

Proposed Change Level (1, 2, 3, 4): 3

Proposed Change: Change Downlink Transmission Rates

Lead Engineer: Krauter/Bester

Subsystem: BAU/Comm

Reason for Change:

Changing downlink transmission rates from the present values of 1.024 Mbps, 512 kbps, 256 kbps, ... 1 kbps to a sequence of values based on the 8.388 MHz System clock frequency, 1.048576 Mbps, 524 kbps, 262 kbps, ... 1024 kbps allows deletion of a separate oscillator from the BAU implementation and saves a small amount of power.

Reference Documentation Summary

THEMIS Link Budget

Subsystem Impacted: (Bold indicates an impact)

ACS	C&DH	Mechanical	Propulsion	Mag Booms	IDPU S/W
Battery	EGSE	MGSE	RF Comm	EFI	SST
Bus	Harness	Mission Ops	Solar Array	ESA	SCM
Avionics	I&T	Power	Thermal	FGM	
Unit	Launch Vehicle			IDPU	

Minutes Summary (Systems Engineering Meeting):

Telemetry data rates will be derived from the 2²³ Hz oscillator. The 10 telemetry data rates will be the following:

1.024 kbps - modulated (2.048 kbps); 4.096 kbps - modulated (8.192 kbps); 8.192 kbps - modulated (16.384 kbps); 16.384 kbps - modulated (32.768 kbps); 32.768 kbps - modulated (65.536 kbps); 65.536 kbps - modulated (131.072 kbps); 131.072 kbps (262.144 kbps); 262.144 kbps (524.288 kbps); 524.288 kbps (1048.576 kbps); 1048.576 kbps (2097.152 kbps)

modulated = modulated on 1.024 MHz subcarrier

System Effects:

1. Eliminates separate oscillator in BAU
2. Requires obtaining corresponding emission data from L-3 TW and an update to NTIA Application
3. Increases in data volume by 2.4% and a degradation in link margin by 0.1 dB. See THEMIS Link Budget

Approval

PROPRIETARY

YES ☐ NO ☐

Project Manager

Date

Systems

Impacted Subsystem Lead

Distribution

- Subsystem trades (level 4) can be made within the resources of the subsystem. Systems Engineer insight and involvement.
- Trades that impact subsystem/system interfaces or resource allocations (level 3/level 2) require concurrence by the Configuration Control Board (CCB): Principal Investigator, Project Manager, Mission Systems Engineer (MSE), Probe Systems Engineer, Mission Operations Manager and affected Team Leads. GSFC Mission Manager insight.
- Trades that impact Level 1 *baseline* science/programmatic requirements must include approval by Principal Investigator and GSFC Mission Manager.
- Trades that impact Level 1 *minimum* science/programmatic requirements must include approval by NASA HQ.

Date