Telemetry Processing and Logging Confidence Test - EOC1

Background Information:
The Telemetry Processing Service provides the capabilities needed to ingest, decommutate, engineering unit (EU) convert, and limit check housekeeping (H/K), health and safety (H&S), and diagnostic/memory dump telemetry from the EOS spacecraft (S/C) subsystems and on-board instruments. The processing of diagnostic/memory dump telemetry is covered in the EOC2, Command Processing Confidence Test.

The telemetry data will be downlinked through a TDRSS S-band Single Access (SSA), S-band Multiple Access (MA) or Ku-band Single Access (KSA) service with a dual channel interface. During normal operations, the H/K data is recorded on the EOS AM-1 solid state recorders (SSRs) and played back during a TDRSS KSA return service at 150 Mbps (75 Mbps/75 Mbps). Recorded H/K telemetry is also played back at 256 kps using the SSA service for anomaly investigations. The real-time H/K (16 kbps) and H&S (1 kbps), and diagnostic/dump (1 kbps, 16 kbps) telemetry will be downlinked through a SSA or MA service. TDRSS ground terminals (WSGT/STGT) forward the telemetry data which is in Consultative Committee for Space Data Systems (CCSDS) packets to EDOS in Channel Access Data Unit (CADU) format via EBnet. Low-rate telemetry is forwarded directly to the EDOS Level Zero Processing Facility (LZPF). High-rate telemetry is first sent to the EDOS Ground Station Interface Facilities (GSIF) and then transferred to the LZPF at reduced rates.

EDOS receives telemetry in CADU format. It extracts the CCSDS packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID), the Virtual Channel Identifier (VCID), and the replay flag. An EDU consists of an EDOS Service Header (ESH) and a Path Service Data Unit (SDU). The ESH contains the quality and accounting data. The Path SDU is simply the Version-1 CCSDS packet. The real-time Path Service EDUs are sent to the EOC via EBnet using UDP, to specific multicast IP addresses (operational and test) and UDP ports per mission as defined in the Operations Agreement (OA) Between the EDOS and the ECS EOC. The recorded EDUs are transferred in rate-buffered data files via EBnet using FTP. The FTP interface details such as EOC User IDs, IP addresses, host names, and file directories are defined in the applicable OA. Customer Operations Data Accounting (CODA) Report (which includes a Ground Message Header) is also sent to the EOC via EBnet using UDP. The CODA Report describes the operational activities of EDOS per S/C, this includes summaries of quality and accounting information (e.g., status of EDOS return and forward links, and VCDU service; and SCS statistics), but no information about Operations Management data is provided.

Upon receiving real-time telemetry, the Telemetry Processing Service decommutates the contents of the packets, performing the necessary EU conversions and parameter derivations. Various forms of limit checking are performed on the telemetry parameters, including boundary limit checking on analog parameters, and delta limit checking (examining the difference between successive parameter samples). For each parameter being checked

for boundary limits, the Telemetry Processing Service uses one of several limit sets, in which each limit set consists of definition for one or more upper and lower boundaries for the parameter (e.g., red high/low and yellow high/low limit sets.) All parameters, along with associated limits, quality, and event information, are made available to the operator via the FOS User Interface Service.

Eventually, the telemetry data, and related event and configuration data are sent to the FOS DMS for temporary storage. The FOS DMS maintains the data files for a user configurable number of days, then the data is sent to the Science Data Processing Segment (SDPS) for permanent archival. The data remains at the FOS DMS for minimum of seven days, but the data may be removed after seven days if confirmation of successful storage is received from the SDPS Data Server. FOS DMS also provides access to the Operational Database (ODB).

Test Objectives:

The objectives of the test are to:

- Verify that EOC can ingest and process the following types of telemetry packets from the ETS or SSIM at the specified data rates:
    1. Real-time instrument and S/C bus H/K telemetry (16 kbps)
    2. Real-time instrument and S/C bus H&S telemetry (1 kbps)
    3. Recorded instrument and S/C bus H/K telemetry (256 kbps, 150 Mbps [ETS HRS only])
    4. Command/Telemetry Interface Unit (CTIU) standby telemetry (1 kbps)
- Verify that the EOC can ingest and process real-time data (e.g., two 16 kbps data streams) sent simultaneously.
- Verify that all telemetry types can be decommutated and the results displayed in soft copy and hardcopy form.
- Verify proper checking of context dependencies for telemetry parameters and derived parameter generation.
- Verify proper EU conversion, limit and alarm check processing, and discrete state determination.
- Verify that when any critical telemetry parameter limit is exceeded, the violations are reported and any related alarm mechanisms respond properly.
- Verify the merging of R/T and recorded telemetry to create a complete hourly file that is archived at the FOS DMS.
- Verify that the EOC can store and retrieve telemetry data from the temporary (FOS DMS) and permanent (SDPS) archive sources for reuse.

Test Configuration:

Hardware and software configurations at each ECS site are managed and tracked by the M&O organization at that site. The configuration that is tested against will be provided in the test report.

(See Exhibit EOC1-1.1)

Participants and Support Requirements:

Participants:

FOT, ETS Operators, EBnet personnel, EDOS (M&O personnel), GSFC DAAC (M&O personnel), I&T conductor

Communications:

Voice Circuits

SCAMA 264	EOC, EDOS
CCL 74	EOC, EDOS
CCL 75	EOC, EDOS, EQUIPT ROOM
CCL 94	EOC, EDOS, ETS
CCL 113	EOC, EDOS, EBnet

Data - EBnet circuit between ETS MPS and EDOS LZPF
EBnet circuit between ETS HRS and EDOS -------
EBnet circuit between EDOS LZPF and EOC

IP addresses:

Operational LAN	198.118.199.0
Support LAN	198.118.200.0

Equipment and Software:

Servers: Real-time Server (3), Data Server (3), Multicast Server (3)
Data Storage Unit (File Servers [3], RAID Units [2])
Printers: Laser (4), Line (4), Color (4)
EOC Workstations (36)
FOS Release B

Test Tools:

1. **ETS MPS** (S/C simulation mode) - sends telemetry in CADU format to the EDOS. **ETS MPS** (EDOS simulation mode) - sends telemetry in EDU format to the EOC (Note: This mode will be used if the ETS LRS is not available.).
2. **ETS LRS** - simulates EDOS, serving as a functional EDOS interface between the EOC and the AM-1 S/C or an AM-1 S/C simulator.
3. **ETS HRS** - provides high-rate telemetry (150 Mbps) in CADU format to EDOS or to the ETS MPS via a H/K file.
4. **SSIM** - simulates the AM-1 S/C and provides telemetry in CADU format to the ETS LRS.

Test Prerequisites:

Dynamic pages containing alphanumerics, tables, graphs, and “NODATA” and “STATIC” flag indicators (use the Display Builder); rooms (use the Room Builder); event messages (use the Quick Message Generator); and report templates (use the

Report Selector: On Demand, Periodic, and Custom dialogs); tables containing predetermined telemetry parameter values to be compared with resulting decommutated and EU converted values; and ETS scenario script files.

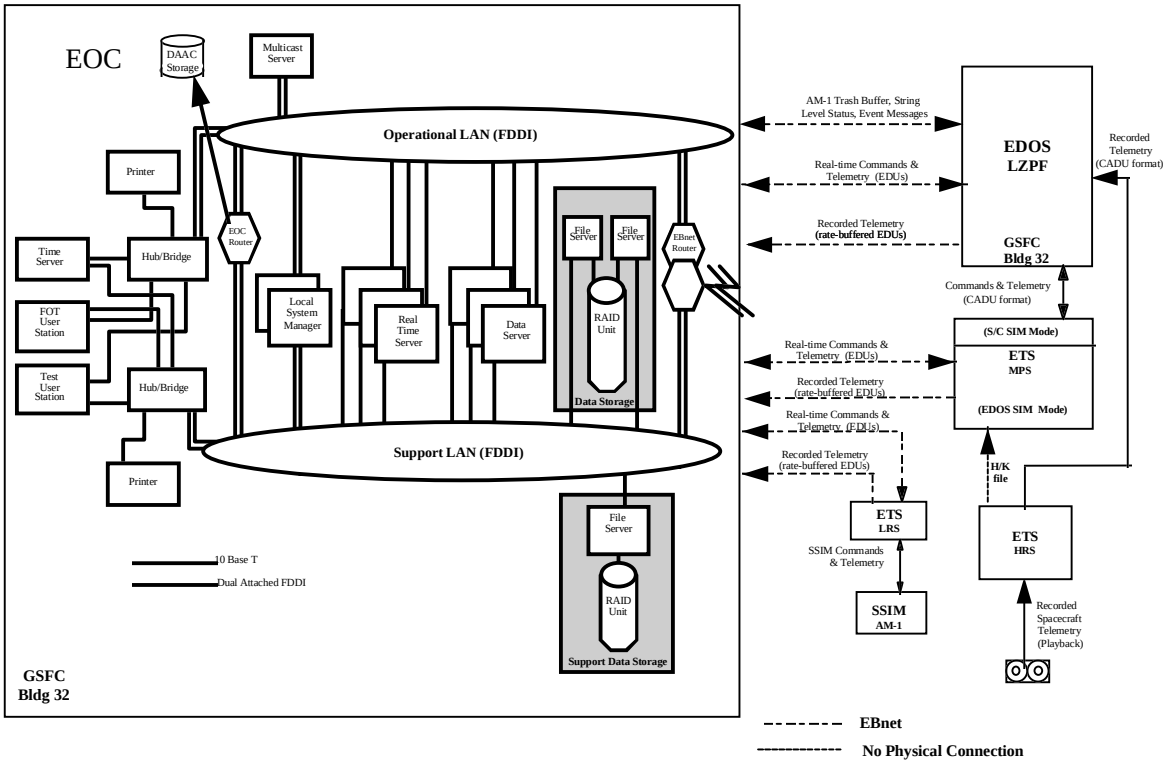

EXHIBIT EOC1-1.1: Telemetry Processing and Logging using EOC, EDOS, ETS and/or the SSIM

<u>Test Data:</u>

Will use the Telemetry Records in the PDB to assist in the definition of the telemetry parameter mnemonics associated with the required test data.

Description / Characteristics	Source	File/script name and physical location
AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters): • S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1)	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**rt_hk.scn**
AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters): • S/C bus and instrument H&S telemetry data (1 kbps, APID = 2, VCID = 2)	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**hs_standby.scn**

Description / Characteristics	Source	File/script name and physical location
CTIU standby telemetry in the form of EDUs (1 kbps [all telemetry sources except SSIM], APID = 5, VCID = 2) - one of each TLM value bit size - 1, 8, 16, 32, 48; representative set.	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**hs_standby.scn**
AM-1 recorded data in CCSDS telemetry packets in the form of recorded EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48) in rate-buffered data files (each file limited to a single APID type,): • S/C bus and instrument H/K telemetry data (256 kbps, APID = 1, VCID = 1; 150 Mbps [ETS HRS and AM-1 S/C only], APID = 1, VCID = 11)	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**playback.scn**
AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48): • S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1) with red & yellow high/low, and delta limit violations; and limit selection • S/C bus H&S telemetry data (1 kbps, APID = 2, VCID = 2) with red & yellow high/low, and delta limit violations; and limit selection	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**eulimhk.scn** **eulimhs.scn** **deltalim.scn** **limitsel.scn**
AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each telemetry sample type - current, voltage, temperature, power; one of each of the telemetry point source type - real or raw data, flight software generated data, pseudo or derived data, passive analog, and active analog; one of each possible APID/VCID combination; one of each analog EU conversion type - line segment [up to 15 line segments - 1, 2, 5, 8, 11, 14, 15]; polynomial [1st, 2nd, 3rd, 4th, 5th, 6th, and 7th order]); exponential; one of each discrete type (bit sizes - 1, 3, 8).	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**eulimhk.scn** **eulimhs.scn**
Dynamically modeled telemetry parameters.	ETS	**model.scn**
AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each possible APID/VCID combination) which are context dependent.	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	**TBS-3** **context.scn**
AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs	ETS, SSIM, AM-1 S/C, FOS DMS, or	**TBS-4** **derived.scn**

Description / Characteristics	Source	File/script name and physical location
(containing at a minimum: one of each possible APID/VCID combination) which are derived.	SDPS	

Test Case Descriptions:
Telemetry processing tests will use the ETS (MPS and HRS) and/or SSIM as the telemetry sources. The telemetry will be forwarded from a S/C simulator to the ETS LRS or EDOS Version 3 and then to the EOC.

EOC1.1 Real-Time Telemetry Processing and Logging

Requirements to be Verified:
EDOS-4.1.1.1#B, EDOS-4.1.1.3#B, EDOS-4.1.1.6#B, EDOS-4.2.1.4#B
EDOS-4.2.1.7#B, EDOS-4.6.1.2#B, EDOS-4.6.1.5#B, EOC-0040#B,
EOC-5010#B, EOC-5015#B, EOC-5030#B (c), EOC-5045#B,
EOC-5050#B, EOC-5080#B, EOC-5180#B, EOC-5220#B,
EOC-6060#B, EOC-6070#B, EOC-6130#B

This test verifies that the EOC can ingest and decommutate real-time S/C bus and instrument health and safety EDUs, and display the resulting parameter mnemonics and values.

- EOC is configured for real-time telemetry (R/T) processing. R/T logical strings are created on R/T server(s). One of each type of connection (mirrored and tailored) is established. A set of dynamic pages with previously assigned data sources is invoked.
- EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format from the ETS MPS (S/C simulator mode). The ETS LRS can also receive telemetry from the SSIM. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. Real-time EDUs are transmitted to the EOC via EBnet using UDP, in real-time.
- EOC receives the telemetry in EDUs from EDOS or an EDOS simulator (ETS LRS or ETS MPS) and extracts the telemetry data. It decommutates the data based on the APID and telemetry decommutation information in the ODB. EOC limit checks (high, low, delta) the telemetry parameters of the R/T data and produces a Parameter Out-of-Limits report. During decommutation, a selected set of context dependent, analog, and discrete parameters are exercised. Derived telemetry parameters are generated and exercised as well.
- The selected analog, discrete, and derived decommutated parameter values with their corresponding mnemonics are shown in telemetry display window(s). Every

event that occurred during the decommutation process is shown in an event display window. A selected set of displays are printed out for review and verification of resulting telemetry values.

- During this simulated S/C Contact Session (SCS), EDOS sends a Customer Operations Data Accounting (CODA) Report to the EOC via UDP every 5 seconds. EDOS initiates the transfer of a SCS Summary Report to the EOC within 5 minutes of the termination of the rate buffering services.
- Telemetry processing reports are generated. The reports are displayed on-line and printed out for review off-line.
- The R/T telemetry data is forwarded to a hourly file. This hourly file will continue to receive data for a period of one hour, then the hourly file will be archived at the FOS DMS along with related event and configuration data for temporary storage. At a user-specified time or per the request of a user, the data is forwarded to the SDPS for permanent archival. The data is maintained at the FOS DMS for a minimum of seven days.

EOC1.2 Recorded Telemetry Processing and Logging

Requirements to be Verified:
EDOS-4.1.1.8#B, EDOS-4.2.1.6#B, EDOS-4.6.1.8#B, EOC-0040#B, EOC-5010#B, EOC-5012#B, EOC-5050#B, EOC-5190#B, EOC-5230#B, EOC-5240#B

This test verifies that the EOC can ingest and decommutate recorded S/C bus and instrument health and safety EDUs, and display the resulting parameter mnemonics and values.

- EOC is configured for R/T and recorded telemetry processing. EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format from the ETS (MPS or HRS). The ETS LRS can also receive telemetry from the SSIM. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. EDOS will initiate the transfer of the rate-buffered data files to the EOC within 5 minutes following the end of the simulated Return Link Service Session (RLSS). The recorded EDUs are transferred in rate-buffered data files, along with a signal file, to the EOC via EBnet using FTP. The signal file is used by the EDOS sending platform to inform the receiving EOC platform that a data file transfer has been completed. EDOS initiates the transfer of a SCS Summary Report to the EOC within 5 minutes of the termination of the rate buffering services.
- EOC receives the telemetry in EDUs and extracts the telemetry data. It merges the rate-buffered data with the R/T telemetry data to complete hourly files that are ready for archival. The data is then stored with the FOS DMS for temporary storage then next to the SDPS for permanent archival.

- The replay of rate-buffered data is invoked through a FUI replay tool. Dedicated and shared logical strings are initialized on EOC workstation(s) or R/T server(s), respectively. For the shared logical strings, one of each type of connection (mirrored and tailored) is established. A set of dynamic pages with previously assigned data sources will be invoked. Selected analog, discrete, context dependent, and derived decommutated parameter values with their corresponding mnemonics are shown in display window(s). The data decommutation is based on the APID and telemetry decommutation information in the ODB. Every event that occurred during the replay request processing is shown in an event display window. A selected set of displays is printed out for review and verification of resulting telemetry values.
- Telemetry processing reports are generated. The reports are displayed on-line and printed out for review off-line.
- R/T and recorded telemetry data merge to create a complete hourly file. This hourly file is then archived at the FOS DMS along with related event and configuration data for temporary storage. At a user-specified time or per the request of a user, the data is forwarded to the SDPS for permanent archival. The data is maintained at the FOS DMS for a minimum of seven days.

EOC1.3 Telemetry Parameter EU Conversion, Limit and Alarm Processing

Requirements to be Verified:
EOC-5090#B, EOC-5100#B, EOC-5105#B, EOC-5110#B,
EOC-5120#B, EOC-6195#B

This test verifies that telemetry parameter limits are checked during decommutation and that violations are handled properly.

- Audible alarms are enabled. EOC receives telemetry that violates red limits (high and low) specified in the ODB. The appropriate event messages are displayed and related audible alarms sound off. Event messages are also displayed when telemetry parameter values return to values within the boundary limits. The audible alarm is disabled. The same telemetry is resent to verify the alarm disablement feature.
- EOC receives telemetry that violates yellow limits (high and low) specified in the ODB. The appropriate event messages are displayed - reporting limit violations and the return of parameter values to values within the boundary limits.
- EOC receives telemetry that violates the delta limits, which are specified in the ODB, for successive samples of selected telemetry parameters. The appropriate event messages are displayed - reporting limit violations and the return of parameter values to values within the delta boundary limits.
- Each type of EU conversion (exponential, polynomial, and linear) and limit violation (red & yellow high/low, and delta) are exercised for a specified limit set. Limit sets or values (temporarily) are changed and the tests are repeated. Discrete state determinations are also exercised.

EOC1.4 Telemetry Dropout

Requirements to be Verified:
EOC-5070#B

This test verifies that the EOC can appropriately mark telemetry parameters before data has been received and when an active R/T telemetry stream has not been received for a time period of 5 seconds or greater.

- The ETS MPS (S/C simulation mode) sends VCDUs with dropouts to EDOS or the ETS LRS. EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. These EDUs are transmitted to the EOC via EBnet using UDP, in real-time. EOC receives the telemetry in EDUs from EDOS or an EDOS simulator (ETS LRS or ETS MPS) and extracts the telemetry data. It decommutates the data based on the APID and telemetry decommutation information in the ODB. The appropriate missing packet event messages are displayed. The affected telemetry parameters are labeled "STATIC" on a previously invoked telemetry display page. The ECL DROPOUT directive will be used to manipulate the sensing rate for the detection of telemetry data loss during data transmissions to the EOC. (Note: When a telemetry page is initially invoked, all telemetry parameters have the value of "NODATA".)
- The ETS MPS (S/C simulation mode) sends a stream of telemetry data in CADU format to EDOS or the ETS LRS. EDOS or the ETS LRS processes this stream of data and transmits it the EOC in the form of EDUs. This stream of data is stopped for a time period greater than 5 seconds and started back up again. When the EOC does not receive telemetry data for a time period greater than 5 seconds. The appropriate "NODATA" event messages are displayed. The affected telemetry parameters retain their last known value and are marked static; this signifies that no data is being received.

Test procedures:

Test Set-Up:

Step	Station	Action	Expected Results	Comments
1	EOC	**Initialize the FOS EOC hardware**. Refer to the FOS Operations Tool Manual for the ECS Project, Section 4.2.1, Hardware Initialization, and Section 4.2.2, Initializing the DEC RAID and RAID Servers.	FOS EOC hardware: DEC RAID (opsraid on either cheetah or lion), RAID Server (supraid on cougar), Data Servers, Real-Time (R/T) Servers, and EOC User Stations (HP and Sun) are up and running.	RAID contains the users' home directories and the operational FOS software in /fos, which needs to be mounted by the other machines. The FOS EOC hardware is usually already initialized so this step will probably not be performed.
2	ETS (MPS)	Initialize the ETS MPS hardware (Power On).	ETS MPS hardware is up and running.	The ETS MPS hardware is usually already initialized so this step will probably not performed.
3	EDOS	Initialize the EDOS hardware.	EDOS hardware is up and running.	
4	ETS (MPS) X-terminal	If the ets2 login window is not up, restart the server and select ets2. **Login to the ETS X-terminal (UNIX OS)**. account: **si_t <Return>** password: **[password] <Return>** Bring-up the MPS Graphical User Interface (GUI). Type **ets_mps <Return>**	The MPS Menu Controller appears with MPS and OMDSIM buttons.	Home directory: /usr/si_t/ MPS executable directory: /usr/si_t/release/bin
5	ETS (MPS) X-terminal	Select **MPS Exec** from the MPS Menu Controller Window**.**	The MPS main window appears	
6	ETS (MPS) PDOS terminal	Reset the MVME177 card and bring-up the MPS software. Press the reset button for the MVME177 card. Login to the ETS PDOS terminal.	The following message is shown at the bottom of the PDOS terminal: **MPS_CONFIG_PKT_FMT** A MPS ready message is shown in the event log	The MVME 177 card and the PDOS terminal are in the back room. Use Option 2.

Step	Station	Action	Expected Results	Comments
		Change to the directory where the MPS startup script resides. Option 1: Type **gotosi** (alias **cd 10:/si_t/release121**) Option 2: Type **cd /ets/dev** Type **RUNACPT.**	window of the MPS main window.	
7	ETS (MPS) X-terminal	Select S/C simulation mode for MPS. Select the **Spacecraft radio button** for **Simulation Mode** from the MPS main window.	The **Spacecraft** radio button is sensitized.	
8	ETS (MPS) X-terminal	Select the PDB as the data source for the telemetry being generated by the MPS. Select the **PDB radio button** under **Data Source** from the MPS main window.	The **PDB** radio button is sensitized.	
9	ETS (MPS) X-terminal	Set and record the S/C and UTC times to the GMT time provided at the EOC. Select **Set Time** from the **Control** pull-down menu in MPS main window and enter the GMT time values or accept the GMT times provided by ETS.	The **Spacecraft Time** and **UTC** displays on the MPS main window are updated.	Use the following Unix command to help in defining GMT time: **date -u** Time Format: yy ddd hh mm ss **This step is optional.**
10	EOC (Data & R/T Servers)	Start the Sybase servers on the Data Server and Real-Time Server. Refer to the FOS Operations Tool Manual for the ECS Project, Section 4.2.3, Sybase Server Initialization.	Sybase servers on the Data Servers have started.	The Sybase servers are usually already up and running so this step will probably not be performed.
11	~	Initialize FOS Software for the Real-Time Server and Data Server.		Refer to the FOS Operations Tool Manual for the ECS Project, Section 4.2.4, FOS Software Initialization.
12	EOC (User Station)	Login to an EOC User Station, "**TBD-UWS**" . Enter **ivvtest** <**Return**> Enter **[password]** <**Return**>	Login window disappears. The workstation pull-down menu is accessible.	
13	EOC	In a X-terminal window:	The NETSCAPE window appears.	

Step	Station	Action	Expected Results	Comments
	(User Station)	Type **netscape &** <**Return**> Check to see if any FOS process endpoints exist. Invoke the URL **http://198.118.199.20/FosDbHome.html** Select **Nameserver** Database. Click on **Clear Form**. Click on **Submit**	The FOS Database Access Page appears. A message is displayed which states that 0 endpoints are found.	
14	EOC (Data Server)	Start up the FOS software for the Data Server. In a X-terminal window, remotely login to the FOS Data Server, "**TBD-DS**". Type **rlogin TBD-DS** <**Return**> or **telnet TBD-DS** <**Return**> Enter **[password]** <**Return**> at password prompt. Type **ps -ef** <**Return**>; look for FOS processes and delete them using **the kill -9 [PID].** Type **test** <**Return**> (alias for **cd /fos/test/am1/scripts/setup**) Type **source A2_DataServerStartup** <**Return**>	Twenty-eight FOS software processes are now running on the Data Server**.** System messages which show the software loading sequence are displayed. The following final message is displayed: **TBD** .	rlogin has a -l <username> option to specify the user or it defaults to the login account name. **PID** stands for process ID. Alias **test** will be used to change directory.
15	EOC (Real-Time Server)	Start up the FOS software for the Real-Time Server. In a X-terminal window, remotely login to the FOS Real-Time Server, "**TBD-RTS**". Type **rlogin TBD-RTS** <**Return**> or **telnet TBD-RTS** <**Return**> Enter **[password]** <**Return**> at password prompt. Type **ps -ef** <**Return**>; look for FOS processes and delete them using **the kill -9 [PID].**	Thirty-three FOS software processes are now running on the Real-Time Server. R/T logical string **100** is created. System messages which show the software loading sequence are displayed. The following final message is displayed: **TBD**	rlogin has a -l <username> option to specify the user or it defaults to the login account name **PID** stands for process ID. Alias **test** will be used to change directory.

Step	Station	Action	Expected Results	Comments
		Type **test** <**Return**> (alias for **cd /fos/test/am1/scripts/setup**) Type **source A2_RealTimeServerStartup** <**Return**>		
16	EOC (User Station)	Check to see if **28** FOS process endpoints exist for the Data Server. Click on **Back**. Enter **TBD-DS** in the **Entry Id** field. Click on **Submi**t.	A message is displayed which states that 28 endpoints are found.	If any active FOS processes are left from a previous session, kill them using the following command: **kill -9 [process ID]**
17	EOC (User Station)	Check to see if **33** FOS process endpoints exist for the R/T Server. Click on **Back**. Enter **TBD-RTS** in the **Entry Id** field. Click on **Submi**t.	A message is displayed which states that 33 endpoints are found.	If any active FOS processes are left from a previous session, kill them using the following command: **kill -9 [process ID]**
18	EOC (User Station)	Check to see if **0** FOS process endpoints exist for the User Station **"TBD-UWS"**. Click on **Back**. Enter **"TBD-UWS"** in the **Entry Id** field. Click on **Submi**t. **Exit** Netscape.	A message is displayed which states that 0 endpoints are found. Netscape window is no longer displayed.	If any active FOS processes are left from a previous session, kill them using the following command: **kill -9 [process ID]**
19	~	Initialize FOS Software for the User Station(s).		Refer to the FOS Operations Tool Manual for the ECS Project, Section 5.1, FOS Login, and Section 5.2, FOS Userstation Startup.
20	EOC (User Station)	Start up the FOS software for the User Station, **"TBD-UWS"**.	The appropriate FOS software processes are now running on the EOC User Station.	The FOS software processes are the ODB and FOS subsystem processes.

Step	Station	Action	Expected Results	Comments
		Login to the EOC User Station**, "TBD-UWS"** Enter **ivvtest3** <**Return**> Enter **[password]** <**Return**> In a terminal window, type **test** <**Return**> (alias for **cd /fos/test/am1/scripts/setup**) Type **source A2_UserStationStartup** <**Return**>	System messages which show the software loading sequence are displayed. Eight iconized Planning and Scheduling windows, and the **Control Window** appear**,** along with the **FOS Login** window.	
21	EOC (User Station)	Login to the **ECS Flight Operations System** and select a role by following the instructions specified in Section 5.3, FOS Login, and Section 5.4, FOS Roles, of the FOS OTM.	Notification of successful login to the **ECS Flight Operations System**, confirming requested role authorization.0	
22	EOC (User Station)	Bring up the **Global Event Display Window** via the **Tools Button** on the **Control Window**. Click on **Tools**. Select **Event_Display_Global**. Click on **OK**.	The **Global Event Display Window** appears.	Make sure that Netscape is not up in any of the workstation rooms.
23	EOC (User Station)	Disable telemetry data archiving. **ARCHIVE TLM =DISABLE**	An event message stating that telemetry archiving is disabled.	Archiving is automatically enabled when the R/T Server software is brought up.
24	EOC (User Station)	In a terminal window, invoke the script that generates the Test Configuration Report. Type **config** (alias **cd /home/ivvtest3/config**) Type **tconfig** (alias **/home/ivvtest3/scripts/tconfig.scr**) Type **mv testconfig test#*Y*r_config_eoc1.<date>**	A file named **test#*Y*r_config_eoc1.<date>,** which contains the "As Run" Configuration details, is in the **/home/ivvtest3/config** directory.	A directory **~/config** has already been created. Aliases **config** and **tconfig** have already been added to the ivvtest3 .cshrc. # is 1 thru 10. *Y* is d or f.
25	~	Record the system configuration on the execution cover sheet.	The "As Run" Configuration details are recorded on the execution cover sheet.	

Test Execution:

EOC1.1 Real-Time Telemetry Processing and Logging

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Connect to this R/T logical string in mirrored mode. **STRING CONNECT STRING=100 TLMTYPE=ALL CONFIG=MIRROR**	A mirrored connection is established. An event message confirming that the connection to the logical string **100** was successful is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=100 or 1*xx*). **Test** mirrored and tailored connections to logical strings will be supported.
2	EOC (User Station)	Request Ground Control privilege for the R/T logical string **100.** **TAKE GROUNDCONTROL STRING=100**	Ground Control privilege for string **100** is obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=101 or 1*xx*). The Ground Control Privilege is granted to one EOC user per logical string for the purpose of modifying the ground configuration of the HW and SW resources within that logical string. These privileges are granted only to local EOC users (not IST) that are pre-authorized by the FOT to perform in these roles.
3	~	Verify that telemetry can be received simultaneously, on both the I & Q channels in the following combinations: two 16 kbps streams - H/K telemetry two 1 kbps streams - H&S and Standby telemetry		The other data flow combinations will be tested in EOC2: two 16 kps streams - H/K and diagnostic telemetry two 1kbps streams - H&S and diagnostic telemetry

Step	Station	Action	Expected Results	Comments
4	EOC (User Station)	Capture the data being received at the EOC on the I channel. In a terminal window, type: **tcpdump -w /tmp/dumphkI# port 20001** Do not hit **<Return>.**	UNIX prompt awaiting user input.	
5	EOC (User Station)	Capture the data being received at the EOC on the Q channel.. In a terminal window, type: **tcpdump -w /tmp/dumphkQ# port 20010** Do not hit **<Return>.**	UNIX prompt awaiting user input.	
6	EOC (User Station)	The telemetry displays called *HEADERS2* and *CODA*, which have pre-defined data sources, is invoked at the EOC user station. **P HEADERS2** **P CODA**	The called *HEADERS2* and *CODA* displays appear. The previously selected ground parameters (packet header and ESH) appear on the *HEADERS2* display page.	ECL directive **PAGE** opens page in the current room.
7	EOC (User Station)	The R/T telemetry displays called *TLMDECOMrawI*, and *TLMDECOMrawQ* which have pre-defined data sources, is invoked at the EOC user station. **P TLMDECOMrawI** **P TLMDECOMrawQ**	The *TLMDECOMrawI* and *TLMDECOMrawQ* telemetry displays appear. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.	ECL directive **PAGE** opens page in the current room. These displays are identical besides their channel specifications.
8	EOC (User Station)	Set one TLM dynamic page to the I-channel and the other to the Q channel. Position the pointer on the dynamic page, click the right mouse button and select **Data Source Switcher** from the menu. Define channel settings by following the instructions specified in Section 7.10.1 of the FOS OTM.	I and Q channel labels appear on the previously invoked display pages.	Refer to Section 7.10.1**, Data Source Switcher,** and Figures 7.10.1-1 and 9.6-1 in the FOS OTM**.** This tool defaults to an I channel specification.

Step	Station	Action	Expected Results	Comments
9	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	Check on the setup and/or steps required to send snaps directly to the printer.
10	EDOS	**Notify EDOS personnel so they can prepare for 16 kbps HK data transmission on the I and Q channels. Request the transmission of real-time return link data at a rate of 32 kbps.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
11	EOC (User Station)	**Exercise the EDOS directive to determine operation readiness of EDOS (communication test request prior to each S/C contact). Follow the instructions as specified in Section 9.13.5, EDOS Communication Test, of the FOS OTM.**	**Event messages appear in the Global Event Display window which correspond to the sending of a communication test message to EDOS and the EOC's reception of the related command echo block from EDOS.**	This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
12	ETS (MPS) X-terminal	Select EDOS simulation mode for MPS. Select the **EDOS radio button** for **Simulation Mode** from the MPS main window.	The **EDOS** radio button is sensitized.	This step will not be required for the EOC1 December 97 formal run. Presently, it is required to workaround the EDOS V3 limitation of no I and Q channel simultaneous data transmissions being supported. This is not an issue for EDOS C1 which will be available in December 97.
13	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (32 kbps) as EDUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **32000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for EDOS Sim Mode has been set.	This step will not be required for the EOC1 December 97 formal run. Presently, it is required as part of the workaround for the EDOS V3 limitation of no I and Q channel simultaneous data transmissions being supported. This is not an issue for EDOS C1 which will be available in December 97.
14	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs.	An event message is displayed in the MPS event log window that the telemetry configuration for	This step will be required for the EOC1 December 97 test runs

Step	Station	Action	Expected Results	Comments
	X-terminal	Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	S/C Sim Mode has been set.	when EDOS C1 will be used. Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
15	ETS (MPS) X-terminal	Set the telemetry packet configuration to H/K for channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **HK radio buttons** for **Channel 1** and **Channel 2**. Select **R/S**. Click on **OK**.	**HK** and **R/S** radio buttons are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	R/S stands for Reed Solomon encoding.
16	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
17	~	Send the R/T S/C bus and instrument data (two streams of 32 kbps H/K) as EDUs to the EOC.		This step will not be required for the EOC1 December 97 formal run.
18	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
19	ETS (MPS) X-terminal	Start sending H/K telemetry to the EOC. Select **Start TLM** from the **Control** pull-down menu in the MPS main window.	Telemetry is being received at the EOC.	This step will not be required for the EOC1 December 97 formal run. Presently, it is required as part of the workaround for the

Step	Station	Action	Expected Results	Comments
		Select **Both** from the **Start TLM** pull-down menu.		EDOS V3 limitation of no I and Q channel simultaneous data transmissions being supported.
20	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **rt_hk.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **rt_hk.scn,** includes analog, discrete, derived, and context dependent parameters.
21	EOC (User Station)	Return to the **tcpdump** windows and type: **<Return>**	Data is being captured in the dump files (dumphkI# and dumphkQ#) in the /tmp directory.	
22	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used. EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
23	EOC (User Station)	Look for telemetry value changes and produce screen snapshots when CDH_NR_SSR2_HKRECTR (counter) is equal to 1, 3, 5, 7, 9, 11, 13, 16. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**)	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *TLMDECOMrawI* and *TLMDECOMrawQ* telemetry displays are being updated as it receives the telemetry sent by the MPS--telemetry parameter values are changing.	

Step	Station	Action	Expected Results	Comments
		or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	
24	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	This step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
25	ETS (MPS) X-terminal	Stop sending H/K telemetry to EOC when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at the EOC.	This step will not be required for the EOC1 December 97 formal run.
26	EOC (User Station)	**Generate derived parameters (use predefined analog, discrete, constant, and other derived values as calculation inputs) . Evaluate and update derived telemetry parameters using the DERIVED directive (which supports adjustment of equation processing intervals). Refer to Section 9.10, S/C Telemetry Processing, and Table A-3, ECL Directives, in the FOS OTM.**	**Derived parameters successfully created, evaluated, and updated successfully.**	Setting the interval to a value of zero disables derived parameter processing. The equation processing rate is based upon S/C time extracted from telemetry. Derived parameter processing involves special computations using predefined algorithms.
27	EOC (User Station)	**Evaluate context dependent parameters and related functionality.**	**Context dependent functionality works properly when designated switch parameters have the required values.**	
28	EOC	**Exercise quality verification and labeling of**	**Verify that the data quality indicators and**	

Step	Station	Action	Expected Results	Comments
	(User Station)	**derived telemetry parameter values of questionable quality. Cover explicitly the quality indicator in the ESH and FOS marking of data of questionable quality**.	**flags are working properly**.	
29	EOC (User Station)	**Exercise the DECOM directive (decom activation/deactivation for parameters -all, by subsystem, or individually). Refer to Section 9.10, S/C Telemetry Processing, and Table A-3, ECL Directives, in the FOS OTM.**	**Verify successful manipulation of the TLM decommutation process.**	
30	EOC (User Station)	Terminate tcpdump. Type **Ctrl -C** in tcpdump windows.	Messages are displayed that inform you of the termination of tcpdump for the HK channels.	
31	EOC (User Station)	Move the HK dump files generated by tcpdump to the formal test directory and list the directory contents to verify the move. mv /tmp/dump* ~/eoc1/testfr# ll (alias ls -la)	The HK dump files are in the formal test directory listing.	#' is 1, 2, 3, ... or 10.
32	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
33	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT H/K. Use the tcpdump files and the snapshots of the TLM dynamic pages to verify the ESH and CCSDS packet header values. Use the snapshots of the CODA dynamic page, archived CODA reports, and the CODA field specifications in the EDOS-EGS ICD to verify the CODA field values.	The values of the parameter mnemonics shown in the snapshots match the values in the Table RT H/K. The ESH and CCSDS packet header values in the tcpdump files and the snapshots also match the values in the Table RT H/K. The CODA field values in the CODA dynamic page and archived CODA reports match the CODA field specifications in the EDOS-EGS ICD (1/97).	The CODA verification portion of this step will be required for the EOC1 December 97 test runs when EDOS C1 will be used.
34	~	Verify that two 1 kbps telemetry streams (H&S and Standby) telemetry can be received simultaneously, on both the I & Q channels, respectively.		This step will not be required for the EOC1 December 97 formal run.

Step	Station	Action	Expected Results	Comments
35	EOC (User Station)	Capture the data being received at the EOC on the I channel. In a terminal window, type: **tcpdump -w /tmp/dumphsI# port 20002** Do not hit **<Return>.**	UNIX prompt awaiting user input.	Check on FOS DMS (local archive) dump instead of tcpdump as an alternative.
36	EOC (User Station)	Capture the data being received at the EOC on the Q channel. In a terminal window, type: **tcpdump -w /tmp/dumphsQ# port 20011** Do not hit **<Return>.**	UNIX prompt awaiting user input.	
37	EDOS	**Notify EDOS personnel so they can prepare for 1 kbps H&S data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
38	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **1000** into the **Bit Rate** field for channels 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
39	ETS (MPS) X-terminal	Set the telemetry packet configuration to H&S for channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **H&S radio buttons** for **Channel 1 and Channel 2**. Select **R/S.**	**H&S** and **R/S** radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
		Click on **OK**.		
40	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
41	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	Test will be modified in the future when Standby data and ETS support for Standby telemetry is provided: One possible combination would be H&S telemetry data on the I channel and Standby telemetry data on the Q channel.
42	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **hs_standby.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **hs_standby.scn,** will include analog, discrete, derived, and context dependent parameters.
43	EOC (User Station)	Return to the **tcpdump** windows and type: **<Return>**	Data is being captured in the dump files (dumphsI# and dumphsQ#) in the /tmp directory.	
44	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
45	EOC (User Station)	Look for telemetry value changes and produce screen snapshots when CDH_NR_SSR2_HKRECTR (counter) is equal to	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending.	

Step	Station	Action	Expected Results	Comments
		1, 3, 5, 7. 9, 11, 13, 16. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The *TLMDECOMrawI* telemetry display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing. No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	
46	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
47	EOC (User Station)	Terminate tcpdump. Type **Ctrl -C** in tcpdump windows.	Messages are displayed that inform you of the termination of tcpdump for the H&S channels.	
48	EOC (User Station)	Move the H&S dump files generated by tcpdump to the formal test directory and list the directory contents to verify the move. mv /tmp/dump* ~/eoc1/testfr# ll (alias ls -la)	The H&S dump files are in the formal test directory listing.	#' is 1, 2, 3, ... or 10.
49	EOC (User Station)	Close the *TLMDECOMrawI* telemetry page.	The *TLMDECOMrawI* telemetry page disappears.	
50	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
51	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the	The values of the parameter mnemonics shown in the snapshots match the values in the Tables	

Step	Station	Action	Expected Results	Comments
		values specified in the Tables RT H&S and RT Standby. Use the tcpdump files and the snapshots to verify the ESH and CCSDS packet header values.	RT H&S and RT Standby. The ESH and CCSDS packet header values in the tcpdump files and the snapshots also match the values in the Tables RT H&S and RT Standby.	
52	EOC (User Station)	The R/T telemetry display called *MODEL1a*, which have pre-defined data sources, is invoked at the EOC user station. **P MODEL1a**	The *MODEL1a* telemetry display appears. The previously selected parameters (H/K and H&S) appear on the graphical display page.	ECL directive **PAGE** opens page in the current room. Reopen *HEADERS2* telemetry page if it is not already open.
53	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	
54	EDOS	**Notify EDOS personnel so they can prepare for 16 kbps HK data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
55	ETS (MPS) X-terminal	Select S/C simulation mode for MPS. Select the **Spacecraft radio button** for **Simulation Mode** from the MPS main window.	The **Spacecraft** radio button is sensitized.	
56	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
57	ETS (MPS) X-	Set the telemetry packet configuration to H/K for channels 1 and 2.	**HK and R/S** radio buttons are sensitized. An event message is displayed in the MPS event	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
	terminal	Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **HK radio buttons** for **Channel 1** and **Channel 2**. Select **R/S**. Click on **OK**.	log window that the packet format configuration (S/C Sim Mode) has been set.	
58	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		
59	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
60	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **model.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **model.scn**, contains analog, derived, and context dependent parameters.
61	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
62	EOC (User Station)	During the data transmission, take screen snapshot(s) to capture the entire graphical function (exponential, linear, step, or discrete) of each graph. **snap**	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *MODEL1a* graphical display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are	There are four graphs on the MODEL1a page.

Step	Station	Action	Expected Results	Comments
		(alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	changing. No parameter values change when the data transmission stops - no more graph updates, the graph is static. The Static Flag '**S**' is placed next to each ground parameter on the *HEADERS2* page. The contents of the terminal window is dumped to a file or printer.	
63	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
64	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
65	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT MODEL.	The values of the parameter mnemonics shown in the snapshots match.	
66	EOC (User Station)	The R/T telemetry display called *MODEL2*, which have pre-defined data sources, is invoked at the EOC user station. **P MODEL2**	The *MODEL2* telemetry display appears. The previously selected parameters (H/K and H&S) appear on the graphical display page.	ECL directive **PAGE** opens page in the current room. Reopen *HEADERS2* telemetry page if it is not already open.
67	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	
68	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		

Step	Station	Action	Expected Results	Comments
69	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
70	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **model.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **model.scn**, contains analog, derived, and context dependent parameters.
71	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
72	EOC (User Station)	During the data transmission, take screen snapshot(s) to capture the entire graphical function (step) of the *MODEL2* graph. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *MODEL2* graphical display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing. No parameter values change when the data transmission stops - no more graph updates, the graph is static. The Static Flag '**S**' is placed next to each ground parameter on the *HEADERS2* page.	

Step	Station	Action	Expected Results	Comments
			The contents of the terminal window is dumped to a file or printer.	
73	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
74	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
75	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT MODEL.	The values of the parameter mnemonics shown in the snapshots match.	
76	EDOS	**Notify EDOS personnel so they can prepare for 1 kbps H&S data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
77	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **1000** into the **Bit Rate** field for channels 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
78	ETS (MPS) X-terminal	Set the telemetry packet configuration to H&S for channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **H&S radio buttons** for **Channel 1 and Channel**	**H&S** and **R/S** radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
		2. Select **R/S**. Click on **OK**.		
79	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
80	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
81	ETS (MPS)	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **model.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **model.scn**, contains analog, derived, and context dependent parameters.
82	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
83	EOC (User Station)	During the data transmission, take screen snapshot(s) to capture the entire graphical function (step) of the *MODEL2* graph. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3**	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *MODEL2* graphical display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing.	

Step	Station	Action	Expected Results	Comments
		(alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	No parameter values change when the data transmission stops - no more graph updates, the graph is static. The Static Flag '**S**' is placed next to each ground parameter on the *HEADERS2* page. The contents of the terminal window is dumped to a file or printer.	
84	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
85	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
86	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT MODEL.	The values of the parameter mnemonics shown in the snapshots match.	
87	EOC (User Station)	The R/T telemetry display called *MODTAB*, which has pre-defined data sources, is invoked at the EOC user station. **P MODTAB**	The *MODTAB* (table) telemetry display appears. The previously selected parameters (H/K and H&S) appear on the display pages.	ECL directive **PAGE** opens page in the current room.
88	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	
89	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
90	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window.	Telemetry is being received at EDOS and eventually the EOC.	

Step	Station	Action	Expected Results	Comments
		Select **Both** from the **Start TLM** pull-down menu.		
91	ETS (MPS)	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **model.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **model.scn**, contains analog, derived, and context dependent parameters.
92	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
93	EOC (User Station)	During the data transmission, produce screen snapshots when the telemetry parameter values change on the *MODTAB* table display. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *MODTAB* tabulated display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing. No parameter values change when the data transmission stops - no more table updates, the table display is static. The Static Flag '**S**' is placed next to each ground parameter on the *HEADERS2* page. The contents of the terminal window is dumped to a file or printer.	
94	ETS	Stop sending H&S telemetry to EDOS when the	Telemetry is no longer being received at EDOS	

Step	Station	Action	Expected Results	Comments
	(MPS) X-terminal	scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	or the EOC.	
95	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
96	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT MODEL.	The values of the parameter mnemonics shown in the snapshots match.	
97	EDOS	**Notify EDOS personnel so they can prepare for 16 kbps HK data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
98	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
99	ETS (MPS) X-terminal	Set the telemetry packet configuration to H/K for channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **HK radio buttons** for **Channel 1** and **Channel 2**. Select **R/S**. Click on **OK**.	**HK** and **R/S** radio buttons are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
100	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		
101	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
102	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **model.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **model.scn**, contains analog, derived, and context dependent parameters.
103	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
104	EOC (User Station)	During the data transmission, produce screen snapshots when the telemetry parameter value change on the *MODTAB* table display. **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *MODTAB* tabulated display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing. No parameter values change when the data transmission stops - no more table updates, the table display is static. The Static Flag '**S**' is	

Step	Station	Action	Expected Results	Comments
		Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	placed next to each ground parameter on the *HEADERS2* page. The contents of the terminal window is dumped to a file or printer.	
105	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
106	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
107	EOC (User Station)	Save the Event_Display data in the test run directory. In Event_Display menu: Select **File**. Select **Save As**. Change the filter directory to the file destination directory. Enter **test#*Y*r_evtlog_eoc1-1**.<**date**>	A message is displayed which states that the event display contents have been saved in **test#*Y*r_evtlog_eoc1-1**.<**date**>.	Make sure that the **event log filename** includes the test name and the current date. # is 1 through 10. *Y* is d or f.
108	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table RT MODEL.	The values of the parameter mnemonics shown in the snapshots match.	
109	EOC (User Station)	Verify that archive files exist for H/K, H&S, and Standby for both the I&Q channels. Type **cd /fos/test/am1/tlmarchive** Type **pwd** Produce a window snapshot of the archive file listing by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The following hourly files will exist: **AM1<year><day of the year><hour>.HKI** **AM1<year><day of the year><hour>.HKQ** **AM1<year><day of the year><hour>.HSI** **AM1<year><day of the year><hour>.HSQ** **AM1<year><day of the year><hour>.SBI** **AM1<year><day of the year><hour>.SBQ**	The naming convention for hourly files follows: **<S/C ><S/C time>"."< data type> <channel>** (e.g., **AM1199610010.HKI**) Channel value is either I or Q.
110	EOC (User	Access the Sybase (fos_tlm_cata) and file_meta	Verify that the start_time, stop_time, start_packet, stop_packet, space_craft_id,	ISSUE: Obtain clarification on the archival verification

Step	Station	Action	Expected Results	Comments
	Station)	that data files HS(X), HS(Y) HK(X), HK(Y), SB(X), SB(Y) exists. Invoke the archive tool TBS(Tool) to view files and ensure that there is no data duplication. Off-line, verify that no data within the octal Hex dump is duplicated.	delta_type and channel all match the values specified in table TLM2160B. There will be no data duplication in any of the Housekeeping, Health & Safety or Standby archived files. There will be no data duplication in any of the Housekeeping, Health & Safety or Standby archived files.	methods and tools mentioned in the FOS I&T procedures, TLM2160B, R/T Telemetry Archive (steps 43, 45, and 46).
111	EOC (User Station)	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	
112	EOC (User Station)	Forward the telemetry data, and related event and configuration data to the SDPS for permanent archival.	Telemetry data, and related event and configuration data are archived at the SDPS (GSFC DAAC).	

EOC 1.2 Recorded Telemetry Processing and Logging

Step	Station	Action	Expected Results	Comments
1	EDOS	**Notify EDOS personnel so they can prepare for recorded and R/T data transmissions.**	**Receive response back from EDOS personnel that EDOS LZPF and GSIF are configured and ready.**	**ISSUE: EDOS LZPF is required. Determine whether the EDOS GSIF is also required. This is pending the path of the high rate data and the use of HRS.**
2	ETS (HRS)	Configure the HRS to transmit 256 kbps H/K data to EDOS GSIF.	Notification is received that the HRS transmission configuration for 256 kbps H/K data has been set.	
3	ETS (MPS)	Configure the MPS to transmit recorded S/C bus and instrument data (256 kbps) as CADUs on Channel 2 and for R/T data (16 kbps) on Channel 1. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1. Enter a value of **256000** into the **Bit Rate** field for Channel 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	**ISSUE: Determine the telemetry source for 256 kbps and 150 Mbps H/K data. HRS or MPS? Maybe MPS can send the high rate data to EDOS at the reduced EDOS GSIF rate .**
4	ETS (MPS)	Corrupt some of the R/T data.	Some of the R/T data is corrupted.	This corruption step will allow verification of the TLM merging process-- bad R/T data being replaced with the good playback data. Consider the addition of step(s) to verify the merging process--corrupting the playback data which would result in no replacement step (discard

Step	Station	Action	Expected Results	Comments
				playback data).
5	ETS (MPS)	Set the telemetry packet configuration to H/K for Channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **HK radio button** for **Channel 2**. De-select the **HK radio button** for **Channel 1**. Click on **OK**.	**HK** radio button for Channel 2 is sensitized. **HK** radio button for Channel 1 is sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	
6	ETS (HRS)	Send the recorded S/C bus and instrument data (256 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.	256 kbps H/K data has been .received at the EDOS GSIF.	
7	ETS (MPS)	Send the recorded S/C bus and instrument data (256 kbps H/K) and R/T data (16 kbps H/K) as CADUs to EDOS GSIF and LZPF, respectively.	16 kbps and 256 kbps H/K data has been .received at the EDOS LZPF and GSIF, respectively.	**ISSUE: Can MPS sent data to the GSIF?**
8	ETS (MPS)	Execute the playback scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **playback.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **playback.scn**, contains analog, discrete, derived, and context dependent parameters.
9	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (one stream of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.

Step	Station	Action	Expected Results	Comments
10	EOC (User Station)	Verify that the H/K archive files for both the I&Q channels exist. Type **cd /fos/test/am1/tlmarchive** Type **pwd** Produce a window snapshot of the archive file listing by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The following hourly files will exist: **AM1<year><day of the year><hour>.HKI** **AM1<year><day of the year><hour>.HKQ**	The naming convention for hourly files follows: **<S/C ><S/C time>"."< data type> <channel>** (e.g., **AM1199610010.HKI**) Channel value is either I or Q.
11	EDOS or ETS (LRS)	EDOS GSIF or the ETS LRS receives the recorded S/C bus and instrument data (256 kbps H/K) as CADUs. GSIF processes the data and transmits it to the EDOS LZPF at a reduced rate. LZPF receives the data and generates rate-buffered data files which contains EDUs. The EDOS LZPF sends the rate-buffered data files to the EOC via FTP to specific IP addresses and file directories.	Status and event messages regarding the telemetry transmission and processing will be displayed at EDOS and the EOC. A signal file is received at the EOC signifying the completion of data transfer.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU. Refer to Table 5.4.1-1, Rate-Buffered Path Service EDU File Name Convention, in the EDOS-EGS ICD (12/96). The rate-buffered data file has a ".RBD" extension. Prior to sending the data and signal files, the sender platform shall reset the "x" permission flags for "User" and "Other", to "not executable". The signal file has the same name as the data file but has an ".XDR" extension.
12	EOC (User Station)	Merge the data in the rate-buffered data files with R/T telemetry data to create complete hourly files that are ready for archival.	Final hourly files which use the following naming convention will be created: **<S/C ><S/C time>"."< data type> <channel>**	(e.g., **AM1199610010.HKI**) The channel value is either I or Q.
13	EOC	Verify that the HK archive files for both the I&Q	The following hourly files have been updated	The naming convention for

Step	Station	Action	Expected Results	Comments
	(User Station)	channels have been updated. Type **cd /fos/test/am1/tlmarchive** Type **pwd** Produce a window snapshot of the archive file listing by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	since last viewed in step 10 of EOC1.2: **AM1<year><day of the year><hour>.HKI** **AM1<year><day of the year><hour>.HKQ**	hourly files follows: **<S/C ><S/C time>“.”< data type> <channel>** (e.g., **AM1199610010.HKI**) Channel value is either I or Q.
14	EOC (User Station)	Access the Sybase (fos_tlm_cata) and file_meta that data files HS(X), HS(Y) HK(X), HK(Y), SB(X), SB(Y) exists. Invoke the archive tool TBS(Tool) to view files and ensure that there is no data duplication. Off-line, verify that no data within the octal Hex dump is duplicated.	Verify that the start_time, stop_time, start_packet, stop_packet, space_craft_id, delta_type and channel all match the values specified in table TLM2160B. There will be no data duplication in any of the Housekeeping, Health & Safety or Standby archived files. There will be no data duplication in any of the Housekeeping, Health & Safety or Standby archived files.	ISSUE: Obtain clarification on the archival verification methods and tools mentioned in the FOS I&T procedures, TLM2160B, R/T Telemetry Archive (steps 43, 45, and 46).
15	EOC (User Station)	REPEAT STEPS 1-14 for 150 Mbps H/K TLM.		Refer to Table 5.4.1-1, Rate-Buffered Path Service EDU File Name Convention, in the EDOS-EGS ICD (12/96). The rate-buffered data file has a “.RBD” extension.
16	EOC (User Station)	REPEAT STEPS 1-14 for Trash Buffer data.		ISSUE: Trash buffer data source? Refer to Table 5.4.3-1, Trash Buffer File Name Convention, in the EDOS-EGS ICD (12/96). The trash buffer file has a “.TRD” extension.
17	EOC	Save the Event_Display data in the test run	A message is displayed which states that the	Make sure that the **event log**

Step	Station	Action	Expected Results	Comments
	(User Station)	directory. In Event_Display menu: Select **File**. Select **Save As**. Change the filter directory to the file destination directory. Enter **test#*Y*r_evtlog_eoc1-2**.<**date**>	event display contents have been saved in **test#*Y*r_evtlog_eoc1-2**.<**date**>.	**filename** includes the test name and the current date. # is 1 through 10. *Y* is d or f.
18	EOC	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	
19	EOC	Forward the telemetry data, and related event and configuration data to the SDPS for permanent archival.	Telemetry data, and related event and configuration data are archived at the SDPS (GSFC DAAC).	

EOC1.3 Telemetry Parameter EU Conversion, Limit and Alarm Processing

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Connect to this R/T logical string in mirrored mode. **STRING CONNECT STRING=100 TLMTYPE=ALL CONFIG=MIRROR or TAILOR**	A mirrored or tailored connection is established. An event message confirming that the connection to the logical string **100** was successful is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=100 or 1*xx*).
2	EOC (User Station)	Request Ground Control privilege for the R/T logical string **100.** **TAKE GROUNDCONTROL STRING=100**	Ground Control privilege for string **100** is obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=101 or 1*xx*). The Ground Control Privilege is granted to one EOC user per logical string for the purpose of modifying the ground configuration of the HW and SW resources within that logical string. These privileges are granted only to local EOC users (not IST) that are pre-authorized by the FOT to perform in these roles.
3	EOC (User Station)	**Exercise the EU directive (coefficient value changes, and display of current algorithms, conversion type, and coefficients for parameters). Refer to Section 9.10, S/C Telemetry Processing, and Table A-3, ECL Directives, in the FOS OTM.**	**The engineering unit conversion process was successfully manipulated.**	
4	EOC (User Station)	**Exercise the LIMITS directive (individual limit value changes, limit sensing changes for parameters, enabling/disabling of limit messages and alarms, as well as frequency of limit messages). Refer to Section 9.10, S/C Telemetry Processing, and Table A-3, ECL Directives, in the FOS OTM.**	**The limit checking process was successfully manipulated.**	

Step	Station	Action	Expected Results	Comments
5	EOC (User Station)	Acknowledge alarm messages, click the blinking message in the **Control Window** and click **ACK**.	Alarm messages are acknowledged and they stop blinking.	
6	EOC (User Station)	The telemetry display called *HEADERS2*, which has pre-defined data sources, is invoked at the EOC user station. **P HEADERS2**	The *HEADERS2* telemetry display appears. The previously selected ground parameters (packet header and ESH) appear on the display page.	ECL directive **PAGE** opens page in the current room.
7	EOC (User Station)	The R/T telemetry display called *EUCONV3*, which has pre-defined data sources, is invoked at the EOC user station. **P EUCONV3**	The *EUCONV3* telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.	ECL directive **PAGE** opens page in the current room.
8	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	
9	EDOS	**Notify EDOS personnel so they can prepare for 16 kbps HK data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
10	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
11	ETS (MPS) X-terminal	Set the telemetry packet configuration to H/K for channels 1 and 2. Select **Packet Format** from the **Configure** pull-	**HK** and **R/S** radio buttons are sensitized. An event message is displayed in the MPS event log window that the packet format configuration	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
		down menu in the MPS main window. Select the **HK radio buttons** for **Channel 1** and **Channel 2**. Select **R/S**. Click on **OK**.	(S/C Sim Mode) has been set.	
12	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		
13	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
14	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **eulimhk.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **eulimhk.scn**, contains analog, discrete, derived, and context dependent parameters.
15	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
16	EOC (User Station)	Look for telemetry value changes and produce screen snapshots when CDH_SR_ACT_CLCW_STAT (counter) is equal to the discrete parameter text that corresponds to the values 0, 1, 2, 3, 4, 5, 6, and 7.	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *EUCONV3* telemetry display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are	

Step	Station	Action	Expected Results	Comments
		Option 1: Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM . *Option2*: **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	changing. No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	
17	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
18	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
19	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values and flags specified in the Table EU Conversions and Limit Checks for HK.	The values of the parameter mnemonics shown in the snapshots match.	
20	EDOS	**Notify EDOS personnel so they can prepare for 1 kbps H&S data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
21	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for

Step	Station	Action	Expected Results	Comments
		Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **1000** into the **Bit Rate** field for channels 1 and 2. Click on **OK**.		selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
22	ETS (MPS) X-terminal	Set the telemetry packet configuration to H&S for channels 1 and 2. Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **H&S radio buttons** for **Channel 1 and Channel 2**. Select **R/S.** Click on **OK**.	**H&S** and **R/S** radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	R/S stands for Reed Solomon encoding.
23	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
24	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
25	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **eulimhs.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **eulimhs.scn**, contains analog, discrete, derived, and context dependent

Step	Station	Action	Expected Results	Comments
				parameters.
26	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
27	EOC (User Station)	Look for telemetry value changes. Produce screen snapshots when telemetry values change, particularly when COM_PR_SBT1_FWD_RF is equal to the values 5, 4.25, 3, 6.05, and 7. *Option 1*: Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM . *Option2*: **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *EUCONV3* telemetry display is being updated as it receives the telemetry sent by the MPS-- telemetry parameter values are changing. No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	
28	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
29	EOC	Printout screen snapshots generated using the FUI	Hardcopies of the screen snapshots appear at the	

Step	Station	Action	Expected Results	Comments
	(User Station)	Snapshot feature.	designated printer.	
30	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values and flags specified in the Table EU Conversions and Limit Checks for H&S.	The values of the parameter mnemonics shown in the snapshots match.	
31	EOC (User Station)	Close the *EUCONV3* telemetry page.	The *EUCONV3* telemetry page disappears.	
32	EOC (User Station)	The R/T telemetry display called *LIMITS2*, which has pre-defined data sources, is invoked at the EOC user station. **P LIMITS2**	The *LIMITS2* telemetry display appears. The previously selected parameters (H/K and H&S) appear on the display page.	ECL directive **PAGE** opens page in the current room.
33	EOC (User Station)	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM..	The contents of the terminal window is dumped to a file or printer.	
34	EDOS	**Notify EDOS personnel so they can prepare for 16 kbps HK data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	
35	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **16000** into the **Bit Rate** field for Channel 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
36	ETS (MPS) X-terminal	Set the telemetry packet configuration to H/K for channels 1 and 2.	**HK** and **R/S** radio buttons are sensitized. An event message is displayed in the MPS event	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
		Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **HK radio buttons** for **Channel 1** and **Channel 2**. Select **R/S**. Click on **OK**.	log window that the packet format configuration (S/C Sim Mode) has been set.	
37	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		
38	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
39	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **deltalim.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **deltalim.scn**, contains analog, discrete, derived, and context dependent parameters.
40	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
41	EOC (User Station)	Look for telemetry value changes and produce screen snapshots when the MISR instrument parameters (MIS_IR_CAMERA_AN28V, MIS_IR_CAMERA_BA28V,	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *LIMITS2* telemetry display is being updated	

Step	Station	Action	Expected Results	Comments
		MIS_IR_CAMERA_DA28V) change. *Option 1*: Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM . *Option2*: **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	as it receives the telemetry sent by the MPS--telemetry parameter values are changing. No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	
42	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
43	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
44	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values and flags specified in the Table Delta Limits.	The values of the parameter mnemonics shown in the snapshots match.	
45	~	Test the Limit Set selection feature.		
46	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		

Step	Station	Action	Expected Results	Comments
47	ETS (MPS) X-terminal	Start sending H/K telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
48	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **limitsel.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **limitsel.scn**, contains analog, discrete, derived, and context dependent parameters.
49	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
50	EOC (User Station)	Look for telemetry value changes and produce screen snapshots when COM_PR_SBT1_FWD_RF changes. *Option 1*: Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM . *Option2*: **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3**	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *LIMITS2* telemetry display is being updated as it receives the telemetry sent by the MPS--telemetry parameter values are changing. No parameter values change when the data transmission stops and a Static Flag '**S**' is placed next to each parameter field. The contents of the terminal window is dumped to a file or printer.	The discrete switch mnemonic, COM_BR_SBT1_XMTRPWR will change to a 0 then eventually a 1 to test both limit sets.

Step	Station	Action	Expected Results	Comments
		(alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).		
51	ETS (MPS) X-terminal	Stop sending H/K telemetry to EDOS when the scenario script runs to completion. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
52	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
53	EOC (User Station)	Save the Event_Display data in the test run directory. In Event_Display menu: Select **File**. Select **Save As**. Change the filter directory to the file destination directory. Enter **test#*Y*r_evtlog_eoc1-3**.<**date**>	A message is displayed which states that the event display contents have been saved in **test#*Y*r_evtlog_eoc1-3**.<**date**>.	Make sure that the **event log filename** includes the test name and the current date. # is 1 through 10. *Y* is d or f.
54	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshots match the values specified in the Table Limit Sets.	The values of the parameter mnemonics shown in the snapshots match.	
55	EOC	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	
56	EOC	Forward the telemetry data, and related event and configuration data to the SDPS for permanent archival.	Telemetry data, and related event and configuration data are archived at the SDPS (GSFC DAAC).	

EOC1.4 Telemetry Dropout

Step	Station	Action	Expected Results	Comments
1	~	**DROPOUT**		
2	EOC (User Station)	Connect to this R/T logical string in mirrored mode. **STRING CONNECT STRING=100 TLMTYPE=ALL CONFIG=MIRROR**	A mirrored connection is established. An event message confirming that the connection to the logical string **100** was successful is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=100 or 1*xx*).
3	EOC (User Station)	Request Ground Control privilege for the R/T logical string **100.** **TAKE GROUNDCONTROL STRING=100**	Ground Control privilege for string **100** is obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the **Control Window** and in the **Global Event Display Window**.	**100** is the <string ID> (e.g., STRING=101 or 1*xx*). The Ground Control Privilege is granted to one EOC user per logical string for the purpose of modifying the ground configuration of the HW and SW resources within that logical string. These privileges are granted only to local EOC users (not IST) that are pre-authorized by the FOT to perform in these roles.
4	EOC (User Station)	The telemetry display called *HEADERS2*, which has pre-defined data sources, is invoked at the EOC user station. **P HEADERS2**	The *HEADERS2* telemetry display appears. The previously selected ground parameters (packet header and ESH) appear on the display page.	ECL directive **PAGE** opens page in the current room.
5	EOC (User Station)	The R/T telemetry display called *TLMDECOMrawI*, which has pre-defined data sources, is invoked at the EOC user station. **P TLMDECOMrawI**	The *TLMDECOMrawI* telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.	ECL directive **PAGE** opens page in the current room.
6	EOC (User	Produce a window snapshot by following the instructions specified in Section 7.8, Snapshots, of	The contents of the terminal window is dumped to a file or printer.	

Step	Station	Action	Expected Results	Comments
	Station)	the FOS OTM..		
7	EOC (User Station)	Capture the data being received at the EOC on the I channel. In a terminal window, type: **tcpdump -w /tmp/dumphsdoI# port 20002** Do not hit **<Return>.**	UNIX prompt awaiting user input.	Release B: Add the following to the EOC1.4 test: 1) Use the telemetry log function of the ETS MPS to capture the telemetry leaving the MPS; 2) Request the capture of telemetry (pre- and post-processed) at EDOS to generate dump files for analysis off-line.
8	EOC (User Station)	Capture the data being received at the EOC on the Q channel. In a terminal window, type: **tcpdump -w /tmp/dumphsdoQ# port 20011** Do not hit **<Return>.**	UNIX prompt awaiting user input.	
9	EDOS	**Notify EDOS personnel so they can prepare for 1 kbps H&S data transmission on the I and Q channels.**	**Receive response back from EDOS personnel that EDOS is configured and ready.**	**Release B**: H/K telemetry dropouts will also be tested.
10	ETS (MPS) X-terminal	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs. Select **TLM** from the **Configure** pull-down menu from the MPS main window. Select the following **radio buttons**: **SN** and **Internal** for Clock Source on both channels 1 and 2. Enter a value of **1000** into the **Bit Rate** field for channels 1 and 2. Click on **OK**.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
11	ETS (MPS) X-terminal	Set the telemetry packet configuration to H&S for channels 1 and 2.	**H&S** and **R/S** radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event	R/S stands for Reed Solomon encoding.

Step	Station	Action	Expected Results	Comments
		Select **Packet Format** from the **Configure** pull-down menu in the MPS main window. Select the **H&S radio buttons** for **Channel 1 and Channel 2**. Select **R/S.** Click on **OK**.	log window that the packet format configuration (S/C Sim Mode) has been set.	
12	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
13	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
14	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **hs_standby.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **hs_standby.scn**, contains analog, derived, and context dependent parameters.
15	EOC (User Station)	Look for the first packet to be received. SDU_PACKET_SEQ ground parameter is initially marked static and begins incrementing from its current value.	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *TLMDECOMrawI* telemetry display is being updated as it receives the telemetry sent by the MPS.	
16	EOC (User	Return to the **tcpdump** windows and type: **<Return>**	Data is being captured in the dump files (dumphsdoI# and dumphsdoQ#) in the /tmp	

Step	Station	Action	Expected Results	Comments
	Station)		directory.	
17	ETS (MPS) X-terminal	Drop three VCDUs during the data transmission (channels 1 and 2). Select **Drop TLM** from the Control pull-down menu in the MPS main window. Select the following **radio buttons**: **Channel 1** and **Channel 2.** Use the **No. VCDUs to drop spinner** to set the drop rate to **3** for Channel 1 and Channel 2.	An event message is displayed in the MPS event log window that three VCDUs have been dropped from the data transmission.	
18	EOC (User Station)	Look for the "STATIC" flag by each telemetry parameter mnemonic in the *TLMDECOMrawI* display window.	The "STATIC" flag is by each telemetry parameter mnemonic in the *TLMDECOMrawI* display window.	This static condition should occur approximately 6 seconds into the return link session.
19	EOC (User Station)	Produce screen snapshots of the event messages and the telemetry displays to depict their states (data being received with data dropouts). **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The contents of the terminal window is dumped to a file or printer. The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *TLMDECOMrawI* telemetry display shows no parameter values change when the data transmission stops.	
20	ETS (MPS) X-terminal	Drop three VCDUs during the data transmission (channels 1 and 2). Select **Drop TLM** from the Control pull-down menu in the MPS main window. Select the following **radio buttons**: **Channel 1** and **Channel 2.**	An event message is displayed in the MPS event log window that sixteen VCDUs have been dropped from the data transmission.	

Step	Station	Action	Expected Results	Comments
		Use the **No. VCDUs to drop spinner** to set the drop rate to **16** for Channel 1 and Channel 2.		
21	EOC (User Station)	Look for the "STATIC" flag by each telemetry parameter mnemonic in the *TLMDECOMrawI* display window	The "STATIC" flag is by each telemetry parameter mnemonic in the *TLMDECOMrawI* display window.	This static condition should occur approximately 6 seconds into the return link session.
22	EOC (User Station)	Produce screen snapshots of the event messages and the telemetry displays to depict their states (data being received with data dropouts). **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The contents of the terminal window is dumped to a file or printer. The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *TLMDECOMrawI* telemetry display shows no parameter values change when the data transmission stops.	
23	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the last set of data dropouts due to the VCDU dropouts by the MPS are received at the EOC. Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.	Telemetry is no longer being received at EDOS or the EOC.	
24	EOC (User Station)	Terminate tcpdump. Type **Ctrl -C** in tcpdump windows.	Messages are displayed that inform you of the termination of tcpdump for the H&S channels.	Release B: Sync up the S/C clock times at the ETS, EOC, and EDOS.
25	EOC (User Station)	Move the H&S dump files generated by tcpdump to the formal test directory and list the directory contents to verify the move. mv /tmp/dump* ~/eoc4/testfr#	The H&S dump files are in the formal test directory listing.	

Step	Station	Action	Expected Results	Comments
		ll (alias ls -la)		
26	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
27	~	Review the snapshots off-line.	The snapshot shows a "STATIC" flag by each telemetry parameter mnemonic after the VCDU dropouts.	
28	~	Data Dropout Manipulation and NODATA flow		
29	EOC (User Station)	Produce a screen snapshot of the *HEADERS2* and *TLMDECOMrawI* pages to depict their static states by following the instructions specified in Section 7.8, Snapshots, of the FOS OTM.	The contents of the terminal window is dumped to a file or printer.	
30	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps - H&S) as CADUs to EDOS or the ETS LRS in real-time.		
31	ETS (MPS) X-terminal	Start sending H&S telemetry to EDOS. Select **Start TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Start TLM** pull-down menu.	Telemetry is being received at EDOS and eventually the EOC.	
32	ETS (MPS) X-terminal	Execute the R/T scenario script. Select **Scenario** from the **Control** pull-down menu in the MPS main window. Select an existing scenario file called **hs_standby.scn.** Click on **OK.** Click on the **Start** push button.	The time elapsed since the scenario started is shown in the **Elapsed Time** field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A **Stop** push button does exist to terminate the scenario at any time; this button will not stop the transmission of the telemetry. The scenario script, **hs_standby.scn**, contains analog, discrete, derived, and context dependent parameters.

Step	Station	Action	Expected Results	Comments
33	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
34	EOC (User Station)	Look for the first packet to be received. SDU_PACKET_SEQ ground parameter is initially marked static and begins incrementing from its current value.	The *HEADERS2* telemetry display shows the telemetry transmission beginning and ending. The *TLMDECOMrawI* telemetry display is being updated as it receives the telemetry sent by the MPS.	
35	EOC (User Station)	Produce screen snapshots of the event messages and the telemetry displays to depict their states (data being received). **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The contents of the terminal window is dumped to a file or printer.	
36	EOC (User Station)	**Exercise the DROPOUT directive (dropout sensing disabled, enabled, and adjusted). Refer to Section 9.10, S/C Telemetry Processing, and Table A-3, ECL Directives, in the FOS OTM.**	**The data dropout process was successfully manipulated.**	
37	ETS (MPS) X-terminal	Stop sending H&S telemetry to EDOS when the parameters on the dynamic displays at the EOC have been in a non-static state (active) for at least one minute.	Telemetry is no longer being received at EDOS or the EOC.	

Step	Station	Action	Expected Results	Comments
		Select **Stop TLM** from the **Control** pull-down menu in the MPS main window. Select **Both** from the **Stop TLM** pull-down menu.		
38	EOC (User Station)	Look for the static "S" flag by each telemetry parameter mnemonic in the *TLMDECOMrawI* and *HEADERS2* display windows.	The static "S" flag is by each telemetry parameter mnemonic in the *TLMDECOMrawI* and *HEADERS2* display windows.	This static condition should occur approximately 6 seconds into the return link session.
39	EOC (User Station)	Produce screen snapshots of the event messages and the telemetry displays to depict their states (data no longer being received - static). **snap** (alias for **'xwd -root | xpr -device ps | lpr -dlw'**) or **snap3** **(**alias for **'xwd -root | xpr -device ps | lpr -dlw -P fose3oe')** or Use **Snapshot V3.4** on the User Station pull-down menu (produces color snapshots).	The contents of the terminal window is dumped to a file or printer.	
40	EOC (User Station)	Save the Event_Display data in the test run directory. In Event_Display menu: Select **File**. Select **Save As**. Change the filter directory to the file destination directory. Enter **test#*Y*r_evtlog_eoc1-4**.<**date**>	A message is displayed which states that the event display contents have been saved in **test#*Y*r_evtlog_eoc1-4**.<**date**>.	Make sure that the **event log filename** includes the test name and the current date. # is 1 through 10. *Y* is d or f.
41	EOC (User Station)	Printout screen snapshots generated using the FUI Snapshot feature.	Hardcopies of the screen snapshots appear at the designated printer.	
42	~	Review the snapshots off-line.	The snapshot shows a static "S" flag by each telemetry parameter mnemonic before the data transmission begins and after data transmission	

Step	Station	Action	Expected Results	Comments
			stops.	

Test Termination:

Step	Station	Action	Expected Results	Comments
1.	EOC (User Station)	Shutdown the FOS applications and hardware following the instructions specified in Section 4.3, System Shutdown, of the FOS OTM.	A series of messages stating that FOS processes are being killed is displayed. All FUI windows have disappeared. FOS applications and hardware are shutdown	
2	EOC	End the remote login sessions. Type **exit** in the X-terminal windows where the Real-Time and Data Server processes were initiated.	The remote login sessions end and a message is displayed that reflects the session logouts. The UNIX prompts for **TBD-RTS** and **TBD-DS** return to the regular User Station (fose*X*oe) prompt.	
3	EOC	Log off the EOC UNIX workstation(s).	UNIX login sessions end.	
4	ETS (MPS) PDOS terminal	Execute the MPS shutdown script. Change to the directory where the MPS shutdown script resides and type **CLEAR** at the PDOS terminal prompt; then type **lt** at the same prompt.	All the MPS task processes are killed-- they no longer appear in the task process listing.	
5	ETS (MPS) X-terminal	Exit the MPS main window.	The MPS main window disappears.	
6	ETS (MPS) X-terminal	Logout of the ETS X-terminal used for the MPS GUI.	UNIX login session ends.	

Appendix A: Test Package Requirements Summary

Requirement	Description	Test Case(s)
EDOS-4.1.1.1#B	EDOS shall interface with the EOC to transfer Operations Management Data, and Operations Management Test Data.	EOC1.1
EDOS-4.1.1.3#A EDOS-4.1.1.3#B	EDOS shall provide the capability to transfer return link real-time Path Service EDOS Data Units (EDUs) to the EOC.	EOC1.1
EDOS-4.1.1.6#B	EDOS shall provide the capability to transfer Customer Operations Data Accounting (CODA) reports as specified in Applicable Document 1 to the EOC.	EOC1.1
EDOS-4.1.1.8#B	EDOS shall provide the capability to transfer Rate Buffered Data to the EOC, as specified in Applicable Document 1.	EOC1.2
EDOS-4.2.1.4#B	The EDOS-EOC interface shall provide the capability to support the transfer of real-time return link data at a rate of up to 32 kbps.	EOC1.1
EDOS-4.2.1.6#B	The EDOS-EOC interface shall provide the capability to support the transfer of rate buffered return link data at a rate of up to 1.5 Mbps.	EOC1.2
EDOS-4.2.1.7#B	The EDOS-EOC interface shall provide the capability to support the transfer of CODA messages to the EOC every 5 seconds.	EOC1.1
EDOS-4.6.1.2#A EDOS-4.6.1.2#B	EDOS shall transfer real-time return link data using UDP/IP.	EOC1.1
EDOS-4.6.1.5#B	EDOS shall transfer CODA reports using UDP/IP.	EOC1.1
EDOS-4.6.1.8#B	EDOS shall transfer rate-buffered return link data using FTP.	EOC1.2
EOC-0040#A EOC-0040#B	The EOC shall interface with EDOS for coordinating EDOS-provided services required by the EOC.	EOC1.1, EOC1.2
EOC-5010#A EOC-5010#B	The EOC shall receive from EDOS the following telemetry data types in CCSDS packets containing: a. Real-time spacecraft and instrument housekeeping data b. Spacecraft recorder housekeeping data c. SCC memory dump data Clarification => A: RT HK data	EOC1.1, EOC1.2
EOC-5012#B	The EOC shall be capable of processing spacecraft recorder data for all periods of time during which real time data was not received.	EOC1.2
EOC-5015#A EOC-5015#B	The EOC shall be capable of simultaneously receiving all EOS telemetry data types.	EOC1.1
EOC-5030#B - c	The EOC shall provide the capability to receive and process, non-telemetry data, which includes at a minimum the following: a. Messages from the NCC b. (Deleted) c. Telemetry processing status messages from EDOS	EOC1.1
EOC-5045#B	The EOC shall be capable of supporting all EOS telemetry formats for spacecraft and instrument housekeeping data.	EOC1.1

Requirement	Description	Test Case(s)
EOC-5050#B	The EOC shall provide the capability to receive and report data quality information with the incoming CCSDS packets as provided by EDOS.	EOC1.1, EOC1.2
EOC-5070#A EOC-5070#B	The EOC shall provide the capability to detect and report gaps in the telemetry data it receives.	EOC1.4
EOC-5080#A EOC-5080#B	The EOC shall provide the capability to decommutate spacecraft and instrument housekeeping data.	EOC1.1
EOC-5090#A	The EOC shall perform the necessary engineering unit conversion on the decommutated housekeeping data.	EOC1.3
EOC-5090#B	The EOC shall perform the necessary engineering unit conversion, derived parameter generation, and digital and discrete state determination on the decommutated housekeeping data.	EOC1.3
EOC-5100#A EOC-5100#B	The EOC shall provide the capability to perform limit checking on all non discrete parameters within the real-time telemetry, flagging all parameters that have limit violations.	EOC1.3
EOC-5105#B	The EOC shall support the definition of multiple sets of boundary limits for each non-discrete parameter, with each set including definitions for one or more upper and lower boundaries.	EOC1.3
EOC-5110#A EOC-5110#B	The EOC shall provide the capability to generate an event message whenever a predetermined number of limit violations for a parameter is detected.	EOC1.3
EOC-5120#B	The EOC shall provide the capability to accept temporary or permanent changes to limit definitions. \\, 1418, 1428\\	EOC1.3
EOC-5180#B	The EOC shall provide the capability to extract specified subsets of the telemetry stream.	EOC1.1
EOC-5190#B	The EOC shall provide the capability to store spacecraft recorder housekeeping data as they are received from EDOS in CCSDS packets.	EOC1.2
EOC-5220#B	The EOC shall be able to process real-time data at rates up to 50 kbps per spacecraft.	EOC1.1
EOC-5230#B	The EOC shall provide the capability to receive and record spacecraft recorder data at rates up to 1.544 Mbps	EOC1.2
EOC-5240#B	The EOC shall be able to process history and archived spacecraft recorder data at rates up to 150 kbps.	EOC1.2
EOC-6060#A EOC-6060#B	The EOC shall provide the capability to plot a specified parameter against another parameter or against time.	EOC1.1
EOC-6070#A EOC-6070#B	The EOC shall provide the capability to time-correlate related spacecraft parameters.	EOC1.1
EOC-6195#A EOC-6195#B	The EOC shall provide the capability to detect, isolate, and report failures and anomalies at the spacecraft subsystem level, and the spacecraft level.	EOC1.3
EOC-9025#A	The EOC shall provide the capability to notify the operator of events and alarms.	EOC1.3

Appendix B: Test Scripts

ETS Scenarios

The format and content of a scenario script file follows:

<days>: <hrs>: <mins>:<secs> <telemetry parameter mnemonic>, <decimal value>
<days>: <hrs>: <mins>:<secs> <telemetry parameter mnemonic>, <decimal value>
<days>: <hrs>: <mins>:<secs> <telemetry parameter mnemonic>, <decimal value>

Sample Script File:

```
000:00:00:01   CDH_NR_SSR1_HKRECTR, 65535
000:00:00:02   GNC_SR_ACEA_CSS1YERR, 255
000:00:00:02   COM_SR_OMN_1Z2N, 255
000:00:00:01   MOD_CR_PS1_ON, 1
000:00:00:01   AST_IR_M_MPSA_OUT, 7
```

Required Scenario Files:

rt_hk.scn, hs_standby.scn, playback.scn, model.scn, context.scn, derived.scn, eulimhk.scn, eulimhs.scn, deltalim.scn, and limitsel.scn