CCSDS SLS-SLP WG Meeting Minutes

Fall 2022 Hybrid Meeting (Toulouse & Virtual)

Oct. 17, 2022

10 AM – 13:15 CEST

Draft Version

1. *Attendees*: Ignacio Aguilar-Sanchez (ESA), Greg Kazz (NASA), Matt Cosby (UKSA), Stehan Veit (DLR), Amanuel Geda (DLR), Gilles Moury (CNES), Brent Andres (NASA-GSFC), Ken Andrews (NASA-JPL), Marco Rovatti (ESA), Tomaso DeCola (DLR), Eric Pitts (NASA).

All the files mentioned in these meeting minutes can be found on the SLP WG CWE under the following URL:  <https://bit.ly/3AbWwS5>

1. *Addition of USLP SDLP to IP over CCSDS Blue Book (CCSDS 702.1-B-1)*

The rationale for the IP over CCSDS revisions work is to incorporate USLP into the mix of SDLPs in this blue book. USLP became a CCSDS standard in 2018. We are somewhat late in adding USLP to IPoC at this time, so it would be good to expedite this activity. The WG Chair found 6 pages in the current IPoC book that needed to be slightly updated in order to add USLP. See attached proposal from SLS WG. So now, we assert that USLP, TC, TM, AOS, and Prox-1 can carry IP datagrams recognized by CCSDS over the link. The document changes per say are very minor as demonstrated during the meeting. The question we want to make sure we ask now, is ….is there anything more to it than that ? This question will be addressed by both the SIS and SLS areas.

Note well, that there is no change at all to the shim protocol specification in Chapter 4. It remains unchanged. We need to check SANA Registries to see if adding USLP, causes an update to SANA. 2014 was the last year in which an update was made to IPoC (Technical Corr.), which is the date of the current blue book, 702-B-1.

**ACTION-1-2022-10-17:** On Tomaso DeCola (SIS -AD)

Work with the SIS Area to determine the best pathway of accomplishing this update to IPoC due to the addition of the USLP SDLP within the SIS area. Consult the SLP WG where and when needed. Due Date: Oct. 30, 2022

1. Update the Prox-1 GB Figure 4-3 and text to match the current Prox-1 BB, Prox-1 Link Establishment moving onto the Working Channel in Full Duplex

WG Chair spoke to the proposed Fig. 4-3 and text vs the current one. The difference was that the Prox-1 BB says in Table 6-7, that when a comm change from the hailing channel to the working channel is made, both the receive and transmit frequencies of the responding node must change at the same time. The error is in the Prox-1 GB and it simply needs to match up with what the BB is saying.

Ken Andrews pointed out to small issues, which the WG chair will address:

* In Figure 4-3, FROM: Reset Persistance TO: Reset Persistance(change frequency). (We actually use the term persistence in the specification but the term maybe unclear to the uninitiated)
* In Fig. 4-3, make all the slopes of the lines in the figure the same.

**ACTION-2-2022-10-17:** On Greg Kazz – update Figure 4-3 and text accordingly per these accepted changes and create a new SLP WG project called, “Prox-1 GB Revisions” in the framework. Due Date: Oct 30 2022.

1. Update to *USLP* (CCSDS 732.1-B) to include VCP and VCA Services and allowing more than 1 USLP transfer frame per CLTU

Rationale for increasing the number of transfer frames per CLTU for USLP is to be in alignment with the TC SDLP. In addition, NASA has identified a use case on the SRL (Mars Surface Retrieval Lander) spacecraft, in which due to low SNR environment, the designers want to utilize more than one transfer frame within a CLTU, in order to minimize CLTU overhead on every transfer frame. Regardless of the SRL case, the working group concurred that it makes sense for CCSDS to be consistent with the forward link SDLP protocols i.e., keep TC and USLP in alignment in this matter.

Major points made during the discussion:

1. Document in the normative part of USLP BB, that one cannot mix truncated and non-truncted USLP transfer frames within the same CLTU. Obviously, by mixing them, it would be very complex to process this kind of CLTU on the spacecraft.
2. We did not concur and we ultimately rejected the proposal to limit the number of truncated USLP frames within a CLTU to 1. This limitation was felt to be too strict for projects who may desire to pack more than one truncated frame within a CLTU.
3. Point out in Section 2.4.1, that of all the referenced documents mentioned in that section, it is only TC Sync & Channel Coding that allows USLP to use one or more USLP transfer frames within the CLTU. This was pointed out by Gilles Moury.

**ACTION-3-2022-10-17:** On Greg Kazz – update the draft revision of the USLP version 2 BB to include points 1 and 3. Due Date: no later than Nov. 17, 2022

**ACTION-4-2022-10-17:** On Greg Kazz – Based upon concurrence obtained from the SLS area director and the SLP WG, create a new project in the framework called “USLP Revision 3.0” to add a) VCP Service, b) VCA Service, and c) align USLP with TC for “Maximum Number of Transfer Frames Given to the Coding and Synchronization Sublayer as a Single Data Unit”.

Due Date: Oct. 30, 2022.

**ACTION-5-2022-10-17:** On Marco Rovatti and Matt Cosby – They will complete a due diligence review of the revised USLP BB based upon the initial changes made by the WG chair along with these additional changes noted in these minutes. The latest version will be provided to the SLP WG by no later than Nov. 17, 2022.

1. Call for any more updates to Space Packet Protocols GB – 1st edition (CCSDS 130.3-G)

The SLP WG was polled for any more comments or concerns associated with the Space Packet Protocols GB – 1st edition. No additional comments or concerns were voiced, so the WG chair stated that this book is ready to be sent to the SLS area director and the CCSDS Secretariat for final editing and eventual posting to the CCSDS website.

1. What is the path forward with the the *Overview of Space Comm Protocols (OSCP) Green Book (OSCP)* (130.0)?

The OSCP GB was placed on hold until clarifications could be made to the overview figure 2-1, and security protocols could be addressed across the CCSDS protocol stack. Working with both the SEA area director (AD) and our SLS AD, the SLP WG chair was able to modify that figure and include the security green, magenta, and blue book references. As a result, a resolution was drafted and sent to the SLS AD for publication of the new version 4 of 130.0-G. Since that time, one more comment was received from Peter Shames concerning the document. That comments was at the Area Director level, so it is in Igancio’s queue to disposition. Once done, that is the last remaining road block to getting the OSCP GB republished as a new version.

**ACTION-6-2022-10-17:** On Ignacio Aguilar-Sanchez to resolve the last and final issue with Peter Shames concerning the OSCP GB, documented in the email forwarded to Ignacio during this meeting.

1. Preliminary Discussion on the order of processing between the COP and SDLS functions. Further discussion will take place in the joint SDLS-SLP WG meeting on Wed. Oct. 19

Brent Andres (NASA-GSFC) spoke to his rationale for why he and others at NASA have a strong conviction that the ordering documented in the TC SDLP BB needs to be changed so that SDLS preceeds the FARM on the receive side. The following observations were made during this discussion:

* 1. The FARM by definition is ONLY concerned with checking that the TC Frame Sequence Number (FSN) is incremently correctly or not. Other validation funcitons such as peforming the FECF CRC calculation, SCID and VCID validation is NOT performed by the FARM but is rather performed by the TC SDLP functions. This surprised some of the SDLS folks and may have driven their thinking that FARM must be executed before SDLS in order to clearly distinguish between transmission vs security events. Note that the FOP/FARM is part of the COP procedure, a separate blue book standard distinct from TC SDLP.
	2. The FSN is a completely different counter than the NONCE (anti-replay counter in SDLS terms). It is important to ensure that the behaviour of both counters is managed and monitored correctly.
	3. Brent’s example of having one BD frame and several AD frames demonstrates a problem with the current way COP & SDLS is currently documented in the TC SDLP. In those examples, which Brent will provide viewgraphs for, the COP retransmits frames, but those retransmitted AD frames will be rejected by SDLS because their NONCE values are smaller than the value expected by SLDS, due to the higher NONCE value of the BD frame, which takes priority on-board the spacecraft receive side. That explanation is included in the list of documents referred to in item 1 above. In essence, currently, when a BD frame is sent, it precludes retransmission of AD frames. A possible solution to this problem was expressed by Matt Cosby. He suggested that the SDLS replay window should be set to 1. That means that frames must be excepted in order without gaps nor duplicates by the FARM. This option needs to be more fully examined before we can adopt it.
	4. Brent made the assertion which the WG chair believes to be true, that we don’t see how changing the order of the FARM and SDLS (FOP and SDLS) allows one to distinguish between transmission errors vs security events. In deed, FEC and the FECF provide the means to correct and/or detect transmission errors before SDLS functions occur.
	5. Marco made clear that we can’t have it both ways i.e., either we keep the current ordering or we change it, otherwise interoperability between flight and ground or between agencies cannot be guaranteed. Quite frankly, it would not be a standard, if everybody can do as they like.
	6. We examined moving functions 15 & 16 in Table 6-1 in TC SDLP after function 17, which would agree with NASA proposal to change the ordering. It was just an examination of the possibility. We didn’t come to a final conclusion yet.
	7. Further discussion on this topic will take place at 16:00 on this Wed. in the joint SLP-SDLS WG meeting.

**ACTION-7-2022-10-17:** On Brent Andres – describe the problem with the FSN and NONCE counters in a couple of viewgraphs for presenation at the joint SLP-SDLS meeting for this Wed.

1. Resolutions requested at this meeting
2. Issue Version 1 of 130.3-G, Space Packet Protocols GB (See item 5**)**
3. Next meeting– the Spring 2023 technical meetings are scheduled to be held in Huntsville, Alabama USA, most likely in May. Hopefully we can all meet physically together. Please see <https://public.ccsds.org/meetings/default.aspx> for more details as they appear. However, due to the COVID-19 pandemic, that may change. Please stay tuned to the CCSDS website for updates.

END