Memory Map for pre-defined data readout scheme (revised)

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Common communication method using standard memory map over RMAP

❑ Background

- PIM (Peripheral Interface Module) protocol for former Japanese scientific satellites has similar mechanism to RMAP.

- PIM protocol can be implemented on SpaceWire by replacing its physical layer and the lower part of the data-link layer with SpaceWire and RMAP.

- In Japan, we have been using a common communication method for house keeping data collection, command transfer, etc.
  We are defining common memory mapping to implement the method on RMAP.
  We have established the common memory map for ASTRO-H project.

❑ Common RMAP memory map is established for ASTRO-H and other small satellite projects.

- Common telemetry and command registers, which were provided in former PIM protocol are mapped over RMAP memory space.

❑ Common Memory Map implementation (revised)

Reserved Area is available for Configuration Information (ex) SpaceWire-RT QoS lookup table, etc.

[Internal Register usage example]
- GPO/GPI register for functional check
- LED control for GSE
- SpaceWire Logical Address
- IP revision
- Buffer memory map information
- etc.

Network wide address assignment is in reference to IEEE1212 CSR architecture.

Address	Region
FFFF_FFFF	Dependent area for specific satellites
FFF0_0000	Reserved
FF80_8000	PIM Internal Memory Buffer
FF80_0000	User's PIM Window
FF00_0000	
F001_0050	Internal Registers
F001_0000	
F000_0010	CSR Reset
F000_000C	Reserved
F000_0000	
C000_0000	CS3
8000_0000	CS2
4000_0000	CS1
	CS0

Address	Region	
8000	Reserved (User's Area)	
3FFC	Command Distribution Area	DPRAM (Data receive Buffer)
3800	Reserved (User's Area)	
37FC	Data Distribution Area	
3100	Reserved (User's Area)	
3004	TI (Time Indicator)	
3000	Reserved (User's Area)	
2200	On-demand Telemetry (Assured)	
1E00	Reserved (User's Area)	
1D02	SI Polling	
1D00	On-demand Telemetry (not Assured)	DPRAM (Data Send Buffer)
1900	Periodic Telemetry	
1500	System HK Telemetry	
1100	Reserved (User's Area)	
100C	Send Request Telemetry Format	
1008	Send Request Telemetry Size	
1004	User Request Code	
1000	Send Request Flag	
0FFE	User Request Flag	
0FFC	Reserved (User's Area)	
0FF8	Send Request ACK	
0FF4	User Request ACK	PIM Registers
0FF0	PIM Register and Free Area	
0000		

Address	Register
0FF0	Reserved
0028	UECC_ERR Clear Register
0024	UECC_ERR Count Register
0022	UECC_ERR Address Register
0020	Reserved
0018	GPO Register
0014	GPI Register
0010	Reserved
000C	ON/OFF STS Register
0008	OFF_Command Register
0004	ON_Command Register
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❑ **"Telemetry / Command Design Criteria" is established , which is based on SMCP (Spacecraft Monitor & Control Protocol) by ISAS.**

❑ **Assured communication, Resources / Channels, and Network Configuration Parameters are realized with RMAP and "Telemetry / Command Design Criteria".**

– "Telemetry / Command Design Criteria" is applied for middleware and application program.

– RMAP reply packet is used as ACK / NACK.

– Re-transmission is realized by the ACK / NACK with CRC checking capability in RMAP packet format.

❑ **Timeliness by Time-Code.**

– Time slot, scheduled system, and kill-equivalent function is realized with Time-Code for latency requirement.

❑ **Priority and channel configuration are specified with category number shown in the secondary header of Space Packet.**

❑ **"All SpaceWire links in the network shall be set to operate at the same data rate.", which is stated in SpaceWire-T "6. e) Network Configuration Parameters" is not satisfied, for which some relaxation is preferred.**