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: XM-1		e. Estimated Date of Placement into Service: 7/15/2001	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: 2	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) 3.68 MHz	l. Orbit Type: Mark all boxes that apply: [X] 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)		
2332.5	M	2345.0	M	T	Satellite Digital Audio Radio Service
7025	M	7075	M	R	Satellite Digital Audio Radio Service

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 85.15 W	b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: Optimal Look Angle for CONUS/CANADA. Colocation with Primary Satellite XM-3 to act as spare capacity for XM-3 or XM-4. XM Repeaters fed from 85.083 location of XM-3.
Longitudinal Tolerance or E/W Station-Keeping: d. Toward West: 0.033 Degrees e. Toward East: 0.033 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.
USA	S		USA
CAN	S		CAN

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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. (db/K)	(p) Min. Saturation Flux Density (dBW/m2)	Input Attenuator (dB)	
																(q) Max. Value	(r) Step Size
XM2T	T	34.65	27	0.1	0.1	17	N		USA	1		71					
XM2	R	18.61	18	0.1	0.1	20	Y		USA				509	-5.3	-92	22	1

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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
XM2T	T	C	85.15		8515WL_Gain Contou	-129	-129	-126	-124	-121
XM2	R	C	85.15		WL_Receive Gain Co					

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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)
1	1840	T	2333.465	L	C
2	1840	T	2335.305	L	C
3	1840	T	2342.205	L	C
4	1840	T	2344.045	L	C
1R	1840	R	7063.993	R	C
2R	1840	R	7061.561	R	C
3R	1840	R	7065.965	R	C
4R	1840	R	7068.397	R	C
CMD1	800	R	7049.0	L	T
CMD2	800	R	7074.0	L	T
TLM1	100	T	2339.2	R	T
TLM2	100	T	2339.7	R	T
TLM3	100	T	2344.0	R	T
TLM4	100	T	2344.5	R	T
5	1840	T	2338.75	L	C
5R	1840	T	7058.521	R	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
1	150	1R	XM2R	1	XM2T
2	150	2R	XM2R	2	XM2T
3	150	3R	XM2R	3	XM2T
4	150	4R	XM2R	4	XM2T
CMD1		CMD1	XM2R		
CMD2		CMD2	XM2R		
TLM1				TLM1	XM2T
5	150	5R	XM2R	5	XM2T
TLM2				TLM2	XM2T
TLM3				TLM3	XM2T
TLM4				TLM4	XM2T

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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)
TDM	1M84G1ED	1840	4	2048	0.75		69.1	85
CMD	800KF2DC	800	1	1				
TLM	100KG2DC	100	2	4			48	

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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)			
(a) Start	(b) End	(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/m2/Hz)	(o)Assoc. Stn Rec. G/T (dB/K)
									(j) Min.	(k) Max.	(l) Min.	(m) Max.		
1	5	TDM		1			0	52.3	41	64	60	71	-118	-20
CMD1	CMD2	CMD		1			0	52.4	51.4	78	0	0	0	
TLM1	TLM4	TLM		1			0				24	32	-157	21.8

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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): No

Remote Control (TT C) Location(s):

S14a: Street Address: 2875 Fork Creek Church Road			
S14b. City: Ellenwood	S14c. County: Clayton	S14d. State/Country GA	S14e. Zip Code: 30294
S14f. Telephone Number: 4043812000	S14g. Call Sign of Control Station (if appropriate): E040204		

Remote Control (TT C) Location(s):

S14a: Street Address: 1500 Eckington Place			
S14b. City: Washington	S14c. County:	S14d. State/Country DC	S14e. Zip Code: 20002
S14f. Telephone Number: 2023804000	S14g. Call Sign of Control Station (if appropriate): E000158		

Remote Control (TT C) Location(s):

S14a: Street Address: 1780 Centre Ave NE			
S14b. City: Calgary	S14c. County: Alberta	S14d. State/Country	S14e. Zip Code: T2E 0A6
S14f. Telephone Number: 4032355751	S14g. Call Sign of Control Station (if appropriate):		

Remote Control (TT C) Location(s):

S14a: Street Address: 133438 Allan Park Rd			
S14b. City: Allan Park	S14c. County: Ontario	S14d. State/Country	S14e. Zip Code: N4N 3B8
S14f. Telephone Number: 5193717490	S14g. Call Sign of Control Station (if appropriate):		

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S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a: Mass of spacecraft without fuel (kg): 2746	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 1981		
S15c. Mass of spacecraft and fuel at launch (kg): 4727	S15f. Length (m): 6.75	S15i. Payload: 0.8795
S15d. Mass of fuel, in orbit, at beginning of life (kg): 231	S15g. Width (m): 14.24	S15j. Bus: 0.8665
S15e. Deployed Area of Solar Array (square meters): 156	S15h. Height (m): 36.9	S15k. Total: 0.762

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): 12844	(f): 12844	(k): 12844	(p): 12844
Bus (Watts):	(b): 971	(g): 908	(l): 971	(q): 908
Total (Watts):	(c): 13815	(h): 13752	(m) 13815	(r): 13752
Solar Array (Watts):	(d): 20000	(i): 19500	(n): 17842	(s): 15672
Depth of Battery Discharge (%):	(e) 78.5 %	(j) 13.6 %	(o) 78.5 %	(t) 13.6 %

S17. CERTIFICATIONS:

a. Are the power flux density limits of § 25.208 met?:	X	**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**	X	**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?	X	**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.