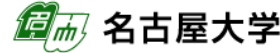




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Guaranteeing the real-time property of SpW network based on SpW-D

NCES (Nagoya University, Center for Embedded Computing Systems)

SpaceWire User Group, Japan

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Joint Project of JAXA/ISAS and NCES

- ▶ JAXA/ISAS and NCES (Nagoya University, Center for Embedded Computing Systems) have started a joint project for spreading the use of SpaceWire to wider range of applications.

Goal of the Project

- ▶ to propose a flexible framework for guaranteeing the real-time property of SpW network based on SpW-D
- ▶ to develop a software platform (real-time operating system + SpW middleware) supporting the proposed framework

Study Group on SpW Real-Time Property

- ▶ ISAS and NCES host a study group with SpaceWire User Group Japan (including NEC, MELCO, and MHI) for:
 - ▶ collecting requirements on “SpW real-time property guaranteeing framework” from industries,
 - ▶ investigating the experience and problems obtained from the development of ASTRO-H, and
 - ▶ discussing on the proposed framework.

Introduction to NCES

What NCES stands for?

- ▶ Nagoya university, Center for Embedded computing Systems

Activities of NCES

- ▶ applied research
- ▶ development of prototype system/software
- ▶ education and training of engineers

Major Research Area of NCES

- ▶ real-time operating system
- ▶ real-time scheduling theory and analysis
- ▶ functional safety
- ▶ low-power computing
- ▶ automotive embedded systems and automotive network
a newcomer to space system domain

Comments on SpW-D

More Flexible Multiple Transfers/Transactions Scheme

- ▶ introducing “subnet” concept (for concurrent schedule)
 - ▶ For each time-slot, SpW network can be divided into some subnets which do not share any link (routers can be shared).
- ▶ Multiple data transfers or transactions *within a subnet* are allowed in a time-slot provided if all data transfers are completed within the time-slot.
 - ▶ Data transfers can compete for a link.
- ▶ Safe (but pessimistic) worst-case time for the data transfers can be obtained by simply adding the worst case transfer time without contention of all the data transfers within the time-slot within the subnet.

Split RMAP Reply Transfer

- ▶ RMAP reply packet should be allowed to be transferred in different time-slot.
- ▶ This is useful when RMAP target node is implemented with software.

Limitation of Upper-Level Protocol

- ▶ Limiting upper-level protocol is not necessary.
- ▶ Any SpW packet can be allowed to be transferred.

Further Comments

- ▶ We are still under investigations on SpW-D (especially on FDIR mechanism) and would like to propose its improvements in next SpW WG meeting.