**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 recommended standard will be composed of Service Agreement and Configuration Profile definitions. 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.

The SACP Blue Book is closely related to the Functional Resource Model Magenta Book (CCSDS 901.3) and takes advantage of multiple concepts defined therein. The knowledge of the FRM Magenta Book is therefore very useful in general and actually required in case of usage of SANA registered Functional Resource Sets.

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 persistent information, such as the list of bilaterally agreed apertures, data storage policies (including storage allocations) or general booking constraints (like maximum number of scheduled Service Packages in a time period). Another topic addressed in this section would be identification of the versions of standards used in the scope of the agreement (e.g. Space Data Link, Transfer Services, etc.).

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 a Service Agreement, i.e. there are no requirements for dynamic creation of configuration profiles nor the need for their dynamic validation. A Configuration Profiles contains the ranges and sets of allowed values that specific parameters can have, which in turn allows for parameters in SMURF Service Package Requests to be validated against the Configuration Profiles.

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.

**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 for common services and finally 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. 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 getting into individual parameter definitions.

The second part of the Configuration Profile section shall cover the concept and handling of pre-defined service profiles. The chapter will also provide the most common cases of such pre-defined profiles. The Configuration Profiles are created from pre-defined Space Link Service Profiles, which in turn are defined from the FRs in FR Sets. The pre-defined service profiles defined in the Blue Book will therefore walk through a 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 themselves 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 ensure that this information is 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.

Following this approach, the implementing organizations may choose whether to freely decide on the contents of the Configuration Profile, still conforming in total to the Functional Resource dependencies within a specific service, or to completely support the existing set of Functional Resource parameters already registered at SANA. The way of treating these options in the Blue Book, is a trade-off to keep the book development to a reasonable timescale whilst retaining the key features of the Functional Resource concept. 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. Another issue to avoid is 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 address multi-service Configuration Profiles and the relationships between services inside. 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 addressed for clarification in the scope of 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 an 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;
* take account of the Functional Resource Model Magenta Book (CCSDS 901.3);
* include the Service Agreement which essentially will be a collection of Configuration Profiles augmented with allowed value ranges or lists;
* provide information on what additional persistent information will be provided within Service Agreement, which will apply for all of the Configuration Profiles and Service Packages within the Service Agreement period;
* show how the Configuration Profile will define the configuration for the mission as combinations of one or more Space Link Service Profiles,
* define the Space Link Service Profiles, representing pre-defined combinations of Functional Resources and Sets, which follow the FR concepts for typical services. A Space Link Service Profile contains the functional resources needed to provide a single service (e.g. Forward CLTU Space Link Service).
* define a set of standard configuration profiles that can be used by missions with little or no adjustment or customization. This set of standard configuration profiles will include single service configuration profiles and multi-service configuration profiles (i.e., configuration profiles contain two or more services, such as a combination of command, telemetry, and tracking services).
* provide the information on FR Sets and XML schemas which will be stored in SANA;
* show that 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.
* provide most important information on how the mission / user shall be able to construct its own configuration profile schema, based on provided template, common classes and abstract strata sets, and optionally, FR Set Schemas from SANA.
* discuss the bilaterally agreed parameters – in case the agencies intend to also take advantage of monitoring and control – showing how 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 the form of a best practice or normative appendix (tbd).

