**Service Agreement and Configuration Profile Blue Book**

**Concept Description**

**Introduction**

The CCSDS Configuration Profile approach sets out to standardize the de facto method that TT&C networks currently employ for configuring space link sessions (a.k.a. contacts, passes, tracks, events) as defined in network-dependent profiles (e.g., SN service specification codes (SSCs), NEN Support Activity Codes).

The Configuration Profiles that a particular mission would require would be defined and agreed before the mission in the CCSDS Service Agreement.

The CCSDS Service Agreement is intended to contain the information that will be needed by the mission and the TT&C network provider to execute the TT&C service. It proposes a standard format for essential information and data that are currently included in custom-formatted documents or contracts. The use of standardized Service Agreement formats will lay the ground for the automation of the TT&C service in the future. However, the Service Agreement is structured in such a way as to allow incremental adoption of the standardized formats as agencies move towards complete interoperability at different rates.

The Space Communication Cross Support Service Management (SCCS-SM) Service Specification, published in 2009, included standard XML-formatted Configuration Profile and Service Agreement specifications. In this nowSilver-1 specification, the Configuration Profile was designed as part of a Configuration Profile Service, in which new configuration profiles could be generated dynamically by a Mission and submitted to the Provider shortly (minutes to hours) before the submission of a Service Package Request that referenced this Configuration Profile. The need for a Provider CSSS to be able to quickly validate a Configuration Profile led to a highly-formalized Service Agreement standard against which the individual parameter values in the dynamically-generated Configuration Profiles could be automatically and quickly validated. This, and a few other shortcomings (monolithic structure, rudimentary timing offsets, all CCSDS or nothing nature) inhibited the implementation. Therefore, in the frame of new approach to the Extensible Service Management, the new structure of Configuration Profiles has been proposed.

The recommended standard will be composed of Service Agreement and Configuration Profile definitions, removing the previous link of the Service Agreement with the Service Catalogue. This emphasizes the technical importance of the Service Agreement in the complete lifecycle, and recognizes it as an integral part of the mission establishment and execution process.

Generally, the Blue Book will follow concepts as defined in technical note (TN) CSSA 902.5-TN-1.4 *Requirements for Simple Configuration Profiles and Service Agreements*. This TN is required for the deeper understanding of all dependencies and especially the coupling with the Functional Resource model, as the Blue Book won’t go into so much detail. Due to the fact that only official Green or Magenta Books may be referenced, the working group may consider converting either the whole TN or parts of it into a Green and/or Magenta book.

The Blue Book is a single consolidated recommended standard for two actual information entities: the Service Agreement and the Configuration Profile. They will be treated in separate sections, showing however the dependencies between the two, as required.

**Service Agreement**

The Service Agreement chapter will include, beside the main definition of the data format (with UML diagram), the sections related to the Configuration Profiles themselves (or actually their containment), as well as so-called Persistent Information.

The Configuration Profiles (defined in detail in the Configuration Profile chapter) are only either referenced or contained in the Service Agreement. In other words, all Configuration Profiles will be created as part of the Service Agreements, eliminating requirements for dynamic creation of configuration profiles and therefore eliminating the need to dynamically validate configuration profiles. The Configuration Profiles will each contain the ranges and sets of allowed values that their configuration parameters can take on, which allows specified parameters in SMURF Service Package Requests to be validated against information that is contained in the Configuration Profiles themselves.

Another advantage of the new approach is that when requesting a space link session to be scheduled, instead of asking for an explicitly-detailed set of resources and associated configuration parameter values, the Mission simply references one or more configuration profiles that have been previously negotiated between the Mission and the Provider CSSS and have been defined within the Service Agreement.

In summary, the Service Agreement section will focus on showing the dependency between actual Configuration Profiles and the Service Agreement, and how the containment shall be performed and understood, also in terms of lifecycle. Also, the some of the considerations related to parameter value ranges or lists may be placed here.

The Service Agreement section shall also include the list of bilaterally agreed apertures, data storage policies or general booking constraints (like maximum number of scheduled Service Packages in a time period).

**Configuration Profile**

The Configuration Profile section will focus on three aspects: general data format definition (and its dependencies with respect to the Service Agreement), the pre-defined service profiles (cookie-cutters) for most common services and finally some considerations for user definitions of configuration profiles.

The general part of the Configuration Profile section contains a description of the main classes and the dependencies of their combinations on Functional Resource Sets (like *RF Aperture*, *CCSDS 401 Return Physical Channel Reception*, *TM Sync and Channel Decoding*, etc.). Additionally, for use at the level of Service Agreement, the possibility to define parameter value ranges or lists is described. Another aspect is the difference in definition and usage, between user defined Configuration Profile parameters and SANA registered Functional Resource Sets, which constitute consolidated functional resource definitions (and shall bridge the identification and usage of functional resources between Service Management and Cross Support Transfer Services e.g. for Monitoring Data). These different usage scenarios will be described and discussed. This section shall provide a basic understanding and implementation of the CSS Service Management compliant Configuration Profile (as a part of Service Agreement or an entity being referenced out of a Service Package) without actually tackling any deeper Functional Resource aspects (like individual parameters, etc.).

The second part of the Configuration Profile section shall cover the so-called “cookie-cutter” concept and its handling. The chapter will also provide the most common cases of such pre-defined profiles. The cookie-cutter Configuration Profiles are created from pre-defined Space Link Service Profiles, which in turn are defined from the FRs in FR Sets. The cookie-cutters defined in the Blue Book will therefore walk through number of identified services, which will be explained in respective detail.

The actual content of each Functional Resource – their detailed parameters – are treated in two ways. First there is a general definition of freely defined parameters or parameter sets (which may be bilaterally agreed between parties) and secondly there are references to the respective fully CCSDS-conformant (in terms of Functional Resource definition) XML schema located at the SANA registry.

The basic Configuration Profile template, the main Common Class Schema and Abstract Strata Definitions will be delivered as an integral part of the Blue Book (mainly described in first part of the book), whereas schemas for FR Sets itself will be stored at the SANA registry. SANA will contain the FR Sets and their schemas generated automatically out of the Functional Resource Model. That way, each agency in a specific use case will be able to construct its desired complete Configuration Profile. As the actual FR Sets will be located at SANA, this will guarantee common (inter-agency) content and provide this information being always up-to-date. This way, the Blue Book will not focus at all on the definition of functional resource parameters (which would be redundant to the FR definition located in SANA registry), but will only mention them as required for fully CCSDS-conformant usage and will focus only on Functional Resource Sets and their required combinations for each specific Service Profile type.

That way the implementing organizations may choose if they freely decide on the contents of the Configuration Profile, still conforming in total to the Functional Resource dependencies within a specific service or completely support the existing set of Functional Resource parameters already existing at SANA. The way of treating these options in the Blue Book, is a trade-off between keeping the book development to a reasonable timescale and on the other hand to not completely loose the Functional Resource concept altogether. This consideration is also of importance with respect to the size of the book, which already just covering simple FR combinations for selected services is going to be very extensive. Additional definition of each single parameter would inevitably lead to a huge and incomprehensible recommended standard. Another issue to avoid is in that case the need for synchronization between the SANA registry of FRs and their definition in the SACP book; the only definitions should be in the SANA registry.

Finally the book will discuss some topics related to multi-service Configuration Profiles and their interactions. This section will provide normative information on how to combine different Service Profiles and how to use Interface Provider definitions for cross connections between services within a specific Configuration Profile. The usage of user defined (unregistered) parameters and FR Sets will be again discussed for clarification in terms of complex (multi-service) Configuration Profiles. One or two most common multi-service Configuration Profiles will be provided for normative definition and as an example for analogue constructions on agency level.

Appendix sections may include example XML configuration profiles, constituting actual pre-defined versions which could immediately be used by missions. Using these examples, missions would need to fill only the parameter values and thus use directly, for instance, a telemetry and telecommand combined configuration profile with FCLTU and RCF SLE.

**Summary**

The SACP Book will:

* Include definitions for two CSS SM information entities: Service Agreement and Configuration Profile
* Follow concepts of the CSSA 902.5-TN-1.4 which will possibly be explained in a Green or Magenta Book (to be defined) which may be officially referenced
* Service Agreement will be essentially a collection of Configuration Profiles augmented with allowed value ranges or lists
* Service Agreement will contain also additional information (Persistent Information) which will apply for all of the Configuration Profiles and Service Packages within the Service Agreement period.
* Configuration Profile will define (based on so called cookie-cutters) the configuration for the mission,
* Cookie-cutters represent pre-defined combinations of Functional Resources and Sets, which follow the FR concepts for typical services (e.g. Forward CLTU Space Link Service).
* The schemas for FR Sets will be stored in SANA
* The configuration profiles may contain actual Functional Resource parameters (from SANA) and ones with freely definable (bilaterally agreed) parameters. The selection on use of these can be done on mission to mission basis.
* Each mission / user shall be able to construct its own configuration profile cookie-cutter schema, based on provided template, common classes and abstract strata sets, and optionally, FR Set Schemas from SANA.
* Bilaterally agreed parameters – in case the agencies intend to also take advantage of monitoring and control – need to follow the FR structures, especially with respect to FR Types and Parameter Identifiers (OIDs). This would possibly require agencies to register their own FRs on the SANA registry subtree that is already set aside for that purpose. This will be provided in form of best practice or even normative appendix (tbd).

