**CCSDS 2014 Fall MEETING**

**SLS-SLP Space Link Protocols Working Group**

**Final Minutes of the Meeting**

**1. Action item list**

* 1. Greg Kazz - will provide the WG with an update to proposed text and tables discussed in item 2.1 below. Due by Jan 15, 2014.
  2. Greg Kazz/Ed Greenberg – will provide the WG with an update to the USLP GB as well as the first version of the USLP White Book. Due by Jan 15, 2014.

**2. Topics Covered**

2.1 Proposed Update to Space Data Link Protocols Green Book CCSDS 130.2-G (to become Version 3 – concurrent with SDLS publication)

* An update to this GB is needed, primarily because of out of date answers in the FAQ chapter of this book, mainly due to the SDLS impact on the AOS, TM, TC Space Data Link Protocols, a new version of this green book is required. A total of 3 questions need to be updated.
* The WG concurred that this GB should reference the SDLS blue book on the FAQ about how to make these link layer protocols secure (realizing there are limitations).
* The FAQ about managed parameters was rewritten to reference the Managed Parameters section in each blue book as well as to reference SANA.
* Finally, it was agreed that both the Overview of Space Comm Protocols (OSCP) and this GB share a common table about the Services offered by the Space Data Link Protocols. Therefore the most recent version of the table of those services recently published in OSCP i.e., Table 3-1 will be copied into the associated table in this GB, i.e., Table 3-2.
* The updated document will be sent out to the SLP WG (See action item 1) for review. Expectation is to publish Version 3.0 of the Space Data Link Protocols Green Book concurrent with the release of the SDLS protocol and the updated TM, AOS, and TC blue books. This proposal is in the SLP CWE under: <http://tiny.cc/cs5aqx>

2.2 Consistent Definition of Transfer Frame in TM, AOS, TC Blue Books and SANA

* Gian Paolo Calzolari discussed his proposal to ensure that CCSDS use a consistent definition of transfer frame across the CCSDS Space Data link protocols as well as in SANA. See his presentation in: <http://tiny.cc/314cqx> (filename: TransferFrameDefinition.v2.0)
* This topic resulted in the following conclusions:
  + Add the following definition to the SANA Glossary and remove the conflicting ones. Use this definition: Transfer Frame:  Protocol Data Unit of the Space Data Link Protocols.  [130.2-G]
  + This addition should be done possibly with a note remarking that according to the actual protocol, there are: AOS Transfer Frames, TC Transfer Frames, TM Transfer Frames, and Proximity-1 Transfer Frames (aka Version-3 Transfer Frames).
  + Check the transfer frame definition for Proximity-1 for consistency
  + Warn SLE-FSP book editor to use complete term whenever the book will be updated.
  + Check with CCSDS Editor whether a caveat can be added in 200.0-G (*Telecommand Summary of Concept and Rationale.* Green Book. Issue 6. January 1987. ) not to change the date of publication if these slight definition updates are made to it.

2.3 Resolution to publish updated TM, TC, AOS Blue Books coincident with the release of SDLS Protocol

A resolution was submitted by the WG chair, see p. 8 after the WG was polled on moving forward with the publication of the updated TM, TC, and AOS Blue Books. Consensus was achieved on this measure. The only caveat was to have the CCSDS editor include the agreed to changes to transfer frame definition in these books. So these three blue books are to be published concurrent with the SDLS protocol and the update to the Space Data Link Protocols GB (CCSDS 130.2-G).

2.4 SDLS WG Proposal for Type 2 OCF report for TM/AOS books

Gilles Moury, SDLS chairman presented a draft modification of both the TM and AOS Space Data Link Protocols to define a new type 2 Operational Control Field (OCF) to accommodate a real-time report of the TC link for the SDLS extended procedures project. This so-called "Command Link Security Report (CLSR)" has been proposed and adopted by SDLS WG as a needed capability to report on-line the status of the on-board SDLS receiver. This CLSR is the equivalent (for SDLS) of the CLCW (for the COP). CLSR proposal is detailed in the attached ppt file: Att4-SDLS Type 2 OCF Reporting.ppt in <http://tiny.cc/314cqx>

The result of the discussion was that in principle the type 2 OCF could be used for this purpose. However, since the SDLS extended procedures blue book does not yet exist, it would be premature to define the type 2 OCF in the AOS and TM blue books. Therefore at this time, no type 2 OCF report will be introduced into either AOS nor TM.

2.5 Unified Space Data Link Protocol (USLP)

An executive summary of the protocol was presented by Greg Kazz and Ed Greenberg. That .ppt resides in <http://tiny.cc/mu0eqx> with the filename: USLP Presentation-10-29-14GK2.pptx.

From a conceptual point of view, there were no major disagreements and at the conceptual level consensus was achieved.

The interface between the C&S sublayer and the data link protocol layer were examined. The key aspect of this interface is that the transfer frame remains as the atomic unit of transfer between these two sublayers. On the sending side, the frame protocol sublayer provides a transfer frame to the C&S sublayer. On the receiving side, the C&S sublayer provides a transfer frame to the frame protocol sublayer. A very important diagram defining this interface between these two sublayers developed by the SLP WG is in the CWE under <http://tiny.cc/kn8cqx> with the filename: Coding-Sync Logic 4 USLP\_gk5.pptx

No major problems were encountered in the discussion on the USLP requirements. The details of the exact format of the protocol still need to be worked out. The protocol specification will be developed in the USLP White Book project.

During the Tuesday AM session, we got into the details of the sections 2 and 3 of the draft USLP Green Book. The issues that were addressed were:

* The option that decouples the transfer frame from the code block (lengths are independent) will require two synchronizations – one at the codeword level and one at the transfer frame level. Gilles Moury brought up the possibility of using a distributed sync marker as part of the needed delimiting mechanism. This is something that the C&S WG may consider when tasked with providing a solution to the dual frame sync problem.
* Larger transfer frames i.e., up to 65K bits long, tend to obviate the need for segmentation. USLP is compatible with the maximum size transmission units of other protocols. For example, CCSDS space packet max. size is 65K. Essentially, a transfer frame will carry one data unit. Do agencies foresee a need to do segmentation, given that the transfer frame size can be as large as 65K?
* No multiplexing of different packet segments can occur in the same transfer frame.
* There is a Requirement to be compatible with the SDLS protocol.
* If the Insert Zone in USLP is used, then it essentially forces the user into supporting variable length frames.
* Consider data system requirements – should the USLP transfer frame be up to multiples of 64 bits compatible for processor handling? In that case, the protocol must deal with identifying fill when necessary. USLP could be augmented to add 3 additional bits in the Transfer Frame Data Field Header to accommodate such fill (0 to 7 bytes of fill) in the frame.
* How big should the SCID be? There are now over 1000 controllable objects in space. 30% are associated with CCSDS. USLP has the advantage that an agency would not have to track more than 1 SCID at a time, since there would be no more separate command and telemetry SCIDs. 8192 possible SCIDs seems sufficient for now.
* The question about the usefulness of the Insert Zone came up. Is there any real requirement for isochronous communication for the IZ? Agencies seem to use IP for this. However Agencies do use the IZ for launch vehicles e.g., Arianne 5 CNES. Should the IZ only be assigned to one user at a time?

**3. SLP Projects in the CCSDS Framework**

The current projects defined for SLS-SLP WG are:

1. USLP Blue Book
2. USLP Green Book
3. AOS Space Data Link Protocol Issue 3: 5-Year Review plus SDLS Requirements
4. TC Space Data Link Protocol Issue 3: SDLS Requirements
5. TM Space Data Link Protocol Issue 2: 5-Year Review plus SDLS Requirements
6. Space Data Link Protocols Green Book Issue 3

Note: Project 6 is pending update on the CWE. Stand by.

**4. Joint C&S/SLP/RFM/OCM (Nov. 13, 2014)**

Minutes of the joint C&S/RFM/SLP/OCM meeting are TBD.

**5. Resolutions**

Request that the Area Director forward to CESG a resolution to publish the updated TM, TC, AOS Space Link Protocols based upon both approved SDLS changes and the already CMC approved changes accumulated over the years.

**6. Planning**

The next SLP WG meeting is tentatively planned for most likely Monday and Tuesday AM during the week of March 23 – 27, 2014 at Caltech in Pasadena, CA. The Fall 2015 meeting is planned for the week of Nov. 9 -13 at ESOC in Darmstadt, Germany. Please check the meetings tab under [www.ccsds.org](http://www.ccsds.org) for updates.

**Annex 1 - List of Participants-Space Link Protocols (SLP) – 20 participants**

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**Annex 2 – SLP WG Chairman’s report to SLS area director – on Nov. 14, 2014**



