

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: INMARSAT 4F2		e. Estimated Date of Placement into Service: 12/31/2005		i. Will the space station(s) operate on a Common Carrier Basis: N	
b. Construction Commencement Date: 1/1/2001		f. Estimated Lifetime of Satellite(s): 12 Years		j. Number of transponders offered on a common carrier basis: 0	
c. Construction Completion Date: 6/1/2005		g. Total Number of Transponders: 1260		k. Total Common Carrier Transponder Bandwidth: 0 MHz	
d1. Est Launch Date Begin: 10/1/2005	d2. Est Launch Date End: 10/31/2005	h. Total Transponder Bandwidth (no. transponders x Bandwidth) 252 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	R	Mobile-Satellite Service
1626.5	M	1660.5	M	T	Mobile-Satellite Service
6425	M	6515.8	M	R	Feeder Link for Mobile Satellite Service in FSS
3564.2	M	3657.8	M	T	Feeder Link for Mobile Satellite Service in FSS
6338	M	6342	M	R	Fixed Satellite Service
3945	M	3955	M	T	Fixed Satellite Service

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 52.75 W		b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: The Inmarsat 4F2 satellite will operate at the 52.75°W.L. geostationary orbital location. The Inmarsat 4F2 satellite will replace the Inmarsat 3 satellite, which currently operates at 54°W.L. and for which the Commission has already authorized the provision of service. This orbital location optimizes Atlantic Ocean coverage while complementing the coverage provided by the Inmarsat 4F1 satellite at 64°W.L.
Longitudinal Tolerance or E/W Station-Keeping:		f. Inclination Excursion or N/S Station-Keeping Tolerance:	Range of orbital are in which adequate service can be provided (Optional):	
d. Toward West:	0.1 Degrees	3 Degrees	g. Westernmost:	
e. Toward East:	0.1 Degrees		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.
GLOBAL	S		All visible areas of the 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
CGU	R	22	18	0.2	0.1	30	N		GLOBAL				692	-6.4	-174.7	16	1
CGU	R	22	18	0.2	0.1	30	N		GLOBAL				692	-6.4	-174.7	16	1
CGD	T	22	18	0.2	0.1	30	N		GLOBAL	3.4	20.1	35					
CGD	T	22	18	0.2	0.1	30	N		GLOBAL	3.4	20.1	35					
LSU	R	42	39	0.2	0.1		N		GLOBAL				583	14.3	-188.8	16	2
LRU	R	34	30	0.2	0.1		N		GLOBAL				1259	3	-168.8	16	2
LSD	T	42	39	0.2	0.1		N		GLOBAL	4.1	631	70					
LRD	T	34	30	0.2	0.1		N		GLOBAL	4.1	251.2	58					
LGD	T	22	18	0.2	0.1		N		GLOBAL	4.1	125.9	43					
TCN	R	9	1.5	0.2	0.1	30	N		GLOBAL				501	-18	-175.1		
TCNL	R	9	1.5	0.2	0.1	30	N		GLOBAL				501	-18	-175.1		
CRD	T	22	18	0.2	0.1	30	N		GLOBAL	3.5	0.355	17.5					
CRD	T	22	18	0.2	0.1	30	N		GLOBAL	3.5	0.355	17.5					
LGU	R	22	18	0.2	0.1		N		GLOBAL				632	-6	-168.8	16	2

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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
CGU	R	C	-52.75		CGUR.GXT					
CGU	R	C	-52.75		CGUL.GXT					
CGD	T	C	-52.75		CGDR.GXT	-169.5	-169.3	-169.1	-168.8	-168.5
CGD	T	C	-52.75		CGDL.GXT	-169.5	-169.3	-169.1	-168.8	-168.5
LSU	R	C	-52.75		LSU.GXT					
LRU	R	C	-52.75		LRU.GXT					
LSD	T	C	-52.75		LSD.GXT					
LRD	T	C	-52.75		LRD.GXT					
LGD	T	C	-52.75		LGD.GXT					
TCN	R	C	-52.75		TCNR.GXT					
TCNL	R	C	-52.75		TCNL.GXT					
CRD	T	C	-52.75		CRDR.GXT	-170.9	-170.7	-170.5	-170.2	-169.9
CRD	T	C	-52.75		CRDL.GXT	-170.9	-170.7	-170.5	-170.2	-169.9
LGU	R	C	-52.75		LGU.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)
CXU	90800	R	6470.4	R	C
CYU	90800	R	6470.4	L	C
CXD	106400	T	3604.6	R	C
CYD	106400	T	3604.6	L	C
LU	34000	R	1542	R	C
LD	34000	T	1643.5	R	C
TLCR	4000	R	6340	R	T
TLCL	4000	R	6340	L	T
TLMR	10000	T	3950	R	T
TLML	10000	T	3950	L	T

(a) Transponder ID	(b) Transponder Gain (dB)	Receive Band		Transmit Band	
		(c) Channel No.	(d) Beam ID	(e) Channel No.	(f) Beam ID
FL1	192	CXU	CGUR	LD	LSD
FL2	192	CYU	CGUL	LD	LSD
FL3	176	CXU	CGUR	LD	LRD
FL4	176	CYU	CGUL	LD	LRD
FL5	176	CXU	CGUR	LD	LGD
FL6	176	CYU	CGUL	LD	LGD
RL1	192	LU	LSU	CXD	CGDR
RL2	192	LU	LSU	CYD	CGDL
RL3	176	LU	LRU	CXD	CGDR
RL4	176	LU	LRU	CYD	CGDL
RL5	176	LU	LGU	CXD	CGDR
RL6	176	LU	LGU	CYD	CGDL
TC1		TLCR	TCNR		
TC2		TLCL	TCNL		
TM1				TLMR	CRDR
TM2				TLML	CRDL

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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)
C1F2	200KD7W	200	16	492	0.822		12.3	24.5
C2F2	200KD7W	200	16	464	0.775		11.4	23.6
C3F2	200KD7W	200	16	384	0.642		9.1	21.3
C1F3	50K0D7W	50	16	98	0.766		11.4	23.6
C2F3	50K0D7W	50	16	90	0.703		10.3	22.5
C3F3	50K0G7W	50	4	49.2	0.796		5.4	17.6
C1F4	12K5G7W	12.5	4	12.2	0.897		8.1	20.3
C2F4	12K5G7W	12.5	4	12.2	0.897		8.1	20.3
C3F4	12K5G7W	12.5	4	12.2	0.897		8.1	20.3
C1R3	50K0D7W	50	16	101.6	0.852		12	24.2
C2R3	50K0G7W	50	4	52.8	0.87		6.6	18.8
C3R3	25K0G7W	25	4	20	0.73		4.4	16.6
C1RT	200KD7W	200	16	492.8	0.852		12.7	24.9
C2RT	200KD7W	200	16	448	0.775		10.8	23
C3RT	200KG7W	200	4	239.6	0.83		4.8	17
13	20K0G1E	20	4	12	0.5		5.1	17.3
14	100KG1X	100	4	64	0.5		5	17.2
15	10K0G1X	10	2	3	0.5		0.6	12.8
16	10K0G1W	10	4	4	0.5		5	17.2
17	10K0G1X	10	2	3	0.5		1.1	13.3
18	10K0G1X	10	2	3	0.5		1.1	13.3
19	10K0G1X	10	2	3	0.5		1.1	13.3
20	5K00G1D	5	2	0.3	0.5		3.5	15.7
21	2K50F1D	2.5	2	0.001	0.242		-10.9	1.3
22	20K0G1E	20	4	12	0.5		5.1	17.3
23	100KG1X	100	4	64	0.5		5	17.2
24	20K0G1X	20	4	12	0.5		4.4	16.6
25	10K0G1W	10	4	4	0.5		5	17.2
26	20K0G1X	20	2	1.5	0.5		1.7	13.9
27	20K0G1X	20	2	1.5	0.5		1.2	13.4
28	5K00G1D	5	2	0.3	0.5		3.5	15.7

29	2K50F1D	2.5	2	0.064	0.5		-3.7	8.5
30	20K0G1E	20	4	12	0.5		5.1	17.3
31	100KG1X	100	4	64	0.5		5	17.2
32	10K0G1W	10	4	4	0.5		5	17.2
33	5K00G1E	5	4	2.8	0.5		5.4	17.6
34	60K0D1W	60	16	64	0.476		7.7	19.9
35	5K00G1W	5	4	3.6	0.643		5.4	17.6
36	5K00G1D	5	2	0.3	0.5		3.5	15.7
37	2K50F1D	2.5	2	0.001	0.242		-10.9	1.3
38	20K0G1E	20	4	12	0.5		5.1	17.3
39	100KG1X	100	4	64	0.5		5	17.2
40	10K0G1W	10	4	4	0.5		5	17.2
41	5K00G1E	5	4	2.8	0.5		5.4	17.6
42	60K0D1W	60	16	64	0.476		7.7	19.9
43	5K00G1W	5	4	3.6	0.643		5.4	17.6
44	5K00G1D	5	2	0.3	0.5		3.5	15.7
45	2K50F1D	2.5	2	0.064	0.5		2.3	14.5

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 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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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.		
FL5	FL6	14		174	100	FLG INM-B 100		54	-3.1	1.9	20.6	24.6		-4
FL5	FL6	15		2089	10	FLG INM-B 10		54	-13.9	-8.9	9.8	13.8		-4
FL5	FL6	16		290	10	FLG INM-M 10		54	-5.3	-0.3	18.4	22.4		-10
FL5	FL6	17		479	10	FLG INM-M 10		54	-7.5	-2.5	16.2	20.2		-10
FL5	FL6	18		135	10	FLG MINI-M 10		54	-2	3	21.7	25.7		-17
FL5	FL6	19		135	10	FLG M-4 10 kH		54	-2	3	21.7	25.7		-7
FL5	FL6	20		207	10	FLG INM-C.doc		54	-3.9	1.1	19.8	23.8		-23
FL5	FL6	21		178	5	FLG INM-D.doc		54	-4.6	0.4	20.5	24.5		-22.1
RL5	RL6	22		368	20	RLG INM-B 20		21	5	12	-8.4	2.6	-165.2	30.7
RL5	RL6	23		174	100	RLG INM-B 100		21	8	12	-1.4	6.6	-168.5	30.7
RL5	RL6	24		2089	20	RLG INM-B 20		21	4.3	12	-9.1	2.6	-165.2	30.7
RL5	RL6	25		290	10	RLG INM-M 10		14	7	13	-13.4	-6.4	-169.4	30.7
RL5	RL6	26		479	20	RLG INM-M 20		14	3	11	-17.4	-5.4	-167.2	30.7
RL5	RL6	27		135	20	RLG MINI-M 20		10	3	7	-21.4	-13.4	-175.5	30.7
RL5	RL6	28		207	5	RLG INM-C.doc		0	9.6	16	-23	-12.6	-174.7	30.7
RL5	RL6	29		178	2.5	RLG INM-D.doc		3.5	-4.9	5.5	-30.2	-18.8	-180.9	30.7
FL3	FL4	30		6300	20	FLR INM-B 20		54	-4.2	0.8	19.5	23.5		-4
FL3	FL4	31		1260	100	FLR INM-B 100		54	0.8	5.8	24.5	28.5		-4
FL3	FL4	32		4898	10	FLR INM-M 10		54	-2.6	2.4	21.1	25.1		-12
FL3	FL4	33		17341	5	FLR MINI-M 5 k		54	-8.1	-3.1	15.6	19.6		-7
FL3	FL4	34		830	60	FLR M4 60 kHz		54	5.1	10.1	28.8	32.8		-7
FL3	FL4	35		17378	5	FLR M4 5 kHz.		54	-8.1	-3.1	15.6	19.6		-7
FL3	FL4	35		6122	5	FLR INM-C.doc		54	-3.6	1.4	20.1	24.1		-23
FL3	FL4	37		5623	5	FLR INM-D.doc		54	-4.6	0.4	20.5	24.5		-22.1
RL3	RL4	38		6300	20	RLR INM-B 20		21	-4.1	4	-10.7	1.4	-166.4	30.7
RL3	RL4	39		1260	100	RLR INM-B 100		21	-1	4	-3.6	5.4	-169.7	30.7
RL3	RL4	40		5129	10	RLR INM-M 10		12	0	7	-15.6	-4.6	-167.6	30.7
RL3	RL4	41		17341	5	RLR MINI-M 5		18	-7.3	-1	-16.9	-6.6	-168.1	30.7
RL3	RL4	42		830	60	RLR M4 60 kHz		18	6.2	7	-3.4	1.4	-170.7	30.7

RL3	RL4	43		17378	5	RLR M4 5 kHz.		18	-7.3	-1	-16.9	-6.6	-168.1	30.7
RL3	RL4	44		6122	5	RLR INM-C.doc		0	0.4	7	-25.4	-14.8	-176.9	30.7
RL3	RL4	45		5623	2.5	RLR INM-D.doc		3.5	-6.5	-3.5	-25	-18	-180.1	30.7
FL1	FL2	C1F2		630	200	C1F2 LB.doc		57	-4.7	0.3	41.5	44.5		-9.7
FL1	FL2	C2F2		630	200	C2F2 LB.doc		57	-4.7	0.3	41.5	44.5		-12.5
FL1	FL2	C3F2		630	200	C3F2 LB.doc		57	-4.7	0.3	41.5	44.5		-16.9
FL3	FL4	C1F3		2520	50	C1F3 LB.doc		57	-1	4	29.2	33.2		-9.7
FL3	FL4	C2F3		2520	50	C2F3 LB.doc		57	-1	4	29.2	33.2		-12.5
FL3	FL4	C3F3		2520	50	C3F3 LB.doc		57	-1	4	29.2	33.2		-16.9
FL5	FL6	C1F4		1		C1F4 LB.doc		57	-1.7	3.3	29	33		-9.7
FL5	FL6	C2F4		1		C2F4 LB.doc		57	-1.7	3.3	29	33		-12.5
FL5	FL6	C3F4		1		C3F4 LB.doc		57	-1.7	3.3	29	33		-16.9
RL1	RL2	C1R3		2520	50	C1R3 LB.doc		16	2	5	-0.5	6.5	-165.8	32.3
RL1	RL2	C2R3		2520	50	C2R3 LB.doc		13	0.1	3.1	-6.5	1.6	-170.7	32.3
RL1	RL2	C3R3		5040	25	C3R3 LB.doc		8	0	3	-11.7	-3.5	-172.8	32.3
RL3	RL4	C1RT		630	200	C1RT LB.doc		16	2	5	5	14.5	-164.3	32.3
RL3	RL4	C2RT		630	200	C2RT LB.doc		13	0.1	3.1	5	9.6	-169.2	32.3
RL3	RL4	C3RT		630	200	C3RT LB.doc		8	0	3	-2	4.5	-174.3	32.3
FL5	FL6	13		368	20	FLG INM-B 20		54	-6.4	-1.4	17.3	21.3		-4

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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: c/o Telespazio, Stazione del Fucino P.Fanti			
S14b. City: ORTUCCHIO	S14c. County: L'AQUILA	S14d. State/Country	S14e. Zip Code: 67050
S14f. Telephone Number: +39 0863 5501		S14g. Call Sign of Control Station (if appropriate):	

**FEDERAL COMMUNICATIONS COMMISSION
SATELLITE SPACE STATION AUTHORIZATIONS
FCC Form 312 - Schedule S: (Technical and Operational Description)**

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Characteristics and
Certifications**

S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a. Mass of spacecraft without fuel (kg): 3340	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 2619		
S15c. Mass of spacecraft and fuel at launch (kg): 5959	S15f. Length (m): 18	S15i. Payload: 0.74
S15d. Mass of fuel, in orbit, at beginning of life (kg): 350	S15g. Width (m): 45	S15j. Bus: 0.89
S15e. Deployed Area of Solar Array (square meters): 89.3	S15h. Height (m): 8	S15k. Total: 0.66

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): 8981	(f): 8981	(k): 8981	(p): 8981
Bus (Watts):	(b): 840	(g): 596	(l): 840	(q): 596
Total (Watts):	(c): 11635	(h): 10423	(m): 11696	(r): 10423
Solar Array (Watts):	(d): 14086	(i): 13208	(n): 13388	(s): 12038
Depth of Battery Discharge (%):	(e) 68 %	(j) 0 %	(o) 72 %	(t) 12 %

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.