" type="checkbox"/> 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	Nature of Service(s): List all that apply to this band	f.
Lower Frequency (.Hz)		Upper Frequency (.Hz)				
a. Numeric	b. Unit (K/M/G)	c. Numeric	d. Unit (K/M/G)			
137.025	M	137.175	M	T	NVNG MSS	
137.000	M	137.025	M	T	NVNG MSS (Non-voice, non-geostationary mobile satellite service)	
137.175	M	137.825	M	T	NVNG MSS	
137.825	M	138.000	M	T	NVNG MSS	
148.000	M	149.900	M	R	NVNG MSS	
149.900	M	150.050	M	R	NVNG MSS	
161.000	M	161.575	M	R	AIS (USCG Automatic Identification System)	
161.575	M	161.625	M	R	AIS	
161.625	M	161.775	M	R	AIS	
161.775	M	162.0125	M	R	AIS	
162.0125	M	163.000	M	R	AIS	

**S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:**

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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: 17      S4c. Celestial Reference Body (Earth, Sun, Moon, etc.): E  
S4b. Total Number of Orbital Planes in Network or System: 4      S4d. Orbit Epoch Date: 4/1/2014

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
1	4	47	5945	715	715	0	0	0	360	
2	4	47	5945	715	715	90	0	0	360	
3	4	47	5945	715	715	180	0	0	360	
4	5	47	5945	715	715	270	0	0	360	

**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)
1	1	0
1	2	90
1	3	180
1	4	270
2	1	0
2	2	90
2	3	180
2	4	270
3	1	0
3	2	90
3	3	180
3	4	270
4	1	0
4	2	72
4	3	144
4	4	216
4	5	288



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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.
A	S		Global Coverage

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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
VHF-	T	0	-5.2	0	0	18.8	N		A	1	22.4	13.5					
VHF-	R	1.5	-9.2	0	0	18.8	N		A				680	-26.8			
AIS-R	R	0.4	-0.1	0	0	18.8	N		A				680	-27.9			

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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
VHF-	T	C		Attachment A		-126.72	-126.47	-126.22	-125.89	-125.48
VHF-	R	C		Attachment A						
AIS-R	R	C		Attachment A						

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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)
VF-T	1000	T	137.5	R	C
VF-R	2050	R	149.025	R	C
AS-R	2000	R	162	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
V-R		VF-R	VHF-R		
A-R		AS-R	AIS-R		
V-T				VF-T	VHF-T

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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)
1	6K72G1D	15	2	4.8			12.3	24.5
2	6K72G1D	15	4	7.2	0.75		8.1	20.3
3	40K3G1D	50	4	57.6			15.6	27.8
4	40K3G1D	50	16	86.4	0.75		16.4	28.6
5	10K0F1D	25	2	9.6			15.5	27.7
6	3K36G1D	5	2	2.4			12.3	24.5
7	3K60G1D	5	4	4.8	0.9		12.3	24.5



## Page 8: Analog Modulation

(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 Componder, Preemphasis, and Noise Weighting (dB)	(n) Total C/N Performance Objective (dB)	(o) Single Entry C/ 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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**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 <sup>2</sup> /Hz)	(o) Assoc. Stn Rec. G/T (dB/K)
(a) Start	(b) End								(j) Min.	(k) Max.	(l) Min.	(m) Max.		
V-T	V-T	1		6	15	Attach 1					8.3	13.5	-125.4	-32.7
V-T	V-T	2		6	15	Attach 1					8.3	13.5	-125.4	-32.7
V-T	V-T	3		1		Attach 1					-3.9	1.3	-145.4	-12.6
V-T	V-T	4		1		Attach 1					-3.9	1.3	-145.4	-12.6
V-R	V-R	6		80	5	Attach 1		0	7	7				
V-R	V-R	7		80	5	Attach 1		0	7	7				
V-R	V-R	3		1		Attach 1		0	32.7	32.7				
V-R	V-R	4		1		Attach 1		0	32.7	32.7				
A-R	A-R	5		2	25	Attach 1		0	10.8	10.8				

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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: 22265 Pacific Boulevard			
S14b. City: Dulles	S14c. County: Loudoun	S14d. State/Country VA	S14e. Zip Code: 20166
S14f. Telephone Number: 703-433-6300		S14g. Call Sign of Control Station (if appropriate):	

**Remote Control (TT C) Location(s):**

S14a: Street Address: 1527 Bray Road			
S14b. City: Arcade	S14c. County: Wyoming	S14d. State/Country NY	S14e. Zip Code: 14009
S14f. Telephone Number:		S14g. Call Sign of Control Station (if appropriate): E940535	

**Remote Control (TT C) Location(s):**

S14a: Street Address: Lyte Lane			
S14b. City: Ocilla	S14c. County: Irwin	S14d. State/Country GA	S14e. Zip Code: 31774
S14f. Telephone Number:		S14g. Call Sign of Control Station (if appropriate): E940536	

**Remote Control (TT C) Location(s):**

S14a: Street Address: State Road 61			
S14b. City: St. Johns	S14c. County: Apache	S14d. State/Country AZ	S14e. Zip Code: 85936
S14f. Telephone Number:		S14g. Call Sign of Control Station (if appropriate): E940537	

**Remote Control (TT C) Location(s):**

S14a: Street Address: 16286 Bager Mountain Road			
S14b. City: East Wenatchee	S14c. County: Douglas	S14d. State/Country WA	S14e. Zip Code: 98801
S14f. Telephone Number:		S14g. Call Sign of Control Station (if appropriate): E940537	

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**Page 11:  
Characteristics and  
Certifications**

**S15. SPACECRAFT PHYSICAL CHARACTERISTICS:**

S15a. Mass of spacecraft without fuel (kg): 175	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 10.3		
S15c. Mass of spacecraft and fuel at launch (kg): 185.3	S15f. Length (m): 1	S15i. Payload: 0.8367
S15d. Mass of fuel, in orbit, at beginning of life (kg): 10.3	S15g. Width (m): 1	S15j. Bus: 0.8367
S15e. Deployed Area of Solar Array (square meters): 2.7	S15h. Height (m): 7.5	S15k. Total: 0.7

**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): 250	(f): 250	(k): 250	(p): 250
Bus (Watts):	(b): 50	(g): 50	(l): 50	(q): 50
Total (Watts):	(c): 300	(h): 300	(m): 300	(r): 300
Solar Array (Watts):	(d): 600	(i): 537	(n): 552	(s): 494
Depth of Battery Discharge (%):	(e) 20 %	(j) 20 %	(o) 20 %	(t) 20 %

**S17. CERTIFICATIONS:**

a. Are the power flux density limits of § 25.208 met?:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input checked="" type="checkbox"/> 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?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input checked="" type="checkbox"/> 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?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> 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.**