

SpaceWire networking Protocol

Working Group Meeting 4

Conclusions

Ph. Armbruster TEC-ED

Introduction and objectives

- Mandate of the WG is to define a set of Networking Protocols for SpaceWire links, nodes and routers (SpW-SnP) in order to foster inter-Agencies compatibility and open the door for on-board state of the art networking services.
- SnP-RMAP (SpaceWire Remote Memory Access Protocol) is an answer to the need to define standardized, secure and flexible primitives to read/write registers (32-bit), exchange memory blocks (including DMA), or push/pull data from FIFOs (sequential I/O) via SpW links.
- Cooperation is framed if required by Inter-Agencies agreements – (c.f. BepiColombo, JWST), in the spirit of the CCSDS charter.
- The objective at ESA level is to complement the existing ECSS-E50-12A standard with the ECSS-E50-12A (Part2) extension specifying RMAP primitives and corresponding packet structures.
- Working Group composition – Agencies members shall act as focal points for national Industries and intra-agencies activities.

Introduction and objectives

First SpaceWire Working Group Meeting, 15th and 16th (AM) of September 2004

Second SpaceWire Working Group Meeting, 10th PM, 11th , 12th (AM) of November 2004 ⇒ RMAP Draft B

Third SpaceWire Working Group Meeting, 15th , 16th , 17th (AM) of February 2005 ⇒ RMAP Draft C

Fourth SpaceWire Working Group Meeting, 19th (PM), 20th and 21st (AM) of July 2005 ⇒ RMAP Draft D

The objective this afternoon is to freeze the technical baseline as described in Draft C and updated following technical comments expressed during the meeting. The Draft D is an input to the ECSS editorial phase.

SpaceWire networking Protocol Working Group Meeting 4

Tuesday 19th of July, room Einstein

Agenda

14:00 Welcome address and Status, Ph. Armbruster, ESA/ESTEC

- Application for PID 239 for legacy device: SMCS116SpW, P. Rastetter, Astrium GmbH
- CRC implementation variants, T. Hult, Saab Ericsson Space
- Overview and review of ECSS-E50-12A Part 2 (RMAP)

17:00 Wrap-Up

Application to a PID

Possible if the legacy protocol:

- Has been developed and defined before 2005
- And is used on a commercially available device
- Or is used by at least two different entities

Other conditions:

- The protocol is described by an open technical note (public), provided to the SpW WG
- And can be used as a basis for further SpW standardization
- Has to be “PID” compatible

Proposal

- PID from 239 downwards

Wrap Up RMAP Draft C \Rightarrow Draft D 1/2

- PID 239 reserved for SMCS116SpW but STUP is presented as Open by Astrium GmbH. Technical Description to be completed by P. Rastetter according to comments expressed during the meeting by Y. Sheynin.
- On the basis on inputs provided by T.Hult, the 8-bit CRC with a Galois implementation approach is adopted, it is suggested to introduce as an annex VHDL and C code implementation examples.
- Note: The CRC size is limited on purpose (implementation easy in HW and in SW) to 8-bit taking into account the fact that command and control packets are usually short. Adoption of the 8-bit CRC polynomial used for ATM considered as suitable.
- Draft D is a technical document that needs a clear segregation between normative and informative section as it is the case for ECSS-E50-12A. This will be done via the ECSS secretariat. If modifications are introduced in Draft D, change bars will allow to track changes

Wrap Up RMAP Draft C \Rightarrow Draft D 2/2

- In a Read command, Draft C says the reply bit is set to 1, what happens if it is set to 0 ?

Disposition : When the standard specifies a value, it is normative and it shall be checked by nodes.

- Usage of the “Destination Key” is restricted to be used as a “Destination Key”, e.g. to unlock access to the memory/register area.
- Transaction Identifier uniquely ties a response to the command that caused the response
- Extended Address can be used for instance to identify destination mailboxes
- Partial implementations to be better defined – minimum level of compliance to be defined
- Color coding of optional Path Addresses different from variable size data field.

SpaceWire networking Protocol Working Group Meeting 4

Wednesday 20th of July AM, room Einstein

09:00 Introduction, Ph. Armbruster, ESA/ESTEC (15 mn)

09:15 First feedback from RMAP implementations

- SpW router ASIC development, G. Kempf, AAE (25 mn)
- RTC ASIC, T. Hult, Saab Ericsson (25mn)
- Video Processing Chain with SpW Interface, F. Lachaud, Sodern (25 mn)

10:30 Break

10:45 SpW Networking

- TopNet - IP tunnel, R. Vitulli Estec, S. Mills UoD (25 mn)
- SpW as seen by prime companies - system issues, O. Notebaert, Astrium (25 mn)
- CCSDS SOIS and SpW, S. Parkes, UoD (30 mn - 45 mn)

13:00 Lunch

SpaceWire networking Protocol Working Group Meeting 4

Wednesday 20th of July PM, room Einstein

14:00 Applications of SpW networks in on-going missions

- NASA SpW Activities G. Rakow, NASA (25 mn)
- SpW App. to missions: BepiColombo&NeXT, Y.Kasaba, JAXA/ISAS (25mn)
- SpW Development activities, M. Nomachi, Osaka University (25mn)

15:15 Very high speed serial links

- SpaceFibre development status, M.Suess & Iain Mckenzie, Estec (25mn)

15:40 SpW Products

- Galvanically Isol. SpaceWire EGSE Building Blocks, P. Walker, 4links (15 mn)
- Development tools and Support Equipment, S.Parkes, Star Dundee (15 mn)
- Status of the SMCS332SpW validation and the SMCS116WpW development, P. Rastetter, Astrium GmbH (15 mn)

16:30 Wrap Up and next issues, Ph. Armbruster, Estec

17:15 Meeting close

Wrap Up 20th of July

- Technical baseline for SpW-SnP-RMAP consolidated, Draft D will be posted on Web site by the end of July 05
- Feedback from RMAP implementations : around 7 K Gates (without Read-Modify-Write), considered as easy to implement, small compared to overall complexity of devices
- Implementation on some FPGA types limits the link speed
- TopNet IP tunnel almost ready, pilot demonstration can be initiated. Announcement of Opportunity will be published this fall/winter
- Need for low bit rate links reiterated
- Need expressed for simplex very high speed point to point links
- SpaceFibre developments on-going, progress can be regularly reported to the WG

Wrap Up 20th of July 2/2

- Format of the WG meetings
- Next meeting location and date, agenda:

Proposed dates : 15th, 16th and 17th of November

Location : Japan

Language : ECSS-E50-12A, RMAP, STUP, LVDS,
CCSDS Packets ... CCSDS SOIS

Many thanks to all participants and see you at the next meeting