

SPACECRAFT ONBOARD INTERFACE SERVICES AREA

Title of Group	4.1 SUB-NETWORK Working Group
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4.1.1 RATIONALE

The Sub-network Working Group is concerned with the transfer of data over onboard buses and individual onboard LANs that constitute a single sub-network. The working group will define the data transfer services that must be provided by the sub-network, bearing in mind requirements on reliable delivery, timeliness and security that may need to be met at the sub-network level. The working group will also define the service interface that is provided by the sub-network to higher layers of the communication stack.

4.1.2 GOALS

The goals of this Working Group are to:

1. Define a set of standard services that enable protocol multiplexing across a variety of real onboard buses and data links;
2. Define standard interfaces to those services such that overlying entities are shielded from the details of the real underlying onboard buses and links;
3. Specify the layer management parameters that may be used to control the operation of the data link and physical layers of the onboard communication stack;
4. Define layer management procedures for the control of configurable parameters, the reporting of errors, and redundant link switching;
5. Make representations to the other Working Groups and BOFs about the use of the onboard bus and LAN services in real systems. This will take the form of inter working group sessions during the area meetings, and a workshop to demonstrate the use of the services;
6. Negotiate with other working groups and BOFs to determine what qualities of service need to be provided within the onboard data link and physical layers particularly, but not exclusively, in respect of reliable transfer of data and security. This will take the form of inter working group sessions during the area meetings;
7. Simulate and/or prototype the proposed services over a selection of popular onboard buses in order to verify functionality and to demonstrate the benefits of the proposed services, and to demonstrate the operation of other CCSDS protocols (such as CFDP) over the proposed service;

8. Identify aspects of physical layer standardization that may be of interest to the CCSDS in the future. Where potentially interesting activities are identified, they will be reported to the CESC in the form of “technology watch” bulletins.

4.1.3 SCHEDULE AND DELIVERABLES

Date	Milestone
1 Dec 2006	Sub Network Quality of Service Green book
Dec 2006	<u>White Books for all Subnetwork services</u>
<u>March 2007</u>	<u>Red book V1 for all Subnetwork services</u>
<u>October 2007</u>	<u>Red Book v2 based on prototyping feedback from ECSS Milbus and SpaceWire working groups</u>
<u>March 2008</u>	<u>Submission of Subnetwork services Blue books</u>

4.1.4 RISK MANAGEMENT STRATEGY

4.1.4.1 Technical Risks

The proposed sub-network services are typically not inherently provided by popular onboard bus specifications such as MIL-STD-1553B and ESA OBDH. Therefore, the primary concern here is the risk associated with the invention of an entirely new set of services. However, this risk can be minimized by keeping the requirements modest, i.e. by providing the minimum capability that is needed by overlying protocols and services.

Another risk is the feasibility of implementing the proposed services over a specific, real onboard bus. This risk is ameliorated by early simulation and prototyping, particularly on flight representative hardware. Finally, the capabilities of real underlying buses are vastly different, particularly in terms of reliable transfer and security, but also in terms of frame size and bandwidth. The risk here is that the service is over-specified for some underlying buses, while being underspecified for others. The risk management strategy in this case is to ensure that the service can be appropriately profiled to suite the given underlying bus while still providing a common service interface to the overlying services and protocols.

4.1.4.2 Management Risks

The quality of the end product relies heavily on the commitment of Agencies to provide support for the simulation and prototyping work.

4.1.5 RESOURCE REQUIREMENTS

Working Group Chair: lead working groups - prepare for and attend meetings, present material at working group meetings,	NASA, ESA
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write green and red books. Effort estimated at around 40 days per year.	
Research and prototyping activities: <u>The Services defined by CCSDS cannot be independently prototyped and will therefore rely on those provided by the SpaceWire and ECSS Milbus mapping groups. Thus little effort will be required by CCSDS. ESA undertakes to prototype and evaluate the complete stack of SOIS defined services & protocols (Application support and subnetwork) once outputs from mapping groups are available.</u>	NASA, ESA