Orbital events

11 March 2015 - AL

The following is based on (and is very close to) the CNES standard « ISIS ».

List of events : 4 categories listed :

- orbital events -> related to orbit celestial bodies…
- satellite events -> related to satellite bus
- station events -> related to ground station visibility
- mission events -> related to the payload

Each category is called a "class" in the events description section.

This is not the latest version, some aspects are still under discussion (at CNES), but this document gives a good overview, and a good starting point for discussion in the group.

Also note that the events description has been done with particular space missions in mind, so that the events structure or the events types as described may not be adapted to all cases.

A few elements / definitions:

- An event occurs at a specific time and has zero length.
- An event is defined by a type (=name), a time (when the event occurs) + additional information that depends on the category of event.
- The "duration" in the event structure is not the duration of the event (which is 0) but the time to the event which is part of the same pair (time from beginning of something to end of something for events that go in pairs).

Other aspects:

- Some events' names contain bracket (e.g. [X]H_LOCAL_TIME). The name a generic name. For an actual event, the "[X]" will be replaced by a value. The values may vary from one mission to another.
- The events listed hereafter are supposed to be standard events. Additional events may be defined for a specific mission (but the standard events are not supposed to be redefined).
- The definition of standard events should not be ambiguous. This may not be the case yet.
- One may have: "measured" events or computed events (particular case: predicted events).

1. List of EVENTS

1.1. ORBITAL_EVENT

ASCENDING_NODE
Date when the satellite is at the ascending node of the orbit (defined by ascending through ITRF equator)

DESCENDING_NODE
Date when the satellite is at the descending node of the orbit (defined by descending through ITRF equator)

[X]DEG_LATITUDE_ARGUMENT
Date when the argument of latitude (orbital position ie PSO) is equal to [X] in degree. [X] in the range [0;360[to be missionised (for instance X=90 for point closest to North Pole and 270 for point closest to South Pole)

PERIAPSIS
Date when the satellite is at the periapsis (ANOM=0 deg)

APOAPSIS
Date when the satellite is at the apoapsis (ANOM=180 deg)

[X]DEG_ANOM
Date when the true orbital anomaly is equal to [X] in degree. [X] in the range [0 ;360[to be missionised

MIN_LATITUDE
Date when the satellite reaches its minimal latitude

MAX_LATITUDE
Date when the satellite reaches its maximal latitude

PLUS_[X]DEG_LATITUDE_UP
Transition above the latitude of [X] in degree. [X] in the range [0 ;90] to be missionised

MINUS_[X]DEG_LATITUDE_UP
Transition above the latitude of -[X] in degree. [X] in the range [0 ;90] to be missionised

PLUS_[X]DEG_LATITUDE_DOWN
Transition below the latitude of [X] in degree. [X] in the range [0 ;90] to be missionised

MINUS_[X]DEG_LATITUDE_DOWN
Transition below the latitude of -[X] degree. [X] in the range [0 ;90] to be missionised

PLUS_[X]DEG_LATITUDE
Date when the satellite reaches the latitude of [X] degree. [X] in the range [0 ;90] to be missionised

MINUS_[X]DEG_LATITUDE
Date when the satellite reaches the latitude of -[X] degree. [X] in the range [0 ;90] to be missionised

MIN_LONGITUDE
Date when the satellite reaches its minimal longitude

MAX_LONGITUDE
Date when the satellite reaches its maximal longitude

[X]_LONGITUDE_UP
Transition above the longitude of [X] degree. [X] in the range [0 ;360[to be missionised

[X]_LONGITUDE_DOWN
Transition below the longitude of [X] degree. [X] in the range [0 ;360[to be missionised

[X]_LONGITUDE
Date when the satellite reaches the longitude of [X] degree. [X] in the range [0 ;360[to be missionised

SUBSOLAR_POSITION
Date when the satellite is at the subsolar position of the orbit (local time=12h)

ANTI_SUBSOLAR_POSITION
Date when the satellite is at the antisubsolar position of the orbit (local time=0h)

QUADRATURE_POSITION
Date of quadrature between satellite; Earth and Sun (local time=6h or 18h)

[X]H_LOCAL_TIME
Date when the local hour of the satellite is equal to [X]hour. [X] in the range [0, 24[to be missionised. The local hour is determined by the Sun and satellite projections on the equatorial plane.

[X]H_SOLAR_TIME
Date when the solar hour of the satellite is equal to [X]hour. [X] in the range [0, 24[to be missionised. The solar hour is determined by the satellite and Sun projection on the osculating orbital plan.

[X]DEG_SUN_BETA_TRANSITION_DOWN
Date when the elevation of the Sun with regards to the orbital plane (beta angle) becomes lower than the value [X]deg.

[X]DEG_SUN_BETA_TRANSITION_UP
Date when the elevation of the Sun with regards to the orbital plane (beta angle) becomes higher than the value [X]deg.

[X]DEG_SUBSAT_SUN_INCIDENCE_DOWN
Date when the Sun incidence with regards to the subsatellite point on the Earth surface (angle between Sun direction and vertical local) becomes lower than the value [X]deg.

[X]DEG_SUBSAT_SUN_INCIDENCE_UP
Date when the Sun incidence with regards to the subsatellite point on the Earth surface (angle between Sun direction and vertical local) becomes higher than the value [X]deg.

[EXT]_MIN_DISTANCE
Time of the closest approach of the satellite towards another object [EXT] (minimal distance)

[EXT]_MAX_DISTANCE
Time of the furthest approach of the satellite towards another object [EXT] (maximal distance)

[EXT]_[X]M_DISTANCE
Time when the distance between the satellite and the other object [EXT] is equal to [X] meters

[EXT]_[X]M_DISTANCE_UP
Transition time when the distance between the satellite and the other object [EXT] passes above [X] meters

[EXT]_[X]M_DISTANCE_DOWN
Transition time when the distance between the satellite and the other object [EXT] passes below [X] meters

[X]KM_ALTITUDE
Time when the satellite is at the altitude of [X] kilometers

[X]KM_ALTITUDE_UP
Transition above the altitude of [X] kilometers

[X]KM_ALTITUDE_DOWN
Transition below the altitude of [X] kilometers

NIGHT_DAY
Transition Night - Day of the subsatellite point

DAY_NIGHT
Transition Day - Night of the subsatellite point

MOON_ECLIPSE_BY_EARTH_START
Entry of the satellite in the area where the Moon is occulted by the Earth

MOON_ECLIPSE_BY_EARTH_END
Exit of the satellite in the area where the Moon is occulted by the Earth

PENUMBRA_LIGHT
Date when the satellite exits the penumbra of the Earth and enters the sunlight

LIGHT_PENUMBRA
Date when the satellite exits the sunlight and enters the penumbra of the Earth

PENUMBRA_SHADOW
Date when the satellite exits the penumbra of the Earth and enters the shadow of the Earth

SHADOW_PENUMBRA
Date when the satellite exits the shadow of the Earth and enters the penumbra of the Earth

LIGHT_SHADOW
Date when the satellite exits the sunlight and enters the shadow of the Earth (applicable for missions for which penumbra phase is ignored)

SHADOW_LIGHT
Date when the satellite exits the shadow and enters the light of the Earth (applicable for missions for which penumbra phase is ignored)

PENUMBRA_LIGHT_BY_MOON
Date when the satellite exits the penumbra of the Moon and enters the sunlight

LIGHT_PENUMBRA_BY_MOON
Date when the satellite exits the sunlight and enters the penumbra of the Moon

PENUMBRA_SHADOW_BY_MOON
Date when the satellite exits the penumbra of the Moon and enters the shadow of the Moon

SHADOW_PENUMBRA_BY_MOON
Date when the satellite exits the shadow of the Moon and enters the penumbra of the Moon

LIGHT_SHADOW_BY_MOON
Date when the satellite exits the sunlight and enters the shadow of the Earth (applicable for missions for which penumbra phase is ignored)

SHADOW_LIGHT_BY_MOON
Date when the satellite exits the shadow and enters the light of the Earth (applicable for missions for which penumbra phase is ignored)

[X]%_SUN_ECLIPSE_START
Date when the satellite enters the shadow of the Earth for a light threshold below [X]%

[X]%_SUN_ECLIPSE_END
Date when the satellite exits the shadow of the Earth for a light threshold below [X]%

[X]%_SUN_ECLIPSE_BY_MOON_START
Date when the satellite enters the shadow of the Moon for a light threshold below [X]%

[X]%_SUN_ECLIPSE_BY_MOON_END
Date when the satellite exits the shadow of the Moon for a light threshold below [X]%

[X]DEG_COLIN_START

Start of the phase when the angle "Satellite-Sun/Satellite-Earth" is included in ([X]deg;-[X]deg) or in (180-[X]deg;180+[X]deg) (colinearity condition)

[X]DEG_COLIN_END
End of the phase when the angle "Satellite-Sun/Satellite-Earth" is included in ([X]deg;-[X]deg) or in (180-[X]deg;180+[X]deg) (colinearity condition)

MIN_COLIN
Date when the angle "Satellite-Sun/Satellite-Earth" is minimal

MAX_COLIN
Date when the angle "Satellite-Sun/Satellite-Earth" is maximal

SUBSAT_[AREA]_ENTER
Date when the subsatellite position enters the terrestrial surface [AREA] to be missionised (for example [AREA]=landmass)

SUBSAT_[AREA]_EXIT
Date when the subsatellite position exits the terrestrial surface [AREA] to be missionised (for example [AREA]=landmass)

IN_[ZONE]_ENTER
Date when the satellite enters the volume [ZONE] to be missionised (for instance [ZONE]=SAA)

IN_[ZONE]_EXIT
Date when the satellite exits the volume [ZONE] to be missionised (for instance [ZONE]=SAA)

MIN_TARGET_[POINT]
Date when the satellite line of sight is the closest to the terrestrial target point [POINT] taking into account the attitude of the satellite and the line of sight (minimal distance)

[EXT]_[X]DEG_AOS
Start of geometric visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), with an elevation angle higher than [X] deg in current satellite antenna frame

[EXT]_[X]DEG_LOS
End of geometric visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), with an elevation angle higher than [X] deg in current satellite antenna frame

[EXT]_PHYSICAL_AOS
Start of physical visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), in current satellite antenna frame, taking into account the antenna mask

[EXT]_PHYSICAL_LOS
End of physical visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), in current satellite antenna frame, taking into account the antenna mask

[EXT]_RF_AOS
Start of radiofrequency visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), in current satellite antenna frame, taking into account the link budget

[EXT]_RF_LOS
End of radiofrequency visibility of the external satellite [EXT] (for instance [EXT] : one GPS satellite), in current satellite antenna frame, taking into account the link budget

1.2. SATELLITE_EVENTS

MANEUVER_THRUST[i]_START
Beginning of the thrust number [i] of a maneuver (calculation performed by FDS). ([i] integer from 1 to M, reinitialised for each new OEF file)

MANEUVER_THRUST[i]_END
End of the thrust number [i] of a maneuver (calculation performed by FDS). ([i] integer from 1 to M, reinitialised for each new OEF file)

EARTH_GLARE_[SENSOR]_START
Date of beginning of the glare of the sensor [SENS], when the angle of the sensor with regards to Earth is under the guard angle

EARTH_GLARE_[SENSOR]_END
Date of end of the glare of the sensor [SENS], when the angle of the sensor with regards to Earth is under the guard angle

SUN_GLARE_[SENSOR]_START
Date of beginning of the glare of the sensor [SENS], when the angle of the sensor with regards to Sun is under the guard angle

SUN_GLARE_[SENSOR]_END
Date of end of the glare of the sensor [SENS], when the angle of the sensor with regards to Sun is under the guard angle

MOON_GLARE_[SENSOR]_START
Date of beginning of the glare of the sensor [SENS], when the angle of the sensor with regards to Moon is under the guard angle

MOON_GLARE_[SENSOR]_END
Date of end of the glare of the sensor [SENS], when the angle of the sensor with regards to Moon is under the guard angle

EARTH_IN_[SENSOR]_START
Date when the Earth enters in the field of view of the sensor [SENS]

EARTH_IN_[SENSOR]_END
Date when the Earth exits the field of view of the sensor [SENS]

SUN_IN_[SENSOR]_START
Date when the Sun enters in the field of view of the sensor [SENS]

SUN_IN_[SENSOR]_END
Date when the Sun exits the field of view of the sensor [SENS]

MOON_IN_[SENSOR]_START
Date when the Moon enters in the field of view of the sensor [SENS]

MOON_IN_[SENSOR]_END
Date when the Moon exits the field of view of the sensor [SENS]

SAFE2NOM_[MODE]_START
Start of the transition between converged AOCS SAFE mode to AOCS NOMINAL mode, in the targeted attitude, ready to begin mission programming. [MODE] to be missionised with the following list : AUTO (automatic), GEO (geocentric), INERT (inertial), SUN (solar), PFYS (PF yaw steering)

SAFE2NOM_[MODE]_END
Same as above but for the end of transition

[MODE]2MAN_SEQ
Date of the switch between a converged AOCS NOMINAL mode to a maneuver sequence. [MODE] to be missionised with the following list : AUTO (automatic), GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

MAN_SEQ2[MODE]
Date of the switch between a maneuver sequence to a converged AOCS NOMINAL mode. [MODE] to be missionised with the following list : AUTO (automatic), GEO (geocentric), INERT (inertial), SUN (solar), PFYS (PF yaw steering)

[MODE1]2[MODE2]_START
Start of the transition between the nominal mode [MODE1] and the nominal mode [MODE2]. [MODE1] and [MODE2]to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

[MODE1]2[MODE2]_END
Same as above but for the end of transition

GUID_POLY2[MODE]_START
Start of the transition between the specific polynomial guidance with no rallying phase and [MODE]. [MODE]to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

GUID_POLY2[MODE]_END
Same as above but for the end of transition

GUID_RALLPOLY2[MODE]_START
Start of the transition between the specific polynomial guidance with rallying phase and [MODE]. [MODE]to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

GUID_RALLPOLY2[MODE]_END
Same as above but for the end of transition

GUID_HARM2[MODE]_START
Start of the transition between the specific harmonic guidance and [MODE]. [MODE]to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

GUID_HARM2[MODE]_END
Same as above but for the end of transition

ENTERING_NOM_AUTO
Date of enter in the nominal automatic guidance mode NOM_AUTO

ENTERING_NOM_GRND
Date of enter in the nominal ground commanded mode NOM_GRND

[MODE]2GUID_POLY_START
Start of the transition between the nominal standard mode [MODE] and the specific polynomial guidance mode with no rallying phase. [MODE] to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

[MODE]2GUID_POLY_END
Same as above but for the end of transition

[MODE]2GUID_RALLPOLY_START
Start of the transition between the nominal standard mode [MODE] and the specific polynomial guidance mode with rallying phase. [MODE] to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

[MODE]2GUID_RALLPOLY_END
Same as above but for the end of transition

GUID_RALLPOLY_POLY_BEGIN
During the GUID_RALLPOLY mode, date when the rallying phase ends and the polynomial profile begins

[MODE]2GUID_HARM_START
Start of the transition between the nominal standard mode [MODE] and the specific harmonic guidance mode. [MODE] to be missionised with the following list : GEO (geocentric), LN (geocentric+local nadir), TC (geocentric+track compensation), LNTC (geocentric+local nadir+track compensation), GEOVEL (geocentric+velocity vector alignement), INERT (inertial), SUN (solar), PFYS (PF yaw steering), PFYSLN (PF yaw steering+local nadir)

[MODE]2GUID_HARM_END
Same as above but for the end of transition

NAV_START_GNSS_TC
Request for navigation function with GNSS data sent through a TC

NAV_START_GROUND_TC
Request for navigation function with an orbit sent by the ground sent through a TC

NAV_GNSS_TC
Request for navigation function with selection of GNSS to be used sent through a TC

NAV_UPDATE_TC
Request for updating the onboard orbit sent through a TC

SADM_HOLD_TC
Request for holding SADM mode (keeping SADM in current position), sent through a TC

SADM_CRUISE_TC
Request for cruise SADM mode (given the targeted SADM position), sent through a TC

SADM_AUTO_TC
Request for autonomous SADM mode (optimising sun enlightment), sent through a TC

COA_START_TC
Request for start COA function for maneuver computation

COA_STOP_TC
Request for stop COA function for maneuver computation

COA_AUT_TC
Request for authorization of the execution of correction maneuvers by COA

COA_INH_TC
Request for inhibiting the execution of correction maneuvers by COA

COA_SLOTS_TC
Request for updating the maneuvers slots used by COA

COA_COMPUT_PARAM_TC
Request for updating solar activity used by COA

COA_REF_ORB_TC
Request for updating reference orbit used by COA

COA_PARAM_TC
Request for updating parameters used by COA

TSHIFT_TC
Request for compensating long track ground computation error due to imprecise knowledege of the onboard orbit

[SURFACE]_[X]PC_ILLUMINATION
Date of a given percentage [X]% of illumination of the surface [SURFACE] of the satellite. [X] and [SURFACE] to be defined by the mission.

1.3. STATION_EVENTS

[X]DEG_AOS
Start of geometric visibility of the satellite with a station, with an elevation angle higher than [X] deg. [X] to be missionised (typical values : 0, 5, 10 deg) - (Nota : AoS = acquisition of signal)

[X]DEG_LOS
End of geometric visibility of the satellite with a station, with an elevation angle higher than [X] deg. [X] to be missionised (typical values : 0, 5, 10 deg) - (Nota : LoS = loss of signal)

PHYSICAL_AOS
Start of physical visibility of the satellite with a station, taking into account the station mask - (Nota : AoS = acquisition of signal)

PHYSICAL_LOS
End of physical visibility of the satellite with a station, taking into account the station mask - (Nota : AoS = acquisition of signal)

TMTC_AOS
Date of start for TM/TC link (defined by the maximum between X_DEG_AOS (X=5 deg minimum authorized to send TM/TC) and the PHYSICAL_AOS

TMTC_LOS
Date of end for TM/TC link (defined by the minimum between X_DEG_LOS (X=5 deg minimum authorized to send TM/TC) and the PHYSICAL_LOS

RF_AOS
Start of radioelectrical visibility of the satellite with a station taking into account the link budget - (Nota : AoS = acquisition of signal). This event is defined by a station, an antenna of the satellite and the type of radioelectrical visibility (continuous (CONT) or intermittent (INT) depending on the atttitude of the satellite)

RF_LOS
End of radioelectrical visibility of the satellite with a station taking into account the link budget - (Nota : AoS = acquisition of signal). This event is defined by a station, an antenna of the satellite and the type of radioelectrical visibility (continuous (CONT) or intermittent (INT) depending on the atttitude of the satellite)

MAX_ELEVATION_PASS
Date when the satellite is at its maximal elevation during the visibility by the station

POLAR_CHANGE_[ANT1]_TO_[ANT2]_IN_NOMINAL_MODE
In nominal mode, change of the polarization of the signal between the antenna [ANT1] and the antenna [ANT2]. The antenna [ANT2] is now visible from the station. [ANT1] and [ANT2] to be missionised (for instance : [ANT1]=L, [ANT2]=R). The change of polarization is calculated considering the transition exactly in the middle of both antennas

POLAR_CHANGE_[ANT1]_TO_[ANT2]_IN_SAFE_MODE
Idem as above but in safe mode

SUN_GLARE_START
Start of TM/TC antenna glare by Sun

SUN_GLARE_END
End of TM/TC antenna glare by Sun

[EXT]_INTERFERENCE_START
Start of interference between the satellite and an external satellite [EXT] during a visibility of a station. [EXT] to be missionised

[EXT]_INTERFERENCE_END
End of interference between the satellite and an external satellite [EXT] during a visibility of a station. [EXT] to be missionised

[ANT]_MASKING_BY_[PART]_START
Begining of the antenna [ANT] masking by the satellite [PART] (for example SOLAR_ARRAY); during RF visibility

[ANT]_MASKING_BY_[PART]_END
End of the antenna [ANT] masking by the satellite [PART] (for example SOLAR_ARRAY); during RF visibility

1.4. MISSION_EVENTS

MANEUVER_SLOT[i]_START
Start of the slot planned for the maneuver number [i] ([i] integer from 1 to N, reinitialised for each new OEF file). Nota : the number of maneuver slots N can be equal or lower than the number of maneuver thrusts M. For instance N=1 if the maneuver slot covers all the maneuver thrusts : N=M if we want to liberate the maneuver slot between 2 maneuvers thrusts

MANEUVER_SLOT[i]_END
End of the slot planned for the maneuver number [i] ([i] integer from 1 to N, reinitialised for each new OEF file). Nota : the number of maneuver slots N can be equal or lower than the number of maneuver thrusts M. For instance N=1 if the maneuver slot covers all the maneuver thrusts : N=M if we want to liberate the maneuver slot between 2 maneuvers thrusts

EARTH_GLARE_[INSTR]_START
Date of beginning of the glare of the instrument [INSTR], when the angle of the sensor with regards to Earth is under the guard angle,

EARTH_GLARE_[INSTR]_END
Date of end of the glare of the of the instrument [INSTR], when the angle of the sensor with regards to Earth is under the guard angle

SUN_GLARE_[INSTR]_START
Date of beginning of the glare of the instrument [INSTR] when the angle of the sensor with regards to Sun is under the guard angle

SUN_GLARE_[INSTR]_END
Date of end of the glare of the instrument [INSTR] when the angle of the sensor with regards to Sun is under the guard angle

MOON_GLARE_[INSTR]_START
Date of beginning of the glare of the instrument [INSTR], when the angle of the sensor with regards to Moon is under the guard angle

MOON_GLARE_[INSTR]_END
Date of end of the glare of the instrument [INSTR] when the angle of the sensor with regards to Moon is under the guard angle

EARTH_IN_[INSTR]_START
Date when the Earyh enters in the field of view of the instrument [INSTR]

EARTH_IN_[INSTR]_END
Date when the Earth exits the field of view of the instrument [INSTR]

SUN_IN_[INSTR]_START
Date when the Sun enters in the field of view of the instrument [INSTR]

SUN_IN_[INSTR]_END
Date when the Sun exits the field of view of the instrument [INSTR]

MOON_IN_[INSTR]_START
Date when the Moon enters in the field of view of the instrument [INSTR]

MOON_IN_[INSTR]_END
Date when the Moon exits the field of view of the instrument [INSTR]

2. Events / events set description

DATA

Name	Type	Optional/Required	Description
METADATA	Structure	Required	Define the method to compute and provide orbital events
EVENT * n	Structure	Optional	Event.

METADATA

Name	Type	Optional/Required	Description
COMMENT * n	String	Optional	
ORBIT_BEGINNING_AOL	AN_ANGLE_INTEGER_IN_DEG : Integer [0 .. 360[	Optional	Argument of latitude (=pso) of the beginning of the orbits (deg). It is a true pso in ITRF. This parameter is an integer between [0; 360[. Example : 0 deg if the orbits begin at ascending node. The orbit number changes at this pso. The first orbit of the cycle has the number 1 **Attribute : unit** - "deg" - Required AN_ANGLE_INTEGER_IN_DEG : an angle that is an integer between 0 and 360 degrees
REF_FRAME	A_RESTRICTED_REF_FRAME : Enumeration ["GCRF" "ITRF" "CIRF" "TIRF" "ITRF_GCRF"]	Required	Name of the reference frame in which the data are computed. ITRF/GCRF means : components in ITRF, velocity relative to GCRF (position expressed in ITRF, inertial velocity expressed in ITRF). A_RESTRICTED_REF_FRAME : Restricted ref frame for the oem, omm and opm structures
ALT_DEF	Enumeration ["geodesic" "geocentric" "spherical"]	Required	Definition of the altitude. Either Geodesic (local vertical, above Earth ellipsoid), geocentric (Earth center direction, above Earth ellipsoid) or spherical (above circular Earth with equatorial

			radius).
PARAM_NATURE	"true"	Required	Definition of the nature of orbital parameters such as AoL.

Structure EVENT

Name	Type	Optional/Required	Description
EVENT_CLASS	Choice	Required	Event class.
TIME	AN_EPOCH : String	Required	Date with CCSDS format. **Pattern :** \d{4}-((\d{2}\-\d{2})|\d{3})T\d{2}:\d{2}:\d{2}(\.\d*)?Z?
DURATION	A_DURATION_IN_SEC : Float [0.0 ..]	Optional	Duration of the event, only for the events whose suffix is START or AoS. **Attribute : unit** - "s" - Required A_DURATION_IN_SEC : A duration in seconds.
LOCATION	Structure	Required	
COMMENT	String	Optional	Text describing the event and providing the characteristics of the event parameters.

Choice EVENT_CLASS

Name	Type	Optional/Required	Description
ORBITAL	AN_ORBITAL_EVENT : String	Required	Orbital event. ***Configurable item using ORBITAL_EVENT_CONFIG.XML***
STATION	Structure	Required	Station event (these events are related to S-band, X-band or S+X-band stations).
SATELLITE	A_SATELLITE_EVENT : String	Required	Satellite event. ***Configurable item using SATELLITE_EVENT_CONFIG.XML***
MISSION	A_MISSION_EVENT : String	Required	Mission event. ***Configurable item using MISSION_EVENT_CONFIG.XML***

Structure STATION

Name	Type	Optional/Required	Description
EVENT_TYPE	A_STATION_EVENT : String	Required	***Configurable item using STATION_EVENT_CONFIG.XML***
PARAMETERS	A_POINTING	Required	A_POINTING : Station event

			characteristics

Type A_POINTING

Name	Type	Optional/Required	Description
STATION	A_STATION_MNEMO : String	Required	Station mnemonic. ***Configurable item using STATION_MNEMO_CONFIG.XML***
EARTH_ANTENNA * n	AN_EARTH_ANTENNA_MNEMO : String	Required	Mnemonic of the Earth antenna(s). ***Configurable item using EARTH_ANTENNA_MNEMO_CONFIG.XML***
SAT_ANTENNA	A_SAT_ANTENNA_MNEMO : String	Optional	Mnemonic of the stellite antenna. ***Configurable item using SAT_ANTENNA_MNEMO_CONFIG.XML***
ELEVATION	AN_ELEVATION : Float [-10.0 .. 90.0]	Required	Elevation angle (degree). **Attribute : unit** - "deg" - Required AN_ELEVATION : A [-10 ; 90] angle in degree used for an elevation
AZIMUT	AN_ANGLE_IN_DEG_0_360 : Float [0.0 .. 360.0]	Required	Azimut angle (degree). **Attribute : unit** - "deg" - Required AN_ANGLE_IN_DEG_0_360 : A [0 ; 360] angle (can be used for azimut)
TYPE	Enumeration ["CONT" "INTERM"]	Optional	State = continuous or intermittent.

Structure LOCATION

Name	Type	Optional/Required	Description
ARGUMENT_OF_LATITUDE	AN_ANGLE_IN_DEG_0_360 : Float [0.0 .. 360.0]	Required	Argument of Latitude of the satellite (degree) in the orbit direction : sum of the argument of perigee and anomaly. Computed using definitions of METADATA **Attribute : unit** - "deg" - Required AN_ANGLE_IN_DEG_0_360 : A [0 ; 360] angle (can

			be used for azimut)
SUBSATELLITE_POSITION	Structure	Required	
DAY_IN_CYCLE	Integer [1 .. 127]	Optional	Number of the day in the cycle (phased orbit) (integer).
ORBIT_NUMBER	AN_ORBIT_NUMBER : Integer [1 .. 32767]	Optional	Orbit number (phased orbit). The orbit number changes at the date of the orbit change event defined for the mission (the same than the one specified in REF-ORB if this interface is used). For all events whose date is higher or equal to the date of the orbit change event, and until the next orbit change, ORBIT_NUMBER will be equal to the one of the orbit change event. AN_ORBIT_NUMBER : Orbit number in the cycle.
ABS_ORBIT_NUMBER	Integer [1 .. 9223372036854775807]	Optional	Absolute Orbit number since beginning of life. The orbit number changes at the date of the orbit change event defined for the mission (the same than the one specified in REF-ORB if this interface is used). For all events whose date is higher or equal to the date of the orbit change event, and until the next orbit change, ABS_ORBIT_NUMBER will be equal to the one of the orbit change event.

Structure SUBSATELLITE_POSITION

Name	Type	Optional/Required	Description
LONGITUDE	AN_ANGLE_IN_DEG_M180_180 : Float [-180.0 .. 180.0]	Required	Geodetic Longitude of the subsatellite point (degree) in ITRF. **Attribute : unit** - "deg" - Required AN_ANGLE_IN_DEG_M180_180 : A [-180 ; 180] angle (can be used for longitude)
LATITUDE	AN_ANGLE_IN_DEG_M90_90 : Float [-90.0 .. 90.0]	Required	Geodetic Latitude of the subsatellite point (degree) in ITRF.

			Attribute : unit - "deg" - Required AN_ANGLE_IN_DEG_M90_90 : A [-90 ; 90] angle (can be used for latitude)
ALTITUDE	A_DISTANCE_IN_KM : Float	Required	Altitude of the satellite (km). Computed using definitions of METADATA **Attribute : unit** - "km" - Required