

Draft Recommendation for  
Space Data System Standards

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PROPOSED Draft Recommended Standard

CCSDS 902.4-W-0.01

White Book

September 2018

AUTHORITY

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| --- | --- | --- | --- |
|  | | | |
|  | Issue: | White Book, Draft 0.01 |  |
|  | Date: | September 2018 |  |
|  | Location: | Not Applicable |  |
|  | | | |

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This document is published and maintained by:

CCSDS Secretariat

Space Communications and Navigation Office, 7L70

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Washington, DC 20546-0001, USA

FOREWORD

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PREFACE

This document is a draft CCSDS Recommended Standard. Its ‘White Book’ status indicates that its contents are not stable, and several iterations resulting in substantial technical changes are likely to occur before it is considered to be sufficiently mature to be released for review by the CCSDS Agencies.

Implementers are cautioned **not** to fabricate any final equipment in accordance with this document’s technical content.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

DOCUMENT CONTROL

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| --- | --- | --- | --- |
| **Document** | **Title and Issue** | **Date** | **Status** |
|  |  |  |  |
| CCSDS 902.4-W-0.00 | Service Package Data Format, Draft Recommended Standard, Draft 0.00 | March 2018 | Initial Draft. |
| CCSDS 902.4-W-0.01 | Service Package Data Format, Draft Recommended Standard, Draft 0.01 | September 2018 | Revised Draft. |
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# Introduction

## PURPOSE AND SCOPE

### PURPOSE

This Service Package Data Format Recommended Standard specifies a standard format for use in transferring the scheduled Service Package information related to cross support services. The Service Package Data is generally expected to be utilized in support of mission operations, in order to inform spacecraft operators of resource allocation and configuration data pertaining to ground station or relay spacecraft resources scheduled to serve their mission. Beyond this primary use case, some additional secondary use cases are also possible, including in design, testing and simulation, and mission planning.

### SCOPE

The scope of this Recommended Standard is limited to the exchange of scheduled service package information required in the context of CCSDS Service Management. In the following figure the Service Package Data Formats Specification is put into context with the various standards that together form the Space Communication Cross Support Service Management.



Figure 1‑1 : Planning Data Formats in the Context of Space Communication Cross Support Service Management.

#### Service Packages

In the Space Communications Cross Support (SCCS) Service Management concept, service requests are typically submitted from a mission user to a network provider managing ground station and/or relay assets. The resulting Service Package data is sent in response, using the Service Package Result messages described in this document. The purpose of the Service Package Result is to communicate to user missions the requested service packages that have been successfully scheduled. The results include identification of the necessary apertures, configuration information, and absolute timing information resulting from specific user mission constraints or from consideration by the service provider of user mission supplied timing flexibility.

Service Package data can be conveyed in two alternative formats, “Simple and “Verbose”. There is no difference in functionality between the two formats, only in how much information is directly conveyed versus referenced. The “Simple” format shares motivations similar to those of the Simple Schedule Format [5], including only basic information referencing the service configuration details that can be found separately in the referenced Service Configuration Profiles. In contrast, the “Verbose” format directly includes the complete service configuration as defined in the Service Configuration Profiles, so that a user might not need to reference them separately or perform. For different users and network providers, one or the other approach may be favourable. This specification provides the flexibility for providers and users to make use of either mode (Simple or Verbose).

Service profiles indicate default parameters, and permissible ranges for service configurations. Some service providers may allow requests to include parameters to be modified from the default values specified in the profile. These “respecified” values are indicated by the user requesting services, on the basis of an individual service package instance. An important motivation for the Verbose format in this document, is to be able to include the values for any such re-specified parameters in the Service Package Result.

Note that while this Recommended Standard has been developed within the scope of the Space Communication Cross Support Service Management (reference [3]) activity it is intended that the Service Package Result can be used to exchange configuration information and references to both CCSDS configuration profiles (see Reference [12]) and to Bilateral configuration profiles.

##### Simple Service Package Result

The purpose of the Simple Service Package Result is to supply the minimum and most common ground station or relay-satellite resource identification and configuration information needed by user missions to configure connections to the service provider at the scheduled times for the scheduled services.

The Simple format references the configuration profiles that are the basis of the scheduled Service Package, but does not identify individual resources or their configuration parameter values. The concept behind the Simple Mode is that where no respecification of configuration profile parameter values occurs, merely referencing the mutually-agreed and mutually–known configuration profiles is sufficient to identify all of the configuration parameter values. However, in order to be robust to cases where respecification of parameters does take place, the Simple format is also able to report the re-specified configuration profile parameters from the Service Package Request [4].

The Simple format can be used with simplified configuration profiles, because all of the required information is available in those profiles – i.e., the Simple format provides identification of the configuration profiles and any resources that are reconfigured in the Service Package Request.

##### Verbose Service Package Result

The purpose of the Verbose Service Package Result is to explicitly state the complete service configuration(s) replicated from the referenced configuration profiles as well as any respecified parameter values. The Verbose mode can be used by user missions to explicitly configure connections to the service provider at the scheduled times for the scheduled services without having to reference data outside of the Service Package Result for the full configuration profile.

The Verbose mode is intended to be a complete read-back of the configurations of all services scheduled in the Service Package. The Verbose mode can be accomplished by simply including a copy of the configuration profile(s) within the Service Package Result, wherein any respecified configuration parameter values are substituted for the original values from those configuration parameters.

## APPLICABILITY

This Recommended Standard is applicable only to the service package data formats and contents, but not to its transmission. With respect to the transmission of service packages between agencies and operators there are two scenarios:

1. The first is where the Planning Information is exchanged within the context of Service Management. In this case the transmission mechanism is described in [TBD].
2. The second deals with the case where the Planning Information is exchanged outside the scope of Service Management. The mechanism by which the Planning Information is transmitted is outside of the scope of this document and should be specified in an ICD agreed by the parties involved.

## RATIONALE

### General

The primary goal of CCSDS is to increase the level of interoperability among Agencies. This Recommended Standard furthers that goal by establishing the means to exchange planning information relating to where most cross support activity occurs: between the tracking stations or ground data handling systems of various Agencies and the mission specific components of a mission ground system.

The use cases described in the following sections were considered in deriving this Recommended Standard.

### USE CASES

#### Mission Planning

The Service Package Result identifies the SCCS services that have been scheduled. It specifies the values of the configuration parameters for resources used to perform those services, and can be used to:

* Confirm settings expected between the user and provider
* Specify exact configurations/values when the flexibilities of the Service Package Request allowed multiple possible configurations/settings
* Convey the values of the configuration parameters for the services comprising in the Service PackageIndicate the time(s) at which the service will be available
* Identify the “locations” where the services will be provided.

The Service Package Result closes the loop on Service Package Requests, and can be used for accounting purposes.

## DOCUMENT STRUCTURE

This document is organized as follows:

1. Section 1 provides the purpose, scope, applicability, and rationale of this Recommended Standard and identifies the conventions and references used throughout the document. This section also describes how this document is organized. A brief description is provided for each section and annex so that the reader will have an idea of where information can be found in the document. It also identifies terminology that is used in this document but is defined elsewhere.
2. Section 2 provides a brief overview of the CCSDS-recommended Service Package Result Formats.
3. Section 3**Error! Reference source not found.** provides details about the structure and content of the Service Package Format.
4. ANNEX A provides the normative Implementation Conformance Statement (ICS) proforma.
5. ANNEX B discusses security, SANA, and patent considerations.
6. ANNEX C contains a list of Acronyms applicable to the Service Package Results Formats.
7. ANNEX D is a list of informative references.

## DEFINITIONS

For the purposes of this document, the following definitions apply:

1. the word ‘agencies’ may also be construed as meaning ‘satellite operators’ or ‘satellite service providers’;
2. the notation ‘n/a’ signifies ‘not applicable’;

## NOMENCLATURE

### Normative Text

The following conventions apply for the normative specifications in this Recommended Standard:

1. the words ‘shall’ and ‘must’ imply a binding and verifiable specification;
2. the word ‘should’ implies an optional, but desirable, specification;
3. the word ‘may’ implies an optional specification;
4. the words ‘is’, ‘are’, and ‘will’ imply statements of fact.

NOTE – These conventions do not imply constraints on diction in text that is clearly informative in nature.

### Informative Text

In the normative sections of this document, informative text is set off from the normative specifications either in notes or under one of the following subsection headings:

* Overview;
* Background;
* Rationale;
* Discussion.

## CONVENTIONS

### THE UNIFIED MODELING LANGUAGE

The Unified Modelling Language (UML) diagrams used in the specification (including class diagrams, package diagrams, sequence diagrams and activity diagrams) follow the notation, semantics and conventions imposed by the Version 2.4.1 UML specification of the Object Management Group (OMG) [9].

Within the document use is made only of class diagrams. A UML class diagram describes the structure of a message; its parts; and how those parts interrelate. A UML class, represented in the diagram as a box, represents a data set. Class diagram conventions include composition, generalization, multiplicity and constraints. Enumeration notation is also used but only when it is involved in a composition constraint.

## References

The following publications contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. All publications are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent editions of the publications indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS publications.

[1] *Space Communication Cross Support – Architecture Description Document*. Report Concerning Space Data System Standards, CCSDS 901.0-G-1. Green Book. Issue 1. Washington, D.C.: CCSDS, November 2013.

[2] *Space Communication Cross Support—Service Management—Service Specification*. Recommended Standard for Space Data System Standards, CCSDS 910.11-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, August 2009.

[3] *Extensible Space Communication Cross Support Service Management—Concept.* Draft Informational Report, CCSDS 902.0-G-0.38, Draft Green Book. April 2014.

[4] *Service Management Utilization Request Formats* Recommendation for Space Data System Standards, CCSDS 902.1-W-0.4. White Book. Issue 0.4. Washington, D.C.: CCSDS, April 2017.

[5] *Simple Schedule Format*. Recommendation for Space Data System Standards, CCSDS nnn.n-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, xxxx 20xx.

[6] “CCSDS-910.NN-B-1\_XML\_schemas.”  
http://public.ccsds.org/publications/archive/CCSDS-910.11-B-1\_XML\_schemas.zip.

[7] *Time Code Formats.* Recommendation for Space Data System Standards, CCSDS 301.0-B-3. Blue Book. Issue 3. Washington, D.C.: CCSDS, January 2002.

[8] *Information Technology—8-Bit Single-Byte Coded Graphic Character Sets—Part 1: Latin Alphabet No. 1*. International Standard, ISO/IEC 8859-1:1998. Geneva: ISO, 1998.

[9] OMG Unified Modelling Language (OMG UML), Version 2.4.1, OMG Document Number: formal/2011-08-05.

[10] *Standard Formatted Data Units — Control Authority Procedures*, Issue 2. Recommendation for Space Data System Standards (Blue Book), CCSDS 630.0-B-2. Washington, D.C.: CCSDS, MONTH YEAR

[11] *CCSDS Global Spacecraft Identification Field Code Assignment Control Procedures*. Issue 6. Recommendation for Space Data System Standards (Blue Book), CCSDS 320.0-B-6. Washington, D.C.: CCSDS, October 2013.

[12] *Service Agreement and Service Configuration.* Recommendation for Space Data System Standards (Blue Book), CCSDS 902.5-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, xxxx 20xx.

# Overview

## GENERAL

This section provides a high-level overview of the CCSDS-recommended Service Package Data Format, which is designed to facilitate standardized exchanges of detailed operational configuration information between space agencies preparing for support events. Both types of Service Package Result (Simple and Verbose) follow the same conventions described in this section, and are commonly described using the same UML structures and XML schema in this document.

The two formats are functionally equivalent in combination with the data for the service agreement and profiles. The difference is that when the Simple format is used, references to the profiles need to be followed to obtain specific configuration data, whereas in the Verbose format the complete configuration data is explicitly contained.

It is expected that the provider and user will agree on which Service Package format should be exchanged as a part of the service agreement, or through some other out of band process. The reason for having two formats is primarily to support both providers who would want a more basic and compact data exchange using the Simple format (similar to what the Simple Schedule Format provides), as well as providers that might be migrating from legacy messaging systems that include all parameters, similar to the Verbose format.

## Service Package Result Format

The Service Package Result consists of messages or files in an XML format. Service Package Results are suitable for automated exchanges, yet are also human-readable (with a suitable XML editor). The use of XML and the basic style of the schema are common between the Service Package Result and other SCCS Service Management data types.

Fields within the Service Package Result are indicated in the schema as either mandatory, in which case suitable values must be present, or optional, in which case values may be present or not. It is also possible to extend some of the contents by defining additional parameters. The content of any parameters defined is outside the scope of this document and should be documented in an ICD agreed by the involved parties, and registered with SANA.

## MAPPING TO W3C XML SCHEMA

This Recommended Standard includes the specification of a mapping to World Wide Web Consortium (W3C) Extensible Markup Language (XML) schema. The normative mapping of this Recommended Standard to XML W3C schemas is a virtual annex to this Recommended Standard and is contained in a stand-alone set of schema files (reference [6]).

NOTE – The XML schema has been elaborated on the basis of the mapping guidelines described in reference [E1].

## Common Portions

The Simple and Verbose formats of a Service Package Result share many common elements, including their basic three-part structure that follows the pattern of having a header, information entity, and data portions as defined in reference [5]:

* A Service Package Result Header (abbreviated “ServicePkgResultHeader”), that includes common SCCS SM message header data, such as a generation timestamp, version number, and start and end times, plus a status code indicating whether the following service package is understood as being for a test, provisional, or operational event.
* A Service Package Result Entity (abbreviated “ServicePkgResultEntity”) that indicates the contained data is a Service Package Result.
* A Service Package Results body (abbreviated “ServicePackageResults”) that contains a set of Service Package Result Details.

The Service Package Result Details may be absent (e.g. if no package was generated), but nominally will be present and multiple instances of the element can be included in a Service Package Result. Each instance of the Details corresponds to an individual service package and includes:

* A unique identifier for the service package
* Start and stop times for the service package
* A result status for the service package that conveys its scheduling status (e.g. “tentative”, “partial”, or “fully” scheduled)
* A result type indicating whether this information is new, or an update, etc.
* A potential reference to trajectory data
* A potential reference to a scenario that this may be a part of
* A readiness status that indicates whether some details still need to be defined, and the time by which they need to be defined.

It is only the contents below the Service Package Result Details that differ between the Simple and Verbose formats.

An individual Service Package Result message or file could contain multiple Service Package Result Details (e.g. batched together, when a request results in multiple service packages), each of which may technically be in either the Simple or Verbose format. However, for a compound service package that has multiple component services, the details for the entire set are consistently either Simple or Verbose.

## Simple Service Package Result

The structure for a Simple format result is abbreviated “simpleServicePkgResult”. It contains some number of “ServiceDetails” elements that each have:

* An indication of the service type
* An indication of the provider port ID to be used
* Timing information describing the start and stop times
* A reference to the relevant configuration profile (which may be for either an online or offline service)
* For online service, the aperture and frequency band are indicated.
* A list of any respecified parameters, with an identification of the resource, parameter, and the respecified value to be used.

For a service package that includes multiple component services, ServiceDetails are included for each component service.

## Verbose Service Package Result

A Verbose format of the Service Package contains:

* The same ServiceDetails structure used for the Simple format
* A set of configuration profile details elements holding:
  + The complete configuration profile contents for each referenced configuration profile in the ServiceDetails instances
  + In the case of bilaterally agreed profile formats, a name used to request the complete schema defining the configuration parameter and values used to configure the services in the service package (verbose option) when using non CCSDS service profile bilaterally agreed to between the provider and the user agencies
* The complete contents of an event sequence, if one is referenced as timing information in the ServiceDetails

Since the Verbose format includes the full set of parameters from each configuration profile, any parameters that were respecified are included with the respecified values inside the configuration profile details (see 3.1.21.2), rather than needing to be indicated within the ServiceDetails in the way that they are for the Simple format.

# Service Package Result

## General

The Service Package Result shall consist of digital data specifying the collection of parameters, data sets, and data set relationships, exchanged in the form of a file or message in XML.

### Overview

Figure 3‑1 shows the UML Class diagram for the Service Package Result. It should be noted that for clarity *abstract* classes are highlighted in green.

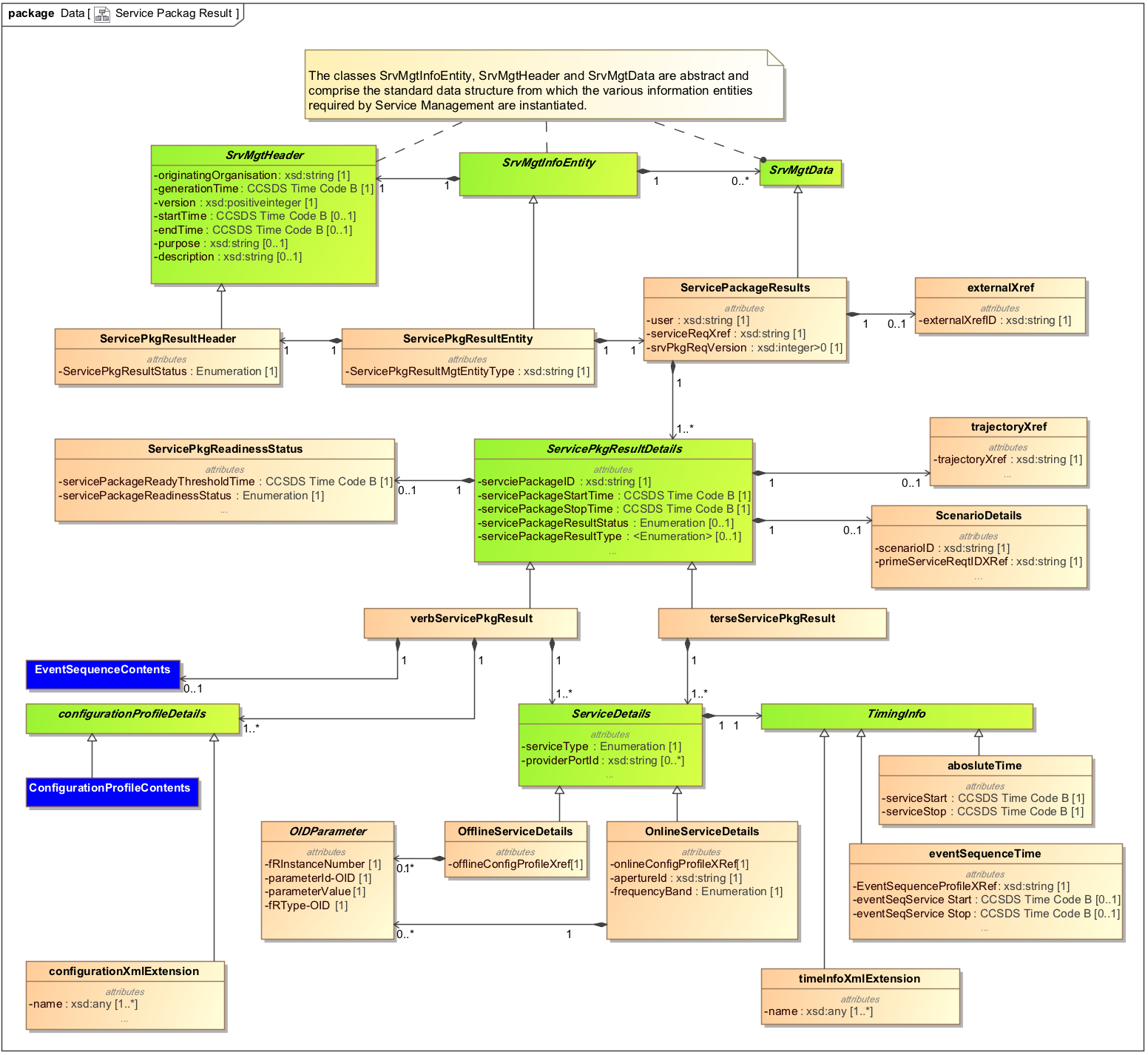


Figure 3‑1 : Service Package Result Class Diagram

The attributes of each class are described further in the following subsections and tables.

### CLASS ServicePkgResultHeader

#### The ServicePkgResultHeader class is mandatory and shall constitute the ‘header’ that is common to both Simple and Verbose styles of the Service Package Result formats.

NOTE – The ServicePkgResultHeader class is a specialization of the class SrvMgtHeader class described in Annex A of reference [5] and the generic description of the parameters is given there.

#### Table 3‑1 specifies the use of the parameters in the ServicePkgResultHeader in the scope of a Service Package Result.

Table 3‑1 : Class ServicePkgResultHeader Parameters

The parameters for the ServicePkgResultHeaderclass as are as per Table A-2 of reference [7] except for the following:

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| ServicePkgResultStatus | Mandatory parameter.  The status of the Service Package Result. | Enumeration  The following values are permitted   * TEST indicates that the service package result has been generated for test purposes only. * PROVISIONAL  indicates that the service package result is provisional and may still be subject to change. * OPERATIONAL  indicates that this is an operational service package result. | n/a |

### CLASS ServicePkgResultEntity

#### The ServicePkgResultEntity class is mandatory and shall constitute the Service Package Result information entity.

NOTE – The ServicePkgResultEntityclass is a specialization of the class **SrvMgtInfoEntity** class described in described in Annex B of reference [5] and the generic description of the parameters is given there.

#### Table 3‑2 specifies the additional parameters defined for the ServicePkgResultEntity in the scope of the Service Package Results.

Table 3‑2: Class ServicePkgResultEntity Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| ServicePkgResultMgtEntity | Mandatory parameter.  See Annex B of reference [5] | xsd:string — For the service package result the only permitted value for this parameter is the string   * “SERVICE PACKAGE RESULT” | n/a |

### CLASS ServicePackageResults

#### The ServicePackageResults class is mandatory and shall constitute the ‘body’ of the Service Package Result.

NOTE – The ServicePackageResults class is a specialization of the class SrvMgtData class described in Annex B of reference [5] and the generic description of the parameters is given there.

#### Table 3‑3 specifies the additional parameters defined for the ServicePackageResults class.

Table 3‑3: Class ServicePackageResults Additional Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| user | Mandatory Parameter.  The user of the scheduled package. These will typically be spacecraft names as specified in SANA. | xsd:string—Permitted values registered in SANA | n/a |
| serviceReqXRef | Manadatory parameter.  Service request identifier. | xsd:string | n/a |
| srvPkgReqVersion | Mandatory parameter.  Service request version number. This is used to specify the version of the service request. The submitter of the service package request is responsible for originally specifying this value, and storing it so that it can be matched up with the response.  The version of a resubmitted service package request must be greater than that specified for any previously submitted version of the same service package request. | xsd:integer>0 | n/a |



### CLASS ServicePkgResultDetails

#### The ServicePkgResultDetails class is an abstract class and is used to derive the mandatory classes required to provide a terse service package result or a verbose service package result.

#### Table 3‑5 specifies the parameters defined for the ServicePkgResultDetails class.

Table 3‑5: Class ServicePkgResultDetails Additional Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| servicePackageID | Mandatory parameter.  An identifier that is unique for every service package within a provider’s schedule.  It should be noted that if a schedule is regenerated then the servicePackageID for a particular Service Package may change. | xsd:string | n/a |
| servicePackageStartTime | Mandatory parameter.  Time at which the Service Package is scheduled to  start. The scheduled start of the Service Package  corresponds to the earlier of:  a) the scheduled start of signal acquisition for the  first (earliest-starting) space link carrier; and  b) the scheduled start time of the first (earliest starting)  transfer service instance in the Service Package. | CCSDS ASCII Time Code B (reference [7]) | n/a |
| servicePackageStopTime | Mandatory parameter.  The time at which the Service Package is scheduled  to stop. The scheduled start of the Service Package  corresponds to the later of:  a) the scheduled end of signal acquisition for the last (latest-ending) space link carrier; and  b) the scheduled stop time of the last (latest ending)  transfer service instance in the Service Package. | CCSDS ASCII Time Code B (reference [7]) |  |
| servicePackageResultStatus | Optional parameter.  This is used to indicate the status of the service package in the service package state machine. Possible values are:  -‘TENTATIVELY SCHEDULED’  -‘PARTIALLY SCHEDULED’  -‘FULLY SCHEDULED’ | Enum | n/a |
| servicePackageResultType | Optional parameter.  This is used to provide context as to the reason why the result is was generated:  -‘NEW’: used for results generated by a new service package request  -‘UPDATE’: used for results generated by an update service package request  -‘ALTERNATE’: used for results generated by a select alternate service package request  -‘FLEXIBILITY CHANGE’: used for results generated by a service package change initiated by the service provider within flexibility of the request | Enum | n/a |

### CLASS ServicePkgReadinessStatus

#### The ServicePkgReadinessStatus class is an optional class and shall constitute optional information regarding the readiness status of the request and the time by which all necessary data for the service package.

#### There shall be at most one instance of the ServicePkgReadinessStatus class for each instance of the ServicePkgResultDetails class.

#### Table 3‑6 specifies the parameters defined for the ServicePkgReadinessStatus class.

Table 3‑6: Class ServicePkgReadinessStatus Additional Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| servicePackageReadyThresholdTime | Mandatory parameter.  The latest time (in UTC) at which all elements required for the execution of the SLS Service Package can be defined or redefined. | CCSDS ASCII Time Code B (reference [7]) | UTC |
| servicePackageReadinessStatus | Mandatory parameter.  Summary status of the readiness of the Service Package for execution. The values are:  – ‘READY’: All required Service Package items are currently defined;  – ‘NOT READY’: One or more required Service Package items must still be defined. | Enum | n/a |

### CLASS trajectoryXref

#### The TrajectoryXRef class is an optional class and shall constitute optional trajectory reference information applicable to all services in the Service Package Result.

#### There shall be at most one instance of the TrajectoryXref class for each instance of the ServicePkgResultDetails class.

#### Table 3‑7 specifies the parameters defined for the TrajectoryXref class.

Table 3‑7: Class TrajectoryXRef Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| trajectoryXRef | Mandatory parameter. This is used to specify a reference to the trajectory that the provider will used to configure and execute the Service Package | xsd:string | n/a |

### CLASS ScenarioDetails

#### The ScenarioDetails class is optional and shall constitute optional reference information applicable to all services in the Service Package Result.

#### There shall be at most one instance of the ScenarioDetails class for each instance of the ServicePkgResultDetails class.

#### Table 3‑8 specifies the parameters defined for the ScenarioDetails class.

Table 3‑8: Class ScenarioDetails Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| scenarioID | Mandatory parameter. This parameter is be used to specify the scenario to which the Service Package belongs.  This is defined by the request submitter and must uniquely (for that user) define the scenario to be used. | xsd:string | n/a |
| primeServiceReqIDXRef | Mandatory parameter. This parameter is used to specify the scenario ID of the Service Package containing the services that will be configured to support the space link carrier(s) | xsd:string | n/a |

### CLASS verboseServicePkgResult

#### The VerboseServicePkgResult class shall constitute the Service Package Result Details entity.

NOTE – The VerboseServicePkgResultclass is a specialization of the ServicePkgResultDetailsclass and has no additional parameters defined.

### CLASS SimpleServicePkgResult

#### The SimpleServicePkgResult class shall constitute the Service Package Result Details entity.

NOTE – The SimpleServicePkgResultclass is a specialization of the ServicePkgResultDetailsclass and has no additional parameters defined.

### CLASS ServiceDetails

#### The ServiceDetails class is mandatory and shall constitute high level information about the scheduled service.

#### There shall be at least one instance of the Service class for each ServicePkgResultDetails class.

#### Table 3‑9 specifies the parameters defined for the ServiceDetails class.

Table 3‑9: Class ServiceDetails Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| serviceType | Mandatory parameter | Enum | n/a |
| providerPortId | Optional parameter.  Complex port identification  for the transfer service user to  utilize in establishing the  transfer service (references TBD) | xsd:string | n/a |

### CLASS TimingInfo

#### The TimingInfo class is an abstract class and is used to derive the mandatory classes required to provide timing information for each service in the service package.

#### NOTE – The TimingInfo class has no parameters defined. The necessary information is deferred to the instantiations of the TimingInfo class.

### CLASS absoluteTime

#### The absoluteTime class shall constitute the TimingInfo information of the service.

NOTE – The absoluteTimeclass is a specialization of the TimingInfoclass.

#### Table 3‑10 specifies the additional parameters defined for the absoluteTime specialization of the TimingInfo class.

Table 3‑10: Class absoluteTime Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| serviceStart | Mandatory parameter.  The serviceStart is calculated by adding the optional configuration profile start offset specified in the Service Package Request to the ScheduedServicePackageStartTime. If no offset is specified then the serviceStart time is the ScheduedServicePackageStartTime | CCSDS ASCII Time Code B (reference [7]) | n/a |
| serviceStop | Mandatory parameter.  The serviceStop is calculated by subtracting the optional configuration profile stop offset specified in the Service Package Request from the ScheduedServicePackageStopTime. If no offset is specified then the serviceStop time is the ScheduedServicePackageStopTime | CCSDS ASCII Time Code B (reference [7]) | n/a |

### CLASS eventSequenceTime

#### The eventSequenceTime class shall constitute the TimingInfo information of the service.

NOTE – The eventSequenceTime class is a specialization of the TimingInfoclass.

#### Table 3‑11 specifies the additional parameters defined for the eventSequenceTime specialization of the TimingInfo class.

Table 3‑11: Class eventSequenceTime Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| eventSequenceProfileXRef | Mandatory Parameter.  This is used to specify a reference to the event sequence that the user wants the information for. | xsd:string | n/a |
| eventSeqServiceStart | Optional Parameter.  The eventSeqServiceStart is calculated by evaluating the conditions and constraints identified in the Event Sequence referenced in the eventSequenceXref. | CCSDS ASCII Time Code B (reference [7]) | n/a |
| eventSeqServiceStop | Optional Parameter.  The eventSeqServiceStop is calculated by evaluating the conditions and constraints identified in the Event Sequence referenced in the eventSequenceXref. | CCSDS ASCII Time Code B (reference [7]) | n/a |

### CLASS timingInfoXmlExtension

#### The timingInfoXmlExtension class shall be used to provide a cross-reference to an existing schema defining a non CCSDS service profile bilaterally agreed to between the provider and the user agencies

NOTE – The timingInfoXmlExtensionclass is a specialization of the TimingInfo class.

#### The timingInfoXmlExtension class is included as the extension point to use this CCSDS Service Package Specification with service timing specifications not defined in the CCSDS Service Package Request (see reference [4]).

#### Table 3‑12: Class timingInfoXmlExtension Parameters specifies the additional parameters defined for the timingInfoXmlExtension class in the context of non-CCSDS configuration profiles.

Table 3‑12: Class timingInfoXmlExtension Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| name | Mandatory Parameter  The cross- reference to an existing non CCSDS service profile | xsd:any | n/a |

### CLASS OnlineServiceDetails

#### The OnlineServiceDetails class shall constitute the ServiceDetails entity.

NOTE – The OnlineServiceDetailsclass is a specialization of the ServiceDetailsclass.

#### Table 3‑13 specifies the additional parameters defined for the OnlineServiceDetails specialization of the ServiceDetails class in the scope of an online service.

Table 3‑13: Class OnlineServiceDetails Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| onlineConfigurationProfileXRef | Mandatory Parameter.  This is used to specify a reference to the configuration profile of the online service that the user wants the information for. | xsd:string | n/a |
| appertureId | Mandatory parameter.  Identifier of the aperture (ground or spacecraft) allocated for the service. | xsd:string—Permitted values registered in SANA | n/a |
| frequencyBand | Mandatory parameter.  Used to specify the frequency band that will be used by the service. If the frequency band is not relevant the value N/A (not applicable) shall be used.   * C-Band * Ka-Band * Ku-Band * L-Band * S-Band * V-Band * X-Band * Optical * N/A | Enum | n/a |

### CLASS OfflineServiceDetails

#### The OfflineServiceDetails class shall constitute the ServiceDetails entity.

NOTE – The OfflineServiceDetailsclass is a specialization of the ServiceDetailsclass.

#### Table 3‑14 specifies the additional parameters defined for the OfflineServiceDetails specialization of the ServiceDetails class in the scope of an online service.

Table 3‑14: Class OfflineServiceDetails Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| offlineConfigurationProfileXRef | Mandatory Parameter.  This is used to specify a reference to the configuration profile of the offline service that the user wants the information for. | xsd:string | n/a |

### CLASS RespecificationParameter

#### The RespecificationParameter class is optional and may be used to specify the values for resource parameters that have been respecified. This is used to specify parameter values that override those specified in the event sequences and configuration profiles referred to by the OnlineConfigurationProfileXRef and OfflineConfigurationProfileXRef classes respectively.

#### The RespecificationParameter class shall contain the parameters as specified in Table 3‑15.

Table 3‑15: Class RespecificationParameter Elements

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| resourceID | Indicates the resource that the respecified parameter is applied to | xsd:string  As defined in reference [12] | n/a |
| parameterID | Identifies the respecified parameter within the resource being configured | xsd:string  As defined in reference [12]. | n/a |
| parameterValue | The value for the parameter to be configured | xsd:string  As defined in reference [12]. | As required per the parameter type |

### CLASS configurationProfileDetails

#### The ConfigurationProfileDetails class is an abstract class that is mandatory when using a the verboseServicePackageResult instance of the ServicePkgResultDetails Class.

#### There shall be at least one instance of the ConfigurationProfileDetails class for each instance of the verboseServicePkgResult class.

#### The ConfigurationProfileDetails class is used to derive classes required to provide configuration information for each service in the service package.

#### The ConfigurationProfileDetails class has no parameters defined. The necessary information is deferred to the instantiations of the ConfigurationProfileDetails class.

### CLASS ConfigurationProfileContents

#### The ConfigurationProfileContents class shall be used to request the complete schema defining the set of Functional Resource parameters and their configuration values as specified in the service package request (verbose option).

NOTE – The ConfigurationProfileContentsclass is a specialization of the ConfigurationProfileDetails class.

#### When parameter values in the referenced configuration profile are respecified in the Service Package Request (see reference [4]) then it is expected that the contents of the configuration profile reflect the changes requested.

### CLASS configurationXmlExtension

#### The configurationXmlExtension class shall be used to request the complete schema defining the configuration parameter and values used to configure the services in the service package (verbose option) when using non CCSDS service profile bilaterally agreed to between the provider and the user agencies

NOTE – The configurationXmlExtensionclass is a specialization of the ConfigurationProfileDetails class.

#### The configurationXmlExtension class is included as the extension point to use this CCSDS Service Package Specification with non-CCSDS conforgutration profiles

#### Error! Reference source not found. specifies the additional parameters defined for the configurationXmlExtension class in the context of non-CCSDS configuration profiles.

Table 3‑16: Class configurationXmlExtension Parameters

| **Parameter** | **Description** | **Data Type** | **Data Units** |
| --- | --- | --- | --- |
| name | Mandatory Parameter  The cross- reference to an existing non CCSDS service profile | xsd:any | n/a |

### CLASS EventSequenceContents

#### The EventSequenceContent class is optional and shall be used to request the complete schema defining the contents of the Event Sequence of the service package (verbose option).

#### There shall be either zero or one instances of the EventSequenceContent class for each instance of the verboseServicePkgResult class.

#### When parameter values in the referenced Event Sequence are respecified in the Service Package Request (see reference [4]) then it is expected that the contents of the Event Sequence reflect the changes requested.

1. Implementation Conformance Statement (ICS) Proforma  
     
   (Normative)
   1. INTRODUCTION
      1. OVERVIEW

* TBD
  + 1. ABBREVIATIONS AND CONVENTIONS
       1. General

TBD

* + - 1. Item Column

TBD

* + - 1. Feature Column

TBD

* + - 1. Class Column/Parameters

TBD

* + - 1. Reference Column

TBD

* + - 1. Status Column

TBD

* + - 1. Support Column Symbols

TBD

* + 1. INSTRUCTIONS FOR COMPLETING THE RL

TBD

* 1. ICS Proforma for Simple Schedule Format
     1. General Information
        1. Identification of ICS

|  |  |
| --- | --- |
| Date of Statement (DD/MM/YYYY) |  |
| ICS serial number |  |
| System Conformance statement cross-reference |  |

* + - 1. Identification of Implementation Under Test (IUT)

|  |  |
| --- | --- |
| Implementation name |  |
| Implementation version |  |
| Special Configuration |  |
| Other Information |  |

* + - 1. Identification of Supplier

|  |  |
| --- | --- |
| Supplier |  |
| Contact Point for Queries |  |
| Implementation Name(s) and Versions |  |
| Other Information necessary for full identification, e.g., names(s) and version(s) for machines and/or operating systems; |  |

* + - 1. Document Version

|  |  |
| --- | --- |
| CCSDS 920..2-W-0.06 draft |  |
| Have any exceptions been required?  (Note: A YES answer means that the implementation does not conform to the Recommended Standard. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming | Yes \_\_\_\_\_ No \_\_\_\_\_ |

* + - 1. Requirements List

TBD

1. Security, SANA, and Patent Considerations  
     
   (Informative)
   1. SecuRity Considerations
      1. Overview

This section presents the results of an analysis of security considerations applied to the technologies specified in this Recommended Standard.

* + 1. CONSEQUENCES OF NOT APPLYING SECURITY TO THE TECHNOLOGY

The consequences of not applying security to the systems and networks on which this Recommended Standard is implemented could include potential loss, corruption, and theft of data. Since it is possible to utilize these messages disseminating events relating to the availability of communications and tracking resources for spacecraft and other information, the consequences of not applying security to the systems and networks on which this Recommended Standard is implemented could include compromise or loss of the mission if malicious tampering of a particularly severe nature occurs.

* + 1. POTENTIAL THREATS AND ATTACK SCENARIOS

Potential threats or attack scenarios include, but are not limited to, (a) unauthorized access to the programs/processes that generate and interpret the messages, and (b) unauthorized access to the messages during transmission between exchange partners. Protection from unauthorized access during transmission is especially important if the mission utilizes open ground networks such as the Internet to provide ground station connectivity for the exchange of data formatted in compliance with this Recommended Standard. It is strongly recommended that potential threats or attack scenarios applicable to the systems and networks on which this Recommended Standard is implemented be addressed by the management of those systems and networks and the utilization of adequate authentication, suitable protocols, and secured interfaces for the exchange of this information.

* + 1. security concerns RELATED TO THIS RECOMMENDED STANDARD
       1. Data Privacy

Privacy of data formatted in compliance with the specifications of this Recommended Standard should be assured by the systems and networks on which this Recommended Standard is implemented.

* + - 1. Data Integrity

Integrity of data formatted in compliance with the specifications of this Recommended Standard should be assured by the systems and networks on which this Recommended Standard is implemented.

* + - 1. Authentication of Communicating Entities

Authentication of communicating entities involved in the transport of data which complies with the specifications of this Recommended Standard should be provided by the systems and networks on which this Recommended Standard is implemented.

* + - 1. DATA TRANSFER BETWEEN COMMUNICATING ENTITIES

The transfer of data formatted in compliance with this Recommended Standard between communicating entities should be accomplished via secure mechanisms approved by the Information Technology Security functionaries of exchange participants.

* + - 1. Control of Access to Resources

Control of access to resources should be managed by the systems upon which provider formatting and recipient processing are performed.

* + - 1. Auditing of Resource Usage

Auditing of resource usage should be handled by the management of systems and networks on which this Recommended Standard is implemented.

* + 1. UNAUTHORIZED ACCESS

Unauthorized access to the programs/processes that generate and interpret the messages should be prohibited in order to minimize potential threats and attack scenarios.

* + 1. DATA SECURITY IMPLEMENTATION SPECIFICS

Specific information-security interoperability provisions that apply between agencies and other independent users involved in an exchange of data formatted in compliance with this Recommended Standard should be specified in an ICD.

* 1. SANA Considerations
     1. General

The recommendations of this document require access to SANA the registries described below. New assignments in these registries, in conformance with the modifications identified, will be shown at the SANA registry Web site: http://sanaregistry.org. Therefore, the reader shall look at the SANA Web site for all the assignments contained in these registries.

Already registered values shall not be affected by this Recommended Standard.

* + 1. Registry containing originatingorganisation

The values for orginatingOrganization (see Table 3‑1) shall be those listed in the “Name” field of the CCSDS Organizations registry.

The procedure to follow for adding new values to this registry shall be that defined in [10]. An approved entry shall have one additional step to this procedure: the “serviceProvider” attribute shall be set the enumerated value of “SchedulePublisher”.

The CCSDS Organizations registry can be found at the following URL: <http://sanaregistry.org/r/organizations/organizations.html>

* + 1. REGISTRY containing user

The values for the “user” parameter (see table **Error! Reference source not found.**) shall be as those defined in the CCSDS Spacecraft Identifiers registry, specifically with regard to the “Spacecraft Name” field of this registry.

The procedure to follow for adding new values to this registry shall be that defined in [11].

The CCSDS Spacecraft Identifiers registry can be found at the following URL: <http://sanaregistry.org/r/spacecraftid/spacecraftid.html>

* + 1. Registry CONTAINING SiteRef and APERTUREREF

The values for siteRef and apertureRef shall be as those defined in the CCSDS Sites and Apertures registry.

The procedure to follow for adding new values to this registry shall be that defined in [11].

The CCSDS Sites and Apertures registry can be found at the following URL: <http://sanaregistry.org/xxx>

NOTE: Only values that have been registered should be used for the originatingOrganization, user, siteRef and apertureRef parameters. Unregistered values for the originatingOrganization, user, siteRef and apertureRef parameters, may be used. If unregistered values are used they should be prefixed with the string "UNR::".

NOTES –

1. "UNR::" indicates an unregistered value;
2. this helps eliminate potential confusion in a multi-agency cross support context;
3. use of unregistered values is not recommended and should be avoided if possible.
   1. Patent Considerations

No patent rights are known to adhere to any of the specifications of the Recommended Standard.

1. Abbreviations and ACRONYMS

**(Informative)**

|  |  |
| --- | --- |
| ASCII | American Standard Code for Information Interchange |
| CCSDS | Consultative Committee on Space Data Systems |
| ICD | Interface Control Document |
| OMG | Object Management Group |
| SANA | Space Assigned Numbers Authority |
| SCCS | Space Communications Cross Support |
| TBD | To Be Decided |
| UML | Unified Modelling Language |
| UTC | Coordinated Universal Time |
| W3C | World Wide Web Consortium |
| XML | eXtensible Markup Language |

1. Informative References  
     
   (Informative)

[E1] Space Communication Cross Support—Service Management—Operations Concept. Report Concerning Space Data Systems Standards, CCSDS 910.14-G-1. Green Book. Issue 1. Washington, D.C.: CCSDS, May 2011.