

SpW implementation of the SOIS SubNet services

Data Systems Division TEC-ED
European Space Agency

David Jameux TEC-EDP
david.jameux@esa.int

Outline

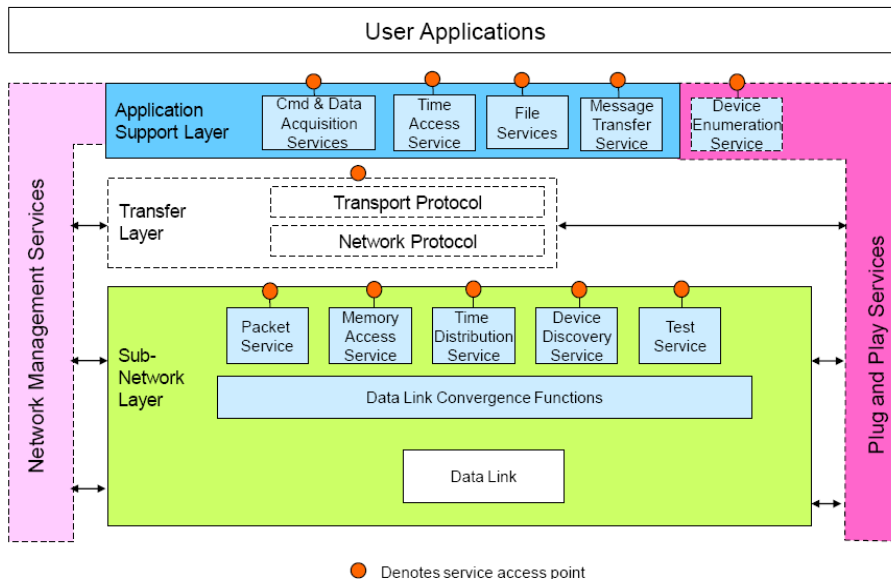
- Clarification questions
- Assumptions
- Are the SOIS SubNet services the services that SpW-based applications require?
- Do we (TEC-EDP) think that the SOIS SubNet services can be implemented at reasonable cost?
- Conclusion

Clarification questions

- How to get “Space Link Identifiers, CCSDS 135.0-B-3 Blue Book” referred to in the Green Book?
- How to get “SOIS Device Access Service Protocol Specification, CCSDS 871.1-R-0.” referred to in the Device Access Service Red Book? (CCSDS 871.1-R-0.1 is in fact “SOIS Device Data Polling Service”)
- QoS classes:
 - Defined differently in the SubNet Services Red Books (consistently) and in the Green Book !
 - Inconsistent level of definition of the four classes in the Red Books

Assumptions

- SOIS Application Support Layer services can be implemented using SubNet services only (via an optional Transport Layer)
- SpW implementation need to be mapped to SubNet services only.
- SOIS services (Application Support Layer services and SubNetwork services) are not defined precisely enough for an API to be defined, therefore they do not allow *YET reuse of mission hardware and software.*



Scope of the review by the SpW WG

(derived from the previous assumptions)

- Are the SOIS SubNet services the services that SpW-based applications (originally payload-only but now extended to avionics and robotics at least) require?
- Do we think the mandatory features of the SOIS SubNet services can be implemented at reasonable cost?
- How much of the optional features of the SOIS SubNet services can be implemented at reasonable cost?

NB : The cost should be reasonable in terms of development effort and HW/SW processing resource

Are the SOIS SubNet services the services SpW-based applications require? (1)

- Probably yes, but we need some clarifications on QoS (quotes from the Red Books):
 - *BestMinimum-Effort Service Class:*
 - makes a single attempt to deliver data to its destination but cannot ensure that it will be delivered successfully does not indicate to the sending entity if it was possible to provide the assured service
 - provides data in sequence (within a priority value), without errors, and without duplication;
 - does not necessarily preserve the order of data packets;
 - uses a priority parameter to signal the importance of the data to the service.
 - *Assured Service Class:*
 - ensures delivery of data to its destination makes (at least) two attempts to deliver data to its destination
 - indicates to the sending entity if it is not was possible to provide the assured service;
 - provides data in sequence (within a priority value), complete, without errors, and without duplication;
 - preserves the order of data packets?
 - uses a priority parameter to signal the importance of the data to the service.

- (red to be replaced with green)
- Proposed ideas:
 - Non-assured (*Best-Effort*) Service Class vs Assured Service class ?
 - Non-reserved Service class vs Reserved Service class ? Or Non-RT vs RT Service class ?

Are the SOIS SubNet services the services SpW-based applications require? (2)

- Probably yes, but we need some clarifications, e.g. on ACK mechanisms:
 - `PACKET_SEND.REQUEST` is non blocking even for Assured/Guaranteed classes:
`PACKET_FAILURE.INDICATION` comes only in case of failure. But we do not know when to consider the sending successful; we only know about the failure; should we wait forever?!? This is not deterministic, and does not correspond to the Green Book definition of “Assured”.

How much of the features of the SOIS SubNet services can be implemented at reasonable cost? (1)

- SOIS SubNet Packet service
 - All primitives in Best effort: native SpW
 - All primitives in Assured: RMAP-like ACK mechanism or more complex
- SOIS SubNet Memory access service
 - All primitives in Best effort and Assured: RMAP
- SOIS SubNet Time distribution service
 - All primitives (Best effort): time packets + SpW time ticks
 - Will the accuracy make sense? Will the resolution make sense?
- SOIS SubNet Device discovery service
 - All primitives (Best effort) and probably more PnP services but it is under investigation by the SpW PnP sub-WG
- SOIS SubNet Test service
 - Definition is too vague to give any answer

How much of the features of the SOIS SubNet services can be implemented at reasonable cost? (2)

- What about the Reserved Service class ?
 - It will be a major challenge
 - Possibility of link allocation or statistical bandwidth allocation through the use of Logical Addresses and Group Adaptive Routing/Regional Addressing (see presentation by Albert Ferrer)
 - TEC-EDP is currently investigating time-multiplexing techniques (pre-emptive time-triggered protocols may allow mixing Best effort and Reserved services on the same network)

Conclusions

- Are the SOIS SubNet services the services that SpW-based applications require?
 - Probably YES but we need some clarifications (QoS and primitives)
- Do we (TEC-EDP) think the mandatory features of the SOIS SubNet services can be implemented at reasonable cost?
 - YES
- How much of the optional features of the SOIS SubNet services can be implemented at reasonable cost?
 - Probably everything (using several SpW PIDs) but Reserved service class is a challenge

Assumed following steps

- Once answers to two first questions are “YES”,
- SOIS SubNet services must be prototyped on several data links (Mil-Std 1553, SpW, CAN, etc.) at data-link specific working group level.
- This will lead to APIs which should be closed to one another.
- The SpW WG will harmonize APIs for the SpW implementation and submit the common API to the SOIS WG for harmonisation at CCSDS level and adoption.

Then we get **re-usability of SubNet-based applications**