REQUEST FOR EXPERIMENTAL SPECIAL TEMPORARY AUTHORIZATION (RAPT-2 MISSION)

Lockheed Martin Corporation ("Lockheed Martin") hereby seeks authority under Part 5 of the Federal Communications Commission's rules to conduct experimental telemetry operations aboard a deployed hypersonic vehicle in support of an Internal Research and Demonstration ("IRAD") program called the Rapid Advanced Payload Test 2 ("RAPT-2"). The RAPT-2 mission is currently scheduled to be conducted December 2026 from Wallops Flight Facility ("WFF") aboard a ballistic vehicle. Lockheed Martin is conducting these operations to demonstrate capabilities to potential future U.S. Government customers, to include the Missile Defense Agency.

The proposed RAPT-2 S-Band telemetry operation will meet ITU requirements by utilizing an IRIG compliant transmitter, for a brief mission duration of 400 seconds that is designed to occur primarily in the thermosphere prior to the vehicle's total disintegration upon descending into the atmosphere. Our analysis concludes that this brief window of operations presents a negligible risk of interference to other operators.

Due to the limited nature of the overall mission, Lockheed Martin is seeking a Special Temporary Authorization ("STA"). This STA indicates a range of dates during which the single mission may be conducted, to account for any potential shifts in the schedule.

Lockheed Martin intends to transmit telemetry from the RAPT-2 unit to NASA ground stations located at WFF and Bermuda. The RAPT-2 unit will transmit telemetry to both ground stations concurrently in order to ensure the reliability of the data link. The ground stations will relay the received telemetry data to the WFF mission control facility that in turn will be collected by Lockheed Martin. Lockheed Maritn has worked closely with NASA to coordinate the use of its ground stations for the very brief duration of this mission.

Mission Overview

The mission flight concept-of-operations ("CONOPS") includes steering the RAPT-2 unit after separating from the deployed vehicle. In order for the telemetry link to be operational during these maneuvers, there are two telemetry antennas located on opposite sides of the RAPT-2 unit to form a quasi-isotropic radiation pattern

Figure 1 provides a general overview of the mission flight CONOPS:

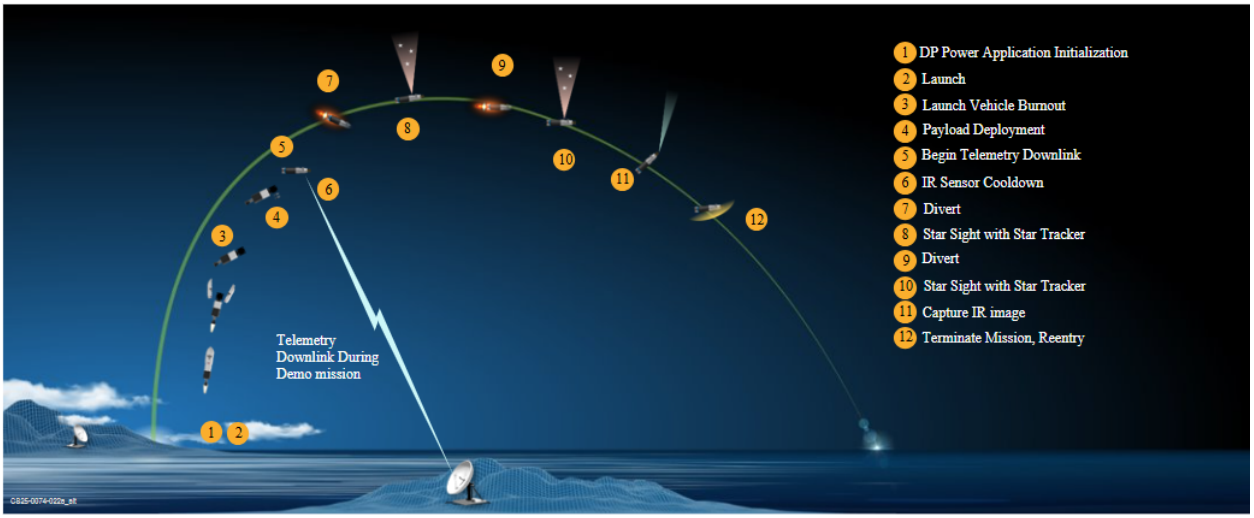

Figure 1 – System CONOPS

NASA stations	Elevation (m)	Latitude	Longitude
Wallops, VA	0.1	37°49'57.1"N	75°29'17.9"W
Bermuda	0.1	32.3519 N	64.6576 W

Additional technical details.

Lockheed Martin supplements its STA request with these additional technical details related to the RAPT-2 mission to provide a clear understanding of the limited interference potential resulting from these operations:

S-band

RAPT-2 Transmit Frequency:

- Requested Frequency: 2250.5 MHz

Payload Telemetry Transmitter Characteristics:

- Max Payload Antenna Gain: -1 dBi Linear polarization
- Maximum EIRP: 9 dBW
- Modulation: SOQPSK IRIG106
- Max Data Rate: 5 Mbps (10.3 Mbps over the air with LDPC R=1/2 FEC)
- Occupied Bandwidth: 7.33 MHz (per IRIG guidance)

RAPT-2 Telemetry Calculations

Tx TLM Downlink 2250 MHZ (Upper S-Band)	Unit	Worst Case Min Angle of Arrival at Maximum Data Rate	Worst Case 5 to 25 degree Angle of Arrival at Maximum Data Rate	Worst Case Max Angle of Arrival at Maximum Data Rate
Equivalent Isotropic Radiated Power (EIRP), Max	dBW	9	9	9
RF Operation BW	MHz	7.33	7.33	7.33
Tx Data Rate	Mbps	5	5	5
Modulation Index (m)		0.5	0.5	0.5
FEC rate (r)		0.5	0.5	0.5
Transmit Symbol Rate RS=Rb/r x m	Msps	5	5	5
Tx Filter Roll-off Factor α		0.67	0.67	0.67
Tx Bandwidth	kHz	7330	7330	7330
Payload Altitude	km	350	350	350
Ground Elevation Angle	deg	10	5	90
Slant Range	km	1303.28	1656.18	350.00
Free-Space Spreading Loss ($4\pi R^2$)	dB	133.3	135.4	121.9
Satellite Total Power Flux Density (PFD)	dBW/m^2	-124.3	-126.4	-112.9
Fraction of power flux density in 4 kHz (dB)	dB	-32.6	-32.6	-32.6
PFD at earth surface (dBW/m^2 / 4kHz)	dBW/m2/4KHz	-156.9	-159.0	-145.5
Maximum Limit*	dBW/m^2 /4 kHz	-151.5	--154.0	-144.0
Margin	dB	5.4	5.0	1.5

* Table 21-4 of ITU RR Vol 1, Chapter II, Article 5 (r2024)