		Contractor >>	Ball Aerospace	Ball Aerospace	Lockheed Martin	Lockheed Martin	MAXAR	Northrop Grumman	Northrop Grumman	QinetiQ Space	Space Elight Laboratory (SEL)	Space Flight Laboratory (SFL)	Southwast Pasaarch Institute	Research	Thales Alenia Italy	Thales Alenia	Tyvak	Tyvak
	Demonst	Spacecraft Name >> Units					1300		LEOStar-3	P200	DEFIANT	DAUNTLESS		Institute	SwSP-100	France		
Compatibility	Parameter Orbit Average Payload Power		Small	Large	LM4XX	LM2100 1,400 to 16,000 W		ESPASat-Ex					SwSP-35	SwSP-100	(Baseline Config)	ELiTeBUS 1000	Trestles-6U	Trestles-12U
,	(EOL) Maximum Payload Mass	W (EOL)	90 170	600	409	300 to 1.275+	4000 - 16,000 500 , up to 1200	100	580	70	20 to 50 7 to 30	30 to 173 30 to 300	22	50	2200	955	35 7.31	60 15.5
	Bus Dry mass (w/o Payload)	kg	170	1270	186	900 to 2,645	939, up to 3000	88	1718	163	11 to 41	60 to 180	24	56.93	945	342	7.69	9.5
	Science Data Downlink Science Data Storage	kbps Mbit	2,000 48,000	300,000 343,000	mission-specific mission-specific	120,000 32MB	up to 2,000,000 400 MB	4000 S-Band 16000	384000 X-Band 4000000	100000	up to 2 GB (or SU to 400 MBps up to 2 GB (or 32 to 256 GB with	up to 2 MBps ( or 50 to 400 MBps up to 2 GB (or 32 to 256 GB with	4,000	7530 16000	16 / 128 / 512 / 2048 1530 Gbits (EQL)	option	2,048 49.152	2,048 49,152
	(Canacity)					<60				512	Ontion 1)	Ontion 1)		1.5	< 0.015°, < 5 arcsec or better using additional.	option		
	Pointing Knowledge	arcsec	25	18	413 (3 <b>0</b> )	<40	32 arc sec	29	5	2	5.5	5.5	116 (3sigma)	(pitch/roll/ vaw) 35	Star Tracker	90	25	25
	Pointing Control Pointing Stability (Jitter)	arcsec arcsec/sec	25	28.8	462 (3 <b>0</b> ) 5 (3 <b>0</b> )	<46	10.8 to 36 arc sec 0.001 deg 3 sigma	63 pitch 39 roll/yaw 12	21 1.2 arc sec 3 sigma below 500 Hz	6 1.5	10 < 1	10 <1	264 (3sigma) 20	(nitch/roll/ 20	0.0025°(peak-peak) in 2 s		50	50
	Slew rate	deg / min	5	16	44	36	None	90	19	60	1 to 5	1 to 5	3 (pitch and yaw), 1.5 (roll)	3 (pitch and vaw)	< 1°/sec	n/a	180	120
	Mission Design Life	years	1, 0.9 Ps	5, 0.93 Ps	1-3	15 Falcon 9 / Ariane / Atlas V /	15, 0.85 Ps	2	5	5	1 to 3	1 to 3	2	3 GSFC-STD-	7	12.5	2	2+
	Compatible LVs	(names)	Delta II, Pegsus, Falcon 9, Atlas V, ESPA-G	Delta II, Falcon 9, Atlas V, Falcon Heavy	Pegasus XL, Minotaur I, Minotaur IV, Minotaur-C, Antares, Falcon 9, Electron, Launcher One, Alpha, RS-1, Alpha, Epsilon, Vega	Vulcan	Falcon 9, Atlas V, Delta V, H2A, Ariane 5, New Glenn, Vulcan	All EELV ESPA Compatible Launch Vehicles	, Altias V, Falcon 9	Falcon-9, Soyuz, PSLV, Ariane 5 & 6, Firefly Alpha.	Any	Any	GEVS, ESPA, NG-Pegasus, NG- Minotaur, RL-Electron, VO-L1, FF-Alpha	7000A (GEVS), ESPA, RocketLab, and Virgin Orbit LauncherOn e	Falcon9, Soyuz, Vega-C	Falcon 9, Soyuz	Ali Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz, VOX, etc.)	All Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz VOX, etc.)
_	Nominal Orbit	Altitude, Inclination, Type, Other	540 km 0 deg, equatorial	824 km, 98.7 deg, sun sync	LEO 400-1000 km, 0° to Sun Synch, Lunar	35,786, 0.0, GEO	GEO at 35,786 km, 0 deg	600 km, 98 deg, Sun Synch 12 pm LTAN	705 km, 98 deg, Sun Synch		400-1000 km, 0-98 deg inclination (any LEO)		Alt: 510 km Inclination: 35deg	Alt: 600km Inclination:	Apogee altitude: 450- 1500, Perigee altitude: 45 1500 km km, Orbit plane type: Dawn-dusk, Orbit type: Inclined or Sun-	i0 780 km, 86.4°	500 km, 98 deg, Sun Synch	500 km, 98 deg, Sun Synch
	Types of Orbits Available	as needed	LEO from 0 - 98 deg, up to 1,200 km	LEO from 0 - 98 deg, up tp 1200 km	LEO 400-1000 km 0° to Sun Synch, Lunar	GEO, MEO	HEO(GEO), MEO, LEO	All Low Earth Orbits, Earth- Trailing, Geosynchronous, Cis- Lunar, Libration Points	All Low Earth Orbits, Earth- Trailing , Geosynchronous, Cis- Lunar , Libration Points	Leo form 28.5 to 98 deg, up to 1000km	400-1000 km, 0-98 deg inclination (any LEO)	400-1000 km, 0-98 deg inclination (any LEO)	Alt: 450-750 km Inclination: 28-98deg SSO	Alt: 450- 750km Inclination: 0-98deg	synchronous Inclined or Sun- synchronous	LEO from 40 to 98 deg, up to 800km	Any inclination for Earth orbits is	Compatible with a vast range of orbits (LEO, GEO, Interplanetary).
	External Payload Volume	meters	1 m hex x 1 m height	1.7 m x 1.4 m x 1.5 m height	0.6 x 0.66 x 0.3 h 0.38 x 0.7 x 0.4 h	Earth deck: ~3.7 m2	2 m x 2 m x 4 m	.56 m x .56 x 21 h	3.55 m dia x 1.78 m h	650 mm x 770 mm (rootprint) x490 - 1872 mm (height)	up to 0.48 x 0.48 x 0.20	up to 1.1 x 1.2 x 0.71	Optional	SSO 0.46 x 0.48 x 0.86 (x/y/z)	3.6 m (max value)	Depends on launcher. Payload	supported N/A	N/A
	Internal Payload Volume	meters	None	None	0.07 m <sup>3</sup>		4 sections, each approx. 3.0 x 1.2	None	None	180 mm x 290 mm (footprint) x	up to 80% of external	up to 80% of external	465 x 190 x 122	Optional	ranges	Same panel, max	3.33E-3 m^3	14.40E-3 m^3
Description	ACS	type	3-axis	3-axis	Zero momentum,	meters; height varies 3-axis	x 0.3 m 3 axis stabilized	3-axis	3-axis	160 mm (height)	tracking, sun pointing, limb	tracking, sun pointing, limb	3-axis	3-axis	3 axis stabilized	height = 380mm 3-axis	3-axis	3-axis
					3-axis stabilized	2				3-axis stabilized	pointing, all possible)	pointing, all possible)			-			
	Star Trackers	# of STs	2	2	1	2	2	1	2	3	1 or 2	1 or 2	2	2	2	3	2	2
	GPS	# recievers	1	2	mission-specific	Z Li-lon, up to 280 Ahr	2	1	1 (internally redundant)	2	1 or 2	1 or 2	1	1 Li-	2	Option Li-ion / 252 cells	1	1
	Batteries Solar Arrays	cell type/capacity (Ah) cell type/Area (m2)	Li-ion / 24 Ah Triple Junction GaAs, 3.2 m <sup>2</sup>	Li-ion / 80 Ah (x2) Triple Junction GaAs, 11 m <sup>2</sup>	Li-ion, 30 Ah Triple Junction GaAs, 3.87 m <sup>2</sup>	Triple junction GaAs 24 - 60	Li-lon, 144 Ahr Triple Junction GaAs 22.4 m <sup>2</sup>	Li ion/24 Ah Triple Junction GaAs, 2.13 m <sup>2</sup>	Two, Li ion/268 Ah Triple Junction GaAs, 15.65 m <sup>2</sup>	P20/18 Four Deployable panels with 640 GaAs cells 30%	including body mounted cells for	including body mounted cells for	Li-ion/8.4 Ahr Triple Junction GaAs with ARC/3.5 m <sup>2</sup>	ion/12.5Ahr Triple Junction GaAs with	Li-Ion /< 340 GaAs/Ge Triple Junction Cells/ 18,3	4.5 Ah@4.1V Triple junction GaAs, 9m <sup>2</sup>	Li-ion, 12.5 Ah Two-terminal triple junction GalnP2/GaAs/Ge, 0.319 m^2	Li-ion, 12.5 Ah Two-terminal triple junction GalnP2/GaAs/Ge, 0.319 m^2
	Main Bus Voltage Range	volts	22 - 34	22 - 34	23-33 (28V nominal)	70V +/- 1.0V	31-100	28-33	25-34	24 - 33.6	safe hold power 10 to 13	safe hold power	26-32	ARC/0.7m2 26-32	Regulated 28 V to the Bus Unregulated 47 – 65 V to	s, o 28-38	9.0-12.6	9.0-12.6
-	C&DH Bus Architecture	description	1553	1553	Centralized processor control, Discrete I/O, 1553B and RS-422	Bus, 1553	1553, RS-485, Compact PCI serial	Single Master Avionics Unit for all spacecraft C&DH and power	IEM for spacecraft		with synchronous and	with synchronous and	RS-422/SpW	RS-	1553	1553	RS-422/485, Ethernet, USB 2.0	RS-422/485, Ethernet, USB 2.0
	Cabin bus Architecture	description	1555	1555	connections		data bus	control functions, .	interfaces and instrument SOH Separate Bauload Interface CCSDS, NEN (STDN), SN (TDRSS)	1553	asynchronous serial, I2C, SPI,	asynchronous serial, I2C, SPI, CAN, CBIO, discrete I/O NSP, commercial networks (KSAT-	K3-422/3pW	422/SpW	1333	1355	N3-422/485, Ethernet, 030 2.0	K3-422/485, Ethemet, 038 2.0
	Downlink Formats	CCSDS, STDN, etc	CCSDS, STDN	CCSDS, STDN	CCSDS or JPL type, STDN, DSN, SGLS, TDRSS	LM2100 BPSK; Optional: CCSDS, QPSK, SGLS, USB, TDRSS, User	Al Honeycomb/Graphite Epoxy composite	CCSDS, NEN (STDN), SN (TDRSS) and DSN	CCSDS, NEN (STDN), SN (TDRSS) and DSN	CCSDS compatible	NSP, commercial networks (KSAT Lite, AWS, Leaf Space, others -		CCSDS, STDN, SGLS	CCSDS, STDN, SGLS	CCSDS standard	CCSDS	AX.25, CCSDS	AX.25, CCSDS
	Comm Up\Downlink Band	S, X, UHF, Ka, Ku, etc.	S-band	S-band Uplink / S-band & X-band Downlinks	Cmd/Tlm: S-band Data: Mission-specific	Ku, Ka, C or S-band	S, X, C, Ku, Ka	S-band	S-band	S-band	S (X, Ku, Ka possible with converters)	S (X, Ku, Ka possible with converters)	S-band	S-band	X-band	Ka	UHF-band, S-band	UHF-band, S-band
	Structure	description	Honeycomb & Machined Al Hexagon	Al Honeycomb Hexagon	6 panel rect. box, CFRP facesheets w/ Al honeycomb core	Composite core cylinder; cruciform + earth and mid-deck panels for component mounting; Al panels with honeycomb core	Al Honeycomb/Graphite Epoxy composite	Al Honeycomb cuboid	Al Honeycomb Octagonal cuboid	Al honecomb panels	Aluminum	Aluminum, honeycomb	AI	Al, Al Honeycomb	Al alloys Honeycomb	Al honeycomb (lateral panels) and Al (bottom frame and chassis)	AI 7075 6U	AI 7075 12U
	Propulsion	type, fuel	None	Mono-prop (N2H4)	Blowdown, Mono-prop (NaHe)	Chemical (Hydrazine), Electric	Bi Prop (MMH/N2O4) Electric available	Mono-prop (N2H4)	Mono-prop (N2H4)	Monoprop (N2H4)	FEEP or Resistojet or Monopropulsion	FEEP, Resistojet, Monopropellant, Bipropellant, or Hall Thruster	Optional	Optional	Monopropellant system, Hydrazine	Mono-prop (N2H4	N/A	N/A
	Propulsion Propellant Capacity	type, fuel kg	-	Mono-prop (N2H4) 360	Mono-nron (N <sub>2</sub> H <sub>4</sub> ) (LM400 baseline propellant load	Up to 2100kg of Hydrazine and		Mono-prop (N2H4) 21	Mono-prop (N2H4) 458	Monoprop (N2H4) 12.5	FEEP or Resistojet or Monopropulsion 5		Optional	Optional Optional	Monopropellant system, Hydrazine 154	' Mono-prop (N2H4) 164	N/A N/A	N/A N/A
			None		Mono-prop (N+H_)	(Manan)	Electric available				Mononropulsion 5	Bipropellant, or Hall Thruster			Hydrazine			
ogrammatic	Propellant Capacity	kg	None	360	(LM400 baseline propellant load	Up to 2100kg of Hydrazine and 1500kg of Oxidizer	Electric available 2272,2820, 3140 & 3800	21	458	12.5	Monopropulsion 5 up to 300 m/s HawkEye 360 Constellation, NorSat-4, NorSat-TD, Gray Jay,	Binronellant. or Hall Thruster 5 to 36	Optional	Optional	Hydrazine 154	164 340	N/A	N/A
ogrammatic	Propellant Capacity Max delta V	kg m/s name(s) months (ATP to ready	None None None	360	Mono-nop (NH4) (LM400 baseline propellant load 49 ke) 350	Up to 2100kg of Hydrazine and 1500kg of Oxidizer 1500 + Arabsat-6A, HellasSat-4, JCSAT-17,	Electric available 2272,2820, 3140 & 3800 >200	21 175	458	12.5 84	Manananaukian 5 up to 300 m/s HawkEye 360 Constellation, NorSat-4, NorSat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster	Binronellant, or Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster	Optional	Optional Optional	Hydrazine 154 155 m/s (ref. CSG) RADARSAT-2, 51, CSK, CSC ATP+26 (It depends on th	164 340 G Iridium Next	N/A N/A	N/A N/A
rogrammatic	Propellant Capacity Max delta V heritage mission(s)	kg m/s name(s)	None None None GPIM, STPSat-2, STPSat-3	360 330 JPSS, NPP	Mono-syge (N-H4) (LM400 baseline propellant load 49 ka) 350 GRAIL, XSS-11	Up to 2100kg of Hydrazine and 1500kg of Oxidizer 1500 + Arabsat-6A, HellasSat-4, JCSAT-17, SBIRS	Flertric available 2272,2820, 3140 & 3800 >200 MTSAT-1/1R	21 175 ICON, TESS, ANGELS, Mycroft	458 322 Landsat 8, Fermi, GeoEye-1	12.5 84 PROBA1, PROBA2, PROBA V	Mananzaulisian 5 up to 300 m/s Hawkfey 630 Constellation, Norfsat-4, Norfsat-TD, Gray Jay, LEO 3, Asperar 12 to 24 (repetitive builds faster than this range) 18 to 30 (repetitive builds faster	Rinronellant.or.Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster	Optional Optional CYGNSS	Optional Optional SensorSat	Hydrazine 154 155 m/s (ref. CSG) RADARSAT-2, S1, CSK, CSC	164 340 G Iridium Next	N/A N/A Tyvak-0129	N/A N/A Tyvak-0129
Contractor-	Propellant Capacity Max delta V heritage mission(s) nominal schedule	kg m/s name(s) months (ATP to ready for payload I&T)	None None None GPIM, STPSat-2, STPSat-3 22	360 330 JPSS, NPP 23	Mono-ryge (N-H-) (LM400 baseline propellant load 8 ke) 350 GRAIL, XSS-11 18	Up to 2100kg of Pydrazine and 1500kg of Oxidizer 1500 + Arabsat-6A, HellasSat-4, ICSAT-17, SBIRS 36	Electric available 2272,2820, 3140 & 3800 >200 MTSAT-1/1R 24	21 175 ICON, TESS, ANGELS, Mycroft 33	458 322 Landsat 8, Fermi, GeoEye-1 37	12.5 84 PROBA1, PROBA2, PROBA V 20	Monoaccouldion 5 up to 300 m/s HawKEye 360 Constellation, NorSiat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) 18 to 30 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer.	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer.	Optional Optional CYGNSS 16	Optional Optional SensorSat 16 20	Hydrazine 154 155 m/s (ref. CSG) RADARSAT-2, S1, CSK, CSC ATP+26 (It depends on th mission)	164 340 G Iridium Next te 20	N/A N/A Tyvak-0129 14	N/A N/A Tyvak-0129 14
Contractor-	Propellant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule	kg m/s name(s) months (ATP to ready for payload I&T) months (ATP to launch)	None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Control: Co-	Mono-ryge (N-H-) (LM400 baseline propellant load 8 ke) 350 GRAIL, XSS-11 18	Up to 2100kg of Hydrazine and 1500kg of Oxidizer 1500 + Arabsat-6A, HeliacSat-4, JCSAT-17, 58iRS 36 54 Enhanced Data Storage Power Upgrade Package	Flectric available           2272,2820, 3140 & 3800           >200           MTSAT-1/1R           24           28 - 36	21 175 ICON, TESS, ANGELS, Mycroft 33 44	458 322 Landsat 8, Fermi, GeoEye-1 37 50	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of	Mononcronulsion 5 up to 300 m/s HawkEye 300 Constellation, Noršat-10, foray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) 18 to 30 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer.	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload on this payload	Optional Optional CYGNSS 16 26	Optional Optional SensorSat 16 20 (with NASA cerc cab Internal Payload S/C Structure Size Expansion	Hvdrazine 154 155 m/s (ref. CSG) RADARSAT-2, S1, CSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on	164         340           G         Iridium Next           ie         20           30         30	N/A N/A Tyvak-0129 14	N/A N/A Tyvak-0129 14 18
Contractor-	Propelant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule Option #1	kg m/s name(s) months (ATP to ready for payload (AT) months (ATP to launch) description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors Jocate primary attitude sensors with payload High Agility: Uses CMGs as primary attutators	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude control: Co- locate primary attitude sensor- locate primary attitude sensor-	Mono-ryge (N-H-) (LM400 baseline propellant load 8 ke) 350 GRAIL, XSS-11 18	Up to 2100kg of Hydrazine and 1500kg of Oxidizer 1500 + Arabsat-6A, HeliasSat-4, JCSAT-17, 588KS 36 54 Enhanced Data Storage	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps	Mononroaution 5 up to 300 m/s HawkEye 300 Constellation, Nor34-4, Nor34-TD, Gray Jay, Li 20 3, Aperia 21 to 24 (repetitive builds faster than this range) 28 to 30 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Different options available: SOMbps to 400Mbps (above science downlink based on this custom staffor retront or commercial ground network (ksa-Lite, AkV, Leef Space.	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload Computer. Norman transmurer can ve auoex Different options available: SoMbaps to 400Maps (above science downlink based on this Custom station Petronk retwork (Ksat-Lite, AWS, Leaf Space,	Optional Optional CYGNSS 16 26 External Payload	Optional Optional SensorSat 16 20 (with NASA CSCC CBB Internal Payload S/C Structure S	Hudratine 154 155 m/s (ref. CSG) RADARSAT-2, S1, CSK, CSC ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on	164         340           G         Iridium Next           ie         20           30         30	N/A N/A Tyvak-0129 14	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics High-data rate (340 Mbps) X-ban
Contractor-	Propelant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #2	kg m/s name(s) months (ATP to ready for payload I&T) description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude Control: Co- locate primary attitude sensors with payload High Agility: Uses CMGs as primary actuators Higher Power: Rests: any/or Anage battero size	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude sensors with payload High Agiity: Uses CMGs as primary actuators Higher Power: Resize solar array, Change battery size	LAMOn nggo (NH.) (LM400 baseline propellant load 350 GRAIL, XS5-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Hellassat-4, JCSAT-17, 581KS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Results and the storage and the storage Starbage and the storage and the storage science downlink based on this Custom stallion retrofit or.	Optional Optional CYGNSS 16 26 External Payload	Optional Optional SensorSat 16 20 (with NASA Kructure Size Expansion Solar Array Capability Increase Battery Capatity	Hvdrame 154 155 m/s (ref. CSG) RADAR5.7.2, S1, CSK, CSK ATP+26 (It depends on the mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Cosmo Second Generation program	164       340       Iridium Next       e       20       30       n       Electrical propulsion       e       Power upgrade	N/A N/A Tyvak-0129 14 18	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics High-data rate (340 Mbps) X-ban radio and antennas Electric Propulsion (0.22 kg, up t 500 m/s)
Contractor-	Propelant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #2 Option #3	kg m/s name(s) months (ATP to ready for payload I&T) months (ATP to launch) description description	None None OPIM, STPSat-2, STPSat-3 GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude Control: Co- locate primary attitude sensors with payload High Agility: Uses CMGs as primary actuators	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Control: Co- locate primary attitude sensors with payload High Agiity: Uses CMGs as primary actuators Higher Power: Resize solar array, Change battery size Downink: Add higher rate and pointed Ka band higher prate and	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing	458 458 322 Landsat &, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing Larger payload volume and	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload S/C Structure Size Expansion Solar Array Capability Increase	Optional Optional SensorSat 16 20 (with NASA (with NASA (with RASA Sate Case Sate Case Sate Case Sate Case Sate Case Sate Case Sate Case Case Case Sate Case Sate Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Case Case Sate Case Case Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Sate Case Case Case Case Case Case Case Case Case Sate Case Case Case Case Case Case Case Case Case Case Case Case Case Case Case	Hvitzano 154 155 m/s (ref. CSG) RADARSAT-2, S1, CSK, CSG ATP+26 (It depends of mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program	164       340       G     Iridium Next       IP     20       30       IP       Electrical propulsion       Power upgrade       Electrical science data	N/A N/A Tyvak-0129 14 18	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics High-data rate (340 Mbps) X-ban radio and antennas Electric Propulsion (0.22 kg, up t
Contractor-	Propelant Capacity Max deta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #2 Option #3 Option #4	kg m/s name(s) months (ATP to ready for payload I&T) months (ATP to launch) description description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude enoros with payload High Agility: Uses CMGs as primary actuators mitude stanors articulate solar array, change hattana vian	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Control: Co- locate primary attitude sensors with payload High Agility: Uses CMGs as primary actuators Higher Power: Resize solar array, Change battery size Downlink: XdB higher rate and	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload S/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase	Optional Optional SensorSat 16 20 (with NASA cerc cana Internal Payload S/Crc Structure Size Expansion Solar Array CapaCity Increase Battery Capacity Increase Battery CapaCity Increase Storage Data Storage	Horitzation 154 154 155 m/s (ref. CSG) RADARSAT-2, SI, CSK, CSG ATP+26 [It depends on th mission] ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Cosmo Second Generation program Protoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase	164       340       G     Iridium Next       e     20       30       n       Electrical propulsion       e     Power upgrade       Science data	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics High-data rate (340 Mbps) X-ban radio and antennas Electric Propulsion (0.22 kg, up t 500 m/s) Custom Payload Interface Board
Contractor-	Propelant Capacity Max deta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #2 Option #3 Option #4 Option #5	kg m/s name(s) months (ATP to ready for payload I&T) months (ATP to launch) description description description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload S/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing	Optional Optional SensorSat 16 20 (with NASA cerc cana Internal Payload Structure Site Expansion Solar Array Capacity <i>Histophae</i> Data <i>Progenia</i> Storage <i>Battery</i> Capacity <i>Histophae</i> Storage	Horitzation 154 154 155 m/s (ref. CSG) RADARSAT-2, SI, CSK, CSG ATP+26 [It depends on th mission] ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X-band or Ka-	164       340       G     Iridium Next       e     20       330       n       Electrical propulsion       e     Power upgrade       §     Science data downlink	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics Fully Redundant Avionics High-data rate (340 Mbps) X-ban radio and antennas Electric Propulsion (0.22 kg, up t 500 m/s) Custom Payload Interface Board Mission Operations
Contractor-	Propelant Capacity Max deta V heritage mission(s) nominal schedule option #1 Option #1 Option #2 Option #3 Option #4 Option #5 Option #6	kg m/s name(s) months (ATP to ready for payload I&T) months (ATP to launch) description description description description description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload 5/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X-	Optional Optional Sensor5at 16 (with NASA (with Nasa) (with Nasa (with Nasa) (with Nasa (with Nasa) (with N	Horitzation 154 155 m/s (ref. CSG) RADARSAT-2, 51, CSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase Downink Capacity Increase; X-band or Ka- hand	164       340       G     Iridium Next       e     20       330       n       Electrical propulsion       e     Power upgrade       §     Science data downlink	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics Fully Redundant Avionics Fully Redundant Avionics Electric Propulsion (0.22 kg, up 500 m/s) Custom Payload Interface Boar Mission Operations
Contractor-	Propelant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #1 Option #2 Option #3 Option #3 Option #5 Option #7 Option #8	kg m/s mame(s) months (ATP to ready for payload I&T) months (ATP to launch) description description description description description description description description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload 5/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X- band or Ka-band Encrypted Communications	Optional Optional SensorSat 16 Contentional Internal Payloan Capacity Capacity Increase Battery Capacity Increase Battery Capacity Increase Battery Capacity Increase Battery Capacity Increase Battery Capacity Payloan Storage Stora	Horitzation 154 155 m/s (ref. CSG) RADARSAT-2, 51, cSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X-band or Ka- Downlink Capacity Increase; X-band or Ka- High Performance Pointing	G Iridium Next     Z0     Joint Services     Science data     downlink     Ground Services	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A Tyvak-0129 14 Fully Redundant Avionics Fully Redundant Avionics Fully Redundant Avionics Electric Propulsion (0.22 kg, up 500 m/s) Custom Payload Interface Boar Mission Operations
Contractor-	Propelant Capacity Max detta V heritage mission(s) nominal schedule Option #1 Option #1 Option #2 Option #3 Option #4 Option #5 Option #6 Option #8 Option #9	kg m/s mame(s) months (ATP to ready for payload I&T) description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload S/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X- band or Ka-band Encrypted Communications High Performance Pointing	Optional Optional SensorSat 16 case_case Internal Payloal Solar Array Capability Increase Battery Capacity Increase Battery Capacity Increase Battery Capacity Data Payloal Da	Horitzation 154 155 m/s (ref. CSG) RADARSAT-2, 51, CSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity increase Payload Data Processing Data Storage increase Downink Capacity Increase; X-band or Ka- hand High Performance Pointing Pointing Agility increase	G Iridium Next     Z0     Joint Services     Science data     downlink     Ground Services	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A Tyvak-0129 14 Fully Redundant Avionics Fully Redundant Avionics Fully Redundant Avionics Electric Propulsion (0.22 kg, up 500 m/s) Custom Payload Interface Boar Mission Operations
Contractor-	Propelant Capacity Max delta V heritage mission(s) nominal schedule nominal schedule Option #1 Option #1 Option #2 Option #3 Option #3 Option #5 Option #7 Option #8	kg m/s mame(s) months (ATP to ready for payload I&T) months (ATP to launch) description description description description description description description description description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload 5/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X- band or Ka-band Encrypted Communications	Optional Optional SensorSat 16 care case Internal Payloal Solar Array Capability Increase Battery Capacity VisioSal Data 2006 Storage Battery Capacity Narray Payloa Patage Propulsion Package	Horitzation 154 155 m/s (ref. CSG) RADARSAT-2, 51, CSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase Downline Capacity Increase; X-band or Ka- Downline Capacity Increase; X-band or Ka- Downline Capacity Increase; X-band or Ka- Botting Pointing Agility Increase Propulsion Package	G     G	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A Tyvak-0129 14 Fully Redundant Avionics Fully Redundant Avionics Fully Redundant Avionics Electric Propulsion (0.22 kg, up 500 m/s) Custom Payload Interface Boar Mission Operations
Contractor-	Propelant Capacity Max detta V heritage mission(s) nominal schedule Option #1 Option #1 Option #2 Option #3 Option #4 Option #5 Option #6 Option #8 Option #9	kg m/s mame(s) months (ATP to ready for payload I&T) description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 26 External Payload S/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X- band or Ka-band Encrypted Communications High Performance Pointing	Optional Optional SensorSat 16 care case Internal Payloal Solar Array Capability Increase Battery Capacity VisioSal Data 2006 Storage Battery Capacity Narray Payloa Patage Propulsion Package	Horitzation 154 155 m/s (ref. CSG) RADARSAT-2, 51, CSK, CSG ATP+26 (It depends on th mission) ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Sentinel-1 program Battery Capacity increase Payload Data Processing Data Storage increase Downink Capacity Increase; X-band or Ka- hand High Performance Pointing Pointing Agility increase	G     G	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics Fully Redundant Avionics Fully Redundant Avionics Electric Propulsion (0.22 kg, up 500 m/s) Custom Payload Interface Boar Mission Operations
Programmatic Contractor- ovided Options	Propelant Capacity Max detta V heritage mission(s) nominal schedule Option #1 Option #2 Option #3 Option #4 Option #5 Option #6 Option #7 Option #8 Option #9 Option #10	kg m/s mame(s) months (ATP to ready for payload I&T) description	None None None GPIM, STPSat-2, STPSat-3 22 29 Enhanced Data Storage Enhanced Attitude sensors with payload High Apility: Uses CMGs as primary attitude sensors with payload High Apility: Uses CMGs as primary actuators many articulate solar array, change hattene data hattene data hattene data hattene data	360 330 JPSS, NPP 23 35 Enhanced Data Storage Enhanced Attitude Storage Enhanced Attitude Storage Kill Agility: Uses CMGs as primary attude senors with payload High Agility: Uses CMGs as primary actuators Higher Power: Reside sold a raray, Chance battery size Downink: Add higher price and pointed fix band higher price and pointed fix band higher price and pointed fix band higher and a sold a	Mono-grage (NH-) (LM400 baseline propellant load a bala 350 GRAIL, XS-11 18 31	Up to 2100kg of Hydrashne and 1500kg of Oxidizer 1500 + Arabsat-6A, Heliassat-4, JCSAT-17, 58IRS 36 54 Enhanced Data Storage Power Upgrade Package High accuracy pointing and stability	Flericic available           2272,2820, 3140 & 38000           >200           MTSAT-1/1R           24           28 - 36           Enhanced Data Storage           Mission Data Link	21 175 ICON, TESS, ANGELS, Mycroft 33 44 Mission Operations Higher Payload Power X- or Ka-band communications Instrument in the loop pointing Larger payload volume and	458 322 Landsat 8, Fermi, GeoEye-1 37 50 Mission Operations Higher Payload Power Ka-band communications Instrument in the loop pointing	12.5 84 PROBA1, PROBA2, PROBA V 20 32 Option for up to 768 Gbit of storage Option for up to 200Mbps Downlink Change of baseline propellant to	Monoaccouldion 5 up to 300 m/s HawKey 806 Constellation, NorSrat-NorSrat-TD, Gray Jay, LEO 3, Aspera 12 to 24 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Advance transmitter can be advect Different options available: SoMbps to 400Mbps (above science downlink based on this custom station retront to commercial ground network (ksat-Lite, AVX), Leof Space, atheral	Rinronellant. or. Hall Thruster 5 to 36 up to 1000 m/s LEO 2, StarBurst, NEMO-HD 18 to 30 (repetitive builds faster than this range) 24 to 36 (repetitive builds faster than this range) Above science downlink and storage are based on this payload computer. Round transmitter can use acoute. Different options available: SOMDps to 400Mbps (above science downlink based on this commercial ground network (Kast-Lite, AWS, Led Space, arbert)	Optional Optional CYGNSS 16 25 External Payload S/C Structure Size Expansion Solar Array Capability Increase Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; X- band or Ka-band Encrypted Communications High Performance Pointing Pointing Agility Increase	Optional Optional SensorSat 16 with NASA serse con Street con Stre	Horitzation 154 154 155 m/s (ref. CSG) RADARSAT-2, SI, CSK, CSC ATP+26 [It depends on th mission] ATP+36 Protoflight, based on Sentinel-1 program Protoflight, based on Cosmo Second Generation program Partoflight, based on Sentinel-1 program Battery Capacity Increase Payload Data Processing Data Storage Increase Downlink Capacity Increase; Vand or Ka- hand High Performance Propulsion Package Access to space; Riddehar	G     G	N/A N/A Tyvak-0129 14 18 Custom Payload Interface Board Mission Operations	N/A N/A Tyvak-0129 14 18 Fully Redundant Avionics Fully Redundant Avionics High-data rate (340 Mbps) X-ban radio and antennas Electric Propulsion (0.22 kg, up t 500 m/s) Custom Payload Interface Board Mission Operations