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| meeting date | 10-12 May 2017 | ref./*réf.* | CSTS-WG-120517 | page/*page* | 1 |
| *date de la réunion* |  |  |  |  | 7 |
| meetingplace | San Antonio-Texas | chairman | M.di Giulio (ESA margherita.di.giulio@esa.int) |
| *lieu de la réunion* |  | *président* |  |

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| minute’s date *dates de minute* | 12 May 2017 | participants *participants* | W.Hell (ESA wo\_.\_he@t-online.de)S.Gully (sylvain.gully@dlr.de)R. Neutze (NASA-MFSC robert.l.neutze@nasa.gov) T.Pham (JPL/NASA, timothy.t.pham@jpl.nasa.gov) J.Liao (jliao@jpl.nasa.gov)

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| subject/*objet* | CSTS Working Group-2017 Spring Meeting | copy/*copie* | CCSDS CSTS Working Group Members |

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| Description*/description* | action/*action* | Due date/*date limite* |
| **NOTE:**All actions are recorded with an “A” in the MoM .The “Workplan” (Chapter 9 ) identifies the responsible WG member for each product/activity.  |   |   |

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# Spring Meetings Agenda

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| **Wednesday, May 10** | **Thursday, May 11** | **Friday, May 12** |
| **CSSM [B189-VCT2]** | **CSTS [B178-CR1]** | **CSSM [B189-VCT2]** | **CSTS [B178-CR1]** | **CSSM [B189-VCT2]** | **CSTS [B189-CR1]** |
| Configuration Profile and Service Agreement Book Development | Introduction: Recap Rome Meeting Interim Progress; Agenda Approval; Action Items | Joint Session CSS Area Control Architecture | <Reserved; WG Chairs Discussion> | Work plan next 6 months, meeting wrap-up, MoM |
| Service Accounting Metrics | Recap on CSTS SFW, MD CSTS, Guidelines | Resources |
| *Break* | *Break* | *Break* | *Break* | *Break* | *Break* |
| Management Service Top level Requirements | Forward Frame CSTS | Concept Check/Adjustments | Editing session: Registry's entries | Work planning --> Fall meetings | Extra session for discussions, or editing session (e.g. Guidelines, Concept) |
| Management Service Preliminary draft test plan | Situational Awareness Discussion (Agency plans) | Actions Items Review; Meeting Summary, Wrap-up |
| *Lunch* | *Lunch* | *Lunch* | *Lunch* | *Lunch* | *Lunch* |
| TBD | Forward Frame CSTS | CSSMRecommendations vs | Editing session: Registry's entries | CSS Area Closing Plenary [Cafeteria CR3] |
| Inter-recommendation spreadsheet updates | Assess all projects re delivery dates + TBD |
| *Break* | *Break* | *Break* | *Break* | *Break* | *Break* |
| Joint Session: NAV WG | TD CSTSRED Book finalization | IOAG Svc Catalogs | TBD | <Reserved> | <Reserved> |
| Preparationg re CSS Area Control Archiecture | TD CSTSPrototype | Joint Session: Func Resource for CCSDS WGs | <Reserved> | <Reserved> |
| *Adjourn* | *Adjourn* | *Adjourn* | *Adjourn* | *Adjourn* | *Adjourn* |

**S Statement**

**D Decision**

**A Action**

# Forward Frame CSTS

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| D/A | The production engine of FF-CSTS shall foresee the reception of the CLCW for the evaluation of RF Lock and Bit Lock flags. Configuration capabilities for such feature shall be foreseen, e.g. regard/disregard of these flags. (TP) |
| D | In case of multiple Service Instances active at the same time, only one SI will be enabled to do configuration actions affecting service production. This will be achieved by using the “Throw Event” procedure.This means that only one SI of a given Service Package shall have the optional “Throw Event” procedure instantiated such that parameters affecting service production are accessible to this SI only. |
| S | The FF-CSTS Recommendation shall consider three cases:* multiplexing of TC (variable length, asynchronous uplink)
* multiplexing of AOS (fixed length, synchronous uplink)
* multiplexing of CADUs (fixed length, synchronous uplink)
 |
| D | The FF-CSTS service provision shall be limited to handling of frames associated with a single VC ID per Service Instance. This means, that there shall be a one-to-one assignment of VC to SI. Then, if required, the multiplexing between VCs will be performed by the FF-CSTS service production engine.  |
| D | The FF-CSTS Functional Resource shall contain the VC ID parameter.  |
| D/A | TP and WH will assess the following behaviour: The VC ID as well as the SCID from the header of every incoming TC/AOS frame forwarded to the FF-CSTS provider by means of a Process Data Operation invocation or a ForwardBuffer PDU shall be checked except if the incoming Process-Data invocations or ForwardBuffer PDUs carry CADUs. In case the invocation is rejected, it shall be assessed how to notify the User (e.g. via the NOTIFY operation).  |
| S | The discussion about the AOS implementation of FF-CSTS has been held with the support of the SLS AD ( G.P. Calzolari). It was concluded that for FF-CSTS to support the “forward” flavour of AOS service, the information is not completely defined.In fact, it is required to identify the selection of encoding/synch options as well as RF and modulation options that can be implemented in forward AOS. The discussion outlined, as an example, that concerning coding possibly R-S, LDPC (for Transfer Frame) and convolutional coding (no puncturing) will be permissible. These are the options shown in diagram Figure 2.1 (NASA input).Possibly, describing such selection of options would be achieved by producing a Magenta Book. There shall be the relevant request by the Agencies and a CMC decision. |
| S | Processing of CADUs implies that the content is not inspected by the Service Provider, therefore it is User’s responsibility to properly insert the CADUs in the Virtual Channel. |
| S | AOS: “Idle” frames get injected locally at the ESLT. Idle Frames (or OID = Only-Idle-Data) will contain all 1 (ones) as VC ID. This VC will be multiplexed with those containing the Frames submitted by FF-CSTS Users.The OID frames VC will be multiplexed with the VC(s) of the operational data. |
| A | TP will analyse the feature defined for the Notify operation in CLTU specification, in order to determine if/which capability will be carried forward in FF-CSTS.  |
| A | TP will look into the prototype of a generic “Provider” of forward services, developed by D. Zoller. The aim is to determine if/to what extent the material can be reused and, in general, to make an estimate of the effort for developing the prototype. It is assumed that NASA will fund that implementation. Concerning the “User” side of that prototype, NASA informed that they will undertake the development via the GSFC (Goddard) site. If that gets confirmed via the CESG, the FF-CSTS Project will be approved. |
| S | In the case of CADUs encoded via LDPC slicing, it is not possible to implement the OID insertion. |
| D | In case of unassigned VC the service will be restricted to a single SI. |
| D | In case of delivery mode “complete” one service instance of FF-CSTS can only have one Buffered Data Processing Procedure instance, which implies that there will be a single input queue buffer.This is in line with what described in CSTS SFW. |
| D | It shall be possible to concurrently operate timely and complete SIs. Any SI will however be configured to operate in one and only one delivery mode. |
| A  | The functional description diagram shall be updated to reflect the randomization feature for LDPC as per Pink Sheet paper delivered by G.P. Calzolari on 12 May.  |
| S | Item already discussed at Fall meeting 2016, but worth repeating:“Insert zone”: It provides the possibility to insert user specific info in a dedicated field ( the “insert zone), which will be encoded together with the whole Frame. Therefore, when the FF-CSTS service production is configured to process CADUs, the insert service cannot be provided.The information to be inserted shall be put in each and every frame, that is, also in the OIDs. |

# Functional Resources Technical Note and FR Model.

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| S | In addition to the presentations given vie teleconferences, another presentation of the TN to the WG Chair has been given by CCS AD at this Spring Meeting, with the expectation that they provide possible comments re the services conceived in the respective WGs and Areas.The CSTS WG has supported this presentation. |

# FR/P/D/E OIDs and their Registration at SANA

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| S  | The tool for FRs editing is available in CWE at [http://cwe.ccsds.org/css/docs/CSS-CSTS/CWE Private/Functional Resources Definition/XML Editor](http://cwe.ccsds.org/css/docs/CSS-CSTS/CWE%20Private/Functional%20Resources%20Definition/XML%20Editor). WH and HD provided a training to the WG members about the installation of the environment for using the tool, and about using the tool itself.Filling in the missing OID information will be the main objective for the next six months, aiming at completion by the Fall Meeting. |
| S | The WG deems that the finalized version of the OIDs table in SANA shall also be reviewed by the WGs of the involved services. |

# CSTS Specification Framework CCSDS 921.1

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| S | The work on CSTS SFW has been completed . The BLUE book has gone through CESG Poll and CMC Poll, the Project is therefore completed. |

# Guidelines

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| S | The final WG version of the Guidelines is uploaded to the CWE. After this Meeting it will be sent to Area Director for starting the path towards Agency Review.  |

# Monitored Data CSTS – CCSDS 922.1

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|  S | The work on MD CSTS is completed, the BLUE book has gone through CESG Poll and CMC Poll, the Project is therefore completed.Some editorial issues were discussed with the CCSDS Editor, and it is agreed that some editorial changes will be implemented. |

# Tracking Data CSTS – CCSDS-922.2

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| S | TD CSTS had been sent by the WG to AD for being submitted to Agency Review as RED-1. The AD produced a few comments, notably one about the “SANA Consideration” chapter . This will be implemented shortly by the WG. At that point the RED Book will be ready ( presumably by end-May 2017)  |
| S | TC CSTS Prototype: following the report provided by SG (DLR) about changes between the previous version of CSTS SFW (which was used to implement the CSTS API by ESA) and the final version of CSTS SFW (the “BLUE” book version), ESA undertook to update the CSTS API. The new version should be ready by end May 2017, and it will then be delivered to DLR, for being used in the implementation of their TD CSTS Provider prototype. |

# Workplan

Update/ finalize CSTS Concept: W.Hell, (ESA), WG to review.

Update/ finalize TD CSTS: W.Hell (ESA)

Update/produce FF CSTS specification: T.Pham ( JPL/NASA)

Completion of data preparation for SANA Registry: W.Hell / H.Dreihahn / H.Ernst / T.Pham

Yellow Book for TD CSTS Prototype: S.Gully (DLR)

Development of TD CSTS Prototype:

* User: Jason Liao (NASA/JPL)
* Provider: S.Gully (DLR)
* Validation, interoperability tests: S.Gully (DLR)/J.Liao (NASA)
* Tests Report - to be turned into Yellow Book: S. Gully (DLR)

# Schedule of Teleconferences

**Telecon 1: 13th July 2017, at 16;00 CEST**

**Telecon 2: 21st September 2017, at 16:00 CEST**

# Outcome of a Splinter Meeting held after the CCSDS Workshop

Tim Pham and Wolfgang Hell met after the CCSDS Spring Workshop, primarily to discuss in further detail FF-CSTS topics. The results of that splinter meeting are listed below.

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| D | In case a single user shall be granted access to several VCs, this shall be achieved by several SIs accessible by this user, each SI handling frames with one VC ID. This statement applies only to handling of TC or AOS frames, but not to CADUs. |
| D | In case a single user shall be granted access to several VCs, this shall be achieved by several SIs accessible by this user, each SI handling frames with one VC ID. |
| S | If a TC or AOS frame conveyed by an individual PROCESS-DATA invocation or a ForwardBuffer PDU needs to be rejected because the SCID or VC ID is not permitted for the given SI, the most appropriate mechanism for the rejection depends on the procedure handling the PROCESS-DATA invocations. If the procedure uses the unconfirmed variant of the PROCESS-DATA operation, the rejection of the invocation shall be signalled to the user by means of the NOTIFY operation being part of that procedure. If the procedure uses the confirmed variant of the PROCESS-DATA operation, the rejection shall be signalled by means of a negative PROCESS-DATA return. |
| S | The OID (“idle”) frames VC will be multiplexed with the VC(s) carrying operational data, where regardless of the multiplexing scheme applicable to the user data VCs the insertion of OID frames will always have the lowest priority. Actually, the insertion of the OID frames is a process applied after the user data multiplexing has been performed. The revised figure illustrating the FF-CSTS production will show this. |
| S | For reasons addressed below, opposite to what was initially stated during the Spring Workshop multiplexing of CADUs shall not be supported by the FF-CSTS.  |
| S/D | Processing of CADUs differs from processing of frames in a number of aspects that are listed here:* CADUs are already encoded, where the applied coding is not necessarily known to the FF- CSTS provider. Therefore the content of CADUs cannot be inspected by the Service Provider in terms of VC ID and SCID. A side effect of this is that by using CADUs any octet string can be uplinked to the spacecraft and therefore this mode can be used to support spacecraft not adhering to CCSDS defined frame formats. Given these characteristics, FF- CSTS shall not support any multiplexing of incoming CADU streams. Rather it shall be restricted to a single SI per service package in case CADUs are to be handled. As a consequence, any multiplexing has to be performed by and is under responsibility of the service user.
* One of the permissible encoding options will be LDPC including slicing, i.e. the framing at coding layer and data link layer are independent. As a consequence, the service provider cannot generate correctly encoded OID frames. Therefore in CADU mode a synchronous uplink can only be maintained if the user and the underlying ground communications service ensure that no input data underflow will occur.
* Given that CADUs are already encoded, it is not possible for the FF-CSTS provider to put data into the insert zone of AOS frames.
 |
| S | Given that the CADU contents cannot be evaluated by the FF-CSTS provider, the limitation of using a single VC per SI cannot be enforced by the service provider. Likewise a rejection of a CADU due to a not permitted SCID or VC ID cannot occur. |
| D | Since the FF-CSTS Functional Resource shall contain the VC-ID and SCID parameter identifying the frames permitted to be handled by the given SI, the VC-ID and SCID shall be set to ‘undefined’ in case the FF-CSTS FR is configured to handle CADUs. |
| A | TP will analyse the events reported via the Notify operation in the F-CLTU specification, in order to determine if/which of those should be carried forward in FF-CSTS. |
| S | Regarding the considerations related to the insert zone of AOS frames it should be noted that handling of insert zone data is outside the scope of the FF-CSTS and would be covered by a dedicated CSTS. However, because such insert service would share a significant part of the service production with the FF-CSTS it is mentioned here. |

# ANNEX A

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**All Presentations given at the 2017 Spring Meeting can be found at:**

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| [The CCSDS Collaborative Work Environment (CWE)](http://cwe.ccsds.org/) > [Cross Support Services Area (CSS)](http://cwe.ccsds.org/css) > [Documents](http://cwe.ccsds.org/css/docs/Forms/AllItems.aspx?View=%7B8045374D-F8E0-4356-83CA-993252A38FE8%7D) > [CSS-CSTS](http://cwe.ccsds.org/css/docs/Forms/AllItems.aspx?RootFolder=%2Fcss%2Fdocs%2FCSS%2DCSTS&View=%7B8045374D-F8E0-4356-83CA-993252A38FE8%7D) > [Meeting Materials](http://cwe.ccsds.org/css/docs/Forms/AllItems.aspx?RootFolder=%2Fcss%2Fdocs%2FCSS%2DCSTS%2FMeeting%20Materials&View=%7B8045374D-F8E0-4356-83CA-993252A38FE8%7D) > 2017 Spring Mtg San Antonio |

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