Below are the Notes that Pete Shames compiled summarizing the comments made during the PowerPoint presentation “Space Communications Cross Support – Architecture Definition Document (SCCS-ARD) 5-Year Refresh”.

I (John Pietras) have interleaved my (preliminary) responses to many of the comments in red.

**Brief Meeting Notes – 23 June 2021**

Attendees: Shames, Krosley, De Cola, Pham, Vassallo, Sanchez-Aguillar, de Vicente, Hamkins, Volk, Haddow, Calzolari, Edwards, Kazz, Barkley, Wilmot, Schulz, Modenini (please update if I left anyone off this list)

Discussion notes: relative to pages in the attached presentation

Pgs 5-6, Andrews:  What is the  relationship of this CCSDS 901.1-M-1 SCCS-ARD doc to the existing SLS Overview of Space Communication Protocols (OSCP), CCSDS 130.0-G-3?  Do we need both?

Answer: The OSCP is a  useful doc, and it  covers the SLS (and some SIS) protocol stack, but the OSCP is not an architecture document and it does not address CSS  at all, nor really much about SIS.   It may be a useful  companion to  the the SCCS-ARD, but it is much more limited in coverage of topics and only addresses a limited set the protocol stack and deployment issues.  It is up to  SLS to determine whether they wish to retain this document.

No change to ARD

Pg 6, Calzolari: Raised the issue of the “Forward / Return File service, that it is a low IOAG priority (stated as “minus infinity”), and that agencies are doing as they wish to implement some sort of “split mode” CFDP file delivery agent.

Answer:  Agreed that this is a low priority for CCSDS, and that it may be better for CCSDS to reject it, but that is not the role of this WG, we just make note of such problems.  Agreed that Agencies are free to implement “split mode CFDP” in any way they deem suitable, but that this is not a standard approach nor is it likely to be cross-supported.

Perhaps we should just remove these “services” from the ARD, and just stick with CFDP in its SSI end-to-end scenario. This would involve deleting tables 6-5 and 6-9, among other things.

Pgs 8-9:  The group agreed that the use of the proposed revisions to Sec 4, and the new tables in Sec 6, made a lot of sense and were much  clearer than the alternative.

Happy to see that they like it.

Pg 11, Schulz: There was a later question as to whether this document is just listing possible options or making concrete recommendations about selections of future standards that are preferred.

Answer: The inclusion of “R<n>” markings in various tables are, in fact, intended to draw attention  to the CCSDS Recommended paths forward.  We can, and should, revisit this as a group and provide such guidance wherever  we can.  One stated example is recommending use of USLP for high rate, bi-directional, mission comms, such as for human rated missions, along with FF-CSTS.

Will assume that the recommended options are okay as-is unless and until specific changes are suggested/discussed/agreed.

Pg 12, Pham: The question was raised about inclusion of the EF-CLTU Orange Book in this document, particularly in Sec 4 Services, because it is of interest to the ISS and Artemis missions.  This also came up again in the context of Table 6-8, pg 17.

Answer: There is agreement that we do need to address the use of this Experimental, Orange Book, spec for these important missions, but also agreement that we  should not warp the already complicated structure of this  document to meet the needs of these slow moving missions that are retaining these older protocols.  The recommendation is to put a new Note (N4) in table 6-8 (see pg 17) to the effect that while AOS forward links are recommended to be supported by FF-CSTS, that they may be supported, in CLTU form, using  F-CLTU or the obsolescent EF-CLTU.  A similar note may be  useful in Sec 4.

This brings up several interesting questions/issues – (1) will Artemis use AOS or USLP? I thought it was USLP. (2) For ISS, does any other agency implement/support EF-CLTU, or is it still just a “NASA thing”? If only NASA has implemented EF-CLTU, then it’s not a “cross support service” and shouldn’t be in the ARD (the point of cross support for the ISS is the AOS ADLP, not the ground transport mechanism (e.g., EF-CLTU) that an agency uses to privately and proprietarily use to get its AOS frames to its ground station). (3) If Artemis uses EF-CLTU, will partner agencies be expected to then implement it? EF-CLTU is a single-user-per-space-link service, which means that the (forward) link cannot be shared (at the ground station) by a mix of DTN and frame data, pushing that muxing function onto the user of the single EF-CLTU instance (i.e.., the “Artemis MOC”, if indeed there is a single “Artemis MOC”).

Bottom line, it’s fair to say that new CCSDS standards (e.g., FF-CSTS) weren’t available in time for Artemis’ 2024 target, and so they’re using what they have. I.e., from the mission-planning-cycle vs. CCSDS-standardization perspective, Artemis is effectively already a legacy mission. Certainly, ISS is a legacy mission. I don’t think that we have to justify the continued use of EF-CLTU for ISS, and maybe not for Artemis (at least in its 2024 configuration). But I’m a bit uneasy about giving missions a pass on obsolescent systems in general, which is the way I read the proposed content of the Note(s).

Pgs 12-20, Andrews: Ken raised a question about the meaning of the column headings in the tables on pgs 12-20.  In many cases the column headers are observed to be the same as the protocol names on the rows.  What are these really intended to represent?  Barkley wanted to make sure that “Interface Binding Signature” is clearly defined in the document.

Answer:  The column headers are really intended to name the Service/Function that is being provided.  The rows are intended to map out the stack of protocols that support that service interface, which is, in effect, the interface binding signature for the service.  Recommendation is to reword the column headers to reflect their role as Service / Function (e.g “Deliver tracking data” instead of TD-CSTS)  and the row entries as the  protocols that form the “stack”.

Making this change will involve rewording of section 4 requirements so that they will map into the section 6 tables. Let’s discuss.

Pg 14, Haddow/Barkley: The question of just what was meant by “Raw Radiometric” data, or, for that matter, “Validated Radiometric” data was raised.  This is in the context of using TGFT [64] and XFDU as the transport method and data format.

Answer: Agreed that the XFDU format, required content description, must be provided in order for the use of TGFT to make sense.  Agreed that this is an issue that the MOIMS Nav WG is in the best position to address.

Typo?  There was also a question about the “N” in the Raw Radiometric column  of this table instead of an “M”?

Regarding “Raw Radiometric Data” – this is the service that IOAG SC #1 calls “Raw Data Radio Metric Service.” It contains essentially the same uncorrected data as conveyed by TD-CSTS service, plus meteorological data. However, unlike TD-CSTS – which is designed to provide near-real-time tracking data – this service outputs XFDUs that cover arbitrarily-long periods of time (e.g., one XFDU for the whole pass).

Regarding “Validated Radiometric Data” – this is the service that IOAG SC #1 calls “Validated Data Radio Metric Service.” Because there is no standard for RM data validation, this service in essence is a standard mechanism (TDM over TGFT) for delivering TDMs generated off-line by provider-specific (and human-involved) processes.

Regarding the typo – it has been corrected to “M”

Pg 14, de Vicente/Volk: The question of just how the D-DOR WG currently returns their voluminous file data, using the RDEF [38] formatted files was raised.

Answer: The response shown, using SFTP, was stated to be accurate.  We need a reference for this.

1. “SFTP” appears in the M-1 version of the ARD only in the list of acronyms, implying that at some point is was in the document but removed before publication.
2. “SFTP” appears only once in the text of CCSDS 506.1-B-1 (D-DOR Raw Data File Format), and only as an example. Specifically, 1.2 states “This Recommended Standard defines only the data format and content, but not the means for its transmission. The method of transmitting the data among partners is beyond the scope of this document. Data transmission could be based on a CCSDS data transfer protocol, filebased transfer protocol such as SFTP, stream-oriented media, or other secure transmission mechanism.” So technically SFTP is not necessarily the recommended transfer protocol, although it sounds like the *de facto* standard for doing so.
3. Assuming that SFTP is the de facto method for transferring D-DOR raw files, then (a) the “SFTP” row in table 6-6 will be replaced with 2 rows, one for FTP and one for SSH (with normative references for each) and both are mandatory for D-DOR Raw Data, and (b) the SFTP acronym will be deleted from the Acronyms list since it is not actually used in the document.

Pg 15, Haddow/Barkley: Why is HTTP over TLS [55] the protocol shown to carry SM “information entities”?

Answer: This is intended to be future looking, and SM transport protocol is likely to be HTTP/REST therefore it is safe (enough) to use it in this table as a [Future] protocol.  Agreed.

If/when the CSSMWG comes up with a more-accurate estimate for the future protocol signature, we’ll be happy to reflect it in the table.

Pg 17, Sanchez-Aguilar, Pham, Schulz, and others: This table generated a lot of discussion.  We traced AOS and TC, in particular, down through the stacks and into the notes.  There was agreement that this was a pretty good way to describe all of the complexities inherent in what has, in fact, been standardized.  There was also a strong desire to understand just what we were trying to describe and to review these tables in detail.

Issues:

1. How does the TC path work?
2. How does the AOS path work?
3. How do the USLP (fixed and variable) path(s) work?
4. Why does F-CLTU for TC S&CC reference C2 which is only about optical comm?

That is a typo. It should be “C1” (underlying 401 RF & mod). It has been changed.
5. Can we put a note, N4, into the cell for AOS forward and F-CLTU indicating that both F-CLTU, and EF-CLTU, can be used, with some local wrangling, to support synchronous AOS forward links, but that FF-CSTS is recommended?

See my previous comment on this proposal. Unless CCSDS sees EF-CLTU as a true cross-supported transfer service (as opposed to a solution that is used only between NASA MOCs and NASA ground terminals) I am reluctant to recognize this as more than what it is: a NASA legacy service that happens to have been derived from a CCSDS standard.
6. Just how much of what is in this table should be shown as “Recommended” as opposed to just “Optional”

Answer: Table still needs work and probably a new N4 note, at a minimum.

Request: That this group undertake a careful review to make sure that these tables make sense and that they are accurate.

Pg 17, Sanchez-Aguilar, Wilmot: How does this table address TC commands sent from a relay, or a relay S/C running DTN to a leaf node over a local / proximate protocol such as WiFi?

Answer:  All of these sorts of ABCBA and SSI deployment questions will be addressed in the SSI sub-sections of the document which will be worked in the next round of edits.  The SSI sections in the current edition should be reviewed with an eye toward whether this already provides a viable framework for such discussions.  It defines a pretty broad variety of node types and possible / example configurations.

Pg 18, Schulz: What is the role of this document?  Is it to provide recommendations or just documentation?

Answer: There is the intent to provide recommendations of best options where we can reach consensus on what those might be.  See discussion on pg 11. We will provide the current ***draft*** document, and the “R<n>” parts to anyone who requests it.

Pg 21-24, Barkley: Is any simplification of the whole complex set of three almost identical VCM protocols going to be possible?   It seems that Agency interests drove us to this awkward and complicated situation.

Answer: While the SEA SAWG would also like to get this situation fixed we are in the same situation as we stated in Pg 6 (and 29-30) in regard Fwd/Ret CFDP.  It is up to the CCSDS Areas and WG to fix this stuff up.  The best we can do is to point out that there are issues and to attempt to describe them as clearly as possible.  We would like to encourage that this be done, the current situation is awkward, at best.