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Canadian Space Agency

MULTI-MISSION OPERATION CENTER (MMOC)

Antenna Reservation System Interface Control Document

Revision 2.7

July 13, 2015

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REVISION HISTORY

Rev.	Description	Initials	Date
IR	Initial Release Released by the approval of CSA CR ##	PC / JFL	February 6, 2014
2.0	Updated Release	JFL	Feb 5, 2015
2.1	Integrated some comments from CCMEO RACC interface	JFL	Feb 11, 2015
2.2	Integrated more comments from RACC interface	JFL	Feb 25, 2015
2.3	Integrated comments from R2 operations Integrated update from new RCM MPS ConOps resulting from TIM with Prime (notably the new Service for Contact Opportunity)	JFL	March 27, 2015
2.4	Field Consistency between Uncommitted and Committed. Integrated comments from P.Coté and M. Sauvageau. Replaced CRITICAL by EMERGENCY.Signature Block. Added contact_priority/preference	JFL	May 8, 2015
2.5	Accepted redlines from G. Brassard and comments from Hany Fawzy	JFL	May 13, 2015
2.6	Integration of CCMEO comments	JFL	June 17, 2015
2.7	Update of Fig 4-1 (Service F4), some typos and links corrected. 1.2 Scope clarified. 8.3.3.1 optional field orbit_number added. 5.3.3.1 added values UNKNOWN and COMMITED to status field. 5.3.4.1 and other related messages: changed ‘priority’ to ‘preference’	JFL	July 13, 2015

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1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to specify the interface definition of the CSA Generic Interface addressing the need for antenna resource coordination in the context of a multi-mission satellite control center. The Generic Interface is a functional sub-system as part of the CSA's Multi-Mission Operation Center (MMOC) architecture.

1.2 SCOPE

The CSA Antenna Reservation System Interface Control Document (ICD) describes the generic interfaces between the Missions and the Generic Scheduling Interface (ARS), as well as between the ARS and the Facilities. It is expected that all current and future Canadian Missions will comply with the generic interface with the exception of RCM, which has its own defined ICD. Also, it is expected that the ARS will have customizable field descriptor to adapt with existing Facility interfaces not controlled by the MMOC (Uncommitted Facilities), which become applicable to this document. However, Uncommitted Facilities would be expected to support the necessary fields required for adequate autonomous scheduling. Also, Committed Facilities are expected to comply with the generic interface. This document comes with the companion ARS Concept of Operations (AD-1).

1.3 APPLICABILITY

This document defines the generic Mission interfaces and become applicable to actual and future Canadian missions, maybe with the exception of Note that, current operational Missions are to be brought to the generic Mission interface, where possible. However, interface migration are discussed more in detail in this document.

This document is applicable to the supported Mission and Facilities interface, as per Definitions 2.2, in which case:

- All supported Missions will be flexible to accommodate the ARS Interface, namely: Radarsat-2, Scisat, NEOSSat, M3MSat, Cassiope, TET-1, Terrasar-X, Tandem-X, and Grace.
- All supported Committed Facilities will accommodate the CSA Generic Scheduling Interface; it is assumed that the following stations be considered Committed Facilities:
    - Polar-Epsilon 2 Facilities in Aldergrove (CAAL) and Masstown (CAMA),
    - All Network Stations as required by Radarsat and RCM,
- All supported Canadian Uncommitted Facilities will be flexible to accommodate the CSA Generic Scheduling Interface, namely:
    - CCMEO's Prince-Albert (PASS), Gatineau (GSS) and Inuvik Canadian Satellite Station (ICAN) (SXGT), and
- The CSA Generic Scheduling Interface will be flexible to accommodate all other expected Uncommitted Facilities, which become applicable to this document, namely:

- MDA’s St-Hubert (SHUB) and Saskatoon (SASK) Facilities,
- DRDC Shirley’s Bay Satellite Facility (DRDC) in Ottawa,
- NASA Facility in Fairbanks, Alaska,
- KSAT’s Facility operated from Norway,
- SSC Facilities operated from Kiruna, Sweden,
- DLR Facilities operated from Oberpfaffenhofen, Germany, and
- CNES Facilities.

2 DEFINITIONS

2.1 ACRONYMS AND ABBREVIATIONS

ACS	Attitude Control System
AD	Applicable Document
AOS	Acquisition of Signal
ASCII	American Standard Code for Information Interchange
CAAL	Canadian Aldergrove Facility
CAMA	Canadian Masstown Facility
CCMEO	Canada Centre for Mapping and Earth Observation
CM	Configuration Management
CSA	Canadian Space Agency
DCS	De-Conflict System
DLR	Deutches Zentrum für Luft- und Raumfart (German Space Agency)
DOY	Day of Year
DR	Data Reception
DRDC	Defence Research and Development Canada
ARS	CSA Antenna Reservation System
GFE	Government Furnished Equipment
GS	Ground Segment
GSS	Gatineau Satellite Station
GUI	Graphic User Interface
HBR	High Bit Rate
ICAN	Inuvik Canadian Satellite Station
ICD	Interface Control Document
ID	Identification
kbps	Kilobit per second
KSAT	Kongsberg Satellite Services
LEOP	Launch and Early Operations Phase
LOS	Loss of Signal
MMOC	Multi-Mission Operation Center
MPS	Mission Planning Subsystem
NASA	National Aeronautics and Space Administration
NGT	Northern Ground Terminal
NORAD	North American Aerospace Defense Command
NRT	Near-Real-Time

OGD	Other Government Department
OSI	Open Systems Interconnection model
PASS	Prince-Albert Satellite Station
PD	Parent Document
PE2	Polar Epsilon 2
RCM	RADARSAT Constellation Mission
RD	Reference Document
RF	Radio Frequency
RNG	Ranging
RT	Real-Time
SAR	Synthetic Aperture Radar
SASK	Saskatoon Facility
SCS	Satellite Control Subsystem
SF	Store and Forward
SHUB	St-Hubert Facility
SOE	Satellite Orbit Ephemeris
SRD	Specification Requirement Document
SSC	Swedish Space Corporation
SXGT	S-Band and X-Band Ground Terminal
TBC	To Be Confirmed
TBD	To Be Determined
TC	Telecommand
TLE	Two-Line Elements
TM	Telemetry
TT&C	Telemetry, Tracking & Commanding
UTC	Coordinated Universal Time
XML	Extensible Markup Language

2.2 TERMINOLOGY

TABLE 2-1 TERMINOLOGY DEFINITIONS

System Elements:	
System	Is the physical implementation (hardware and software) of the ARS functionalities. (Note: In addition to the System, the overall ARS may include other elements such as a Backup System, the Operator interface, the network connectivity, the voice interface, the System maintenance, the programmatic layer, etc.).
Operator	Is the personnel that commands and controls the System. The Operator has delegated rights to operate the ARS, approve Schedules, generate or edit Configurations, modify scheduling rules and algorithms, and manually reserve Antenna time. On the implementation side, there might be several classes of Operator allowing different levels of authorization and privileges on the System. However, the terminology Operator is referred to as the overarching element representing human control and decision making over the ARS.
Satellite	Consist of an Earth-orbiting spacecraft with one or multiple payloads that require ground infrastructure to allow its commanding and payload Data Reception (DR)
Mission	Consists of one or multiple Satellites, and appropriate ground segment functional elements and personnel required to conduct the mission operations such as the Mission Planning Subsystem (MPS).
Antenna	Is composed of a tracking dish reflector with RF components and baseband equipment required to conduct ranging, TT&C and/or Data Reception (DR) operations for a Satellite.
Facility	Consists of one or multiple unique ground station Antennas, and appropriate equipment, connectivity and personnel to enable either or both TT&C and DR operations.
Committed Facility	Is dedicated to the ARS for any one or all of its supported Missions and that is committed to fulfill the Committed Schedule that is being given to it by the ARS. A Schedule sent to an Committed Facility is assumed by the ARS to be blindly accepted and committed with the only exception of unforeseen events such as Antenna breakdown. It is expected that Committed Facilities be able to process the Committed Schedule within few minutes if they want to qualify for Missions that have Fast-Tasking requirements.

Uncommitted Facility	Is a Facility, domestic or foreign, that is controlled by a third-party organization but allows tasking of its Antennas through a request and confirmation process. The Approved Schedule is sent to the Uncommitted Facility in the form of an Antenna Access Request. The ARS is expecting a responsive Confirmation of the requested Schedule from the Facility by acceptance of the individual Satellite Contact entries on the submitted Antenna Access Request. Responsiveness of the Antenna Access Confirmation from the Uncommitted Facility is key to ARS' overall responsiveness in producing a Committed Schedule for the Missions Therefore, it is expected that Uncommitted Facilities be able to reply with the Confirmation within few minutes if they want to qualify for Missions that have Fast-Tasking requirements.
Network Station	Is an Antenna station used for local DR of commercial data dedicated to a commercial client of a given Mission. A Network Station is controlled by the data user and generally tasked by the user synchronously with the order of data from the Mission.
Satellite Orbit TLE	Is the Orbit information at an epoch time required to propagate a Satellite's orbit and provided in a standard message format like the NORAD Two-Line Elements (TLE) (Section 2.3.4).
Orbit Propagator	Is the module or set of functions (such as SGP4) required to extrapolate the Satellite's geographical position in the future from the TLE at Epoch in order to predict Satellite Contacts over Facilities. The Orbit Propagator does not necessarily require the orbit determination module to produce its own TLE from Satellite tracking data, as the TLE is generally provided by Missions or available from the online catalogue.
Satellite Attitude Ephemeris	Describes de satellite attitude in standard type like quaternion, which is required to determine RF contacts, particularly in the case of inertial pointing satellites and when the satellite antenna radiation pattern is far from the ideal isotropic case.
Satellite Antenna Definition	Describes the location, bore-sight and cone angle of receiver/transmitter antenna to be used in conjunction with the Satellite Attitude Ephemerides to determine RF contacts
Satellite Contact and Time	
Time Window	Is the time span referring to the Scheduling exercise. This may spans over several days or weeks depending on operational needs. It may also be specified to start in the future to prevent unnecessary rescheduling of imminent Committed Contacts.
Availability Time Window	Is a Time Window used in Configurations referring to the availability time of resource or personnel.

Satellite Contact	Is the time span where the Mission Satellite have a contact line-of-sight with a Facility Antenna resource, and which the resource can be allocated to the Mission on a Schedule.
Compliant Contact	Is a Satellite Contact that satisfies all the System, Mission and Facility Configuration Constraints while being a valid Contact as propagated from the Satellite Orbit TLE. The outcome of this validation process forms the Compliant Satellite Contact List.
Contact Opportunity	Is a Compliant Contact that may potentially be made available to the Mission but without being validated with the Facility. Such a contact may be in conflict with an already Committed Contact, in which case, the contact will be marked accordingly for selection purposes. The outcome of this validation process forms the Contact Opportunity Report that may be requested by the Mission as a preliminary selection tool prior a formal Satellite Contact Request.
Time Period	Is the time span specified in a Satellite Time Request within which the ARS has to allocate the Satellite Contact Times.
Satellite Contact Time	Is the total time duration specified in a Satellite Time Request to be allocated by the ARS within a Time Period. The Satellite Contact Time can be sliced across more than one Satellite Contacts depending on the availability of Antennas within the Time Period and according to specific Mission constraints relative to minimal Contact Time.
Satellite Contact States:	(see AD-1 for the State Change Transition Diagram)
AVAILABLE	Is the status of a Contact Opportunity requested by the Mission through a Contact Opportunity Request that is *a priori* not in conflict with other ARS Committed or Reserved Satellite Contacts. However, an Available Contact does not guarantee that the Mission will be allocated the Contact upon a formal Satellite Contact Request.
UNKNOWN	Is the status of a Contact Opportunity requested by the Mission through a Contact Opportunity Request which availability is *a priori* not known to the ARS. This is mostly the case for all Contacts pertaining Uncommitted Facilities as the Facility has to accept the Requested Contact during the Antenna Access Request process.
CONFLICT	Is the status of a Contact Opportunity requested by the Mission through a Contact Opportunity Request that is *a priori* in conflict with another ARS Committed or Reserved Satellite Contact. The Mission may still request the Conflicted Contact to the ARS for tentative allocation with a formal Satellite Contact Request.

	That request may in some cases overrule (bump) the previous Contact during the de-conflicting and optimization process, either automatically or manually by the ARS Operator, and according to specific rules. Otherwise, the Requested Contact will still allow the rescheduling capability of the ARS to search for an alternate Satellite Contact for the Mission.
RECEIVED	Is the status of a requested Satellite Contact by the Mission through a Satellite Contact/Time Request that has been received by the ARS and nominally validated as Compliant but is pending Operator's admittance for scheduling.
ADMITTED	Is the status of a validated Satellite Contact that has been admitted by the Operator for scheduling.
REQUESTED	Is the status of a consolidated Satellite Contact/Time that is being processed by the Scheduler or has been submitted to the Facility through an Antenna Access Request.
RESERVED	Is the status of a Satellite Contact that has been manually reserved by the Operator from the Compliant Satellite Contact List and that is approved for scheduling along with Requested Contacts/Times.
ACCEPTED	Is the status of a requested Satellite Contact through an Antenna Access Request that has been accepted by the Facility but is pending commitment by the ARS Operator.
COMMITTED	Is the status of a Satellite Contact that has been accepted by the Facility and committed by the ARS.
WITHDRAWN	Is the status of a previously requested Satellite Contact that has been withdrawn by the Mission on a subsequent Satellite Contact/Time Request.
REJECTED	Is the status of a requested Satellite Contact that has been rejected either by the Facility or by the ARS.
CANCELLED	Is the status of a previously Accepted or Committed Satellite Contact that has now been cancelled by the Facility for exceptional reasons.
RESCHEDULED	Is the status of a requested Satellite Contact that has been rejected either by the Facility or by the ARS and that has been automatically rescheduled from another available Contact by the ARS. The replacement Contact will follow the acceptance and commitment process like any other requested Contact. Once Committed, the Rescheduled Contact will keep the Rescheduled label in order to notify the Mission/Facility of a time and/or Antenna change from the initial Request.

CONTINGENCY	Is the status of a Satellite Contact that has been added by the ARS as a backup to another EMERGENCY Contact on a different Antenna but without being formally allocated. The Contingency Contact is meant not to be de-conflicted, but just a fall-back option in case of urgent spacecraft emergency situation where the associated Committed EMERGENCY Contact has failed. At this stage, any bumping of pass will be handled live by the Operator and the Facility's operator, on a case by case basis, and according to agreed upon rules.
ADDED (secondary internal state)	Is the status of a Satellite Contact that has been added by the ARS or the Operator and is not directly tied to a specific Satellite Contact/Time Request. This internal status is secondary and goes in addition to any other status pertaining the approval and commitment process of a Schedule.
LOCKED (secondary internal state)	Is the status of a Committed Contact that has been Locked by the Operator to prevent any future automatic unallocation or rescheduling by the System. This internal status is secondary and goes in addition to any other status pertaining the approval and commitment process of a Schedule.
Contact Criticality	Is the qualifier of a Contact that allows prioritization during the de-conflicting process in the computation of a Schedule. Criticality ratings could be defined in importance as EMERGENCY, Important, Routine, and Proficiency.
Criticality Ratings:	
EMERGENCY	Is considered the highest priority Contact type and relates to the spacecraft Health & Safety (launch, collision avoidance, Satellite emergency recovery).
IMPORTANT	Is considered the second highest priority Contact type and relates to time-sensitive or emergency operations of the Mission (Fast-Tasking, Near-Real-Time (NRT) download, disaster monitoring, national security, etc.).
ROUTINE	Relates to all other nominal and operational Contacts.
PROFICIENCY	Is considered the lowest priority Contact type and relates to a contact that is required for periodical or ad-hoc validation and testing of the end-to-end ground systems with a specific Facility.
Schedule	
Schedule	Is a list of time-tagged Satellite Contacts for all Missions that have been allocated amongst the pool of Facility Antennas for a given Time Window. **A Schedule is conflict-free**, that is only a single Satellite Contact is allocated at any given time to an Antenna and

	with enough time margin to allow Antenna setup between Contacts. It contains, in addition, a set of fields describing for each Contact the Mission Satellite ID, the Facility Antenna ID, the Acquisition of Signal (AOS) time, Contact duration, Loss of Signal (LOS) time, maximum antenna elevation, RF bands, RF data rate, etc. The Schedule in the context of the ARS does not contain data downlink, processing or management information specific to the execution of the Data Reception contact for a given Mission. This detailed information has to be provided by the specific Mission to the Facility through another channel than the ARS.
Facility Schedule	Is a subset of the Schedule that represents only the Satellite Contacts and fields relevant to a given Facility.
Mission Schedule	Is a subset of the Schedule that represents only the Satellite Contacts and fields relevant to a given Mission.
Schedule States:	(see AD-1 for the State Change Transition Diagram)
PRELIMINARY	Is the status of a Schedule that has been generated by the System but is pending Operator's approval before sending Antenna Access Requests to Uncommitted Facilities.
APPROVED	Is the status of a Preliminary Schedule that has been approved by the Operator for access request to Uncommitted Facilities.
ACCEPTED	Is the status of a Schedule containing all Accepted Contacts from Facilities but is pending Operator's final commitment.
COMMITTED	Is the status of an Accepted Schedule that has been approved by the Operator for distribution to Missions and Committed Facilities.
OBSOLETE	Is the status of a Schedule that has been overruled by a new Committed Schedule.
Interface Messages:	
Satellite Contact Request	Is a list of desired specific Satellite Contacts that are requested by the Mission for allocation by the System on the Schedule. A Request may also include added, removed and modified Contacts from a previous Request with respect to the same Schedule Time Window.
Satellite Time Request	Is a list of desired Satellite Contact Times over desired specific Time Periods that are requested by the Mission for allocation by the System on a Schedule. Those Contact Times may exceed any single Contact duration and overlap across several Contact opportunities or Facilities. The System requires advanced allocation processing in order to efficiently distribute and allocate

	time requests amongst specific Contact opportunities in conjunction with the other standard Satellite Contact Requests.
Standing Request	Is a specific Satellite Time Request that repeats itself periodically (i.e. daily, weekly or monthly) and for a finite Standing Time Period.
Request Validity Report	Is a Satellite Contact/Time Request that was checked and validated by the System against a Compliant Satellite Contact List. The Report includes an invalidity explanation field. The report is used internally by the ARS but also is intended to be used as a form of acknowledgment to a Satellite Contact/Time Request when sent back to the Mission.
Compliant Satellite Contact List	Is the list of all Compliant Contacts for all Satellites and all Antennas generated by the Orbit Propagator and associated with a defined Schedule Time Window.
HBR Contact List	Is the list all Compliant Contacts for all Satellites and all Antennas generated by the Orbit Propagator in conjunction with the propagation of the Satellite Attitude Model, when provided in the Mission Configuration. The HBR Contact List is therefore a more constrained version of the Compliant Satellite Contact List.
Contact Opportunity Report	Is the list of all Contact Opportunities over the qualified Antennas for the specified Satellites that are generated by the Contact Opportunity Request Handler and associated with a defined Schedule Time Window.
Contact Opportunity Request	Is a simple query from a Mission to obtain the Contact Opportunity Report over a Time Period.
Antenna Access Request	Is a list of Contact Times where the System requests access to Uncommitted Facility Antenna resources in support of Missions.
Request Acknowledgment	Is a return message acknowledging reception of a Satellite Contact/Time Request by the ARS or Antenna Access Request by the Uncommitted Facility.
Antenna Access Confirmation	Is a return message accepting, rejecting or cancelling Satellite Contacts from the Schedule of an Antenna Access Request. Responsiveness of the Confirmation from the Uncommitted Facility is key to ARS' overall responsiveness in producing a Committed Schedule for the Missions.
Antenna Unavailability Report	Is a list of Time Windows where the Facility Antenna is not available for allocation to a Mission. Antenna Unavailability Reports are unsolicited by the ARS and could be received at any time from the Facilities. The reasons for Unavailability can be anything from planned Antenna maintenance to reserved time slots

	for any other Mission or reason at the Facility's discretion, in the case of an Uncommitted Facility. In the Case of an Committed Facility, as the Facility is dedicated to the ARS, it is not expected that the Committed Facility be unavailable for other commitments except for maintenance.
Scheduling Report	Is a summary of Mission requirements fulfillment and Facility usage resulting from a specific Schedule. This may include the total time allocated for each Mission Satellite on Facility Antennas, the unallocated/reallocated Satellite Contacts from Requests, and relative figures of merit of allocation time and requirement fulfillment.
Facility Scheduling Report	Is a subset of the Scheduling Report that displays the specific Antenna usage relevant to a Facility.
Mission Scheduling Report	Is a subset of the Scheduling Report that displays the Satellite Contact allocation relevant to a Mission.
Configuration	Is a set of user-configurable parameters that captures the definition, constraints and requirements of a Facility, a Mission or the System . Its format could be stored as readable, binary or XML file, or simply captured by a user interface. Every System, Facility and Mission Configuration use their respective structure type but each individual has its unique parameter Configuration.
Configuration Constraints	Is a subset of the Configuration parameters that specifically addresses constraints to be used during orbit propagation and also for validation of Satellite Contact/Time Requests.

2.3 TRANSPORT DESIGN CONVENTIONS

2.3.1 File Transfer

File transfer is used for point-to-point transfer of messages and data as discrete files exchanged asynchronously via predefined channels (e.g. dropboxes).

2.3.2 Date/Time Convention

In order to reduce size and complexity of the document, the following table will detail the format used to describe dates and times during this document.

Format	Description	Range
DD	Day two-digits number (in month)	01 … 31
DOY	Day of the year three-digit number	001 … 366
Mon	Month three-letter name	Jan ... Dec
Month	Month complete name	January … December
MM	Month two-digit number (in year)	01 … 12
YYYY	Year four-digit number	2000 … 2099
hh	Hour two-digit number	00 … 23
mm	Minute two-digit number	00 … 59
ss	Second two-digit number	00 … 59
ww	Two-digit week number	01...52
ff…f	Fraction of a second	Depends on the number of digits
nn…n	Integer value	Depends on the number of digits Note: If related to the orbit field inside of the product file (and not in the file name), all leading digits will not be printed/shown if zero.
cc…c	n-digit cyclic counter	00 … 99…
aa…a	Variable length character string	Depends on the number of characters.

NOTE: UNLESS OTHERWISE MENTIONED, NUMBERS WILL BE ADDED WITH LEADING ZEROS IF THEIR VALUE IS TOO SMALL TO FIT THE FORMAT.

TABLE 2-2: FIELDS FORMAT

Within the MMOC, the specific format for displaying a generic time will be used as follows:

YYYY-MM-DDThh:mm:ss.fff in the case where fractional seconds are necessary;

YYYY-MM-DDThh:mm:ss in the case where whole seconds are acceptable;

where T is the time delimiter character in the string. This format for full date and time will be used whenever possible (both in header information and within the data itself).

2.3.3 File Name Convention

For the File Transfer transport mechanism, the file naming convention used, except where otherwise noted, is as follows:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

where

<*originator*> is a constant string that identifies the originator of the file;

<*recipient*> is a constant string that identifies the recipient of the file;

<*xxx…xx*> is a variable length string that makes the file name unique and is such that when files from a particular originator to a particular recipient are alphanumerically sorted based on this string, they will be sorted in order of the creation time of the file;

<*info type*> is a constant string that identifies the information flow type;

<*extension*> is a constant string that identifies the file type;

<*originator*>, <*recipient*>, <*xxx…xx*>, <*info type*>, and <*extension*> all conform to the regular expression [0-9A-Za-z_\-+] and do not contain any double underscore sequences;

there are two consecutive underscores immediately after <*originator*>;

if <*recipient*> is included in the filename then there are two consecutive underscores immediately after <*recipient*>;

the maximum file name length including the file extension is 140 characters.

If the information flow is not directed at a single recipient (for example with a broadcast or subscription paradigm), the recipient string and its trailing underscores may be omitted from the file name.

If a date/time stamp is used in the file name, it must be in UTC and of the form YYYY-MM-DDThh-mm-ss-ff…f, where "-ff…f" is optional. (Hyphen is used for time separation in file names as the colon character is avoided in order to maintain cross-platform compatibility)

Details of the file name format are specified in the File Name Format section for each information flow.

2.3.4 Two-Line Element Set Coordinate System

(excerpt from NASA web site: http://spaceflight.nasa.gov/realdata/sightings/SSapplications/Post/JavaSSOP/SSOP_Help/tle_def.html)

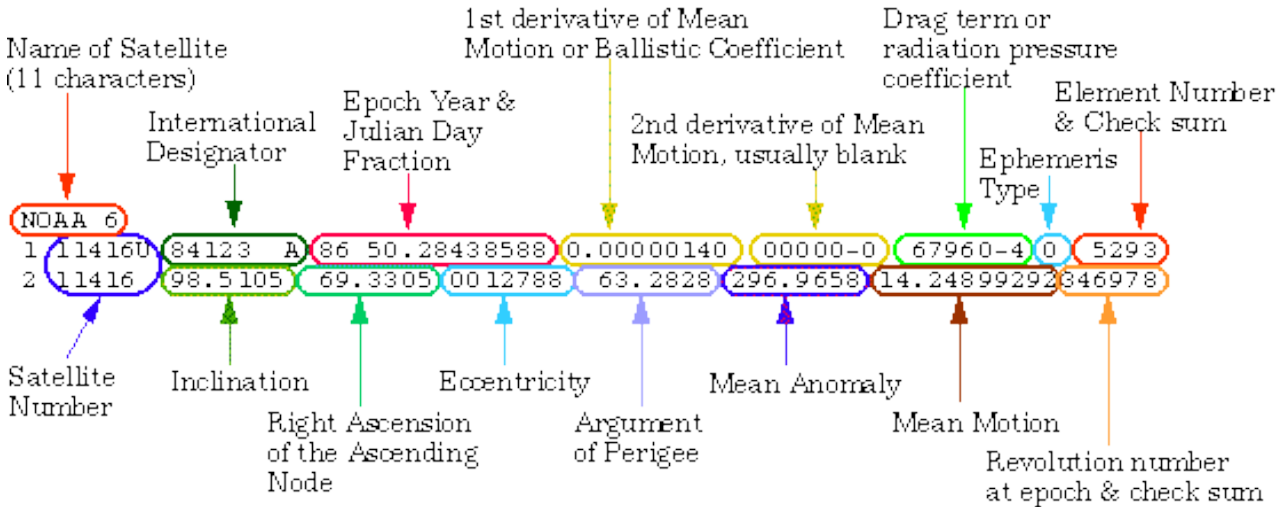

FIGURE 1 TWO-LINE ELEMENT SET

2.3.4.1 Name of Satellite

(NOAA 6) This is simply the name associated with the satellite. Typical names you might be interested in might be "Mir" or "ISS".

2.3.4.2 International Designator

(84 123A) The 84 indicates launch year was in 1984, while the 123 tallies the 124th launch of the year, and "A" shows it was the first object resulting from this launch.

2.3.4.3 Epoch Date and Julian Date Fraction

The Julian day fraction is just the number of days passed in the particular year. For example, the date above shows "86" as the epoch year (1986) and 50.28438588 as the Julian day fraction meaning a little over 50 days after January 1, 1986. The resulting time of the vector would be 1986/050:06:49:30.94. Note that NASA SkyWatch will expect the time tag to be the same format as shown above when entering a TLE data.

This was computed as follows:

Start with 50.28438588 days (Days = 50)
50.28438588 days - 50 = 0.28438588 days
0.28438588 days x 24 hours/day = 6.8253 hours (Hours = 6)
6.8253 hours - 6 = 0.8253 hours
0.8253 hours x 60 minutes/hour = 49.5157 minutes (Minutes = 49)
49.5157 - 49 = 0.5157 minutes
0.5157 minutes x 60 seconds/minute = 30.94 seconds (Seconds = 30.94)

2.3.4.4 Ballistic Coefficient

(0.00000140) Also called the first derivative of mean motion, the ballistic coefficient is the daily rate of change in the number of revs the object completes each day, divided by 2. Units are

revs/day. This is "catch all" drag term used in the Simplified General Perturbations (SGP4) USSPACECOM predictor.

2.3.4.5 Second Derivative of Mean Motion

(00000-0 = 0.00000) The second derivative of mean motion is a second order drag term in the SGP4 predictor used to model terminal orbit decay. It measures the second time derivative in daily mean motion, divided by 6. Units are revs/day^3. A leading decimal must be applied to this value. The last two characters define an applicable power of 10. (12345-5 = 0.0000012345).

2.3.4.6 Drag Term

(67960-4 = 0.000067960) Also called the radiation pressure coefficient (or BSTAR), the parameter is another drag term in the SGP4 predictor. Units are earth radii^-1. The last two characters define an applicable power of 10. Do not confuse this parameter with "B-Term", the USSPACECOM special perturbations factor of drag coefficient, multiplied by reference area, divided by weight.

2.3.4.7 Element Set Number and Check Sum

(5293) The element set number is a running count of all 2 line element sets generated by USSPACECOM for this object (in this example, 529). Since multiple agencies perform this function, numbers are skipped on occasion to avoid ambiguities. The counter should always increase with time until it exceeds 999, when it reverts to 1. The last number of the line is the check sum of line 1.

2.3.4.8 Satellite Number

(11416) This is the catalog number USSPACECOM has designated for this object. A "U" indicates an unclassified object.

2.3.4.9 Inclination (degrees)

The angle between the equator and the orbit plane. The value provided is the TEME mean inclination.

2.3.4.10 Right Ascension of the Ascending Node (degrees)

The angle between vernal equinox and the point where the orbit crosses the equatorial plane (going north). The value provided is the TEME mean right ascension of the ascending node.

2.3.4.11 Eccentricity

(0012788) A constant defining the shape of the orbit (0=circular, Less than 1=elliptical). The value provided is the mean eccentricity. A leading decimal must be applied to this value.

2.3.4.12 Argument of Perigee (degrees)

The angle between the ascending node and the orbit's point of closest approach to the earth (perigee). The value provided is the TEME mean argument of perigee.

2.3.4.13 Mean Anomaly (degrees)

The angle, measured from perigee, of the satellite location in the orbit referenced to a circular orbit with radius equal to the semi-major axis.

2.3.4.14 Mean Motion

(14.24899292) The value is the mean number of orbits per day the object completes. There are 8 digits after the decimal, leaving no trailing space(s) when the following element exceeds 9999.

2.3.4.15 Revolution Number and Check Sum

(346978) The orbit number at Epoch Time. This time is chosen very near the time of true ascending node passage as a matter of routine. The last digit is the check sum for line 2.

3 DOCUMENTS

3.1 APPLICABLE DOCUMENTS

The following documents of the exact issue date and revision level shown are applicable and form an integral part of this document to the extent specified herein.

Ref #	Document Number	Rev.	Title
AD-1	MM-CSA-CO-0001	1.5	Multi-Mission Antenna Reservation System Concept of Operations
AD-5	RCM-IC-53-1948	2/1	RCM Reservation System ICD

3.2 REFERENCE DOCUMENTS

The following documents provide additional information or guidelines that either may clarify the contents or are pertinent to the history of this document.

Ref #	Document Number	Revision	Title
RD-1	http://www.celestrak.com/SpaceTrack/TLERetriever3Help.asp		Space Track TLE Retriever v3
RD-2	https://www.space-track.org/documentation#formats		Space Track interface formats

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4 ANTENNA RESERVATION SYSTEM OVERVIEW

The ARS is a multi-mission tool part of the MMOC necessary to coordinate antenna resource allocation to multiple satellite missions. The ARS becomes more necessary when the number of satellites sharing the same pool of available antenna increases and when conflicts to antenna resource access occur more frequently. The ARS is therefore responsible to receive contact time requests from missions and best meet all mission requirements by carefully reserving antenna time to the various missions on a priority and performance basis.

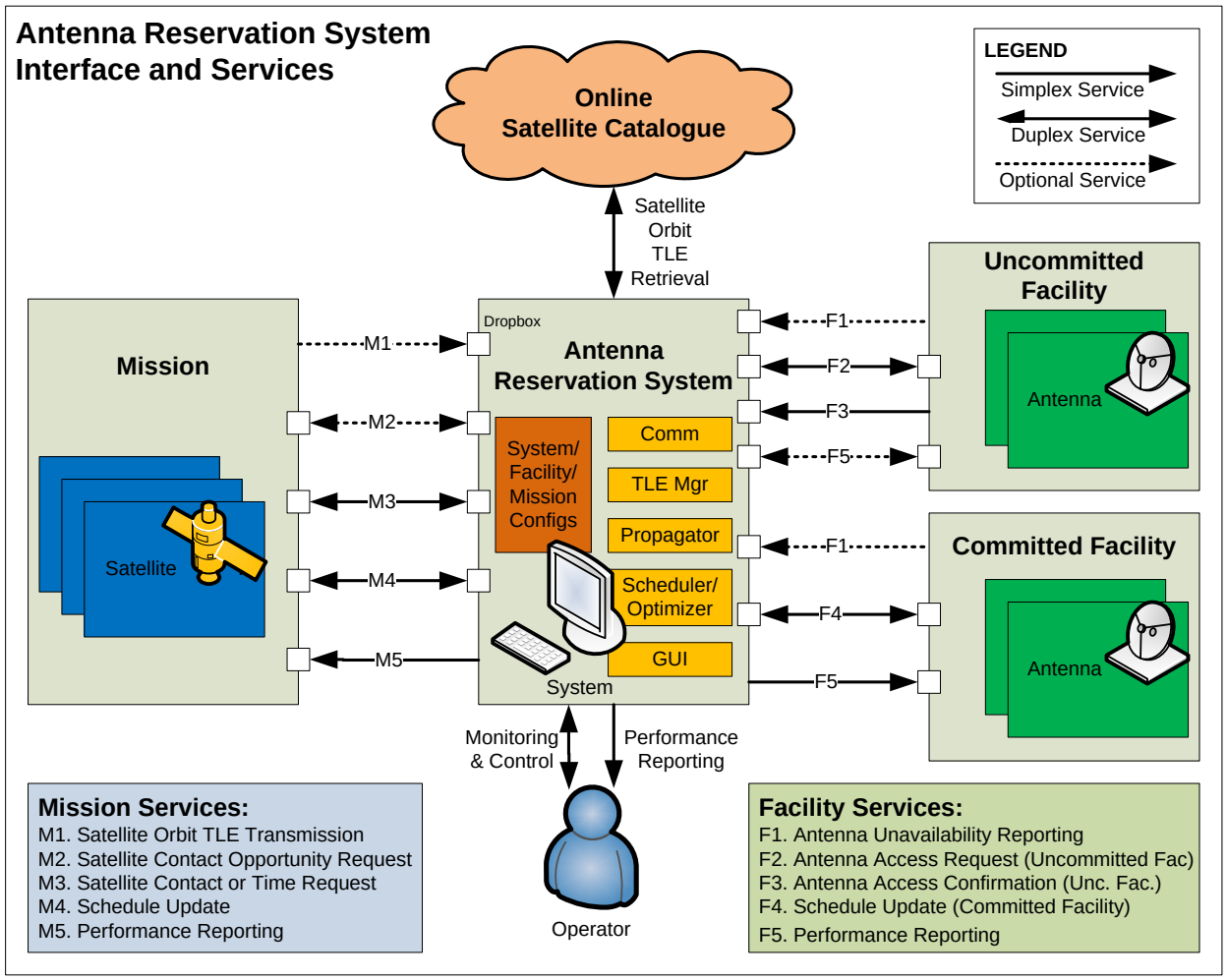

FIGURE 4-1 ARS INTERFACE AND SERVICES OVERVIEW

The ARS may be seen as the central point where all mission requests for antenna time converge to a single scheduling system and where all facility resources are allocated for both TT&C and DR (For a detailed process flow diagram, refer to AD-1). The ARS does not deal with actual satellite operation requirements or direct commanding interfaces between the missions and the facilities (like the Spacecraft Control Subsystem (SCS)). However, the ARS does provide missions with a central antenna scheduling tool to coordinate all Satellite Contacts and mitigate conflicts. In addition, the ARS does provide a generic interface definition to the missions therefore saving the missions from having to manage several scheduling interfaces with the

various facilities. Finally, the ARS provides one point of decision making, through the Operator and user-configurable System Configurations, when it's the time to handle different contact priority levels and mitigate conflicts.

For the detailed Service descriptions, refer to AD-1.

4.1 OPERATIONAL SEQUENCE OF EVENTS

The ARS typical nominal sequence of events goes as follow:

Event 1. Reception of an unsolicited message: The ARS receives any asynchronous and unsolicited message (stimulus) amongst:

a. Contact Opportunity Request from a Mission;

b. Satellite Contact/Time Request from a Mission;

c. Satellite Orbit TLE from a Mission or manually entered by the Operator;

d. Antenna Unavailability Report from either an Committed or an Uncommitted Facility;

e. Changes to a previously received Antenna Access Confirmation from an Uncommitted Facility.

Event 2. Generation of Compliant Satellite Contact List: Upon reception of stimuli (c), (d), or (e) from Event 1, the ARS automatically propagates the orbits from Satellite Orbit TLE and generates the List of all Satellite Contacts opportunities that are compliant to Mission and Facility Constraints.

Event 3. Generation of Contact Opportunity Report: Upon reception of stimuli (a) from Event 1, the ARS generates a Contact Opportunity Report from the Compliant Satellite Contact List and the previous Committed Schedule, then sends back a Request Validity Report to the Mission.

Event 4. Validation of Satellite Contact/Time Request: Upon reception of stimuli (b), (c), (d), or (e) from Event 1, the ARS (re-)verifies the validity of all Contacts or Times in the Satellite Contact/Time Request against the new Compliant Satellite Contact List and then sends back a Request Validity Report to the Mission.

Event 5. Admittance of Satellite Contact/Time Request: The ARS submits the Request to the Operator for modification and admittance to scheduling. (Note that modification and admittance is made in accordance with operational procedures and directives from the Mission Control Board in order to insure proper operation of the ARS.)

Event 6. Consolidation of Satellite Contact/Time Requests: The ARS consolidates separate and complementary Requests that may cover different services or RF bands but pertaining the same Satellite Contact. (This especially addresses the RCM concept where TT&C and DR Requests are submitted independently by the MPS). The ARS also creates/spawns individual Satellite Contact Times from accepted Standing Requests and Mission Configuration (for Autonomous Contact Management) over the Schedule Time Window.

Event 7. Manual Contact Reservation: In parallel, the Operator may at this point directly reserve Contacts from the Compliant Satellite Contact List, with superseding priority over the Satellite Contact/Time Requests. (Note that direct reservation is made in accordance with operational procedures and directives from the Mission Control Board in order to insure proper operation of the ARS.)

Event 8. Generation of the Preliminary Schedule: From accepted Satellite Contact/Time Requests and manually Reserved Contacts, the ARS automatically de-conflicts and computes a Preliminary Schedule based on priority and performance factors.

Event 9. Approval of Preliminary Schedule: The ARS submits the Preliminary Schedule to the Operator for approval. If approval is refused by the Operator, the Operator can change Configurations or Requests, thus forcing re-execution from Event 2, Event 5 or Event 7.

Event 10. Antenna Access Request: The ARS sends the Approved Schedule to Uncommitted Facilities in the form of Antenna Access Requests for their acceptance.

Event 11. Antenna Access Confirmation: Uncommitted Facilities reply with a Request reception acknowledgement and send an Accepted Schedule as a Antenna Access Confirmation. (Note that at any later time, an Uncommitted Facility could change its Schedule acceptance status by resubmitting an unsolicited modified Confirmation referring to the appropriate Antenna Access Request, in which case the ARS will be forced back to Event 6)

Event 12. Commitment of the Accepted Schedule: The ARS submits the Accepted Schedule from the Facilities to the Operator for commitment. If commitment is refused by the Operator, the Operator can change Configurations or Requests, thus forcing re-execution from Event 2, Event 5 or Event 7.

Event 13. Distribution of the Committed Schedule: The ARS distributes the Committed Schedule to Missions and Committed Facilities (Uncommitted Facilities are expected to abide by their own Antenna Access Confirmation at Event 11).

Event 14. Committed Schedule Acknowledgment: Missions and Committed Facilities reply with a Schedule reception acknowledgement.

Event 15. Distribution of Scheduling Reports: The ARS computes and sends Scheduling Reports to Missions and to the Operator.

In parallel to the whole sequence of events, the ARS retrieves periodically the Satellite Orbit TLE from online satellite catalogues to make sure the information is always up to date in case the Mission doesn’t send it during Event 1.

Also, at any time, the Operator can manually abort and start the computation of a Preliminary Schedule and make changes to Configurations, thus forcing the re-execution of the Sequence from Event 2, Event 5 or Event 7.

For a detailed process flow diagram, refer to AD-1.

5 GENERIC MISSION INTERFACE

This section describes the generic Mission interface. (for specific Mission interfaces, see Sec. 6)

5.1 MESSAGE FORMAT

The message format used for the generic Mission interface are files coded using the Extensible Markup Language (XML). The content and tag descriptions for each message types are defined below.

5.2 TRANSPORT MECHANISM

The transport mechanism used between the Mission and the ARS is file transfer. This mechanism allows the information to be exchanged asynchronously as point-to-point discrete files via predefined channels (i.e. dropboxes).

The transport mechanism shall rely on the Secure Shell File Transfer Protocol (SFTP) to transfer files to the designated mission dropboxes.

5.3 MESSAGE DESCRIPTIONS

5.3.1 Satellite Orbit TLE

Related Service: M1

This message is facultative to the Mission. If the Mission is not providing the TLE, the ARS will update his orbital knowledge from the spacecraft databases on the Internet (celestrak.com or space-track.org)

5.3.1.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. SCISAT	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <TLEt> tag will be disregarded.
body		Tag containing an unlimited number of <TLE> tags
TLE		Tag in which to enter TLE information, each with a single <satellite_name>, <TLE-1> and <TLE-2> tag. Unlimited.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog

		definition
TLE-1	As per Section 2.3.4	First line of TLE
TLE-2	As per Section 2.3.4	Second line of TLE

5.3.1.2 File Name Format

The filename format for Satellite Orbit TLE uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Mission identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is a Satellite Orbit TLE unique reference number that shall contain a date/time stamp,

<*info type*> is SOE,

<*extension*> is xml.

5.3.2 Contact Opportunity Request

Related Service: M2

This message is facultative to the Mission. It consist in a query to obtain the Contact Opportunity Report respective to specified Satellites over specified Antennas and over the specified Time Period.

5.3.2.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. SCISAT	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. S1R001	Any unique Request identifier
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	List of comma-separated Satellite names as per satellite catalog definition.
antenna_name	e.g. PASS-1	Suggested list of comma-separated antenna identifiers. Optional to the Mission and if omitted, the Request

		will cover all qualified antenna assets configured in the system.

5.3.2.2 File Name Format

The filename format for Satellite Contact Request uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Mission identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is a Contact Opportunity Request unique reference number that may contain a date/time stamp,

<*info type*> is COR,

<*extension*> is xml.

5.3.3 Contact Opportunity Report

Related Service: M2

The Request Validity Report is the reply to a Contact Opportunity Request and refers to the appropriate "request_reference". It is sent to the Mission the of predicted contacts for the specified Satellites over specified Antennas and over the specified Time Period.

5.3.3.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. SCISAT	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. S1R001	Any unique Request identifier
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <contact_entry> tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the

		<contact_entry> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the <contact_entry> tag will be disregarded.
body		Tag containing an unlimited number of <contact_entry> tags
contact_entry		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier attributed by the System
contact_preference	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional
antenna_name	e.g. PASS-1	Requested Suggested antenna identifier, optional
Orbit	nnnnnn	Satellite orbit number. Optional
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
contact_ status	AVAILABLE, CONFLICT, UNKNOWN, COMMITTED	Status is indicative only: A contact marked Conflict does not preclude possible allocation and overruling (bumping) during the de-conflicting and optimization process. A contact marked Available does not guarantee acceptance by an Uncommitted Facility during the

		Antenna Access Request process.

5.3.3.2 File Name Format

The filename format for Satellite Contact Request Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is CSA_MMOC,

<*recipient*> is the <*Mission identifier*>,

<*xxx…xx*> is the dependant Contact Opportunity Request unique reference number,

<*info type*> is COP,

<*extension*> is xml.

5.3.4 Satellite Contact Request

Related Service: M3

Each Satellite Contact Request has a unique identifier in the filename and in the file header also referred as to “request_reference”. The Request file contains a list of specific contacts with unique identifiers referred to as “contact_id” and that matches a Spacecraft to an Antenna at a specific time defined by “start_time”.

5.3.4.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. SCISAT	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. S1R001	Any unique Request identifier
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <contact_request> tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the

		<contact_request> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the <contact_request> tag will be disregarded.
Body		Tag containing an unlimited number of <contact_request> tags
contact_request		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier on a Request
contact_request_action	ADD or DELETE	
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT).
contact_preference	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
contact_reschedulability	DROP, RESCHEDULE or hh:mm:ss	Specify what to do in case of conflicts. Drop the contact or reschedule any time or within the specified validity Time Period from <start_time>. Optional, and if omitted will default to RESCHEDULE any time.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested facility name, optional
antenna_name	e.g. PASS-1	Suggested antenna identifier, optional
Orbit	nnnnnn	Satellite orbit number. Optional
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as AOS time

end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional. If field is omitted and uplink field states YES, rf_on_time will default to start_time
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional. If field is omitted and uplink field states YES, rf_off_time will default to end_time
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account. If not specified, it will default to AB
coherent	YES or NO	Optional, default: YES
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan. Configuration is especially used to indicate nominal or non-nominal operations and could trigger specific actions at the facility
value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Missions

5.3.4.2 File Name Format

The filename format for Satellite Contact Request uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Mission identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is a Satellite Contact Request unique reference number that may contain a date/time stamp,

<*info type*> is SCR,

<*extension*> is xml.

5.3.5 Request Validity Report

Related Service: M3

The Request Validity Report is the first reply to a Satellite Contact Request and refers to the appropriate "request_reference". It is sent to the Mission as an indicative preliminary schedule without being de-conflicted but that offers advance notice about request compliance.

5.3.5.1 Message Composition

Field	Format	Description
Header		Tag in which to enter file header tags
Originator	e.g. SCISAT	Organization or mission identifier
Recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. S1R001	Any unique Request identifier
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <contact_request> tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the <contact_request> tag will be disregarded.
body		Tag containing an unlimited number

		of <contact_request> tags
contact_request		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier on a Request
contact_request_action	ADD or DELETE	
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT).
contact_preference	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
contact_reschedulability	DROP, RESCHEDULE or hh:mm:ss	Specify what to do in case of conflicts. Drop the contact or reschedule any time or within the specified validity Time Period from <start_time>. Optional, and if omitted will default to RESCHEDULE any time.
contact_request_status	WITHDRAWN, REJECTED, RECEIVED	
rejected_reason	OVERRULED, INCOMPLIANT ANTENNA, WRONG RF BAND, WRONG CHANNEL, , WRONG SERVICE, WRONG TIME.	Optional, if <contact_request_status> is REJECTED
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional
antenna_name	e.g. PASS-1	Suggested antenna identifier, optional
orbit	nnnnnn	Satellite orbit number. Optional
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as

		AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional. Provided only when Satellite Contact Request had it specified
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional. Provided only when Satellite Contact Request had it specified
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR. Ranging (RNG), Telecommanding (TC), Real-time telemetry (RT-TM), store & forward telemetry (SF-TM), Real-time data reception (RT-DR), store & forward data reception (SF-DR)
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account. If not specified, it will default to AB
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan.
value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Missions

5.3.5.2 File Name Format

The filename format for Satellite Contact Request Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is CSA_MMOC,

<*recipient*> is the <*Mission identifier*>,

<*xxx…xx*> is the dependant Satellite Contact Request unique reference number,

<*info type*> is RVR,

<*extension*> is xml.

5.3.6 Satellite Contact Schedule

Related Service: M4

The Satellite Contact Schedule is the de-conflicted reply to a Satellite Contact Request and refers to the appropriate "request_reference". It is sent to the Mission as subset of the complete ARS Committed Schedule but containing only the information pertaining the specific Mission.

5.3.6.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	CSA_MMOC	
recipient	e.g. SCISAT	Organization or mission identifier
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
schedule_reference	e.g. SCI0001	Unique Schedule identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the < scheduled_contact > tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be

		disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the < scheduled_contact > tag will be disregarded.
body		Tag containing an unlimited number of <contact_request> tags
scheduled_contact		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier from the Request
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT).
contact_preference	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
contact_reschedulability	DROP, RESCHEDULE or hh:mm:ss	Optional. Specify what to do in case of conflicts. Drop the contact or reschedule any time or within the specified validity Time Period from <start_time>. Optional, and if omitted will default to RESCHEDULE any time.
contact_request_status	WITHDRAWN, COMMITTED, REJECTED, CANCELLED, RESCHEDULED, CONTINGENCY	
rejected_reason	OVERRULED, INCOMPLIANT ANTENNA, WRONG RF BAND, WRONG CHANNEL, , WRONG SERVICE, WRONG TIME.	Optional, if <contact_request_status> is REJECTED or CANCELLED

satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional
antenna_name	e.g. SASK	Requested Suggested antenna identifier, optional
orbit	nnnnnn	Satellite orbit number. Optional
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account.
coherent	YES or NO	Optional, provided only when Satellite Contact Request had it specified, default: YES
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan.

value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Missions

5.3.6.2 File Name Format

The filename format for Satellite Contact Schedule uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is CSA_MMOC,

<*recipient*> is the <*Mission identifier*>,

<*xxx…xx*> is a Satellite Contact Schedule unique reference number that may contain a date/time stamp,

<*info type*> is SDL,

<*extension*> is xml.

5.3.7 Satellite Contact Schedule Acknowledgement

Related Service: M4

This message is facultative to the Mission. If the Mission is known not to submit an acknowledgment, the ARS will assume any Schedule submission as successful. Otherwise, the ARS may be configured to follow up with a retransmission of the Schedule if acknowledgment is not received within a defined time limit.

5.3.7.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. SCISAT	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
schedule_reference	e.g. SCI0001	Unique Schedule identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Optional
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be disregarded.

antenna_name	e.g. PASS-1	Optional

5.3.7.2 File Name Format

The filename format for Satellite Contact Schedule Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Mission identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is the respective Satellite Contact Schedule unique reference number,

<*info type*> is SDLA,

<*extension*> is xml.

5.3.8 Mission Scheduling Report

5.3.8.1 Message Composition

Related Service: M5

TBD during the design phase. Designer to propose the message composition.

5.3.8.2 File Name Format

The filename format for Satellite Contact Schedule Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Mission identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is the respective Satellite Contact Schedule unique reference number,

<*info type*> is SCPR,

<*extension*> is xml.

6 SPECIFIC MISSION INTERFACES

6.1 RCM INTERFACE

The RCM specific interface is described in AD-5. Note that the services defined in this applicable documents are mostly similar to those defined in Section 5 above but will require xml format translation between the two interface descriptions.

7 COMMITTED FACILITY INTERFACE

7.1 MESSAGE FORMAT

The message format used for the Committed Facility interface are files coded using XML. The content and tag descriptions for each message types are defined below.

7.2 TRANSPORT MECHANISM

The transport mechanism used between the Committed Facility and the ARS is file transfer. This mechanism allows the information to be exchanged asynchronously as point-to-point discrete files via predefined channels (i.e. dropboxes).

The transport mechanism shall rely on the Secure Shell File Transfer Protocol (SFTP) to transfer files to the designated mission dropboxes.

7.3 MESSAGE DESCRIPTIONS

7.3.1 Antenna Unavailability Report

Related Service: F1

The Antenna Unavailability Report is an Unsolicited file received from the Facility.

7.3.1.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. CCMEO	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
report_reference	e.g. CCMEO001	Unique identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the <unavailability> tag will be disregarded.
body		Tag containing an unlimited number

		of <contact_request> tags
unavailability		Tag in which to enter unavailability entry tags
antenna_name	e.g. PASS-1	
start_time	YYYY-MM-DDThh:mm:ss	
end_time	YYYY-MM-DDThh:mm:ss	
reason		Optional text.

7.3.1.2 File Name Format

The filename format for Antenna Unavailability Report uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Facility identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is an Antenna Unavailability Report unique reference number that shall include a date/time stamp,

<*info type*> is AUR,

<*extension*> is xml.

7.3.2 Committed Antenna Schedule

Related Service: F4

The Antenna Schedule is as subset of the de-conflicted ARS Committed Schedule but containing only the information pertaining the specific Facility. It is assumed that an Committed Facility is automatically and completely committed to an Antenna Schedule once acknowledged.

7.3.2.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	CSA_MMOC	
recipient	e.g. CCMEO	Organization or mission identifier
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
schedule_reference	e.g. CCMEO001	Unique Schedule identifier,

		incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the < scheduled_contact > tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the < scheduled_contact > tag will be disregarded.
body		Tag containing an unlimited number of <contact_request> tags
scheduled_contact		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier from the Request
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT). PROFICIENCY is used for ground system check tests.
contact_priority	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional
antenna_name	e.g. SASK	Requested Suggested antenna

		identifier, optional
orbit	nnnnnn	Satellite orbit number. Optional
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account.
coherent	YES or NO	Optional, default: YES
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan.
value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Facilities

7.3.2.2 Message Format

7.3.2.3 File Name Format

The filename format for Antenna Schedule uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is CSA_MMOC,

<*recipient*> is the <*Facility identifier*>,

<*xxx…xx*> is an Antenna Schedule unique reference number that shall include a date/time stamp,

<*info type*> is ASDL,

<*extension*> is xml.

7.3.3 Antenna Schedule Acknowledgment

Related Service: F4

This message is facultative to the Facility. If the Facility is known not to submit an acknowledgment, the ARS will assume any Schedule submission as successful. Otherwise, the ARS may be configured to follow up with a retransmission of the Schedule if acknowledgment is not received within a defined time limit.

7.3.3.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. CCMEO	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
schedule_reference	e.g. CCMEO001	Unique Schedule identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Optional
station_name	e.g. PASS	Facility identifier. Optional.
antenna_name	e.g. PASS-1	Optional

7.3.3.2 File Name Format

The filename format for Antenna Schedule Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Facility identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is the respective Antenna Schedule unique reference number,

<*info type*> is ASDLA,

<*extension*> is xml.

7.4 COMPATIBILITY OF ACTUAL FACILITIES

7.4.1 SASK/SHUB Interface Migration

TBD during the design phase. Designer to propose the message composition.

8 GENERIC UNCOMMITTED FACILITY INTERFACE

8.1 MESSAGE FORMAT

The message format used for the generic Uncommitted Facility interface are files coded using XML. The content and tag descriptions for each message types are defined below.

8.2 TRANSPORT MECHANISM

The transport mechanism used between the generic Uncommitted Facility and the ARS is file transfer. This mechanism allows the information to be exchanged asynchronously as point-to-point discrete files via predefined channels (i.e. dropboxes).

The transport mechanism shall rely on the Secure Shell File Transfer Protocol (SFTP) to transfer files to the designated mission dropboxes.

8.3 MESSAGE DESCRIPTIONS

8.3.1 Antenna Unavailability Report

8.3.1.1 Message Composition

Same as Committed Facility Interface Section 7.3.1.1.

8.3.1.2 File Name Format

Same as Committed Facility Interface Section 7.3.1.2.

8.3.2 Antenna Access Request

Related Service: F2

Each Antenna Access Request has a unique identifier in the filename and in the file header also referred as to “request_reference”. The Request file contains a list of specific contacts with unique identifiers referred to as “contact_id” and that matches a Spacecraft to an Antenna at a specific time defined by “start_time”.

8.3.2.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	CSA_MMOC	
recipient	e.g. CCMEO	Organization or mission identifier
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. CCMEO001	Unique Request identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	

schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <contact_request> tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the <contact_request> tag will be disregarded.
body		Tag containing an unlimited number of <contact_request> tags
contact_request		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier on a Request
contact_request_action	ADD or DELETE	
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT).
contact_priority	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional.
antenna_name	e.g. PASS-1	Suggested antenna identifier, optional.
orbit	nnnnnn	Satellite orbit number.

start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the Satellite. May also be referred to as AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional. If field is omitted and uplink field states YES, rf_on_time should default to start_time
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional. If field is omitted and uplink field states YES, rf_on_time should default to stop_time
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account.
coherent	YES or NO	Optional, default: YES
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan.
value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Facilities

8.3.2.2 File Name Format

The filename format for Antenna Schedule uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is CSA_MMOC,

<*recipient*> is the <*Facility identifier*>,

<*xxx…xx*> is an Antenna Access Request unique reference number that shall include a date/time stamp,

<*info type*> is AAR,

<*extension*> is xml.

8.3.3 Antenna Access Request Acknowledgment

Related Service: F2

This message is facultative to the Facility. If the Facility is known not to submit an acknowledgment, the ARS will assume any Request submission as successful. Otherwise, the ARS may be configured to follow up with a retransmission of the Request if acknowledgment is not received within a defined time limit

8.3.3.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. CCMEO	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. CCMEO001	Unique Request identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Optional
station_name	e.g. PASS	Facility identifier. Optional .
antenna_name	e.g. PASS-1	Optional
orbit	nnnnnn	Satellite orbit number. Optional to the Facility.

8.3.3.2 File Name Format

The filename format for Antenna Schedule Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Facility identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is the respective Antenna Access Request unique reference number,

<*info type*> is AARA,

<*extension*> is xml.

8.3.4 Antenna Access Confirmation

Related Service: F3

The Antenna Access Confirmation is the reply to an Antenna Access Request and refers to the appropriate "request_reference". It is received from the Facility as a copy of the Antenna Access Request without the request action field, but containing additional contact fields describing the acceptance status ("contact_request_status") and the rejected reason (if needed).

8.3.4.1 Message Composition

Field	Format	Description
header		Tag in which to enter file header tags
originator	e.g. CCMEO	Organization or mission identifier
recipient	CSA_MMOC	
generation_time	YYYY-MM-DDThh:mm:ss	file generation time (UTC)
request_reference	e.g. CCMEO001	Unique Request identifier, incremental numbering
schedule_valid_from	YYYY-MM-DDThh:mm:ss	
schedule_valid_to	YYYY-MM-DDThh:mm:ss	
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition. Optional and if used, any instance of <satellite_name> under the <contact_request> tag will be disregarded.
station_name	e.g. PASS	Facility identifier. Optional and if used, any instance of <station_name> under the <contact_request> tag will be disregarded.
antenna_name	e.g. PASS-1	Suggested antenna identifier. Optional and if used, any instance of <antenna_name> under the

		<contact_request> tag will be disregarded.
body		Tag containing an unlimited number of <contact_request> tags
contact_request		Tag in which to enter contact-specific tags
contact_id	e.g. S1R001C001	Any unique Contact identifier on a Request
contact_request_status	ACCEPTED, REJECTED, CANCELLED	
rejected_reason	UNAVAILABLE, WRONG RF BAND, WRONG CHANNEL, WRONG SERVICE, WRONG TIME.	Optional, if <contact_request_status> is REJECTED
contact_priority	1..100	Optional. Represents the Originator's relative priority against Contacts of the same Criticality level, 1 being the most important.
contact_criticality	ROUTINE, IMPORTANT, EMERGENCY, PROFICIENCY.	EMERGENCY relates to spacecraft Health & Safety, IMPORTANT relates to time-sensitive or user emergency operations (Fast-Tasking, Near-Real-Time (NRT).
contact_reschedulability	DROP, RESCHEDULE or hh:mm:ss	Specify what to do in case of conflicts. Drop the contact or reschedule any time or within the specified validity Time Period from <start_time>. Optional, and if omitted will default to RESCHEDULE any time.
satellite_name	e.g. SCISAT-1	Satellite name as per satellite catalog definition
station_name	e.g. PASS	Requested Facility identifier, optional.
antenna_name	e.g. PASS-1	Suggested antenna identifier, optional.
orbit	nnnnnn	Satellite orbit number.
start_time	YYYY-MM-DDThh:mm:ss	Refers to the time where the Antenna should start tracking the

		Satellite. May also be referred to as AOS time
end_time	YYYY-MM-DDThh:mm:ss	Refers to the Antenna time where the Antenna should stop tracking the Satellite. May also be referred to as LOS time
rf_on_time	YYYY-MM-DDThh:mm:ss	Optional. Provided when Antenna Access Request had it specified
rf_off_time	YYYY-MM-DDThh:mm:ss	Optional. Provided when Antenna Access Request had it specified
rf_band	S, X, C, SX, SC, SCX	Optional, default: SX
rf_service	RNG, TC, RT-TM, SF-TM, RT-DR, SF-DR	Optional, default: RNG, TC, RT-TM, SF-DR
uplink	YES or NO	Optional, default: YES
channel	X1, X2	Optional, default: X1,X2, Data Reception downlink channel to be taken into account.
coherent	YES or NO	Optional, default: YES
configuration		Single tag containing an unlimited number of <parameter> tags. Optional.
parameter		Tag in which to enter optional parameters, each with a single <name> and <value> tag. Optional, unlimited.
name	e.g. bit_rate, configuration	Some missions use the Request and Schedule to convey such information to the Facility without relying on a Pass Plan.
value	e.g. nnnn.fffkbps, HBR	Mission specific, to be defined with Facilities

8.3.4.2 File Name Format

The filename format for Antenna Schedule Acknowledgment uses the filename convention Section 2.3.2:

<originator>__<recipient>__<xxx…xx>.<info type>.<extension>

Where:

<*originator*> is the <*Facility identifier*>,

<*recipient*> is CSA_MMOC,

<*xxx…xx*> is the respective Antenna Access Request unique reference number,

<*info type*> is AAC,

<*extension*> is xml.

9 SPECIFIC UNCOMMITTED FACILITY INTERFACES

9.1 DRDC INTERFACE

TBD

9.2 SSC INTERFACE

TBD.

9.3 DLR INTERFACE

9.3.1 Message Format

The message format used for DLR Facility interface is plain ASCII file using tab separated columns.

9.3.2 Transport Mechanism

The transport mechanism used between the ARS and the DLR Facilities is through email directed to the station coordinator in Oberpfaffenhofen, Germany.

9.3.3 Sample Message

Good day,
We would like to schedule one NEOSSAT contact on January 30 .
Please confirm if it can be supported.

```
   DATE     SAT   STN   REVN  MAX.ELE     AOS   LOS
14 01 30    NEO   WHM   04862      0.0   030-18:44:57    030-18:57:55
```

Thank you,

9.4 SSC INTERFACE

9.4.1 Message Format

The message format used for SSC Facility interface is plain ASCII file using tab separated columns.

9.4.2 Transport Mechanism

The transport mechanism used between the ARS and the SSC Facilities is through email directed to the station coordinator at the Esrange Space Center near Kiruna, Sweden.

9.4.3 Sample Message

```
DATE       SAT STN  REV   MAX EL   AOS       LOS       OPRN
2014-01-13 SCI KRN  56110 016.7    00:23:05  00:31:16  TM 4 Mbps

2014-01-13 SCI KRN  56111 049.8    02:02:51  02:10:55  TM 4 Mbps

2014-01-13 SCI KRN  56114 043.1    07:02:30  07:10:26  TM 4 Mbps
```

```
2014-01-14 SCI KRN  56125 025.1    00:47:06  00:56:09  TM 4 Mbps
2014-01-14 SCI KRN  56126 073.1    02:28:10  02:35:40  TM 4 Mbps
2014-01-14 SCI KRN  56128 039.2    05:47:58  05:55:13  TM 4 Mbps

2014-01-15 SCI KRN  56144 063.2    07:51:41  08:00:25  TM 4 Mbps
2014-01-15 SCI KRN  56154 018.7    23:57:39  00:06:05  TM 4 Mbps

2014-01-16 SCI KRN  56155 055.5    01:38:11  01:45:41  TM 4 Mbps
2014-01-16 SCI KRN  56157 040.1    04:58:02  05:05:03  TM 4 Mbps

2014-01-17 SCI KRN  56174 070.5    08:40:45  08:48:22  TM 4 Mbps
2014-01-17 SCI KRN  56183 013.6    23:08:37  23:15:55  TM 4 Mbps

2014-01-18 SCI KRN  56184 041.5    00:48:13  00:55:42  TM 4 Mbps
2014-01-18 SCI KRN  56187 041.1    05:47:33  05:55:05  TM 4 Mbps
```

10 ONLINE SATELLITE CATALOGUE INTERFACE

As per interface description RD-1 and RD-2.