

Glossary

GLOSSARY of TERMS for the Flight Operations Segment

activity	A specified amount of scheduled work that has a defined start date, takes a specific amount of time to complete, and comprises definable tasks.
analysis	Technical or mathematical evaluation based on calculation, interpolation, or other analytical methods. Analysis involves the processing of accumulated data obtained from other verification methods.
APID	application process identifier, number assigned by spacecraft mission management which represents the on-board application which generated a given telemetry packet
attitude data	<p>Data that represent spacecraft orientation and onboard pointing information. Attitude data includes:</p> <ul style="list-style-type: none">• Attitude sensor data used to determine the pointing of the spacecraft axes, calibration and alignment data, Euler angles or quaternions, rates and biases, and associated parameters.• Attitude generated onboard in quaternion or Euler angle form.• Refined and routine production data related to the accuracy or knowledge of the attitude.

availability

A measure of the degree to which an item is in an operable and committable state at the start of a "mission" (a requirement to perform its function) when the "mission" is called for an unknown (random) time. (Mathematically, operational availability is defined as the mean time between failures divided by the sum of the mean time between failures and the mean down time [before restoration of function].

availability
(inherent) (A_i)

The probability that, when under stated conditions in an ideal support environment without consideration for preventive action, a system will operate satisfactorily at any time. The "ideal support environment" referred to, exists when the stipulated tools, parts, skilled work force manuals, support equipment and other support items required are available. Inherent availability excludes whatever ready time, preventive maintenance downtime, supply downtime and administrative downtime may require. A_i can be expressed by the following formula:

$$A_i = \text{MTBF} / (\text{MTBF} + \text{MTTR})$$

Where: MTBF = Mean Time Between Failures

MTTR = Mean Time To Repair

availability
(operational) (A_o)

The probability that a system or equipment, when used under stated conditions in an actual operational environment, will operate satisfactorily when called upon. A_o can be expressed by the following formula:

$$A_o = \text{MTBM} / (\text{MTBM} + \text{MDT} + \text{ST})$$

Where: MTBM = Mean Time Between Maintenance
(either corrective or preventive)

MDT = Mean Maintenance Down Time where
corrective, preventive administrative and logistics
actions are all considered.

ST = Standby Time (or switch over time)

baseline activity profile	A schedule of activities for a target week corresponding to normal instrument operations constructed by integrating long term plans (i.e., LTSP, LTIP, and long term spacecraft operations plan).
boundary limit	telemetry parameter range value associated with a warning or alarm
build	An assemblage of threads to produce a gradual buildup of system capabilities.
calibration	The collection of data required to perform calibration of the instrument science data, instrument engineering data, and the spacecraft engineering data. It includes pre-flight calibration measurements, in-flight calibrator measurements, calibration equation coefficients derived from calibration software routines, and ground truth data that are to be used in the data calibration processing routine.
CCSDS	Consultative Committee for Space Data Systems, recommendations for spacecraft telemetry and telecommand packet formats and protocols
command	Instruction for action to be carried out by a space-based instrument or spacecraft.
command authority	Privilege granted to one FOT user per spacecraft or spacecraft/spacecraft simulator to send spacecraft commands.
command and data handling (C&DH)	The spacecraft command and data handling subsystem which conveys commands to the spacecraft and research instruments, collects and formats spacecraft and instrument data, generates time and frequency references for subsystems and instruments, and collects and distributes ancillary data.

command group	A logical set of one or more commands which are not stored onboard the spacecraft and instruments for delayed execution, but are executed immediately upon reaching their destination on board. For the U.S. spacecraft, from the perspective of the EOS Operations Center (EOC), a preplanned command group is preprocessed by, and stored at, the EOC in preparation for later uplink. A real-time command group is unplanned in the sense that it is not preprocessed and stored by the EOC.
comprehensive telemetry monitor	telemetry software residing on the Real-Time Server that provides complete parameter processing with temporary limit definition controlled by user with ground configuration authority
delta limit	maximum allowable value change in successive samples of a given parameter
detailed activity schedules	The schedule for a spacecraft and instruments which covers up to a 10 day period and is generated/updated daily based on the instrument activity listing for each of the instruments on the respective spacecraft. For a spacecraft and instrument schedule the spacecraft subsystem activity specifications needed for routine spacecraft maintenance and/or for supporting instruments activities are incorporated in the detailed activity schedule.
direct broadcast	Continuous down-link transmission of selected real-time data over a broad area (non-specific users).
EDU	message packet generated by EDOS which contains the reconstructed spacecraft telemetry packet

EOS Data and Operations System (EDOS) production data set	Data sets generated by EDOS using raw instrument or spacecraft packets with space-to-ground transmission artifacts removed, in time order, with duplicate data removed, and with quality/accounting (Q/A) metadata appended. Time span, number of packets, or number of orbits encompassed in a single data set are specified by the recipient of the data. These data sets are equivalent to Level 0 data formatted with Q/A metadata.
	For EOS, the data sets are composed of: instrument science packets, instrument engineering packets, spacecraft housekeeping packets, or onboard ancillary packets with quality and accounting information from each individual packet and the data set itself and with essential formatting information for unambiguous identification and subsequent processing.
ESH	EDU Service Header, contains EDU time tag, quality, and accounting information
EU	engineering Unit, unit of measure assign to a given parameter (e.g. volts, amperes, degrees)
ground configuration authority	privilege granted to one FOT user per logical string to alter the configuration of the comprehensive telemetry monitor
housekeeping data	The subset of engineering data required for mission and science operations. These include health and safety, ephemeris, and other required environmental parameters.
instrument	<ul style="list-style-type: none"> • A hardware system that collects scientific or operational data. • Hardware-integrated collection of one or more sensors contributing data of one type to an investigation. • An integrated collection of hardware containing one or more sensors and associated controls designed to produce data on/in an observational environment.
instrument activity deviation list	An instrument's activity deviations from an existing instrument activity list, used by the EOC for developing the detailed activity schedule.

instrument activity list	An instrument's list of activities that nominally covers seven days, used by the EOC for developing the detailed activity schedule.
instrument engineering data	All non-science data provided by the instrument.
instrument microprocessor memory loads	Storage of data into the contents of the memory of an instrument's microprocessor, if applicable. These loads could include microprocessor-stored tables, microprocessor-stored commands, or updates to microprocessor software.
instrument resource deviation list	An instrument's anticipated resource deviations from an existing resource profile, used by the EOC for establishing TDRSS contact times and building the preliminary resource schedule.
instrument resource profile	Anticipated resource needs for an instrument over a target week, used by the EOC for establishing TDRSS contact times and building the preliminary resource schedule.
instrument science data	Data produced by the science sensor(s) of an instrument, usually constituting the mission of that instrument.
logical string	collection of FOS resources that support shared access to real-time contacts, simulations or replay of historical data
long term spacecraft operations plan	Outlines anticipated spacecraft subsystem operations and maintenance, along with forecasted orbit maneuvers from the Flight Dynamics Facility, spanning a period of several months.
long-term instrument plan (LTIP)	The plan generated by the instrument representative to the spacecraft's IWG with instrument-specific information to complement the LTSP. It is generated or updated approximately every six months and covers a period of up to approximately 5 years.

long-term science plan (LTSP)	The plan generated by the spacecraft's IWG containing guidelines, policy, and priorities for its spacecraft and instruments. The LTSP is generated or updated approximately every six months and covers a period of up to approximately five years.
mean time between failure (MTBF)	The reliability result of the reciprocal of a failure rate that predicts the average number of hours that an item, assembly or piece part will operate within specific design parameters. (MTBF=1/(l) failure rate; (l) failure rate = # of failures/operating time.
mean down time (MDT)	Sum of the mean time to repair MTTR plus the average logistic delay times.
mean time between maintenance (MTBM)	The mean time between preventive maintenance (MTBPM) and mean time between corrective maintenance (MTBCM) of the ECS equipment. Each will contribute to the calculation of the MTBM and follow the relationship: $1/MTBM = 1/MTBPM + 1/MTBCM$
mean time to repair (MTTR)	The mean time required to perform corrective maintenance to restore a system/equipment to operate within design parameters.
mirrored telemetry service	telemetry software residing on user workstations that provides complete parameter processing with temporary limit definition controlled in parallel with the comprehensive telemetry monitor
multicast	message addressing technique in which data is sent over a network for capture by multiple nodes
object	Identifiable encapsulated entities providing one or more services that clients can request. Objects are created and destroyed as a result of object requests. Objects are identified by client via unique reference.

orbit data	Data that represent spacecraft locations. Orbit (or ephemeris) data include: Geodetic latitude, longitude and height above an adopted reference ellipsoid (or distance from the center of mass of the Earth); a corresponding statement about the accuracy of the position and the corresponding time of the position (including the time system); some accuracy requirements may be hundreds of meters while other may be a few centimeters.
playback data	Data that have been stored on-board the spacecraft for delayed transmission to the ground.
preliminary resource schedule	An initial integrated spacecraft schedule, derived from instrument and subsystem resource needs, that includes the network control center TDRSS contact times and nominally spans seven days.
preplanned stored command	A command issued to an instrument or subsystem to be executed at some later time. These commands will be collected and forwarded during an available uplink prior to execution.
principal investigator (PI)	An individual who is contracted to conduct a specific scientific investigation. (An instrument PI is the person designated by the EOS Program as ultimately responsible for the delivery and performance of standard products derived from an EOS instrument investigation.).
prototype	Prototypes are focused developments of some aspect of the system which may advance evolutionary change. Prototypes may be developed without anticipation of the resulting software being directly included in a formal release. Prototypes are developed on a faster time scale than the incremental and formal development track.

raw data	<p>Data in their original packets, as received from the spacecraft and instruments, unprocessed by EDOS.</p> <ul style="list-style-type: none"> • Level 0 – Raw instrument data at original resolution, time ordered, with duplicate packets removed. • Level 1A – Level 0 data, which may have been reformatted or transformed reversibly, located to a coordinate system, and packaged with needed ancillary and engineering data. • Level 1B – Radiometrically corrected and calibrated data in physical units at full instrument resolution as acquired. • Level 2 – Retrieved environmental variables (e.g., ocean wave height, soil moisture, ice concentration) at the same location and similar resolution as the Level 1 source data. • Level 3 – Data or retrieved environmental variables that have been spatially and/or temporally resampled (i.e., derived from Level 1 or Level 2 data products). Such resampling may include averaging and compositing. • Level 4 – Model output and/or variables derived from lower level data which are not directly measured by the instruments. For example, new variables based upon a time series of Level 2 or Level 3 data.
real-time data	<p>Data that are acquired and transmitted immediately to the ground (as opposed to playback data). Delay is limited to the actual time required to transmit the data.</p>
reconfiguration	<p>A change in operational hardware, software, data bases or procedures brought about by a change in a system's objectives.</p>

SCC-stored commands and tables	Commands and tables which are stored in the memory of the central onboard computer on the spacecraft. The execution of these commands or the result of loading these operational tables occurs sometime following their storage. The term “core-stored” applies only to the location where the items are stored on the spacecraft and instruments; core-stored commands or tables could be associated with the spacecraft or any of the instruments.
scenario	A description of the operation of the system in user’s terminology including a description of the output response for a given set of input stimuli. Scenarios are used to define operations concepts.
segment	One of the three functional subdivisions of the ECS: CSMS -- Communications and Systems Management Segment FOS -- Flight Operations Segment SDPS -- Science Data Processing Segment
sensor	A device which transmits an output signal in response to a physical input stimulus (such as radiance, sound, etc.). Science and engineering sensors are distinguished according to the stimuli to which they respond. <ul style="list-style-type: none"> • Sensor name: The name of the satellite sensor which was used to obtain that data.
spacecraft engineering data	The subset of engineering data from spacecraft sensor measurements and on-board computations.
spacecraft subsystems activity list	A spacecraft subsystem's list of activities that nominally covers seven days, used by the EOC for developing the detailed activity schedule.

spacecraft subsystems resource profile	Anticipated resource needs for a spacecraft subsystem over a target week, used by the EOC for establishing TDRSS contact times and building the preliminary resource schedule.
SSR static	Solid State Recorder, spacecraft data recorder parameter state status which indicates that a telemetry parameter is not currently being updated
tailored telemetry service	telemetry software residing on user workstations that provides selective parameter processing and limit settings controlled by the individual user
target of opportunity (TOO)	A TOO is a science event or phenomenon that cannot be fully predicted in advance, thus requiring timely system response or high-priority processing.
thread	A set of components (software, hardware, and data) and operational procedures that implement a function or set of functions.
thread, <i>as used in some Systems Engineering documents</i>	A set of components (software, hardware, and data) and operational procedures that implement a scenario, portion of a scenario, or multiple scenarios.
toolkits	Some user toolkits developed by the ECS contractor will be packaged and delivered on a schedule independent of ECS releases to facilitate science data processing software development and other development activities occurring in parallel with the ECS.

This page intentionally left blank.

