

FAM Science



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Feedback on SpaceWire-PnP

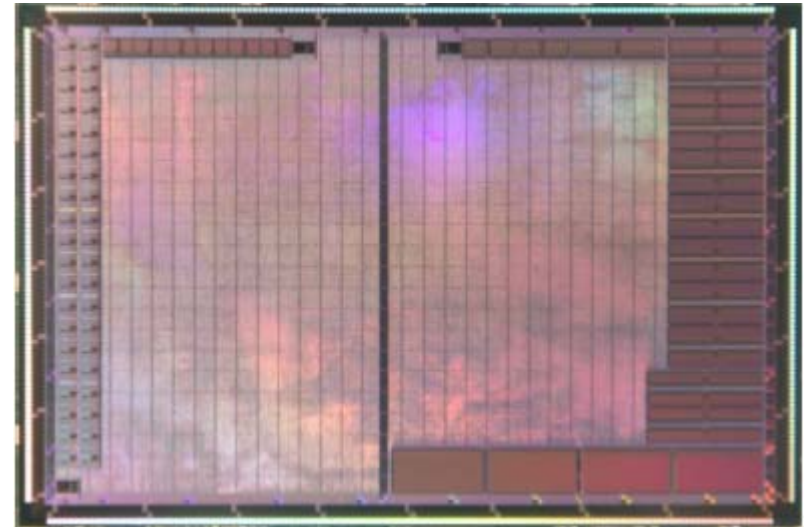
SpaceWire User's Group, Japan

- ❑ **SpaceWire PnP uses the Remote Memory Access Protocol (RMAP) standard to define the packet format and the basic semantics of the protocol.**
- ❑ **SpaceWire and RMAP is suitable to inherit the network protocol development heritage which is verified as efficient and flexible on orbit over many Japanese scientific satellites applications.**
- ❑ **Interoperability among various instruments are required.**
 - Interoperability is required not only for space-born instruments but also for consumer electronics, because a lot of test equipments and simulators have been developed by consumer electronics manufacturers.
- ❑ **Expected SpaceWire PnP users**
 - JAXA/ISAS
 - Universities
 - Industries
 - Space Industries
 - Consumer Industries

❑ SOI process processor with SpaceWire interface

- Processor
 - 32 bit RISC Processor, 100MIPS
 - FPU
 - Cache (Icache = 16kB, Ocache = 16kB)
 - MMU
- External Interface
 - SpW I/F = 3ch, Routing
 - Memory I/F (SDRAM, SRAM, EEPROM, FlashROM)
 - DMAC
 - UART = 1ch
- Power Supply
 - Core = 1.8V IO = 1.8V (3.3V)
- Radiation Characteristics
 - SEU 40MeV/(mg/cm²)
 - SEL free

 **MITSUBISHI HEAVY INDUSTRIES, LTD.**



❑ Space Cube



SHIMAFUJI Electric Incorporated

❑ Space Cube mk2



❑ Cryocoolers



Sumitomo Heavy Industries, Ltd.



Candidates of SpaceWire-PnP (RMAP applications)



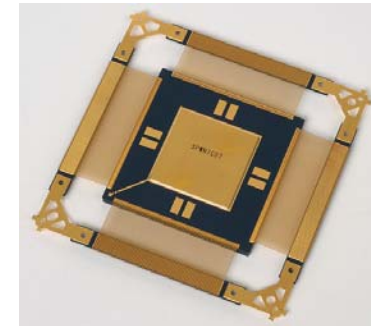
❑ NEXTAR® platform



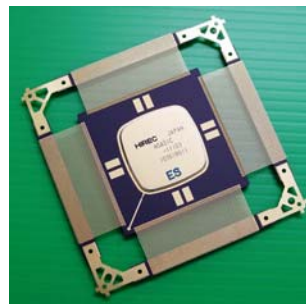
Space Cube 2



SpaceWire router



SpaceWire-NIC
Network Interface Controller/Chip



SpaceWire-NSR14
SpaceWire Router 14ports (real), 6ports (virtual)



Empowered by Innovation
NEC Corporation

Feedback on SpaceWire-PnP



❑ 3.2.4 Network size

- 2M bps is expected for deep space applications.
- Millisecond order of response time might have to be allowed for wide range of applications.

❑ 3.5.1 Device Identification

- Character code for large character set should be used as option.
 - Many characters are unified in UTF-8 regardless of the meaning of each character.
 - (ex.) TRON character set has 1.5 million code space and 180 thousand codes have already been used, and it is impossible to convert all code into UTF-8.

❑ 3.5.4 Router Configuration

- The primitive operation set for watchdog timer had better be defined, and the operation set for SpW-10X is useful to show an example.

❑ 5.2.2.5.2 Capability Record Fields

- An example of “transported” is expected in “5.2.2.5.2 Capability Record Fields”

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indication / Result

- Are additional error code supported in indications applicable for RMAP protocol itself ?

5.3.5.9 NMS_DISCOVER_NETWORK.request

- Breadth-first algorithm is specified as standard for network discovery ?

5.4.2.2.3 Reference Rate Field

- How users can find whether the rate is supported or not supported ?

5.5.2.1.1 Watchdog Timeout Field

- The definition for “immediate” should be defined.
- How can user use maximum timeout value 0xFFFFFFFF as real number ?

5.5.2.1.3 Time-Code Counters Field

- Is optional number of time-code not required ?

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- ❑ **5.5.5.18 RCS_READ_ROUTING_TABLE_ENTRY.indication**
 - The explanations for the meaning of “Spill_If_Not_Ready” and its necessity are expected.
- ❑ **7.3.4.11 SRC_READ_INITIATOR_CONFIG.indication**
 - The explanation for “Lease_Timeout” is expected.

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❑ Miscellaneous (1)

- It is helpful to show a permitted network topology on “3.2.3. Network Topology”.
- A brief definition is expected for level 1 network and level 2 network in “3.3.2 SpaceWire-PnP Support Levels”.
- It is possible to show following items as capabilities included in capability list for legacy interfaces used through SpaceWire protocol bridge ?
 - Pulse command generation
 - Serial command generation
 - Active bi-level telemetry attribute
 - Passive bi-level telemetry attribute
 - Analog telemetry attribute

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❑ Miscellaneous (2)

- What is the recommended way to show that the interface has specific interface capability ?
 - (ex.) Telemetry and Command interface accommodation capability for legacy satellite application shown as follows;

