**CCSDS System Architecture Working Group (SAWG) Meeting**

Attendees: Yonghui Huang, Roger Thompson, Wallace Tai, Ramon Krosley, Tim Pham, Sylvain Gully, Nestor Peccia, Mario Merri

**Introductory Discussions**

* Discussed RASDS refresh and proposed future work, no issues identified with just doing a refresh, WG to do review and provide feedback
* Discussed future extensions to RASDS, adding new viewpoints for services, operations, and possibly physical, need to verify ISO TC 20 / SC 14 involvement
* Discussed future addition of UML/SysML representation, agree to value of this, but recognize the added complications this brings and the need for resources
* Consider taking Lunar & Mars exploration as a Use Case for SAWG; including CNSA, ESA, ISRO, JAXA, KARI, NASA, RFSA, UAE. Consider inviting Interagency Operations Advisory Group (IOAG) team that is looking at Lunar and Mars exploration into CCSDS SAWG to do the technical communication arch work.
* Keep this in mind as example deployments are developed for the Application and Support Architecture materials.
* Consider how to represent operationally focused data and control architecture flows in these deployment diagrams

**CCSDS Application & Support Architecture Development Approach**

* Focus is to create the first (viewgraph) and second (document) phase materials for the Application and Support Architecture document
* Develop viewgraph level materials first for MOIMS, SOIS, and joint deployments, to include the use of services and interfaces identified in the SCCS-ADD/ARD (CSS, SLS, SIS & most of SEA), include security services as needed
* Use a consistent set of viewpoints and views based on RASDS method and representations, define the agreed set (below)
* Agree to develop the base materials adhering to the SOIS and MOIMS services and functions as they are defined
* Agree to propose extensions to the documented base as and where this seems advisable
* Review base materials and proposed extensions with the relevant MOIMS & SOIS groups
* Adjust materials as needed and iterate if needed
* Present to CESG and then CMC
* Revise and augment as needed until there is an agreed set of PPT materials (diagrams and 1-page descriptions)
* The above within 9 months
* Develop a document based on the agreed materials
* Initial document to be Reference Architecture Magenta Book, including tables, figures and descriptive materials referencing all the other standards
* Basic layout of the document will be similar to the RASDS and SCCS-ARD, with references to all the other standards in each section
* All the above within the first 18 months

Views

* Service view, including service types:
	+ Represented as a table with group name, functions, operations, stds reference
	+ Nav is different, use group name, functions, data formats, stds reference
* Functional views:
	+ Top level black box (overview) and white box (at least 1 level, possibly 2)
	+ Functions (with operations lists) & relationships
	+ Specifically show services interfaces & interactions
* Protocol views, including service interface bindings:
	+ Space transport & terrestrial transport,
	+ Building blocks & end-to-end,
	+ Reference SCCS underpinnings,
	+ Include MAL bridging, SOIS subnet bridging
* Information views:
	+ Identify all major data objects from functional views,
	+ At abstract (key component) level, not at detail level,
	+ Use tree structured or ER diagrams as needed (examples provided from RMP)
* Deployment views (both single link (ABA) & space internetworking (SSI)), these are just representative examples:
	+ Show relationship of the app layer functions to SCCS and below, and then abstract it away in most of the materials and focus on the upper layer stack
	+ Show MOIMS and SOIS separate and also integrated,
	+ Ground, flight, and also flight & ground,
	+ S/C, relay S/C (packet, file, SSI),
	+ Indicate mission centers, science centers, satellite operators, as examples

MOIMS materials review notes (Roger)

* Need to keep focus on SM&C functions and services as opposed to MAL & its layering (which is covered, but not primary)
* Keep focus on service interfaces, with optional interface bindings (file & message), service specs, and underlying transport
* This top level functional group view does not exist in the MOIMS documents now, we created it.
* Agree to adopt the use of a round “dot” on the function boundary of the service provider function as the service interface representation, this is different from the nominal RASDS service interface (see Roger’s materials for examples)
* Consider extending some of the SM&C services, like “OB SW management” to really being something like a Configuration Management (CM) function for software (SW) and other operations files
* Similarly, the File Handling function could really be called Data Management (files, messages, and other)
* Drop “FH” data object from the diagrams as a data type, its really an interface binding to the File Handling (or Data Management) function (and others)
* What is in the MOIMS Common Services and how do they relate? How is configuration at setup time handled? Develop a separate view if needed.
* TT&C service system does not directly provide timing data to Navigation, it is extracted from SLE frames and annotations. Update the diagrams as needed.
* Need to add information views for all the key information objects
* Need to add an Archive functional object to top level view and associate it with the OAIS / PAIMAS / DAI function and data definitions
* Develop White Box views for all of the Black Box objects, not all will show a lot of internal functions and interaction details
* ***=> Update MOIMS materials (RT)***

SOIS materials review notes (Ray and Yonghui)

* Review top level SOIS models: Ray did transfer services, Yonghui did device discovery
* Top level functional group layer is pretty good, but there is a question about the grouping of packet / file and time related services as “Content”.
* This top level functional group view does not exist in the SOIS documents now, we created it.
* How/where do file and packet services best fit into hierarchy?
* What is role of Device Data Pooling service, is it going away? Doesn’t it provide a useful service to limit the impact on devices?
* How does Subnetwork Test Service fit into hierarchy, does it directly access underlying devices and bypass (or replicate) Packet & Memory Access? Just what does this Test service do?
* Need to render the SOIS and MOIMS services consistently, using functions with service interfaces and operations (request / response) instead of data flow view. The SOIS diagrams will all need to be re-drawn to use the agreed approach.
* Shift the diagram style from rectangular service elements and request / response interfaces to functional elements, with the identified functions, and service interfaces.
* In SM&C MAL there is a standard set of interaction patterns that have names and descriptions; could consider using the pattern names (for consistency) without implying the adoption of the MAL implementation. It may be that the SOIS defines new patterns as well, reference earlier SOIS / MAL / MTS materials.
* Fix Device Virtualization Service (DVS) diagrams, there is a missing DVS block
* Adopt top level class diagram of services and operations or use tabular form? Agree to use tabular form.
* What is role of EDS, where does it fit into the function and stack views? Need to define diagrams that show the role of EDS clearly, SOIS does not have these in existing materials that are published.
* Question of how MIB relates to the other services, and if it involves EDS.
* Is Yonghui’s representation of the MIB and the associated information, extracted from the docs, accurate according to SOIS?
* =***> Provide MAL / MTS / AMS materials if possible (PS)***
* ***=> Provide subnet mapping materials from earlier SOIS discussions (PS)***
* ***=> Update base SOIS materials (RK)***
* ***=> Update device virtualization services and MIB (YH)***

Future topics

* How would something like One Web fit into this architecture in the future …?
	+ Essentially could become another terrestrial deployment option
* Does Satellite Manufacturer provide EDS for all components, how is that handled, how is S/C command dictionary handled?
* Consider how to integrate security services such as credentials and access control, key management, and end-to-end encryption.
* Recognize that operations level security services, especially authentication, access control, and key management, will be needed in the future, but are not yet fully defined.
* ***=> talk to Sec WG about services that should be included (PS)***

**RASDS Topics**

* WG agreed to request RASDS refresh, v1.1, now. Agreed that this document is still useful and that it is also what will be used for the SAWG work in the near term.
* Agree to return to the subject of RASDS extensions v2 (new viewpoints, SysML representation / profile) in the future
* ***=> Create RASDS refresh resolution for CESG (PS)***

**Telecons**

* once per month
* Pacific 600, UK 1400, China 2200
* First telecon 10 May 2016