**ASTER Ground Data System
to
EOS Ground System
Integration Plan**

DRAFT

1 March, 1997

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1. Introduction

1.1 Purpose and Scope

The purpose of this document is to provide a top level planning document for integration and test activities conducted between the ASTER Ground Data System (GDS) and the EOS Ground System (EGS). The scope of the document is limited to those activities under the cognizance of the EGS I&T Manager on the EGS side. The relationship of EGS I&T activities to engineering tests and operational tests, conducted by the development organizations and the AM1 Operations Manager, respectively, is explained in Section 3. This document is intended to be a "living document", that is, one able to be readily modified to reflect programmatic changes and to maintain a current Work Breakdown Structure (WBS) for the effort.

1.2 Content

Section 2 discusses the unique characteristics of the ASTER GDS - EGS integration task and provides an overview of the functionality of the EGS - GDS interfaces.

Section 3 provides an overview of the GDS - EGS Integration Program, including a brief discussion of engineering and operational test efforts.

Section 4 establishes the ASTER GDS - EGS Integration Team and defines the roles and responsibilities of the team members.

Appendix A provides a WBS for the ASTER GDS - EGS Integration effort.

1.3 Related Documents

Interface Requirements Documents

1. IRD Between ASTER Japan IST and IST US - AG-E-E-2060-R00 November 1996
2. IRD Between ECS and MITI ASTER GDS - 505-41-18 July 1995
3. IRD Between EDOS and EBnet - 560-EDOS-0211.0004R2 August 1996

Interface Control Documents

1. ICD Between EDOS and ASTER GDS - 510-ICD-EDOS/ASTER August 9, 1996
2. ICD Between ECS and ASTER GDS - 209-CD-002-005 January 1997
3. ICD Between ASTER Japan IST and IST US - AG-E-E-2061-R00 November 1996
4. ICD Between EOSDIS EBnet and ASTER GDS - 540-037 November 1996

Other References

1. Project Implementation Plan Volume II - 505-10-11 July 1996
2. Operations Agreement Between EDOS and MIT ASTER GDS - September 10, 1996
3. ASTER GDS/EGS Overall Test Agreement - February 3, 1997
4. OICD Earth Observing System AM S/C to ASTER - GSFC 421-11-19-03 January 1997
5. ASTER GDS - EGS Integration Schedule
6. AM1 Mission Simulations Plan
7. EGS Integration and Test Program Plan EOSVV-1109-1 February 1997

2.   ASTER GDS - EGS Integration Overview

The integration of the ASTER GDS with the EGS is a very complex undertaking. The ASTER GDS development effort involves two agencies of the Japanese government and five teams from Japanese industry developing a distributed system decomposed into five major sub-systems. In the United States, NASA directs three major teams of US contractors developing two major distributed systems (ECS and EDOS), linked by a highly complex communications network (EBnet). Additionally, ASTER is supported in the United States by the ASTER Science Team at the Jet Propulsion Laboratory (JPL). ASTER data is archived at the EDC DAAC in Sioux Falls, SD. Exhibit 1 illustrates the global scope and international character of this effort.
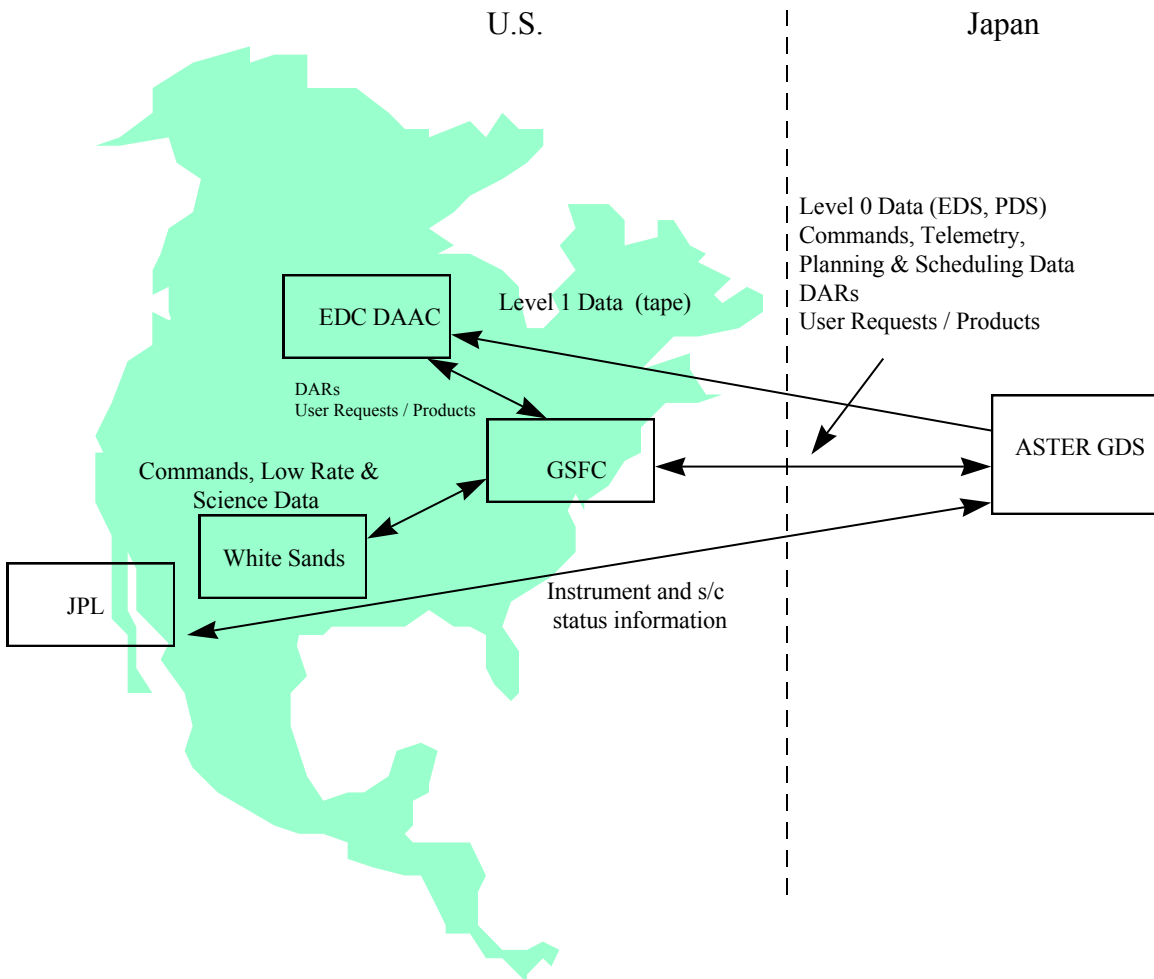
Exhibit 1: ASTER related facilities in the United States and Japan

Shifting from a geographic view to a functional view, the various sub-systems of the ASTER GDS and the EGS communicate through the interfaces and data flows illustrated in Exhibit 2.
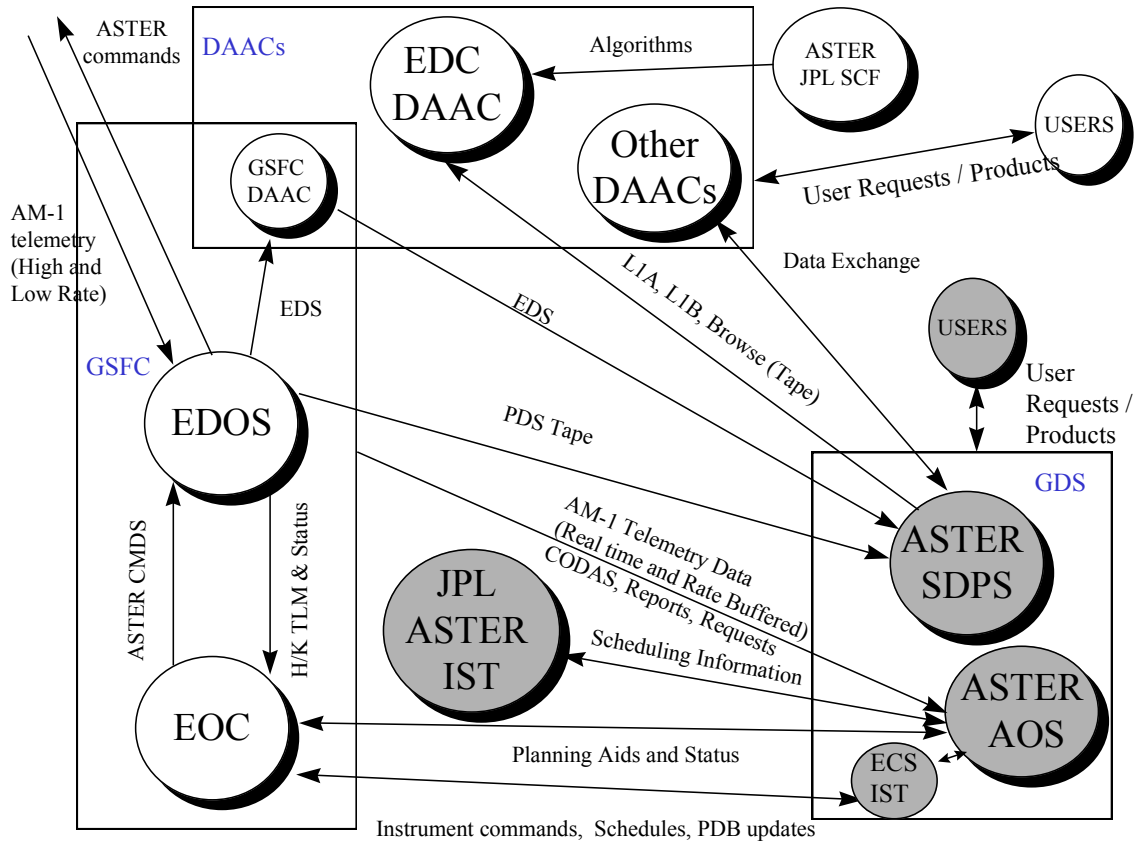
Exhibit 2: ASTER GDS - EGS functional interfaces

The interfaces and data flows shown Exhibit 2 support two broad functions: (1) ASTER Instrument Operations, and (2) ASTER Science Data Production and User Access.

2.1 ASTER Instrument Operations

The ASTER Instrument Operations Interfaces are shown in Exhibit 3
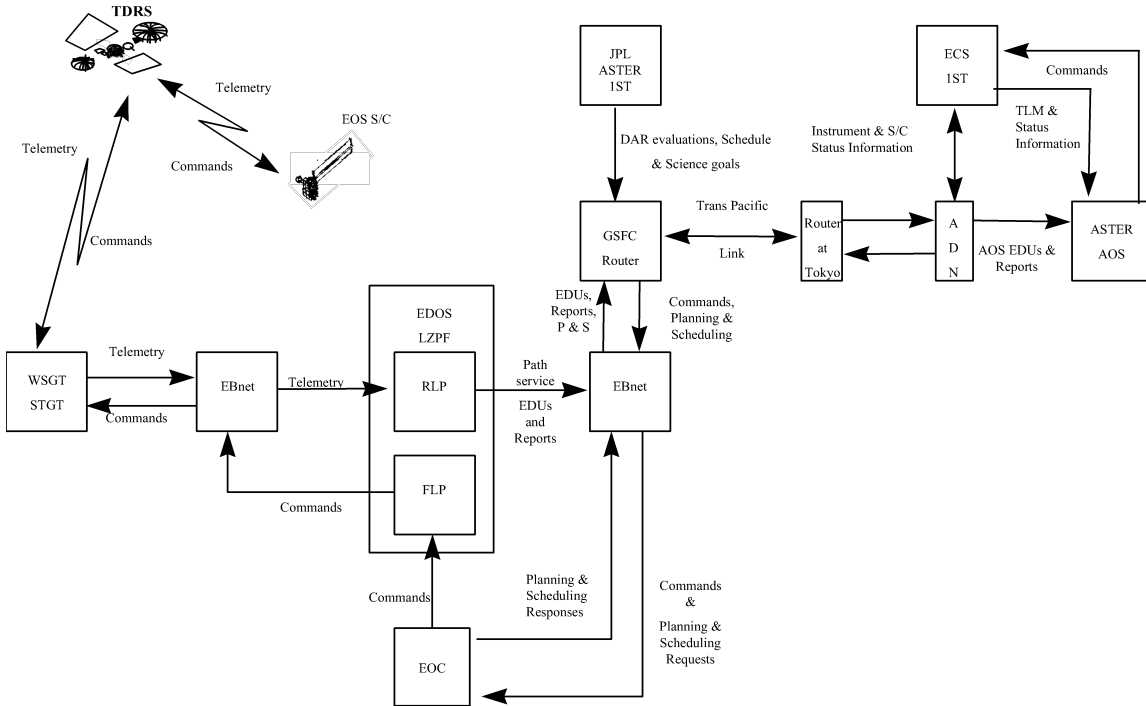
Exhibit 3: ASTER Instrument Operations Interfaces

ASTER Instrument Operations may be further sub-divided into two types: (1) Instrument Planning and Scheduling, and (2) Instrument Telemetry, Command and Control

2.1.1 Instrument Planning and Scheduling

The ASTER GDS and ECS interface provides ground support for the instrument planning and scheduling functions relating to the ASTER instrument on board the EOS AM-1 spacecraft. The planning and scheduling functions include Short Term Schedules, One Day Schedules, Preliminary Resource Schedules, Activity Schedules, Detailed Activity Schedules, and EOC Schedules. Additionally, Planning Aids containing orbital information are supplied to the ASTER AOS for use in the planning and scheduling the ASTER instrument. The primary instrument planning and scheduling interface is between EOC and the ASTER ICC.

2.1.2 Instrument Telemetry, Command and Control

The ASTER GDS and ECS interface also provides the ground support required for the ASTER ICC to receive the instrument telemetry from the EDOS, and for the EOC to receive command and control information from the ASTER ICC. Instrument telemetry information includes CODA Reports, SCS Summary Reports, Real Time Path Service EDOS Data Units, Rate Buffered Path Service EDUs and PDSs.   The primary instrument telemetry path is between EDOS and ASTER AOS.

Command and control information includes Command Procedures, Relative Time Command Sequences, Real Time Command Requests, Instrument Real Time Command Notification, and Instrument Command Uplink Status. The primary command and control path is between EOC and the ASTER ICC.

2.2 ASTER Science Data Production and User Access

The ASTER GDS and EGS interface to provide ground support for science data processing for the ASTER Instrument onboard the EOS AM-1 spacecraft. Ground support includes the following: science data processing, distribution, and archival; and ground systems communication and management. The primary science data processing interface is between the ASTER GDS SDPS and the EROS Data Center (EDC) DAAC, in Sioux Falls, SD. User access interfaces exist on both the ECS and ASTER GDS sides. The ASTER Science Data Production and User Access Interfaces are shown in Exhibit 4.

Science Data Instrument Operational Interfaces

TDRS

Science Data

AM-1 S/C

Science Data

WSC Facility

WSGT/ STGT

EDOS GSIF

High Rate Science Data

EBnet

Users

User Requests

ECS DAACs

EDC DAAC

DADS

ASTER JPL SCF

Algorithms

ASTER GW

DAR GW

GSFC DAAC

ASTER Level 1A, 1B, and Browse Data Products (Via Mail)

•DAR Creation/Submission (ECS Release B.0)
•DAR Messages to ASTER GDS (ECS Release B1)
•Higher Order Products/On Demand Processing (ECS Release B.1)
•Catalog Interoperability (ECS Release B.1)

EDOS LZPF

Return Link Processing

Production Data Handling

ASTER EDSs

EBnet

Requested ASTER EDSs

GSFC Router

Trans Pacific Link

Router at Tokyo

A D N

ASTER GDS SDPS

User Requests

Users

ASTER PDSs (Via Mail)

Exhibit 4: ASTER Science Data Production and User Access Interfaces

3. ASTER GDS - EGS Integration Program Overview

The integration program described in this plan follows engineering test efforts conducted by the ASTER GDS and EGS development organizations and precedes the execution of operational testing conducted by the AM1 Flight Project and the ASTER Project. This relationship is shown in Exhibit 5.

Engineering Tests	EGS I&T Tests	Joint Tests	AM1 Tests
Instrument Operations • EDOS -ASTER tape (V3,C1) • EDOS - ASTER/AOS network test • EOC - ICC tape exchange • EOC - ICC (ECS IST) network test **Science Data Operations** • ECS - ASTER Catalog Interoperability • ECS - ASTER DARs • ECS - ASTER L1A/L1B tape Validation • EDOS - ASTER PDS tape (V3,C1)	Instrument Operations ICT 11 EDOS-AOS → EGS6 ASTER Inst. Operations ICT 13 ECS IST (generic) ICT 14 EOC - ICC (inc. ECS IST) → EGS3 AM1 Daily Operations ICT 12 ECS DAAC - ASTER GDS → EGS9 ASTER Science Data Operation Science Data Operations	ECT 2 → ECT 3	AM1 ETE AM1 Mission Simulations
• ECS ASTER Early Eng. Test Plan • EDOS Eng. Test Information Sheets • FOS Eng. Test Information Sheets	ASTER GDS/EGS Integration Plan Specific test packages will be developed for each test		AM-1 Simulations Plan

Exhibit 5: ASTER - EGS Test Program Sequence

Requirements Coverage

The ASTER interface requirements and the tests that verify them are identified in Exhibits 6(a) and 6(b) below.

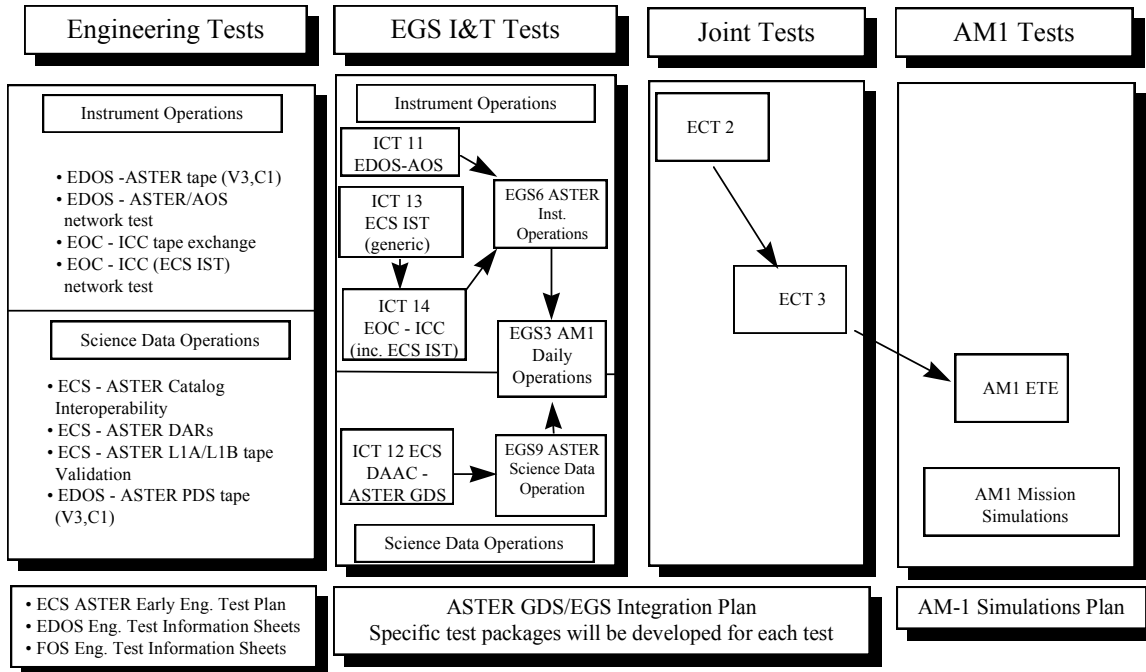| Interface Requirements Document between ECS and ASTER GDS		
Requirement Source	Confidence Test	Test Case
5.2.1 Science Software Delivery Interface Req.		
5.2.2 Long Term Planning Interface Req.		
5.2.3 Operations Data Base Interface Req.	ICT 14	14.2
5.2.4 DAR Development Data Base Interface Req.	ICT 12	12.2
5.3 DAR Handling Functional Interface Req.	ICT 12	12.2
5.4 Planning & Scheduling/Command Load Functional Interface Req.	ICT 14/EGS 6	14.3, 6.2 & 6.3
5.5 Instrument Operations Functional Interface Req.	ICT 14/EGS 6	14.4, 6.4 & 6.5
5.6 Science Data Handling Functional Interface Req.	ICT 12/ICT 14	12.2, 12.4, 14.3
5.7 User Search & Data Request Functional Interface Req.	ICT 12	12.2
5.8 Product Request & Delivery Functional Interface Req.	ICT 12	12.2, 12.5
5.9 System & Network Management Functional Interface Req.	ICT 12/ICT 14/EGS 6	12.1, ALL of 6 & 14
5.10 Performance Interface Req.	ICT 12	12.6
5.11 Data Volume Estimates		

Exhibit 6(a): ASTER Requirements Coverage (ECS - ASTER IRD)

Interface Requirements Document between EDOS - ASTER GDS		
Requirement Source	Confidence Test	Test Case
4.1.1 EDOS - EOC Functional Req.	ICT 11/EGS 6	11.1 & All of 6
4.1.2 EDOS - LaRC DAAC Functional Req.		
4.1.3 EDOS - GSFC DAAC Functional Req.		
4.1.4 EDOS - ASTER ICC Functional Req.	ICT 11/EGS 6	11.1, 11.2, All of 6
4.1.5 EDOS - ASTER SDPS Functional Req.		
4.1.6 EDOS - NOAA Facility Functional Req.		
4.1.7 EDOS - EDC DAAC Functional Req.		
4.1.8 EDOS - SMC Functional Req.		
4.2 EDOS - EGS Element Interface Performance Req.	N/A	N/A
4.2.1 EDOS - EOC Performance Req.		
4.2.2 EDOS-LaRC DACC Performance Req.		
4.2.3 EDOS - GSFC DAAC Performance Req.		
4.2.4 EDOS - ASTER ICC Performance Req.	ICT 11/EGS 6	?
4.2.5 EDOS - ASTER SDPS Performance Req.		
4.2.6 EDOS - NOAA Facility Performance Req.		
4.2.7 EDOS - EDC DAAC Performance Req.		
4.2.8 EDOS - SMC Performance Req.		
4.3 EGS Element - EDOS Interface Performance Req.	N/A	N/A
4.3.1 EOC - EDOS Performance Req.		
4.3.2 LaRC DAAC - EDOS Performance Req.		
4.3.3 GSFC DAAC - EDOS Performance Req.		
4.3.4 ASTER ICC - EDOS Performance Req.	ICT 11/EGS 6	?
4.3.5 ASTER SDPS - EDOS Performance Req.		
4.3.6 NOAA - EDOS Facility Performance Req.		
4.3.7 EDC DAAC - EDOS Performance Req.		
4.3.8 SMC - EDOS Performance Req.		
4.6 EDOS - EGS Element Generic Functional Req.	N/A	N/A
4.6.1 Transfer Protocol & Format Req.	ICT 11/EGS 6	11.1, 6.1, 6.2, 6.3, 6.5

Exhibit 6(b): ASTER Requirements Coverage (EDOS - ASTER IRD)

3.1 ASTER Instrument Operations Test Build Up

Instrument Operations integration starts with engineering tests of the supporting interfaces, continues with formal interface tests (ICT series) conducted by EGS I&T and ASTER GDS and ends with system level tests exercising the instrument operations functions "end-to-end". The tests are as follows:

ICT 11	EDOS - AOS Interface Confidence Test
ICT 13	ECS- IST Generic Interface Confidence Test
ICT 14	EOC - ICC Interface Confidence Test
EGS 6	ASTER Instrument Operations Test

3.1.1 EDOS - AOS Interface Confidence Test (ICT 11)

Systems Under Test: EDOS V3 (and C1), ICC, AOS

Test Objectives:

Ensure EDOS receives ASTER instrument data, demultiplexes the information, and delivers the information from the EDOS as follows :

ASTER AOS (ICC)   CODA
SCS Summary Reports
Real Time Path Service EDUs
Rate Buffered Path Service EDUs
Rate Buffered Path Service EDUs - Contingency {Tape}

Additionally, the following failure modes will be tested:

- FTP transmission failures, where an alert is raised to the EDOS system operator and recovery procedures are attempted. In our case, the primary host will have failed and the recovery procedure will be to attempt connection with an alternate host.

- Insure that EDOS stores the data when a communication outage occurs.

- When communications are reestablished insure EDOS first processes/transmits the Real-time Path Service EDUs and then the Rate Buffered Path Service EDUs.

- If a transmission conflict exists, EDOS gives priority to transmitting the Real time Path Service EDUs over the Rate Buffered Service EDUs.

Test Configuration:

Spacecraft ASTER
Instrument Data
& Telemetry Data
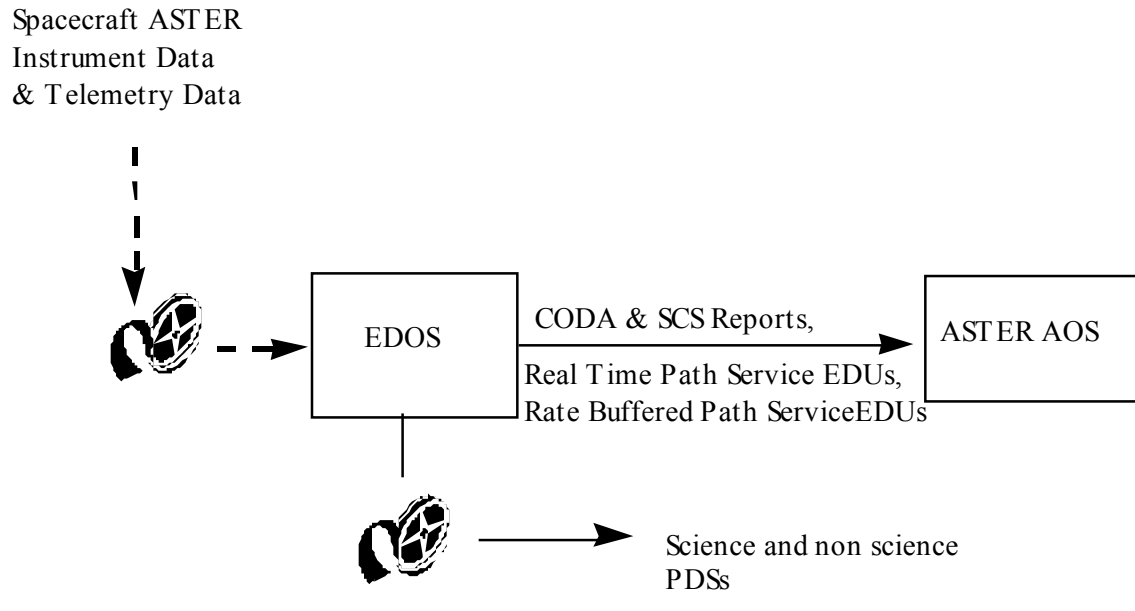
Exhibit 7: ICT11 Test Configuration

3.1.2 ECS - IST Generic Interface Confidence Test (ICT 13)

System Under Test: ECS IST and EOC.

Test Objectives:

The ASTER specific portions of **ICT 13.1 Stand-alone Testing** and **ICT 13.2 IST Operational Scenario Tests** have been incorporated into ICT 14.2.

ICT 13.3 - Simultaneous Users and Management Mode

The purpose of ICT 13.3 is to test the limits on the numbers of IST users allowed on the system simultaneously. ASTER IST users do not count against the maximum number of users permitted. While ICT 13.3 does not necessarily require involvement of the ASTER IST, their involvement is optional.

3.1.3 EOC - ICC Interface Confidence Test (ICT 14)

<u>System Under Test:</u> EOC, ASTER AOS.

<u>Test Objectives:</u>

• Exercise mission data flow and the ability to transfer and respond to all message data types. Error and exception handling will be exercised for custom protocols, but not for COTS/standard protocols supporting the interface.

• Verify the ability of the ECS IST to send updates of the ASTER database to be included in the EOC database, and verify that ECS IST can view the updated EOC database.

<u>Test Configuration:</u>
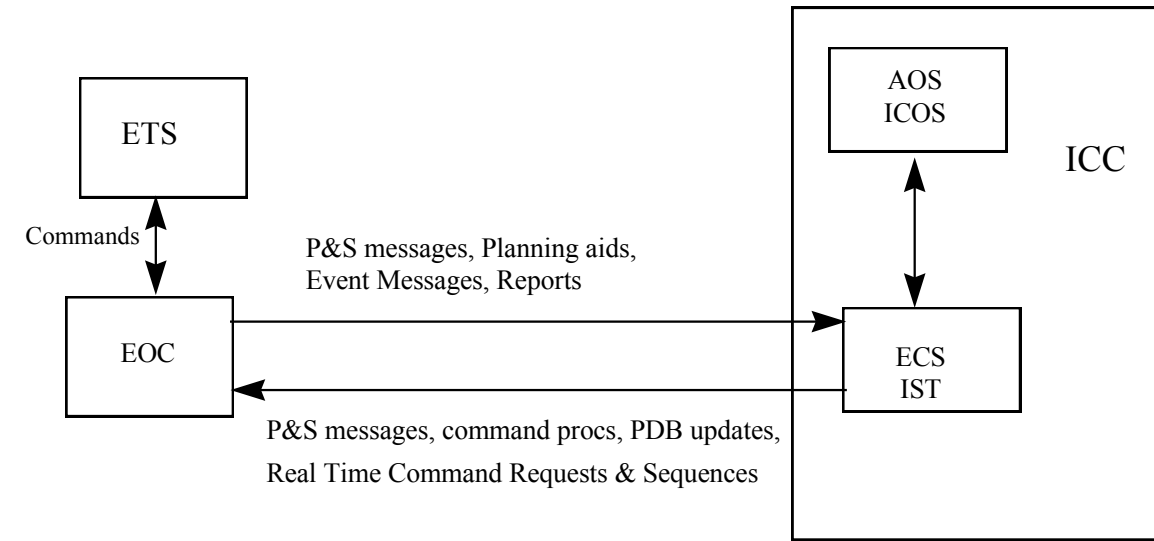
Exhibit 8: ICT14 Test Configuration

3.1.4 ASTER Instrument Operations Test (EGS 6)

System Under Test: EOC, EDOS, ASTER AOS.

Test Objectives:

Ensure ASTER GDS ICC can operate ASTER through EOC. The ASTER GDS will submit baseline activity profiles, ad hoc activities, real time commanding, and other ICC functions to EOC and the output from EOC will be checked to ensure EOC accurately generate the supporting command loads and ground scripts.

Test Configuration:

Exhibit 9: EGS6 Test Configuration

3.2 ASTER Science Data Production and User Access Build Up

EGS I&T verifies the following data handling capabilities using ASTER data products.

- ICT3 passes ASTER EDSs to GSFC DAAC
- SDP1 ingests and archives ASTER EDSs received from EDOS
- SDP3 verifies ECS user access to search and order EOSDIS data holdings
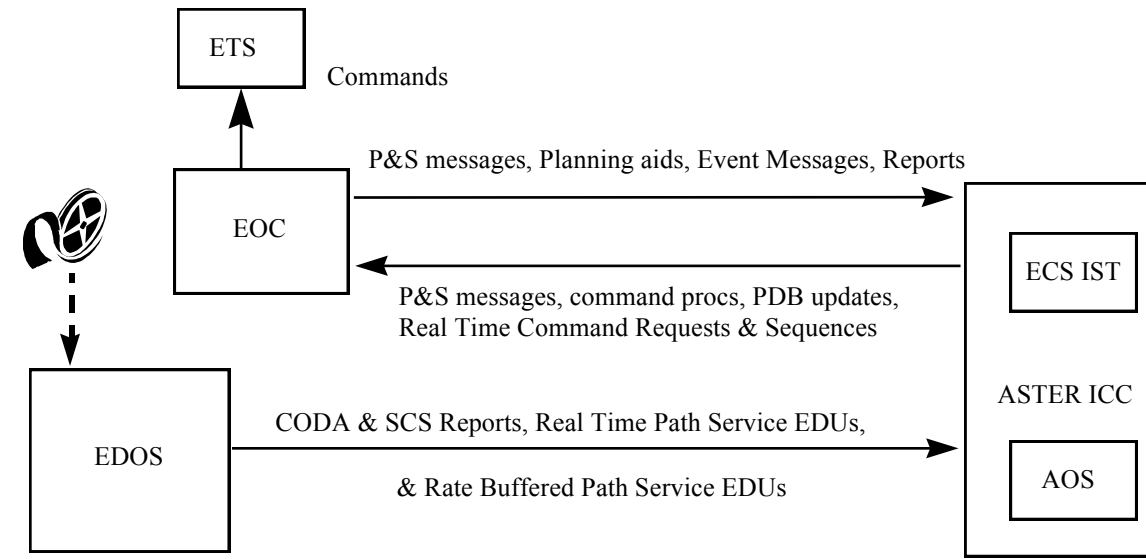
However, these tests are not ASTER-specific. Therefore, the ASTER Operations will be tested using the following EGS I&T Confidence Test Packages:

ICT12:   DAAC - ASTER GDS Interface Confidence Test
EGS9:   ASTER Science Operations Confidence Test

An overview of each test is provided in the following sections.

3.2.1 DAAC - ASTER GDS Interface Confidence Test - ICT12

Test Objectives:

The ASTER GDS and ECS combine to provide ground support for science data processing for the ASTER instrument on board the EOS AM-1 spacecraft. Ground support includes the following: spacecraft and instrument mission operations (planning, scheduling, control, monitoring, and analysis); science data operations; and ground systems communication and management. Science data operations are tested in ICT12. The ICT12 test objectives are as follows: verify catalog interoperability between ECS SDPS and the ASTER GDS SDPS;

- Verify DAR\XAR message exchange ECS SDPS and the ASTER GDS SDPS;
- Verify data exchange between ECS SDPS and the ASTER GDS SDPS, including EDSs, Level 1A, 1B, and higher order data products;
- Verify data transfer protocols between ECS SDPS and the ASTER GDS SDPS;
- Verify interface performance requirements between ECS SDPS and the ASTER GDS SDPS.

Test Configuration:

Exhibit 10: ICT12 Test Configuration

Systems Under Test:

The systems under test include the GSFC and EDC DAACs and the ASTER GDS SDPS.

3.2.2 ASTER Science Operations Confidence Test - EGS9

Test Objectives:

The objectives of EGS9 are as follows:

- Exercise science operations interfaces and user data access in an operational environment.
- Exercises all ASTER science operations
- ECS/ASTER user access via IMS Clients
- DAR message exchanges
- Science data products exchange and processing

EGS9 will include all ICT12 test cases, along with ASTER specific test cases from ICT3, SDP1, and SDP3. The test will be scenario driven, thereby simulating an "operational environment."

Test Configuration:

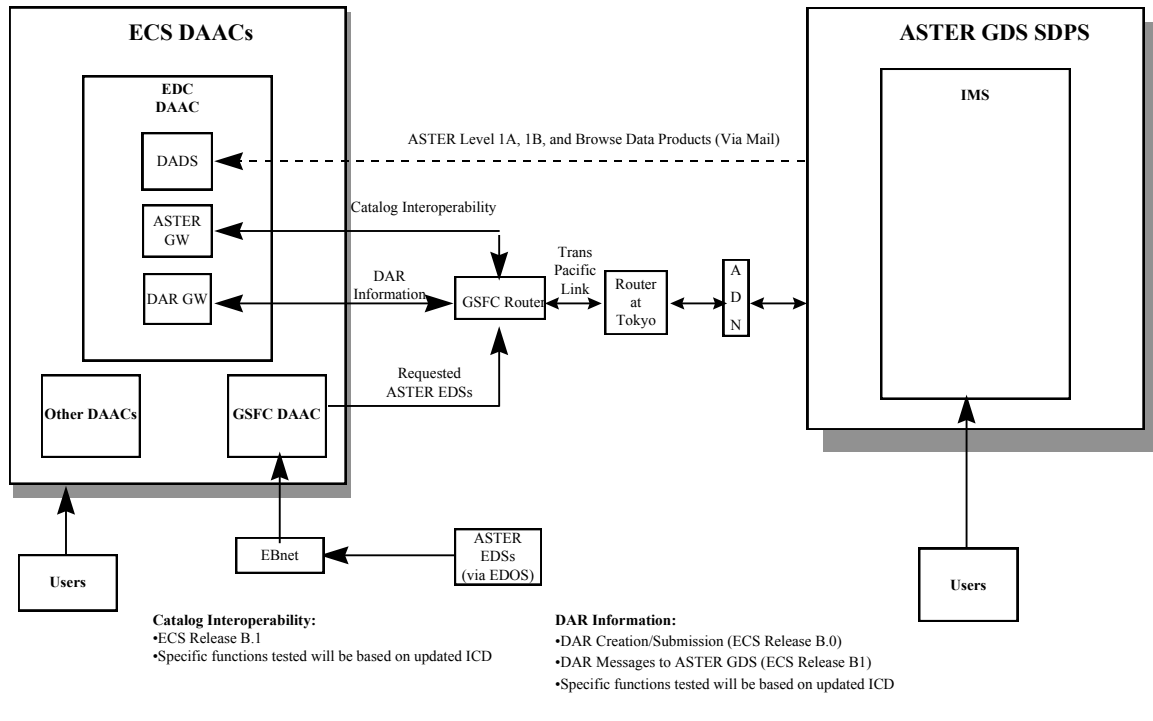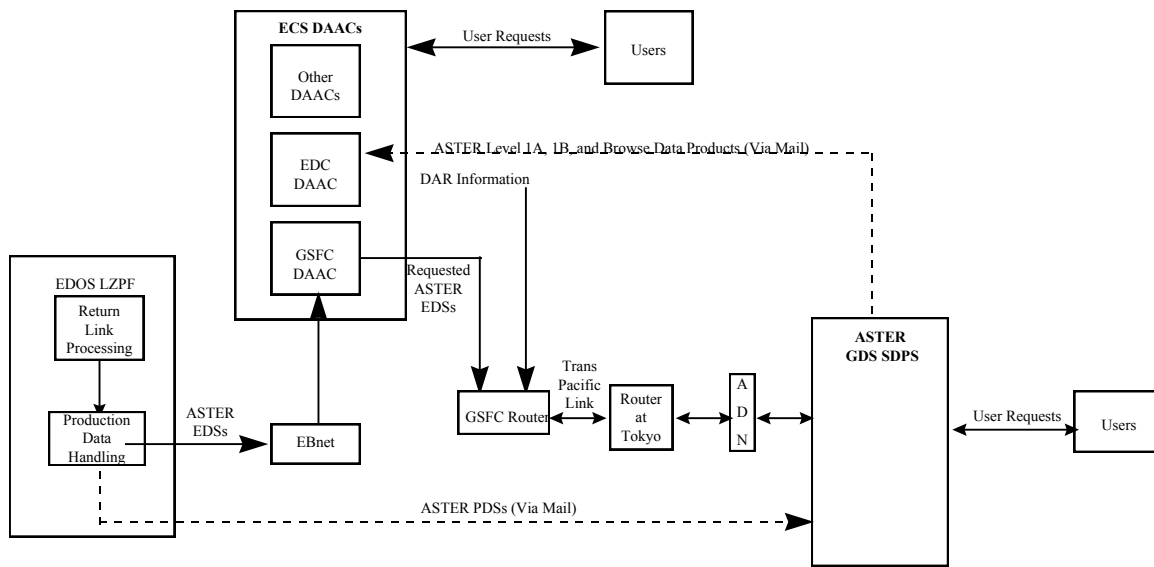**Exhibit 11: EGS9 Test Configuration**

Systems Under Test:

The systems under test include the GSFC and EDC DAACs, EDOS, and the ASTER GDS SDPS.

Current Status:

This test was recently added to the EGS I&T Program; therefore, further details are TBD.

3.3 Joint AM1 Project / ESDIS Tests with ASTER Participation

EGS I&T and the ASTER Project will participate in two EOC Compatibility Tests (ECT series). ECT 2 and 3 are coordinated and directed by the ECT team at GSFC. The ASTER Project will be invited to provide remote representation to this team and will be provided with all planning materials and coordination messages.

3.3.1 EOC Compatibility Test 2 (ECT2)

Test Objectives:

The primary objectives of ECT2 are to provide a test of AM1 - SN - EOC compatibility for all types of engineering telemetry and command data. A secondary objective is to provide instrument teams an opportunity to monitor instrument telemetry via the ISTs.

Test Configuration:

The ECT2 test configuration is shown in exhibit 12 below.

EOC Compatibility Test 2
TEST CONFIGURATION
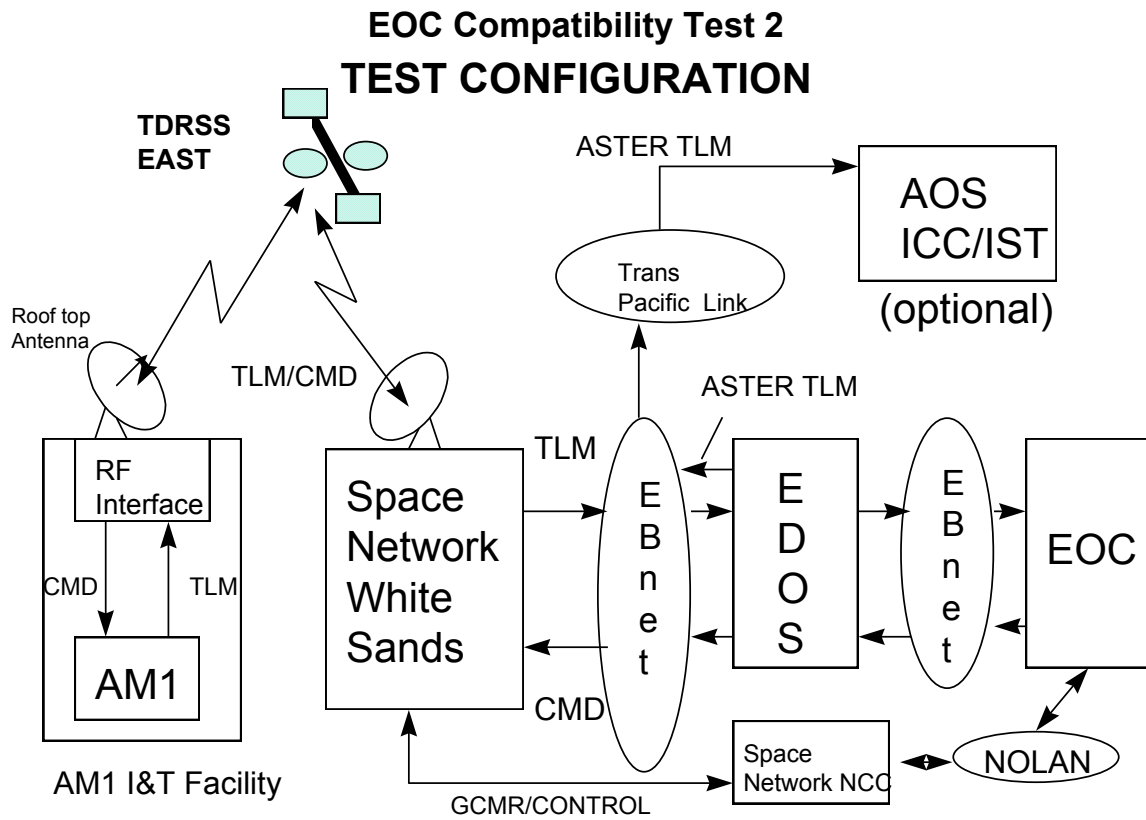
Exhibit 12: ECT2 Test Configuration

3.3.2 EOC Compatibility Test 3 (ECT3)

Test Objectives:

ECT3 includes the following ASTER related primary objectives;

- Verify the ability to send science data to the DAACs via EDOS. (for ASTER - PDS to ASTER GDS and EDS to GSFC DAAC)
- Verify the ability to send instrument loads to the spacecraft. (for ASTER - instrument loads transferred from AOS are uplinked to AM1 via SN.)

A secondary objective is to verify proper operation of the ASTER GDS interfaces with EDOS, EDC DAAC, and the EOC, using data actually originating from the AM1 spacecraft and the ASTER instrument.

Test Configuration:

The ECT3 test configuration is shown in exhibit 13 below.

Exhibit 13: ECT3 Test Configuration
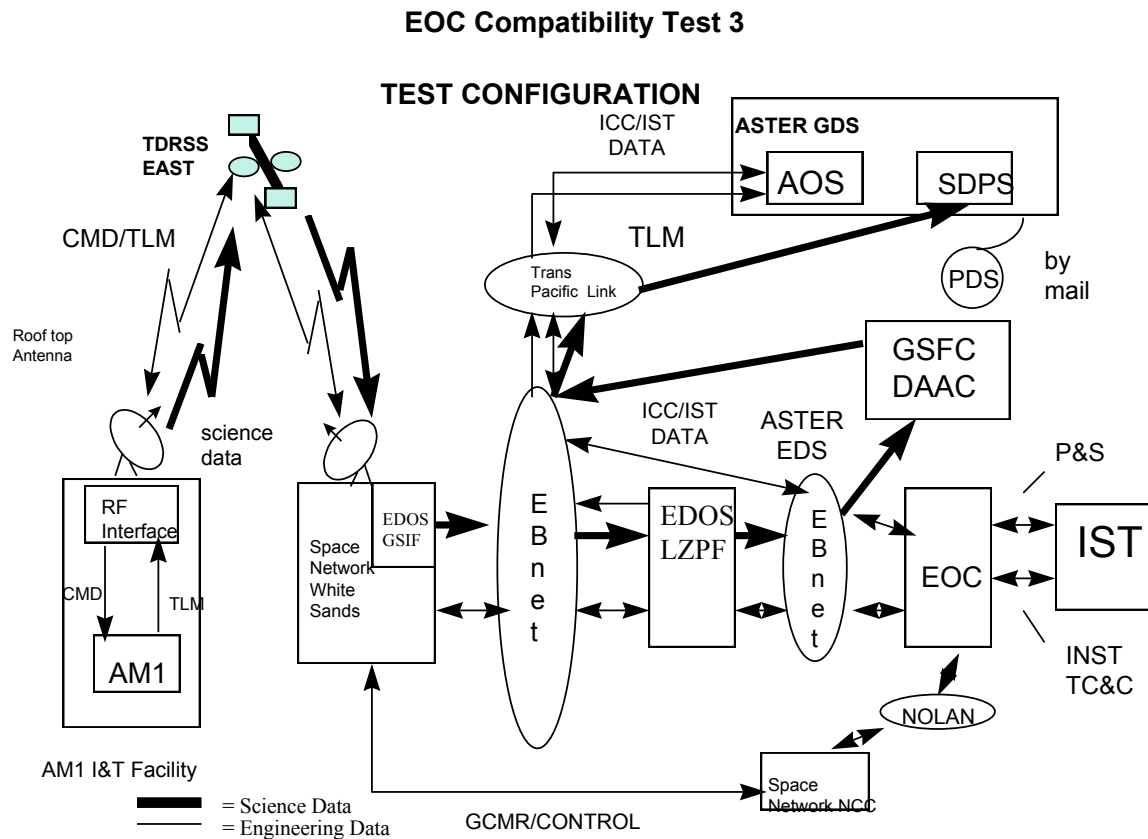
3.3.3 AM1 Daily Operations Test (EGS3)

Test Objectives:

The objective of this test is to perform all of the normal daily operations of the EGS in support of the AM-1 Mission. This includes exercising the real time command and control of the spacecraft in the EOC and the instruments from their ISTs, while simultaneously conducting mission planning and scheduling processing for future activities and spacecraft analysis processing on history data. At the DAACs, and the ASTER GDS, Level 0 data are received from EDOS, and ancillary data are transferred across DAACs and from ADCs and other sources. Science data production and archiving processing is performed. Product delivery to instrument teams is performed and the IMS is queried from multiple sources and ad hoc deliveries of data to users are performed. This test is the final step in the EOSDIS Mission Certification process for the AM-1 mission.

Test Configuration:

AM1 Daily Operations Test EGS3
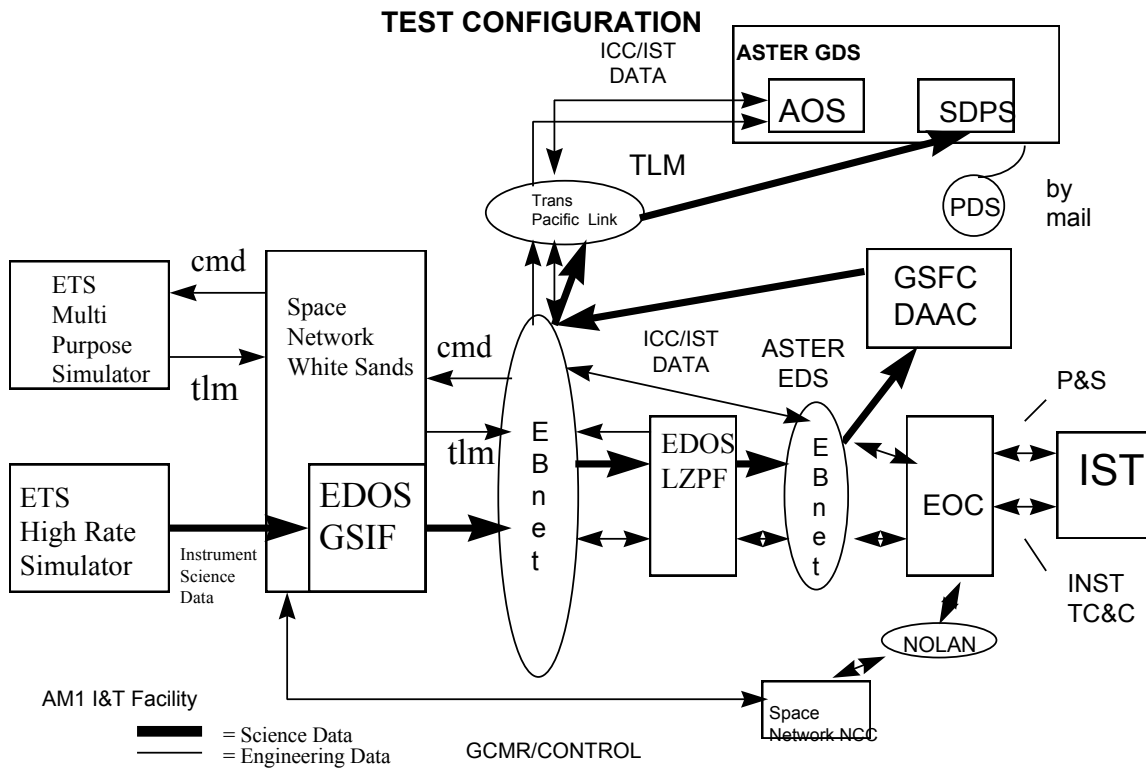
Exhibit 14: EGS3 Test Configuration

3.4   Operational Tests

Operational Tests with ASTER participation will be run under the direction of the AM1 Mission Operations Manager, as laid out in the AM1 Mission Simulations Plan. The Operational Tests currently planned are:

- AM1 End-to-End Test (AM1 ETE): The AM1 End-to-End test will flow spacecraft and instrument data of all types from the on-board origination point to the end user for that data type. For ASTER, this will include all instrument high rate data streams and the instrument housekeeping data stream, both real time and rate buffered.

- Mission Simulations: A series of Mission Simulations will be performed to verify the readiness of the Flight Operations Teams, Instrument Operations Teams, and Science Data Operations Teams to support the mission. The mission simulations will be based on a series of operations scenarios and exercise all elements of the EGS and ASTER GDS.

4. ASTER GDS - EGS Integration Program Management

4.1 The ASTER - EGS Integration Team

ASTER GDS - EGS Integration efforts will be coordinated and directed through the ASTER - -EGS Integration Team. The organization of the ASTER Integration Team is shown in Exhibit 15 below.

ASTER - EGS Integration Team

Program Liaison

ESDIS Project
M. Schwaller - Ext. Interface Mgr.
J. Smith - I&T Mgr.

ASTER Project
Dr. H. Watanabe

* also
ECS SCDO
I&T Manager

EGS ASTER I&T lead - G. Iona
S. War - Inst. Operations
D. Brown - Sci. Operations
P. Parker - System Tests

I&T Liaison

ASTER I&T Lead - Mr. S. Fushimi
AOS - Mr. Tanii, Mr. Watanabe
IMS / DADS - Mr. S. Kogita
PGS/SSIS - Mr. T. Ezaka

EDOS/FOS I&T Mgr. B. Seaton

EBnet P. Sullivan

GSFC DAAC C. Lynnes K. Simmons

EDC DAAC T, Kalvelage J. Daucsavage

AM1 FOT B. Kozon

NEC AOS Development

Fujitsu DADS Development

Hitachi PGS/SSIS Development

HITS - LM FOS Development

TRW EDOS Development

JPL

Mitsubishi IMS Development

JAROS ASTER FOT

US ASTER Science M. Pniel

US ASTER OPS D. Wenkert

Exhibit 15: ASTER Integration Team

Roles and Responsibilities for ASTER - EGS Integration Team members are discussed in section 4.1.1.

The US members of the ASTER - EGS Integration Team will conduct regular meetings at an interval to be set by the EGS I&T Manager. This interval will vary depending on the current level of activity in the integration program.   EGS I&T will provide a standard agenda for the meetings, which will be used to track progress of WBS items and action items. The agenda will be provided via e-mail to the Japanese members of the team, with questions and issues needing input from the Japanese side noted. The Japanese members will respond and ask questions of the US members the same way.

4.1.1 Roles and Responsibilities

Roles and responsibilities for ASTER - EGS Integration Team members are listed in Exhibit 16.

Organization and current representative	Responsibilities
Japanese Members	
ERSDAC Dr. Watanabe	• Overall ERSDAC - NASA Program Liaison for ASTER
JAROS	• ASTER Operations Team
JGI Mr. S. Fushimi - Team Lead AOS - Mr. Tanii Mr. Watanabe IMS / DADS - Mr. S. Kogita PGS/SSIS - Mr. T. Ezaka	• GDS Systems Integration Lead • Point of Contact for EGS I&T level integration • ASTER CSMS Developer
NEC (TBS)	• ASTER AOS Development • Support EGS/GDS I&T as needed
Mitsubishi (TBS)	• ASTER IMS Development • Support EGS/GDS I&T as needed
Fujitsu (TBS)	• ASTER DADS Development • Support EGS/GDS I&T as needed
Hitachi (TBS)	• ASTER PGS / SSIS Development • Support EGS/GDS I&T as needed
US Members	
NASA ESDIS External Interface Manager M. Schwaller	• Overall ERSDAC - NASA Program Liaison for ASTER
ESDIS I&T Manager J. Smith	• Overall responsibility for EGS Integration

Exhibit 16: Roles and Responsibilities

Organization and current representative	Responsibilities
ESDIS I&T Lead for ASTER G. Iona	• Lead ASTER Integration Team • Point of Contact for EGS I&T level integration
S. War	• Lead for Instrument Operations Testing
D. Brown	• Lead for ASTER Science Data Operations Testing
P. Parker	• Lead for ASTER System Level Testing
NASA FOS / EDOS I&T Manager B. Seaton	• Point of contact for engineering tests with FOS and EDOS • Scheduling EOC and EDOS facilities and personnel
NASA GSFC 540 (EBnet) P. Sullivan	• Point of contact for network matters and testing
Hughes / Lockheed-Martin (TBS)	• ECS (Hughes) development • FOS development (Lockheed - Martin sub contract) • Developer support for EGS I&T
TRW (TBS)	• EDOS development • Developer support for EGS I&T
GSFC DAAC C. Lynnes (NASA) K. Simmons (HITS)	• ASTER EDS production support for EGS I&T
EDC DAAC T. Kalvelage (USGS) J. Daucsavage (HITS)	• ASTER higher level production and archiving support for EGS I&T
AM1 Flight Operations B. Kozon	• EOC Operations in support of EGS I&T
US ASTER Instrument Operations Team D. Wenkert	• ECS IST operations at JPL in support of EGS I&T
US ASTER Science Team M. Pniel	• ASTER SCF operations at JPL in support of EGS I&T

Exhibit 16 (cont.): Roles and Responsibilities

4.2 ASTER - EGS Integration Test Planning and Coordination

The guiding principle for ASTER GDS - EGS integration will be that each level of integration (Engineering Tests, EGS I&T, an Operations) will be controlled by ONE document for that level. This document controls ASTER - EGS integration at the EGS - GDS I&T level. The set of tests defined here will be developed jointly by NASA and ERSDAC. Japanese and US organizations will participate in each test to the extent defined in each test package. The EGS I&T contractor will develop the packages with inputs and concurrence from the cognizant Japanese organizations.

4.2.1 Test Package Development Process

For each EGS - GDS I&T test, the EGS I&T contractor will draft a test package using as a requirements base the source documents identified in Exhibit 6.

The content and organization of the test packages is described in the EGS Integration and Test Program Plan [Reference (e)]. The EGS I&T contractor will develop draft test packages up to and including the Test Case Descriptions of the Plans and Procedures. The package will then be made available to both US and Japanese technical organizations for review and comment. When all sides are satisfied with the test case descriptions and supporting information, The EGS I&T contractor will develop the Test Director's Script. The Test Director's Script identifies the major events of the test. It refers to subordinate procedures or standard operating procedures for the details of execution. When the Test Director's script is approved by all sides, the US and Japanese EGS - GDS I&T Leads will identify the target test date (month / year) that ASTER GDS and EGS systems will support this test and place it on the ASTER GDS - EGS Integration schedule. A dry run period and an execution period will be scheduled.

US and Japanese technical organizations will develop the subordinate procedures and/or normal operating instructions to support the Test Director's Script. They will report their progress to the ASTER -EGS Integration Team.

When the subordinate procedures / normal operating instructions are ready, and at least 30 days prior to dry run, the ASTER - EGS Integration Team will conduct a Test Readiness Review (TRR) in the US and Japan. The results will be reported to both the US and Japanese ASTER - EGS I&T Leads. The ASTER-EGS Integration Team will monitor the correction of deficiencies noted in the TRR. Adjustments will be made to the schedule if necessary to allow enough time for correction of deficiencies.

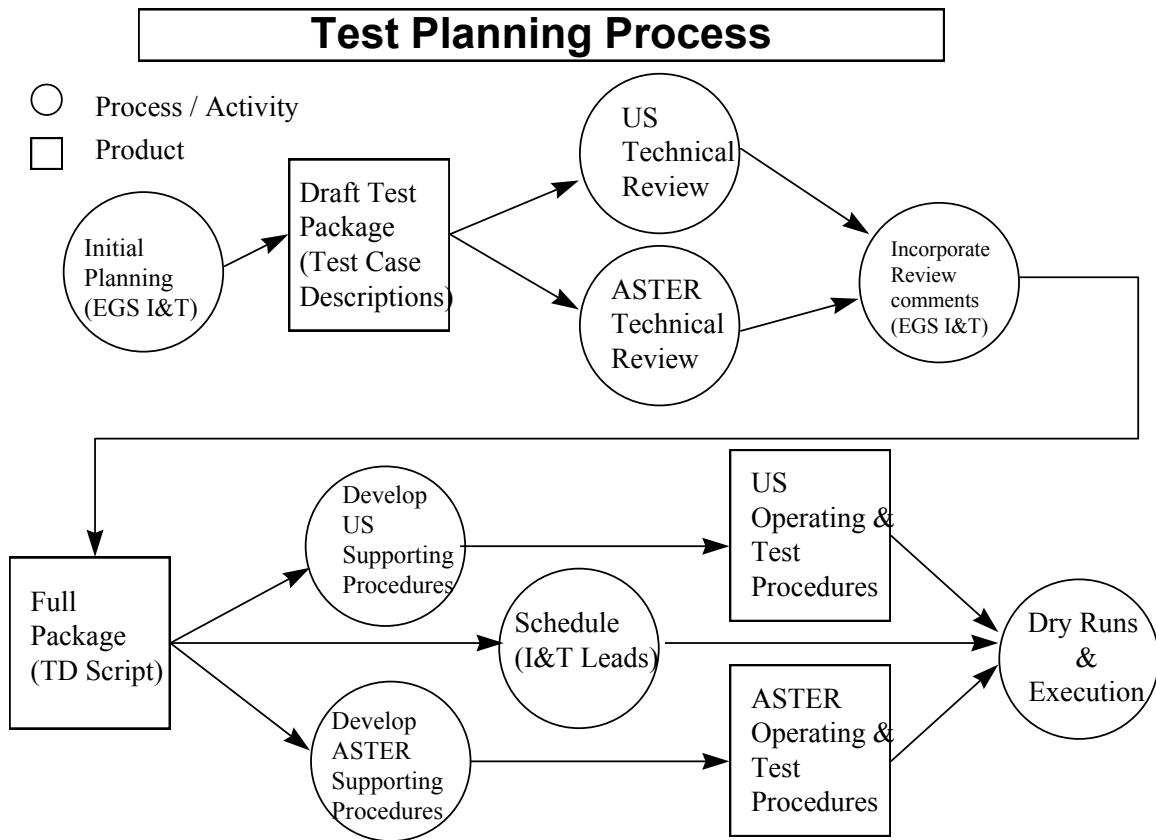The test development process is illustrated in Exhibit 17 below

Test Planning Process

Test Development Process flowchart:

- Legend: ○ Process / Activity, □ Product
- Initial Planning (EGS I&T) → Draft Test Package (Test Case Descriptions) → US Technical Review / ASTER Technical Review → Incorporate Review comments (EGS I&T) → Full Package (TD Script)
- Full Package (TD Script) → Develop US Supporting Procedures → US Operating & Test Procedures → Dry Runs & Execution
- Full Package (TD Script) → Schedule (I&T Leads)
- Full Package (TD Script) → Develop ASTER Supporting Procedures → ASTER Operating & Test Procedures → Dry Runs & Execution

Exhibit 17: Test Development Process

4.2.2 Test Scheduling and Coordination

4.2.2.1 Initial Scheduling

The ASTER GDS - EGS Integration Schedule will be used to schedule all ASTER - EGS I&T Tests. This Schedule will be maintained by the EGS ASTER I&T Lead. It will be posted on the EGS I&T home-page.
(url = http://esdis.gsfc.nasa.gov/INTEG/schedule.html)

Requests to change the schedule should be made to the EGS ASTER I&T Lead (glenn.iona@gsfc.nasa.gov). Schedule changes must be approved by both NASA and ERSDAC.

4.2.2.2 Near Term Scheduling and Coordination

Thirty to sixty days prior to the start of an integration period the ASTER - EGS Integration Team will set the actual day or days of execution within the dry run and integration windows established in the ASTER I&T schedule. In the dynamic environment of both ASTER GDS and EGS development, last minute changes may be required. These will be coordinated by the EGS and ASTER I&T Leads via e-mail and/or telephone.

An overview of the scheduling process is shown in Exhibit 18 below.

Test Scheduling Process

○ Process / Activity
□ Product

Initial Scheduling (6-12 months) → ASTER GDS EGS Integration Schedule (month / year) → Program Changes

url=http://esdis.gsfc.nasa.gov/INTEG/schedule.html

Near Term Scheduling (30-60 days) → Facility weekly / daily schedules → Respond to short notice changes
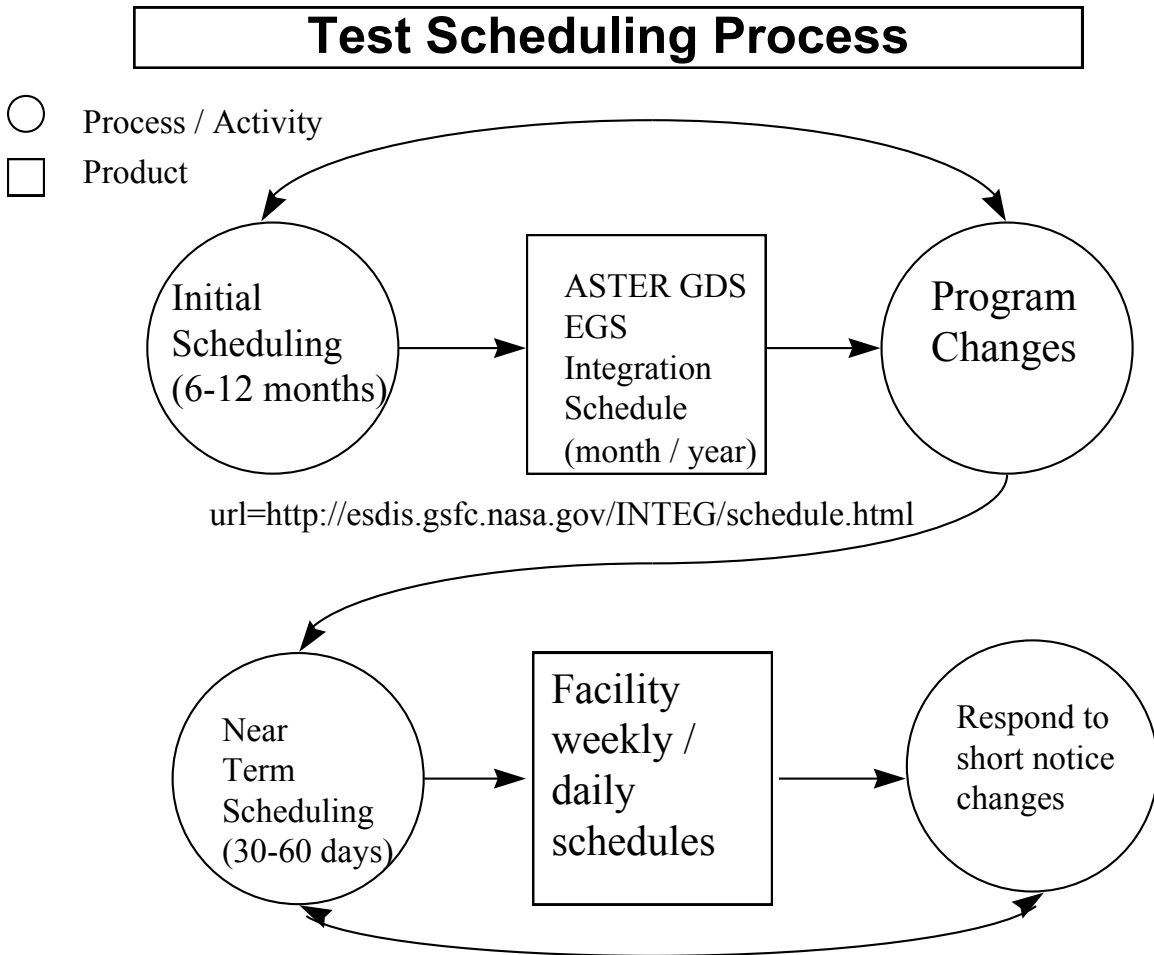
Exhibit 18: Test Scheduling Process

4.3 Test Execution

The EGS I&T organization will provide a US Test Director. The ASTER Project will provide an English speaking ASTER Test Director. The US Test Director and the ASTER Test Director will jointly conduct pre-test and post-test briefings over the voice circuit specified in the Test Package. The controlling procedure for execution will be Test Director's Script in the Test Package.

The US Test Director will call the events from the Test Director Script and provide overall direction to the US participants. The US Test Director will call out events and direct the execution and receive status from the US participants. The ASTER Test Director provides direction to and receives status from the Japanese participants. The ASTER Test Director provides ASTER status to US Test Director over the voice circuit provided for the test.

The US and Japanese Test Directors must concur on deviations from the procedure, decisions to halt or resume testing, and the authorization of workarounds.

EGS I&T will post problems affecting both EGS and ASTER GDS to the ESDIS SMO DR System. SMO DRs may be reviewed on http://iree.gsfc.nasa.gov/ddts

4.4 Test Reporting

EGS I&T will produce informal "quick look" reports 1 week after completion of individual tests. A full ASTER GDS - EGS Integration Summary Report will be produced 45 days after the completion of the program. This report will be drafted by EGS I&T with inputs from the ASTER Project. The draft report will be submitted to the ASTER Project for review and concurrence before publication.

Appendix A   ASTER GDS - EGS Integration Work Breakdown Structure

[TBS]

Sample WBS - Test "X"

X.1   Test Package Development

    X.1.1   EGS I&T Test Package Initial Draft
    X.1.2   EGS Technical Reviews
    X.1.3   ASTER Technical Reviews
    X.1.4   EGS I&T Test Package - Final with Test Director's script

X.2   Supporting Procedures and Data

    X.2.1   EGS Supporting Procedures
    X.2.2   ASTER GDS Supporting Procedures
    X.2.3   Test Data Generation / Acquisition

X.3   Execution and Reporting

    X.3.1   Dry Run Completion
    X.3.2   Formal Execution Completion
    X.3.3   "Quick Look" Report

Appendix B   Acronyms

AOS	ASTER Operations Segment
ASTER	Advanced Spaceborne Thermal Emissions Radiometer
CODA	Customer Operations Data Accounting
DAAC	Data Acquisition and Archive Center
DADS	Data Archive and Distribution System
DAR	Data Acquisition Request
ECS	EOSDIS Core Systems
ECT	EOC Compatibility Test
EDC	Earth Resources Data Center
EDOS	EOS Data and Operations System
EDS	Expedited Data Set
EDU	EDOS Data Unit
EGS	EOS Ground System
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ERSDAC	Earth Resources Satellite Data Center
FTP	File Transfer Protocol
GDS	Ground Data System
GSFC	Goddard Space Flight Center
ICC	Instrument Control Center
ICT	Interface Confidence Test
IMS	Information Management System
IST	Instrument Support Terminal
I&T	Integration and Test
JAROS	Japan Resources Observation System
JPL	Jet Propulsion Laboratory
NASA	National Aeronautics and Space Administration
PDS	Production Data Set
SCF	Science Computing Facility
SCS	Spacecraft Contact Session
SDPS	Science Data Processing Segment
TBD	To Be Determined
TBR	To Be Reviewed
TBS	To Be Supplied
TRR	Test Readiness Review
WBS	Work Breakdown Structure
XAR	ASTER Instrument Activity Request