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## **EOSDIS Core System Project**

# **Release 5A Segment/Design Specification for the ECS Project**

May 1999

Final

Raytheon Systems Company  
Upper Marlboro, Maryland

# Release 5A Segment/Design Specification for the ECS Project

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# Preface

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This document is a contract deliverable with an approval code 2. As such, it does not require formal Government approval, however, the Government reserves the right to request changes within 45 days of the initial submittal. Once approved, contractor changes to this document are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision. The ECS Science Development configuration control board has reviewed it, and this final version is being delivered prior to the Release Readiness Review.

This document is a final delivery of CDRL 305, Release 5A Segment/Design Specification of the ECS Project (305-CD-500-001).

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# Abstract

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The Release 5A Segment/Design Specification is an overview description of the ECS Project. The functionality of the ECS software is described at the Subsystem, Computer Software Configuration Item (CSCI), Computer Software Component (CSC), and Process levels. Architecture and context diagrams illustrate the process interconnections within the ECS CSCIs and the external connections to other CSCIs, subsystems, and specified segment interfaces. Interface events description tables describe the data, messages, notifications, or status information that occurs at each level of functionality within the ECS. A basic description of the Commercial Off The Shelf (COTS) software and hardware used in ECS is included. Also, a more detailed class level of documentation is offered from the output of the on-line tool ABC++.

Detailed design in this document is the level of information derived from requirement sources, and used by the development team to complete the ECS design implementation for a software system at a 5A state of maturity.

**Keywords:** Release 5A, Overview, SDPS, CSMS, Design, Detailed Design, Subsystem, Architecture, Software, Hardware, Object Oriented, Security, Gateway, System Management, Reports, User Interface, GUI.

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## **Appendix B. Libraries**

### **Abbreviations and Acronyms**

# 1. Introduction

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## 1.1 Purpose and Scope

The purpose of the Segment/Design Specification for the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS) is to provide an overview of the hardware and software subsystems of the project. This document describes the detailed design of each ECS software subsystem implemented to satisfy the allocated and derived functional and performance requirements. This document also provides basic descriptions of the Commercial Off The Shelf (COTS) hardware and software used in the ECS. This document contains:

- Functional overviews of each Computer Software Configuration Item (CSCI)
- Context diagrams of each CSCI
- Interface event descriptions based on the context diagrams
- Process architecture diagrams
- Interface event description tables based on the process architecture diagrams
- CSCI data stores (databases as they relate to the process architecture diagrams)
- CSCI functions allocated to processes. For data servers, this includes descriptions of the functionality offered to clients via the server interfaces. For Graphical User Interface (GUI) applications, it describes the functionality provided to the GUI users.
- Specific limitations of the capabilities provided
- Summary of object classes listed by CSCI
- Summary of class libraries listed by CSCI
- Abbreviations and Acronyms

Hyper-linked on-line documentation generated by ABC++ is provided to accompany this document. The various subsystems, subdirectories, processes, libraries, and classes can be browsed down to the code level. This documentation can be accessed through the Universal Resource Locator (URL) <http://ecsdocs.east.hitc.com:88> for those who have access to the ECS internally at the Landover Facility. For anyone not having access to the ECS internally at the Landover facility, the Data Management Office of the ECS Project must be contacted for access.

Under every process or library documented in Appendix A or B, there is a directory string. This string indicates the location of the Makefile and sources for the library.

This same directory string can be used to locate on-line documentation. This is accomplished by replacing the “/ecs/formal” part of the directory string with the URL for the on-line documentation associated with the page on which the classes are listed along with the names of processes and libraries which share those classes.

## **1.2 Document Organization**

The remainder of this document is organized as follows:

- Section 2: Related Documentation
- Section 3: System Description
- Section 4: Subsystem Descriptions
- Section 5: Limitations of Current Implementation
- Appendix A: Software Processes
- Appendix B: Software Libraries
- Abbreviations and Acronyms

## 2. Related Documentation

---

### 2.1 Parent Documents

The parent documents are the documents from which the scope and content of this Design Specification are derived. These documents are listed below.

194-207-SEI	System Design Specification for the ECS Project
305/DV2 (F)	Segment/Design Specifications for the ECS Project
212-WP-002	Game Plan (latest copy) for the ECS Project

### 2.2 Applicable Documents

Documents referenced in this document are listed below.

#### *912-series Disk Partition-Common*

912-TDA-002	Application Server
912-TDE-012	EDC MSS / MSS Backup Server
912-TDG-012	GSFC MSS / MSS Backup Server
912-TDL-012	LaRC MSS / MSS Backup Server
912-TDS-012	SMC MSS / MSS Backup Server
912-TDV-112	VATC-SMC MSS / MSS Backup Server

#### *920-series General documents*

920-TDE-001	EDC Hardware Diagram (Design)
920-TDG-001	GSFC Hardware Diagram (Design)
920-TDL-001	LaRC Hardware Diagram (Design)
920-TDS-001	SMC Hardware Diagram (Design)
920-TDV-101	VATC-SMC Hardware Diagram (Design)
920-TDE-002	EDC Hdwe/Sfwe Mapping (COTS)
920-TDG-002	GSFC Hdwe/Sfwe Mapping (COTS)
920-TDL-002	LaRC Hdwe/Sfwe Mapping (COTS)
920-TDS-002	SMC Hdwe/Sfwe Mapping (COTS)

920-TDV-102	VATC-SMC Hdwe/Sfwe Mapping (COTS)
920-TDE-003	EDC System Infrastructure Assignments (DCE/ DNS/DTS Infra.)
920-TDG-003	GSFC System Infrastructure Assignments (DCE/ DNS/DTS Infra.)
920-TDL-003	LaRC System Infrastructure Assignments (DCE/ DNS/DTS Infra.)
920-TDS-003	SMC System Infrastructure Assignments (DCE/ DNS/DTS Infra.)
920-TDV-103	VATC-SMC System Infrastructure Assignments (DCE/DNS/DTS Infra.)
920-TDE-004	EDC Floor Plan
920-TDG-004	GSFC Floor Plan
920-TDL-004	LaRC Floor Plan
920-TDS-004	SMC Floor Plan
920-TDV-104	VATC-SMC Floor Plan
920-TDE-005	EDC Cable Management Plan
920-TDG-005	GSFC Cable Management Plan
920-TDL-005	LaRC Cable Management Plan
920-TDS-005	SMC Cable Management Plan
920-TDV-105	VATC-SMC Cable Management Plan
920-TDE-007	EDC Vendor Documentation List
920-TDG-007	GSFC Vendor Documentation List
920-TDL-007	LaRC Vendor Documentation List
920-TDE-008	EDC Mount Points
920-TDG-008	GSFC Mount Points
920-TDL-008	LaRC Mount Points
920-TDS-008	SMC Mount Points
920-TDV-108	VATC-SMC Mount Points
920-TDE-009	EDC DAAC Baseline Hardware / Database Mapping
920-TDG-009	GSFC DAAC Baseline Hardware / Database Mapping
920-TDL-009	LaRC DAAC Baseline Hardware / Database Mapping
920-TDS-009	SMC DAAC Baseline Hardware / Database Mapping

920-TDV-109	VATC-SMC DAAC Baseline Hardware / Database Mapping
920-TDE-010	EDC DAAC Baseline Database Configuration Listing
920-TDG-010	GSFC DAAC Baseline Database Configuration Listing
920-TDL-010	LaRC DAAC Baseline Database Configuration Listing
920-TDS-010	SMC DAAC Baseline Database Configuration Listing
920-TDV-110	VATC-SMC DAAC Baseline Database Configuration Listing
920-TDE-011	EDC DAAC Baseline Sybase Logging Mapping
920-TDG-011	GSFC DAAC Baseline Sybase Logging Mapping
920-TDL-011	LaRC DAAC Baseline Sybase Logging Mapping
920-TDS-011	SMC DAAC Baseline Sybase Logging Mapping
920-TDV-111	VATC-SMC DAAC Baseline Sybase Logging Mapping
920-TDE-012	EDC DAAC SCSI Cable Management Plan
920-TDG-012	GSFC DAAC SCSI Cable Management Plan
920-TDL-012	LaRC DAAC SCSI Cable Management Plan

***921-series Network Infrastructure documents***

921-TDE-001	EDC Network Overview Diagram (LAN Topology)
921-TDG-001	GSFC Network Overview Diagram (LAN Topology)
921-TDL-001	LaRC Network Overview Diagram (LAN Topology)
921-TDS-001	SMC Network Overview Diagram (LAN Topology)
921-TDV-101	VATC-SMC Network Overview Diagram (LAN Topology)
921-TDE-002	EDC Hardware / Network Diagram
921-TDG-002	GSFC Hardware / Network Diagram
921-TDL-002	LaRC Hardware / Network Diagram
921-TDS-002	SMC Hardware / Network Diagram
921-TDV-102	VATC-SMC Hardware / Network Diagram
921-TDE-003	EDC IP Address Assignments (DAAC Hosts)
921-TDG-003	GSFC IP Address Assignments (DAAC Hosts)
921-TDL-003	LaRC IP Address Assignments (DAAC Hosts)
921-TDS-003	SMC IP Address Assignments (DAAC Hosts)

921-TDV-103	VATC-SMC IP Address Assignments (DAAC Hosts)
921-TDE-004	EDC IP Address Assignments (DAAC Network Hardware)
921-TDG-004	GSFC IP Address Assignments (DAAC Network Hardware)
921-TDL-004	LaRC IP Address Assignments (DAAC Network Hardware)
921-TDS-004	SMC IP Address Assignments (DAAC Network Hardware)
921-TDV-104	VATC-SMC IP Address Assignments (DAAC Network Hardware)
921-TDE-005	EDC Dual-Homed Host Static Routes
921-TDG-005	GSFC Dual-Homed Host Static Routes
921-TDL-005	LaRC Dual-Homed Host Static Routes
921-TDE-006	EDC Ingest Host Static Routes
921-TDG-006	GSFC Ingest Host Static Routes
921-TDL-006	LaRC Ingest Host Static Routes

***922-series Disk Partitions documents***

922-TDE-001	EDC APC Server
922-TDG-001	GSFC APC Server
922-TDL-001	LaRC APC Server
922-TDS-001	SMC APC Server
922-TDV-101	VATC-SMC APC Server
922-TDE-002	EDC Application Server
922-TDG-002	GSFC Application Server
922-TDL-002	LaRC Application Server
922-TDS-002	SMC Application Server
922-TDV-102	VATC-SMC Application Server
922-TDG-003	GSFC AQA Host
922-TDL-003	LaRC AQA Host
922-TDS-004	SMC Bulletin Board Server
922-TDV-104	VATC-SMC Bulletin Board Server
922-TDE-005	EDC CSS Server
922-TDG-005	GSFC CSS Server

922-TDL-005	LaRC CSS Server
922-TDS-005	SMC CSS Server
922-TDV-105	VATC-SMC CSS Server
922-TDE-006	EDC DIP Server
922-TDG-006	GSFC DIP Server
922-TDL-006	LaRC DIP Server
922-TDS-006	SMC DIP Server
922-TDV-106	VATC-SMC DIP Server
922-TDE-007	EDC DRP Server
922-TDG-007	GSFC DRP Server
922-TDL-007	LaRC DRP Server
922-TDS-007	SMC DRP Server
922-TDV-107	VATC-SMC DRP Server
922-TDE-008	EDC ICL Server
922-TDG-008	GSFC ICL Server
922-TDL-008	LaRC ICL Server
922-TDS-008	SMC ICL Server
922-TDV-108	VATC-SMC ICL Server
922-TDE-009	EDC Interface Server
922-TDG-009	GSFC Interface Server
922-TDL-009	LaRC Interface Server
922-TDS-009	SMC Interface Server
922-TDV-109	VATC-SMC Interface Server
922-TDE-010	EDC MSS Server
922-TDG-010	GSFC MSS Server
922-TDL-010	LaRC MSS Server
922-TDD-010	SMC MSS Server
922-TDV-110	VATC-SMC MSS Server
922-TDE-011	EDC MSS File Server / CM Server

922-TDG-011	GSFC MSS File Server / CM Server
922-TDL-011	LaRC MSS File Server / CM Server
922-TDS-011	SMC MSS File Server / CM Server
922-TDV-111	VATC-SMC MSS File Server / CM Server
922-TDE-013	EDC Planning Server
922-TDG-013	GSFC Planning Server
922-TDL-013	LaRC Planning Server
922-TDS-013	SMC Planning Server
922-TDV-113	VATC-SMC Planning Server
922-TDE-014	EDC Queuing Server
922-TDG-014	GSFC Queuing Server
922-TDL-014	LaRC Queuing Server
922-TDS-014	SMC Queuing Server
922-TDV-114	VATC-SMC Queuing Server
922-TDE-015	EDC Science Processor
922-TDG-015	GSFC Science Processor
922-TDL-015	LaRC Science Processor
922-TDS-015	SMC Science Processor
922-TDV-115	VATC-SMC Science Processor
922-TDE-016	EDC SDSRV Server
922-TDG-016	GSFC SDSRV Server
922-TDL-016	LaRC SDSRV Server
922-TDS-016	SMC SDSRV Server
922-TDV-116	VATC-SMC SDSRV Server
922-TDE-017	EDC Sybase Staging Server
922-TDG-017	GSFC Sybase Staging Server
922-TDL-017	LaRC Sybase Staging Server
922-TDS-017	SMC Sybase Staging Server
922-TDV-117	VATC-SMC Sybase Staging Server

922-TDE-018	EDC WKS Server
922-TDG-018	GSFC WKS Server
922-TDL-018	LaRC WKS Server
922-TDS-018	SMC WKS Server
922-TDV-118	VATC-SMC WKS Server
922-TDE-019	EDC DIP Server #2
922-TDG-019	GSFC DIP Server #2
922-TDL-019	LaRC DIP Server #2
922-TDL-020	LaRC Science Processor # 2
922-TDE-021	EDC AIT Server
922-TDG-021	GSFC AIT Server
922-TDL-021	LaRC AIT Server
922-TDS-021	SMC AIT Server
922-TDV-121	VATC-SMC AIT Server

### **2.2.1 Other Related Documents and Documentation**

205-CD-004	Science User's Guide and Operations Procedures Handbook (Release B.0) for the ECS Project
311-CD-109	Subscription Server Database Design and Schema Specifications for the ECS Project
313-CD-006	CSMS/SDPS Internal Interface Control Document for the ECS Project
333-CD-100	SDP Toolkit User's Guide for the ECS Project
193-801-SD4	PGS Toolkit Requirements Specification for the ECS Project (a.k.a. GSFC 423-06-02)
193-WP-118	Algorithm Integration and Test Issues, White Paper for the ECS Project
194-WP-925	Science Software Integration and Test White Paper for the ECS Project
423-16-01	Data Production Software and Science Computing Facility (SCF) Standards and Guidelines
IMSV0-PD-SD-002	Messages and Development Data Dictionary for v5.0 IMS Client v1.0.14 950928

COTS	XRP-II Manual
RFC	793 Transmission Control Protocol
RFC	768 User Datagram Protocol
RFC	791 Internet Protocol
RFC	1597 Address Allocation for Private Internets
	WWW page <a href="http://cmdm.east.hitc.com/baseline">http://cmdm.east.hitc.com/baseline</a>

## 2.3 Information Documents Not Referenced

The documents listed below, while not directly applicable, help in the maintenance of the delivered software.

423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System Core System
540-022	Goddard Space Flight Center, Earth Observing System Communications System Interface Requirements Document
560-EDOS-0211.0001	Goddard Space Flight Center, Interface Requirements Document between EDOS and the EOS Ground System

### Discover

Discover is an information system for software engineering that transforms a code base into a tangible asset by enabling a software engineer's code comprehension, analysis of impact to code, and automated support of metrics collection. Discover starts with the creation of an Information Model, a highly associative database. The Information Model stores and tracks every entity, attribute and relationship between software objects. The Discover products do leverage off the Information Model to provide a variety of graphical and narrative development, engineering analysis, and quality assessment tools. The use of Discover on the ECS Program has been customized to take advantage of a selected set of Discover tools. However, the broad spectrum of tools is available for the more experienced user to use. The major activities provided for use by the user are:

1. Basic Navigation and Query – How to navigate in the Discover environment, taking advantage of the query mechanisms provided by the Discover Browser.
2. Results Collection – How to make query results logical groupings (groups) to assist in better understanding and management of system components.
3. Graphical Representations – How to use the graphical views to understand the relationships of code, which include:

Call Trees – Header file or function calling relationships

Outline – Representation of the code Structure

Flowchart – Overview of the program flow which also depicts complexity

Class Inheritance Diagrams – Shows class hierarchy according to a particular class

Entity Relationship Diagram (ERD) – A methodology independent representation of the relationships between C++ classes similar to object diagrams

Graphs – Shows the possible paths between two functions.

4. Impact Analysis – How to use the ECS customized “Modified Entities Report” which is a single push button action to determine what has been changed, the extent of the change, and the quality of the change made by a software engineer.

Detailed instructions for the use of the Discover tool are provided in the Discover User Training Version 5.1 slide presentation.

### **ABC++**

ABC++ is a C++ program that creates on-line and hard copy documentation output for C and C++ programs by analyzing the header and source code (compiled using the same switches as for a C/C++ compiler) and by extracting comments from it. ABC++ uses a top-down recursive parser with multi level look-ahead. It implements its own version of the ANSI C/C++ preprocessor in order to obtain maximum ability to associate comments with declarations and to correlate its parse tree with the original code. It uses ANSI standard C++ libraries, with provision for minor variations between Unix and other operating systems and has been built on a variety of computer platforms including Linux, Sun, SGI, HP, DEC, AIX, OS/2, and Windows 95/NT. For each header file encountered in compilation, the declarations of classes, functions, variables, constants, templates, and macros are catalogued, forming a reference manual by which the various components can be located easily. Comments are associated with their declarations and included in this reference manual. The same is done for each source file that does not have a header (such as a “main” module). Hyperlinks allow you to jump from class names used as object types, return types, and parameter types in a declaration to the documentation generated for those classes. The user documentation for ABC++ can be accessed through the Universal Resource Locator (URL) <http://ecsdocs.east.hitc.com:88/abc> and a user manual can be found within this documentation.

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## 3. System Description

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### 3.1 Release 5A Objectives

#### 3.1.1 Release 5A Capabilities

The ECS capabilities are developed in increments called formal releases. Release 5A, which is controlled by Configuration Management, provides capabilities to support the ingest and archival of raw data obtained from the EOS AM Mission spacecraft 1, morning equator crossing spacecraft series (AM-1), and the Land Remote-Sensing Satellite (Landsat 7). Other capabilities provided by Release 5A include processing the data obtained, distributing raw or processed data as requested, quality assurance of processed data, supporting communication networks, and systems monitoring via interfaces with the ECS operations staff.

Release 5A capabilities include:

- ingest and archival of AM-1 and other science and engineering data from the EOS Data and Operations System (EDOS) and Landsat 7 Level 0 Reformatted (LOR) data from the Landsat 7 Processing System (LPS)
- ingest of Product Generation Executive (PGE) software from a Science Computing Facility (SCF) either electronically or via media tape
- archival, production, and Quality Assurance (QA) processing of AM-1 science data products, science software integration and test, and the associated communications network interfaces with the SCF
- operator interfaces for production and resource planning
- directory and inventory search, including a user browse capability via the Version Zero (V0) System user interface
- receiving requests for science data products and distributing science data products via FTP and 8mm tape
- interfacing with the Advanced Space-borne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS) for the submission of Data Acquisition Requests (DARs) for data collection by the ASTER instrument aboard the AM-1 spacecraft
- ingest of ASTER Level 1A/1B data from the ASTER GDS
- managing the startup and shutdown of system network components, user registration and profile administration, database and archive administration, system data and file back-up and restores, system performance tuning and resource usage monitoring, and other routine operator duties
- delivery of Terra's (AM-1) ancillary data files for use at other DAAC sites

- spatial container changes for ASTER L1A/L1B from bounded rectangle to gpolygon
- ingest of FDS (formerly FDD) orbit data via polling without DR
- ingest of SAGE III MOC granules into the Science Data Server via SIPS interface
- direct insert of SAGE III SCF granules into the Science Data Server via polling with DR
- ingest of DAS HDF EOS data via standard polling with DR
- ingest standard ECS products, including LaTIS, MODAPS, and MOPPITT SCF via the SIPS interface
- ingest data resident in the SDPS across a mode in the same DAAC or across DAACs
- direct insert of ASTER 14 DEM granules into the Science Data Server via polling with DR
- mapping of data collection to information manager
- editing of ECS core attribute values
- consolidation of trouble tickets using the Remedy Tool
- fault recovery for mode management
- startup and shutdown of an entire mode
- encryption of the subscription server FTP password in the Science Data Server database
- support of DAR and DAR status between the ECS Java DAR Tool and the ASTER GDS via the MOJO Gateway
- scheduling and processing ASTER requests on a regular basis versus on demand
- support of production rules to allow multiple L0 granules as input into a single PGE
- support of production rules for most recent granule and optional DPRs
- tracking Landsat 7 order processing via MSS
- deletion of science data from the archive without deleting the corresponding metadata
- Configurable parameters to control the number of granules returned from a single search request
- handling of variations on search areas and product-specific spatial representations
- installation of ESDTs to insert and acquire archived data without the archive storage directory names
- processing of orbit, attitude, and ephemeris data into toolkit native format and HDF
- persistence of asynchronous acquire requests, which do not have callback functions
- storage of event information into the SDSRV database instead of flat files
- monitoring of the usage of memory by the Science Data Server

ECS Release 5A has been distributed to five site locations including: the System Management Center (SMC), located at the Goddard Space Flight Center (GSFC), the DAACs at GSFC, Langley Research Center (LaRC), and the Earth Resource Observation System (EROS) Data Center (EDC) and the National Snow and Ice Center (NSIDC).

The ECS Release 5A communications network includes the National Aeronautics and Space Administration (NASA) Science Internet (NSI) and the EOSDIS Backbone Network (EBnet). These portions of the network are physically located at the SMC and at the DAAC sites. The communications network connects ECS to data providers at the EDOS, the Landsat 7 Processing System (LPS), the LaRC TRMM Information System (LaTIS), NOAA Affiliated Data Center (ADC), and the EOSDIS Version 0 system.

The data users for Release 5A are the science user community connected to the three DAACs, the SCFs, and the ASTER GDS.

### **3.1.2 Release 5A Instrument and DAAC Support**

ECS Release 5A supports the following instrument data operations and DAACs.

- AM-1 Support:

ECS Release 5A supports archiving, processing, and distributing instrument data from a complement of five AM-1 instruments. These instruments are ASTER, Clouds and Earth's Radiant Energy System (CERES), Multi-Imaging SpectroRadiometer (MISR), Moderate-Resolution Imaging SpectroRadiometer (MODIS), and Measurements Of Pollution In The Troposphere (MOPITT).

ECS Release 5A provides a communications network and data/information management support for:

- ASTER instrument data including the receipt of ASTER level 1 data on magnetic tape at EDC from Japan, and the production and distribution of higher level ASTER products by EDC.
- CERES instrument data including the receipt of CERES level 0 data and an interface with LaTIS to provide L0 data and ancillary data and receive higher level products via the SIPS interface.
- MISR instrument data including the receipt of MISR level 0 data and the LaRC archive, production, and distribution of levels 1, 2 and 3 data and data products.
- MODIS instrument data including level 0 data: archive, production, and distribution of levels 1A and 1B including distribution of the 1A and 1B data to the MODIS Data Processing System (MODAPS) for higher level processing. The receiving of higher level MODIS products from MODAPS via the SIPS interface is also supported.
- MOPITT instrument data including the receipt of MOPITT level 0 data, and the LaRC archive, production, and distribution of levels 1, 2 and 3 data. During the initial period after launch, the MOPITT higher level products are generated at the SCF and provided to the ECS via the SIPS interface.

- Landsat 7 Support:
  - ECS Release 5A provides a repository for Landsat 7 LOR (L0 reformatted) data. The ECS communications network includes interfaces with the Landsat 7 system elements, the Mission Management Office (MMO), and the Ground Data Processing System (GDPS). The GDPS is composed of the Landsat 7 Processing System and the Image Assessment System (IAS).
  - The ECS network interfaces are needed to receive product cost information, exchange of registration services, and system management status from the MMO. The ECS receives and stores Landsat 7 level 0R data, metadata, and browse data from the LPS. The ECS also receives calibration data and metadata from the IAS. ECS network interfaces for data search, data order, and data distribution services to Landsat 7 users are also provided in Release 5A.
- SAGE III Support
  - The ECS Release 5A supports receiving SAGE III Level 0 data from the SAGE III MOC, provides the Level 0 data to the SAGE III SCF, and receives higher level products from the SCF via the SIPS interface.

## 3.2 Release 5A Architecture Overview

The ECS Release 5A architecture comprises the logical items listed here. Commercial Off The Shelf (COTS) software and hardware are used, to the extent possible, to implement the ECS functionality of these logical items.

- System
- Segments
- Subsystems
- Computer software configuration items (CSCIs)
- Computer software components (CSCs)
- Processes

ECS Release 5A was built of the following two segments.

- CSMS – Communications and Systems Management Segment
- SDPS – Science Data Processing Segment

Each segment was in turn built of the following subsystems.

- CSMS:
  - CSS - Communications Subsystem
  - ISS - Internetworking Subsystem
  - MSS - System Management Subsystem

- SDPS: CLS - Client Subsystem  
DMS - Data Management Subsystem  
IOS - Interoperability Subsystem  
DSS - Data Server Subsystem  
PLS - Planning Subsystem  
DPS - Data Processing Subsystem  
INS - Ingest Subsystem

**System:** A stand-alone composite of hardware, facilities, material, software, services, and personnel required for operation based upon a defined set of system level requirements.

**Segment:** A logical and functional set of related capabilities, implemented with COTS hardware and COTS and custom developed software to satisfy a defined set of system level requirements.

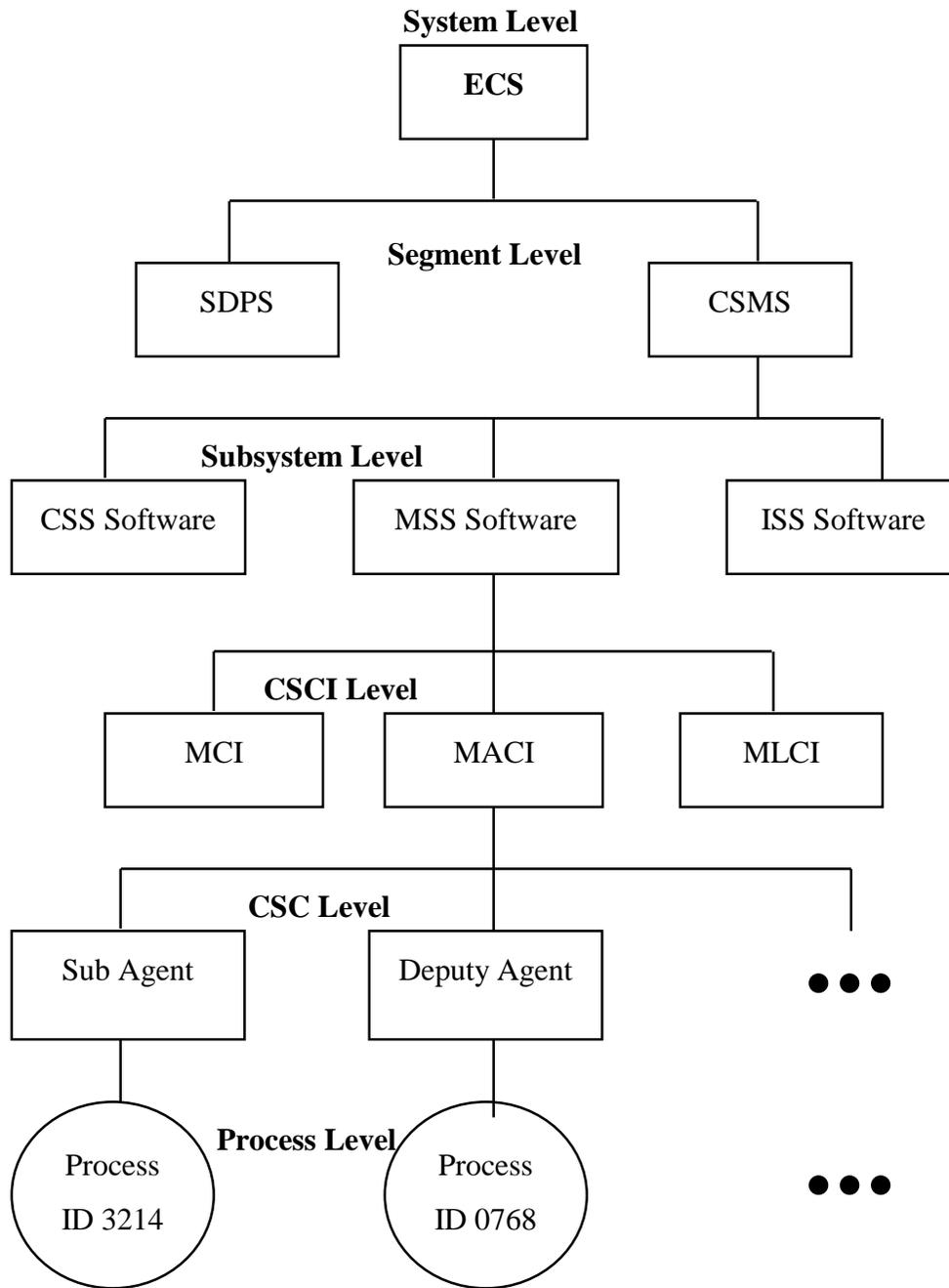
**Subsystem:** A logical set of related capabilities, implemented with COTS hardware and COTS and custom developed software to satisfy a defined subset of system level requirements.

**CSCI:** A logical set of related capabilities, implemented with COTS and custom developed software to satisfy a defined subset of system software requirements.

**CSC:** A logical set of related capabilities, implemented with COTS and custom developed software to satisfy a defined subset of software requirements.

**Process:** A logical set of software, written in a specific order and in a defined manageable size to manipulate data as part of a product-generating algorithm. A process can be separately compiled but is not always separately executable.

Figure 3.2-1 is a hierarchical software diagram. The hierarchical software diagram depicts an example of the decomposition levels used in the ECS design and described in this document. The diagram is also a graphical representation of the terms just described.

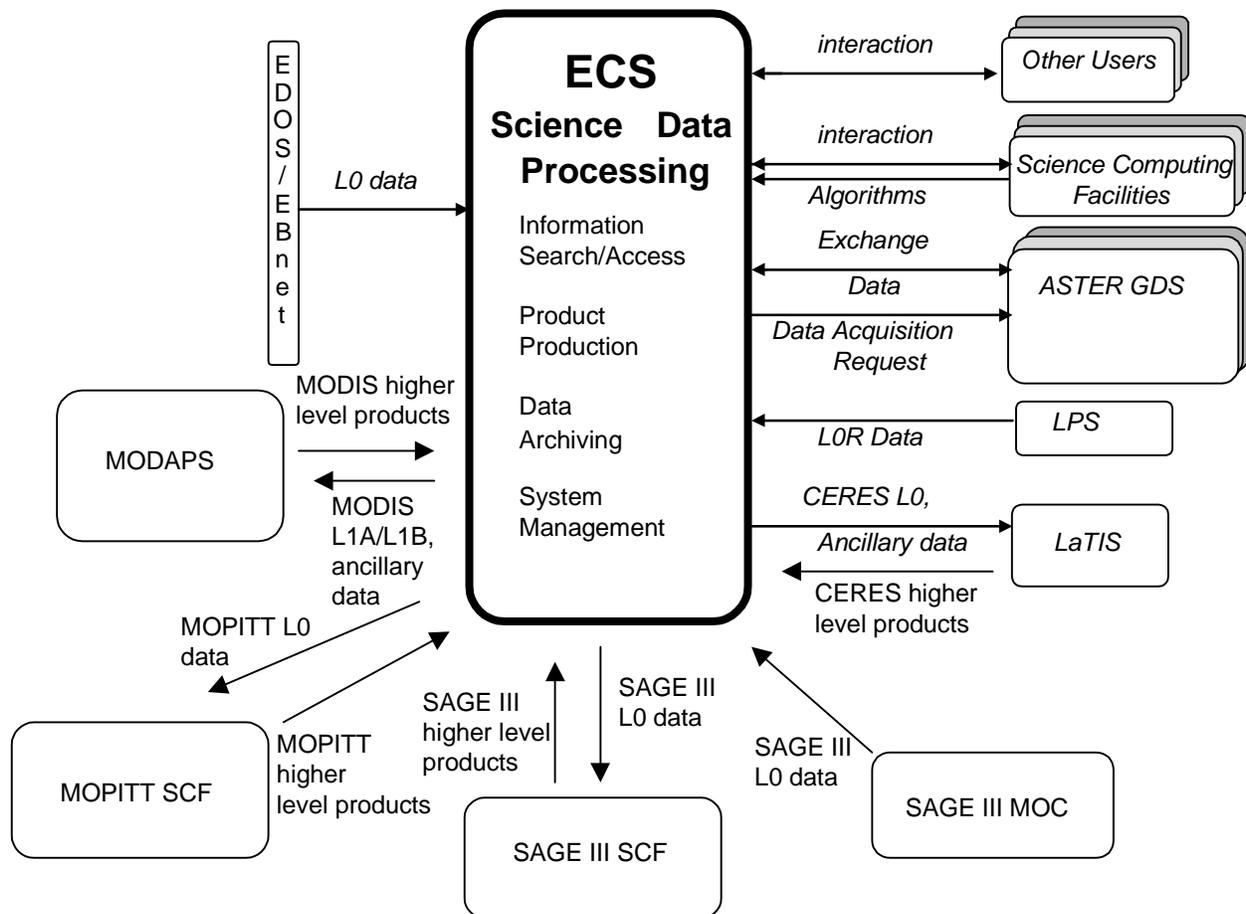


**Figure 3.2-1. Example Hierarchical Software Diagram**

### **3.2.1 Release 5A Context Description**

ECS Release 5A provides the capability to collect and process satellite science data as depicted in Figure 3.2.1-1.

The Science Data Processing and Communications and Systems Management are the two segments of the ECS Release 5A described in this document. The Science Data Processing Segment (SDPS) provides science data ingest and production, search and access functions, data archive, and system management capabilities. The SDPS receives AM-1 Level 0 science data from EDOS and LOR Data from the Landsat 7 Processing System. The SDPS exchanges data with the ASTER GDS and other affiliated data centers to obtain science and other data (i.e., engineering and ancillary) required for data production. It also connects with the ASTER GDS to submit ASTER Data Acquisition Requests (DARs) for the collection of science data by the ASTER instrument. Science algorithms, provided by the Science Computing Facilities (SCFs), are used in data production to transform data into higher level products (Level 1 to Level 4 products) for research. The ECS project uses SCF expertise to support the Quality Assurance activities of using the results of the Science Software Integration and Test (SSIT) activities to process data and verify the data production science algorithms prior to actual data production. The Communications and Systems Management Segment (CSMS) provides the communications infrastructure for the ECS and systems management for all of the ECS hardware and software components. The CSMS provides the interconnection between users and service providers within the ECS, transfer of information between subsystems, CSCIs, CSCs, and processes of the ECS.



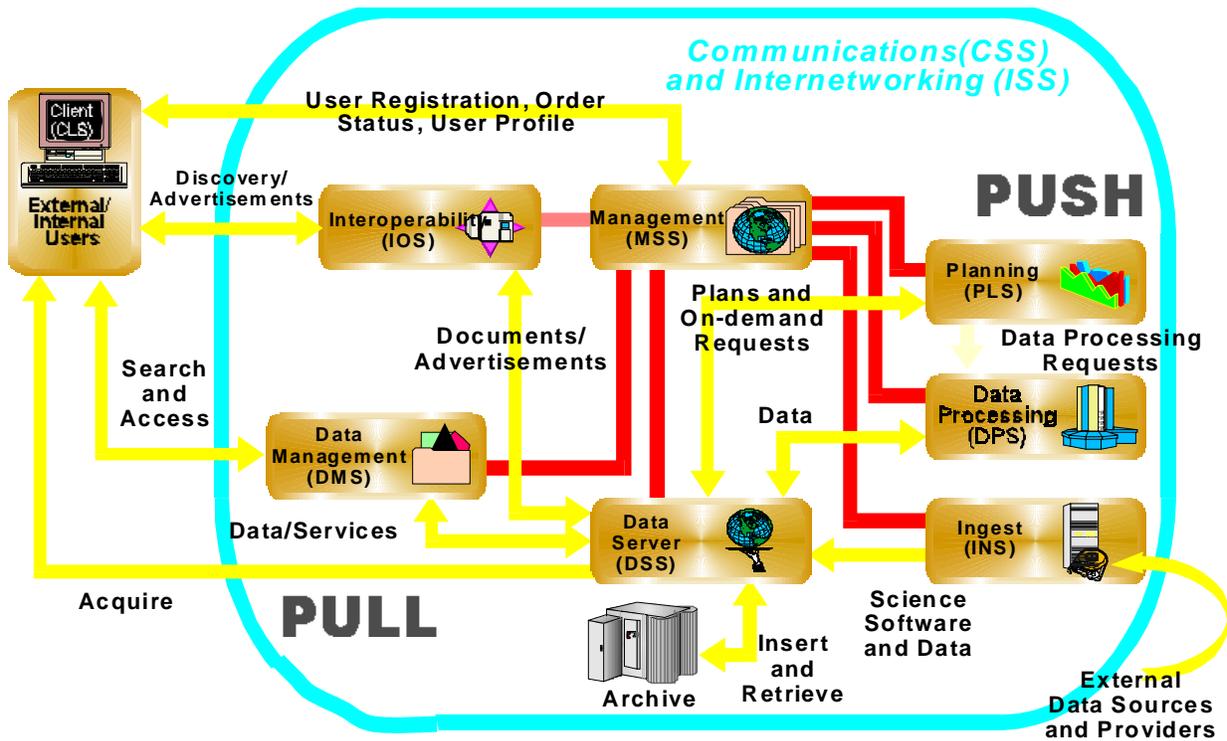
**Figure 3.2.1-1. Release 5A Context Diagram**

The remaining sections of this document provide an overview of the ECS Release 5A design and as such do not deal specifically with the configuration of components at each EOSDIS site. For more information on the site unique configurations, refer to the 920-series of General documents. Each of the segments consists of subsystems as specified in Section 3.2.

### 3.2.2 Release 5A Architecture

#### 3.2.2.1 Subsystem Architecture

The ECS SDPS subsystems are depicted in Figure 3.2.2.1-1. A subsystem consists of the Commercial Off The Shelf (COTS) and/or ECS developed software and the COTS hardware needed for its execution. This document describes the software and hardware components of each subsystem. However, since the hardware configurations differ between the sites, the hardware descriptions in this document are at a generic level. Specific hardware and network configurations for each site are documented in the 921-series Network Infrastructure documents.



**Figure 3.2.2.1-1. Subsystem Architecture Diagram**

As shown in the subsystem architecture diagram, SDPS Release 5A subsystems can be grouped into a 'Push' or 'Pull' category of functionality with the exception of DSS. The DMS and the IOS on the 'Pull' side of ECS also use the DSS functionality described on the 'Push' side of the ECS architecture. Data capture (ingest of data), storage management, planning and data processing of satellite or previously archived data from other sites make up the 'Push' side of the ECS architecture/design and consists of:

1. The DSS with the functions needed to
  - archive (insert) science data
  - search for and retrieve archived data
  - manage (create and delete items from) the archives
  - stage (store on physical media temporarily) data resources needed as input to data processing or resulting as output from their processing execution

2. The INS with interfaces to external suppliers (such as EDOS and LPS) to:
  - transfer data into SDPS and temporarily store the data
  - provide staging capabilities for data waiting to be archived
  - provide operator interfaces for managing ingest operations
3. The DPS and PLS with:
  - DPS dispatching and monitoring the execution of the science software, and interfaces to DSS to stage the input data needed and archive the generated data
  - PLS providing long and short term planning of science data processing of the production environment and production resources

Information search and data retrieval makes up the ‘Pull’ side of the ECS architecture/design and consists of:

1. The CLS, DMS, and IOS with:
  - CLS providing user interfaces for data search and retrieval to science users and operators
  - DMS providing support for data search and retrieval across all ECS sites in conjunction with the DSS at each site. The DMS also provides a gateway as the interface to the Version 0 (V0) Information Management System (IMS) using the V0 IMS protocol
  - IOS managing advertisements of data and services it receives from the DSS or non-ECS users via the operations staff. IOS makes the advertisements available via a World Wide Web (WWW) interface for searching and browsing. Other SDPS subsystems (i.e., CLS, PLS, DPS, DMS, and INS) use IOS to determine the location of data and the services, offered by the DSS, for a particular type of data or distributed data that has been processed

CSMS – The following subsystems are the CSMS subsystems, which interact with and support the SDPS to complete the ECS architecture.

2. The MSS with:
  - hardware and software baseline and configuration management
  - trouble ticketing and nonconformance report (NCR) tracking
  - system start-up and shut-down
  - fault and performance monitoring for networks, platforms, and software applications
  - user account management and user order tracking

3. The CSS with:
  - Distributed Computing Environment (DCE) using Transmission Control Protocol/Internet Protocol (TCP/IP) for the network communications stack.
  - Libraries with common software mechanisms for application error handling, aspects of recovering client/server communications; Universal References to distributed objects and interfaces to e-mail, file transfer and network file copy capabilities.
  - External gateways to translate from the CSMS internal protocols, based on DCE, to protocols acceptable by external systems such as ASTER GDS and Landsat 7 LPS and vice versa.
4. The ISS with:
  - Networking hardware devices (e.g., routers, switches, hubs, cabling, etc.) and their respective embedded software. For more information on site unique configurations, refer to the 920-series of General documents.

### **3.2.2.2 Multi-Site Architecture**

ECS Release 5A is distributed to five sites specified in Section 3.1.1. Each site is identified and its operational capabilities follow.

1. EDC DAAC capabilities include:
  - ingest of ASTER Level 1A / 1B and Landsat 7 Level 0R data, with ancillary data needed for production
  - production, archival and distribution of ASTER products
  - archival and distribution of Landsat 7 0R data
  - Receipt of higher level MODIS land products from MODAPS, via the SIPS interface, for archival and distribution
2. GSFC DAAC capabilities include:
  - ingest of MODIS Level 0 data and related ancillary data
  - production, archival and distribution of the level 1A and 1B including the distribution of the level 1A, 1B and ancillary data to MODAPS for higher level processing
  - Receipt of higher level MODIS atmospheric and ocean products from MODAPS, via the SIPS interface, for archival and distribution
3. LaRC DAAC capabilities include:
  - ingest of CERES, MISR and MOPITT Level 0 and related ancillary data
  - production, archival, and distribution of the higher level products for MISR
  - data forwarding support for CERES through LaTIS and MOPITT to the SCF

- Receipt of higher level CERES products from LaTIS, via the SIPS interface, for archival and distribution
  - Receipt of higher level MOPITT products from the MOPITT SCF, via the SIPS interface, for archival and distribution
  - Receipt of SAGE III Level 0 from the SAGE III MOC and the distribution of this data to the SAGE III SCF for processing
  - Receipt of higher level SAGE III products from the SCF, via the SIPS interface, for archival and distribution
4. NSIDC DAAC capabilities include:
- Receipt of higher level MODIS snow and ice products from MODAPS, via the SIPS interface, for archival and distribution
5. SMC capabilities include:
- Overall ECS system performance monitoring, coordinating, and setting system-wide policies and priorities.

## 4. Subsystem Description

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### Design Description Organization and Approach

This section presents a subsystem-by-subsystem overview description of the “as-built” ECS. The current detailed design information is provided for the Hardware Configuration Items (HWCI), Computer Software Component Items (CSCI), and Computer Software Components (CSC) for each subsystem and is being delivered to the DAACs in drop increments.

The SDPS and CSMS subsystem descriptions include:

- Subsystem functional overviews with a subsystem context diagram and a table of interface event descriptions
- CSCI descriptions with a context diagram and a table with interface event descriptions
- Architecture Diagrams, Process Descriptions, and Process Interface Event Tables. The Architecture Diagrams show the processes of the CSCI/CSC and how these processes connect with other CSCIs and CSCs of the same subsystem and the interfaces with other subsystems and external entities such as Operations, External Data Providers and Users. These processes and the supporting libraries are listed in Appendices A (Software Process) and B (Software Libraries).
- Data Store descriptions for each CSCI in each SDPS/CSMS subsystem. The Data Stores are identified with the software name and shown in the architecture diagrams either as single data stores or as a group of data stores with a generic name such as “Data Stores” or “database.”
- Hardware descriptions of the subsystem hardware items and the fail-over strategy.

The convention used for Context and Architecture diagrams includes using circular and elliptical shapes to show the subject subsystems, CSCIs, CSCs, or processes (with name in bold) and squares and rectangles to show other subsystems, CSCIs, CSCs, and processes. Data stores are shown using the data store or database name with horizontal lines, one above and one below the name. An interface event is data, a message (which includes a notification or status), command/request or status code passed between subsystems, CSCIs, CSCs, or processes. The convention used to identify events is a straight line between two objects labeled with a phrase beginning with an action-oriented word to best describe the event. The arrow on the event line indicates an origination point and to where the event is directed. The response to this action is not shown in the diagram, in most cases, for simplification. However, the response is described in the description column of the interface event tables. These conventions are consistent with other ECS documentation. The convention for naming the ECS processes is *Ec* <subsystem abbreviation> meaningful name. The *Ec* identifies the process as an ECS developed process versus a Commercial Off The Shelf (COTS) product. The *subsystem abbreviations* are listed subsystem-by-subsystem.

- Ds for DSS
- Dm for DMS
- Io for IOS
- Ms for MSS
- In for INS
- Pl for PLS
- Dp for DPS
- Cl for CLS
- Cs for CSS

The *meaningful name* identifies the process and its functionality within the subsystem, CSCI, or CSC. An example is EcIoAdServer, which identifies an ECS-developed IOS process called the Advertisement Server. Any names within an architecture diagram that do not follow this convention are COTS products. COTS product names are kept for simplicity and to adhere to licensing and trademark agreements.

## 4.1 Data Server Subsystem Overview

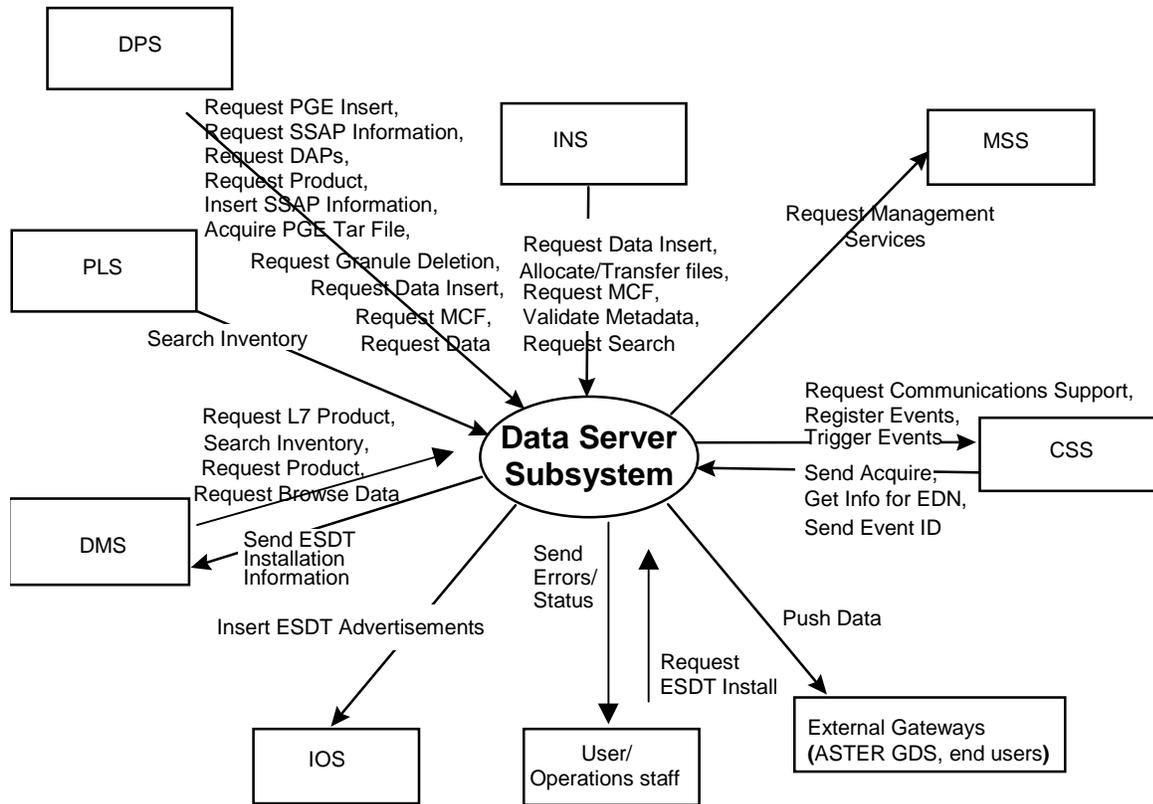
The Data Server Subsystem (DSS) provides capabilities to store, search, retrieve, and distribute earth science and related data. The DSS provides data repositories and management capabilities to safely store data on a permanent basis. The DSS stages data needed for data processing by the Data Processing Subsystem (DPS) or for retrieval by users at external locations. The DSS organizes and stores its data by data types, and provides advanced search capabilities and processing services on those data types in support of earth science data users. The DSS distributes data to users either electronically or on physical media. It also includes administrative capabilities to operate and manage its hardware and software.

DSS functionality includes:

- The DSS provides advertisements, for data types and corresponding data type services, to the Interoperability Subsystem (IOS)
- The DSS stores (archives) the Ingest Subsystem (INS) ingested data and products created via the DPS
- The DSS receives service requests for data and data type services from external service requesters including the Client Subsystem (CLS), the Data Management Subsystem (DMS), the Planning Subsystem (PLS), and the DPS
- The DSS provides (distributes) data in response to service requests, to the request originator, by means of either electronic transfer or physical media. Alternatively, the subsystem can provide references to data as a Universal Reference (UR)

### Data Server Subsystem Context

Figure 4.1-1 is the context diagram for the DSS. The diagram shows the events DSS sends to other SDPS or CSMS subsystems and the events sent to DSS.



**Figure 4.1-1. Data Server Subsystem Context Diagram**

Table 4.1-1 provides a description of the interface events shown in the Data Server Subsystem context diagram.

**Table 4.1-1. Data Server Subsystem Interface Events (1 of 3)**

Event	Interface Event Description
Request Communications Support	The CSS provides a library of services available to each SDPS/CSMS subsystem. The services required to perform the specific subsystem assignments are requested by the subsystem from the CSS. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.
Register Events	The DSS sends the subscription events for an Earth Science Data Type (ESDT) to the CSS Subscription Server when an ESDT is installed into the system.
Trigger Events	The DSS notifies the CSS (via an event trigger) when a subscription event occurs on an ESDT Service.

**Table 4.1-1. Data Server Subsystem Interface Events (2 of 3)**

Event	Interface Event Description
Send Acquire	An "acquire" (instruction to obtain data) is created by the CSS and sent to the DSS. This is similar to the "Request Product" interface event, except it applies to EDOS expedited data.
Get Info for EDN	Expedited Data Set Notification (EDN) information is obtained from the DSS, by request, and used by the CSS to send messages to users at the ASTER GDS.
Send Event ID	The CSS sends Event IDs to the DSS when ESDTs are installed.
Request Management Services	The MSS provides a basic management library of services to the subsystems, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include: <b>Lifecycle commands</b> - The MSS forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.
Request Data Insert	The INS and DPS send insert requests to the DSS for a particular file or files (into the SDPS archives). Inserted data is accompanied by metadata. The metadata is catalogued in the SDSRV inventory as a granule of a particular ESDT short name and version.
Allocate/Transfer files	The INS accesses local disks to allocate and deallocate disk space and transfer data files to the DSS. A deallocation request deletes data not marked as persistent data.
Request MCF	The INS and DPS request the Metadata Configuration File (MCF) template, from the DSS, prior to a data insert request.
Validate Metadata	The DSS validates the metadata files the INS has populated.
Request Granule Deletion	The DPS sends delete requests to the DSS for particular granules (interim data) in the metadata (the SDPS inventory).
Request Data	The DPS sends retrieval requests, to the DSS, for a particular data granule l. The product is transferred (pushed), via the File Transfer Protocol (FTP) service, onto the DPS science processor and used as input for Product Generation Executive (PGE) processing or for Science Software Integration and Test (SSIT) work.
Request ESDT Install	The Operations staff or a user sends ESDT installation information to the DSS for adding descriptor, dynamic link library (dll), version id, and archive configuration information for a new Earth Science Data Type.
Search Inventory	The PLS and DMS send Inventory Search Requests to the DSS to search the SDPS Inventory (metadata). In response, Earth Science Data Type (ESDT) Universal References (URs) for the granules are returned from the DSS.
Request Browse Data	The DMS submits requests for Browse data to the DSS to acquire reduced resolution products to support a product request.
Send ESDT Installation Information	The DSS sends ESDT installation information, to the DMS Data Dictionary, whenever a new ESDT is installed. This data consists of Valids and Collection level metadata.
Insert ESDT Advertisements	The Interoperability Subsystem (IOS) receives requests to insert advertisements for data types (ESDTs) from the DSS including both data product and signature service advertisements.

**Table 4.1-1. Data Server Subsystem Interface Events (3 of 3)**

Event	Interface Event Description
Request Search	The INS sends a search request to the DSS for a granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Request PGE Insert	The DPS sends requests to the DSS to insert data that defines a PGE and allows it to be scheduled and executed.
Request SSAP Information	The DPS sends requests to the DSS for SSAP information, including names of existing SSAPs and the information associated with a specific SSAP. In response, the DSS sends lists of SSAPs and related information.
Request DAPs	The DPS requests DAPs based on URs from the DSS. The DAPs are placed on a local DPS disk.
Request Product	The DPS sends requests, to the DSS, for particular data granules to be pushed, via the FTP service, onto the DPS science processor as input for data processing or for SSIT work. The DMS forwards product requests (to the DSS) to acquire data products for an external user.
Insert SSAP Information	The Operations Staff sends requests to the DSS to insert SSAP information, via the DPS SSAP GUI, including SSAP name, SSAP version number, PGE name, PGE version number, and SSAP Acceptance Date.
Send Errors/Status	The DSS sends error conditions and status of data distribution to the Operations staff or users.
Push Data	The DSS assembles instructions to send data to the ASTER GDS or other external users. The DSS pushes data, via the FTP service, followed by a signal file to the destination specified in an acquire instruction (by particular ESDTs that function this way).
Request L7 Product	The EOS Data Gateway within the V0 IMS requests Landsat 7 Products from the SDPS (via the DMS to the DSS) through the EDC Dorran Billing and Accounting System.
Acquire PGE Tar File	The DPS acquires a tar file for any PGE not currently local to the science processor from the DSS. The executable is extracted from the tar file and used during PGE execution.

### Data Server Subsystem Structure

The DSS is three CSCIs:

- The Science Data Server (SDSRV) CSCI manages and provides user access to collections of non-document (non hard copy) earth science data, extracts and modifies data by request, accepts browse, search, and retrieval requests from users, and catalogs data insert requests from other SDPS or CSMS CSCIs, CSCs, and processes. The SDSRV CSCI manages earth science data as logical collections of related data, via interfaces independent of data formats and hardware configurations inherent in underlying storage technologies. The SDSRV manages interactive sessions with service requesters and informs the service requester of the availability of data and services via the IOS.
- The Data Distribution (DDIST) CSCI formats and distributes data to users electronically or via physical media. The formatting process includes the layout of a sequence of files,

assembling a packing list and using Tape Archive (TAR) formats for tapes. The DDIST CSCI accepts requests from the SDSRV CSCI. The DDIST CSCI distributes staged data (data prepared for distribution), directs the Storage Management (STMGT) CSCI to transfer data either electronically or by 8mm tape, and provides a Graphical User Interface (GUI) for operations management to view, cancel, suspend/resume and change the priorities of distribution requests. Electronic distribution can be requested via an FTP push or pull. With push, the DDIST CSCI uses network resources managed by the STMGT CSCI to transfer the data to a remote destination specified by the requester. For pull, the data is placed in an area managed by the STMGT CSCI, from which the requester can retrieve the data.

- The Storage Management (STMGT) CSCI stores and manages data, and retrieves data files from the archives for other science data processing software. The STMGT CSCI provides an interface to make implemented changes in new data storage technologies transparent to users and without interfering with ECS systems outside the STMGT CSCI. The STMGT CSCI performs quality assurance processing and files recovery services. The STMGT CSCI also provides management of storage resources and prepares data for distribution.

The Data Server Subsystem hardware consists of the following four Hardware Configuration Items (HWCI)s:

- Access Control and Management

The Access Control and Management HWCI (ACMHW) is hardware to support the Ingest and Data Server Subsystems' software to directly interact with users. The ACMHW provides a level of security by isolating other hardware items from external software access.

- Working Storage

The Working Storage HWCI (WKSHW) is hardware to provide high-performance storage of large volumes of data on a temporary basis.

- Data Repository

The Data Repository HWCI (DRPHW) is hardware to provide high-capacity storage for long-term storage of data files.

- Distribution and Ingest Peripherals

The Distribution and Ingest Peripherals HWCI (DIPHW) is hardware to provide support to ingest and distribution via physical media.

Detailed information on hardware/software mapping, hardware diagrams, disk partitioning, etc., can be found in 920-TDx-00x, the 921-TDx-00x, and the 922-TDx-00x series of baseline documents.

## Use of COTS in the Data Server Subsystem

- RogueWave's Tools.h++

The Tools.h++ class libraries provide libraries of object strings and collections. These libraries must be installed for the DSS processes to run.
- RogueWave's DBTools.h++

The DBTools.h++ C++ class libraries interact with the Sybase database Structured Query Language (SQL) server and buffer the processes from the relational database used. These libraries must be installed for the Server to run.
- Rogue Wave's Net.h++

This is a C++ class library to provide an object-oriented interface to Inter-Process Communication (IPC) and network communication services. The Net.h++ framework enables developed code to be portable to multiple operating systems and network services. These libraries must be installed with the STMGT software to support interaction with other subsystems.
- Integrated Computer Solutions (ICS) Builder Xcessory  

The Builder Xcessory GUI builder tool modifies the displays. The Builder Xcessory generates the C++ code to produce the Mtool display at run time. There is no operational part of the Builder Xcessory needed at run-time.
- Sybase SQL Server  

The Sybase SQL server provides the capabilities to insert, update and delete database contents. The Sybase SQL Server must be operational to execute search and insert requests for metadata. The terms Sybase Server and Sybase SQL Server are used interchangeably in this section.
- Autometric's Spatial Query Server  

The Spatial Query Server (SQS) provides the capability to store and search spatial metadata. SQS has spatial indexing to search on spatial metadata for the SDSRV.
- Sybase Open Client / CT\_LIB  

The Sybase Open Client provides access between DSS custom code and the Sybase SQL Server DBMS.
- University of Illinois' Hierarchical Data Format (HDF)  

HDF provides EOS extended capabilities for sub-setting services with the SDSRV CSCI.
- University of Colorado's Object Description Language (ODL)  

ODL provides a general architecture, independent means of passing metadata files between subsystems.

- DCE Client

DCE Client provides DSS with communications between other subsystems. DCE can reside on one or both sides of the interface. An instance must be installed on the platform where DSS resides. Although the DCE Client is part of CSS, this COTS item must be installed for DSS to run in the SDPS operational and test environment.

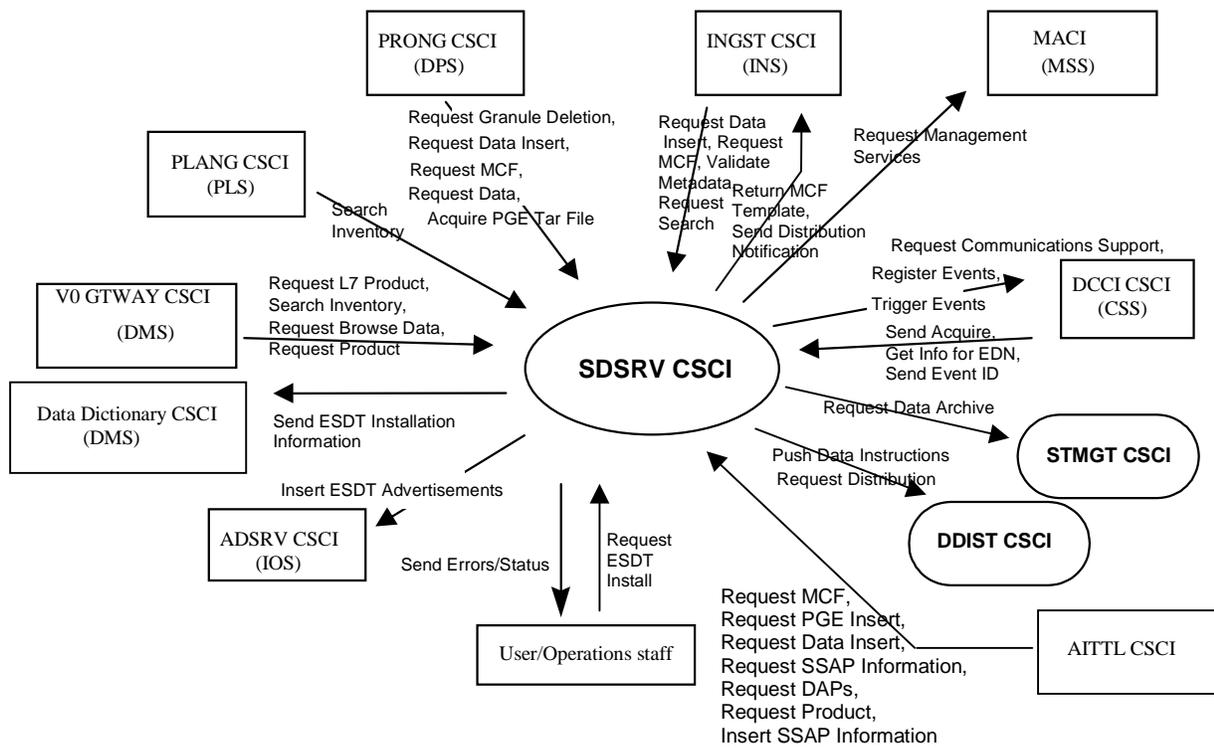
#### 4.1.1 Science Data Server Software Description

##### 4.1.1.1 Science Data Server Functional Overview

The SDSRV CSCI provides the SDPS with a catalog of Earth Science Data holdings, and the Earth Science Data Type services that operate on the data. The SDSRV CSCI provides a catalog of metadata describing the archived data holdings of the SDPS and provides mechanisms to acquire the data from the archive. The SDSRV CSCI also provides data type services on the catalog and a data reduction or sub-setting service.

##### 4.1.1.2 Science Data Server Context

Figure 4.1.1.2-1 is the SDSRV CSCI context diagram. The diagram shows the events sent to the SDSRV CSCI and the events the SDSRV CSCI sends to other CSCIs. The events have been grouped by CSCI including the Storage Management and Data Distribution functions of the DSS.



**Figure 4.1.1.2-1. SDSRV CSCI Context Diagram**

Table 4.1.1.2-1 provides descriptions of the interface events shown in the SDSRV CSCI context diagram.

**Table 4.1.1.2-1. SDSRV CSCI Interface Events (1 of 4)**

<b>Event</b>	<b>Interface Event Description</b>
Register Events	The SDSRV CSCI sends the subscription events for an Earth Science Data Type to the DCCI CSCI when an ESDT is installed into the system.
Trigger Events	The SDSRV CSCI sends event triggers when a subscription event has occurred on an Earth Science Data Type.
Send Acquire	An "acquire" (instruction to obtain data) is created by the DCCI CSCI and sent to the SDSRV CSCI.
Get Info for EDN	Information for the Expedited Data Set Notification (EDN) is obtained from the SDSRV CSCI, by request, and used by the DCCI CSCI.
Send Event ID	The DCCI CSCI sends Event IDs to the SDSRV CSCI when ESDTs are installed.
Request Granule Deletion	The PRONG CSCI sends delete requests to the SDSRV CSCI for particular granules (interim data) in the SDSRV metadata.

**Table 4.1.1.2-1. SDSRV CSCI Interface Events (2 of 4)**

Event	Interface Event Description
Request Data Insert	The INGST, PRONG, and AITTL CSCIs send requests to the SDSRV CSCI to insert a particular file or files into the archive. Inserted data is accompanied by metadata. The metadata is catalogued in the SDSRV inventory as a granule of a particular ESDT short name and version. For INGST CSCI, this data can be algorithms, Level 0 (L0) data, standard products, ancillary data, correlative data or calibration data. For the PRONG AND AITTL CSCIs, these files can be processing output, static files received with PGEs, PGE Tape Archive (TAR) files, Algorithm Packages (APs), Science Software Archive Packages (SSAPs), or Delivered Algorithm Packages (DAPs), failed PGE tar files, or production history files.
Request MCF	The INGST, PRONG, and AITTL CSCIs request the Metadata Configuration File (MCF) template, from the SDSRV CSCI, for each input or output data type, respectively, prior to a data insert request. Also, the PRONG CSCI can request from the SDSRV CSCI the MCF for a particular ESDT short name prior to a data insert request.
Request Data	The PRONG CSCI submits requests to the SDSRV CSCI for a particular data granule to be provided. The data is pushed, via the FTP service, onto the DPS science processor to be used as input for PGE processing or for SSIT work.
Search Inventory	The PLANG AND V0 GTWAY CSCIs send requests to the SDSRV CSCI to search the SDPS Inventory (archives). In response, the ESDT Universal References (URs) for the granules are returned from the SDSRV CSCI.
Request Browse Data	The V0 GTWAY CSCI submits requests for browse data to the SDSRV CSCI to acquire reduced resolution products to support a product request.
Send ESDT Installation Information	The SDSRV CSCI sends ESDT installation information, to the DDICT CSCI, whenever a new ESDT is installed. This data consists of Valid and Collection level metadata.
Validate metadata	The SDSRV CSCI validates the metadata files, which the INGST CSCI has populated.
Insert ESDT Advertisements	The ADSRV CSCI receives requests to insert advertisements for data types (ESDTs) from the SDSRV CSCI including both data product and signature service advertisements.
Request Distribution	The SDSRV CSCI sends distribution requests to the DDIST CSCI for various categories of data. The distribution services on those data are essentially identical for all data categories.
Request Data Archive	The SDSRV CSCI sends archive requests to the STMGT CSCI for various categories of data. The archive services on those data are essentially identical for all data categories and consist of requests to retrieve files, store files, copy files, or create/destroy an area on a staging disk.
Request PGE Insert	The AITTL CSCI sends requests to insert data that defines a PGE and allows it to be scheduled and executed.
Request SSAP Information	The AITTL CSCI sends requests to the SDSRV CSCI for SSAP information, including names of existing SSAPs and the information associated with a specific SSAP. In response, the SDSRV CSCI sends lists of SSAPs and related information.
Request DAPs	The AITTL CSCI requests DAPs based on URs from the SDSRV CSCI. The DAPs are placed on a local AITTL disk.

**Table 4.1.1.2-1. SDSRV CSCI Interface Events (3 of 4)**

Event	Interface Event Description
Insert SSAP Information	The Operations Staff sends requests to the SDSRV CSCI to insert SSAP information, via the SSAP GUI in the AITTL CSCI, including SSAP name, SSAP version number, PGE name, PGE version number, and SSAP Acceptance Date.
Send Errors/Status	Error conditions and status of data distribution are sent from the SDSRV CSCI (for acquires that are synchronous) or the DDIST CSCI (if the acquire is asynchronous and the DDIST CSCI gets the request) to the Operations staff or users.
Request ESDT Install	The Operations staff or a user sends ESDT installation information to the SDSRV CSCI for adding the descriptor, dynamic link library (dll), version id, and archive configuration information for a new Earth Science Data Type.
Request Communications Support	The DCCI CSCI provides a library of services available to each SDPS or CSMS CSCI. The services required to perform the specific CSCI assignments are requested by the CSCI from the DCCI CSCI. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.
Request Management Services	The MACI provides a basic management library of services to the CSCIs, implemented as client or server applications, using the DCCI CSCI Process Framework. The basic management library of services include: <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> – The MACI forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>
Push Data Instructions	The SDSRV CSCI assembles instructions to send data and sends the instructions to the DDIST CSCI. The DDIST CSCI sends a request to the STMGT CSCI to push the data, via the FTP service, followed by a signal file (to the destination specified in an acquire instruction by particular ESDTs that function this way).
Request Product	The V0 GTWAY CSCI forwards requests to the SDSRV CSCI for a product order from an external user to be distributed by the DDIST CSCI upon receipt of the data from the STMGT CSCI. The AITTL CSCI sends requests to the SDSRV CSCI to push data granules, via the FTP service, onto the DPS science processor as input for data processing or SSIT work.
Request L7 Product	The EOS Data Gateway within the V0 IMS requests Landsat 7 Products from the SDPS (via the V0 GTWAY CSCI to the SDSRV CSCI) through the EDC Dorran Billing and Accounting System.

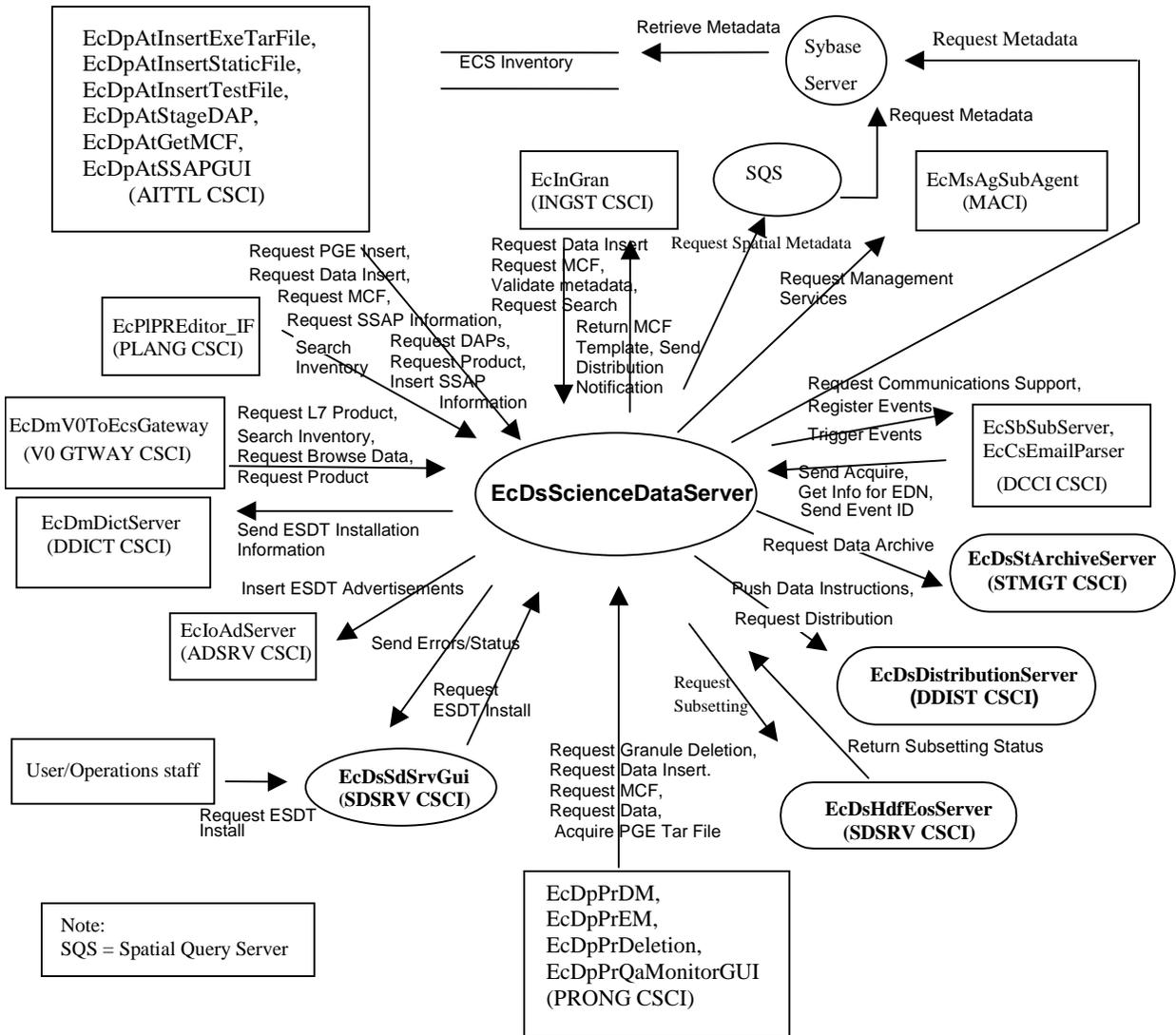
**Table 4.1.1.2-1. SDSRV CSCI Interface Events (4 of 4)**

Event	Interface Event Description
Acquire PGE Tar File	The PRONG CSCI acquires a tar file for any PGE not currently local to the science processor from the SDSRV CSCI. The executable is extracted from the tar file and used during PGE execution.
Request Search	The INGST CSCI sends a search request to the SDSRV CSCI for a granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Return MCF Template	The template is sent to INGST CSCI by the SDSRV CSCI to populate the file to create a MCF.
Send Distribution Notification	The SDSRV CSCI sends a distribution notification, via e-mail, to the INGST CSCI when data being distributed is to be ingested.

### 4.1.1.3 Science Data Server Architecture

Figure 4.1.1.3-1 is the SDSRV CSCI Architecture diagram. The diagram shows the events sent to the SDSRV CSCI processes and the events the SDSRV CSCI processes send to other processes.

The Science Data Server (SDSRV) CSCI is five processes: three SDPS custom developed processes and two COTS processes. The three SDPS custom developed processes are the Science Data Server (EcDsScienceDataServer), the Hierarchical Data Format (HDF) EOS Server (EcDsHdfEosServer) [Note: multiple HDF Server processes can be defined.], and the Science Data Server GUI (EcDsSdSrvGui). The COTS processes are the Sybase SQL Server and the Spatial Query Server (SQS). The SDSRV CSCI uses the Sybase SQL Server Database Management System (DBMS) for SDPS Inventory and Configuration data storage. The server holds Earth Science Data Type configuration information and the data catalog for all the archived products found at a DAAC.



**Figure 4.1.1.3-1. SDSRV CSCI Architecture Diagram**

#### 4.1.1.4 Science Data Server Process Descriptions

Table 4.1.1.4-1 provides descriptions of the processes shown in the SDSRV CSCI architecture diagram.

**Table 4.1.1.4-1. SDSRV CSCI Processes (1 of 2)**

Process	Type	COTS / Developed	Functionality
EcDsScienceDataServer	Server	Developed	<p>The EcDsScienceDataServer server manages collections of earth science and related data, and service requests for the storage, search, retrieval, and manipulation of data within those collections. The science data server performs the following functions:</p> <ul style="list-style-type: none"> <li>• manages earth science data as logical collections of related data, using interfaces independent of any data formats and hardware configurations provided by underlying storage technologies,</li> <li>• manages interactive sessions with users,</li> <li>• manages the processing of service requests from the DMS (VO Gateway), providing a variety of services on earth science and related data,</li> <li>• issues requests to the STMGMT and DDIST CSCIs to perform storage and distribution services in support of processing service requests,</li> <li>• provides advertisements to the IOS to announce the availability of data and services to users,</li> <li>• manages the processing of service requests from the INS and DPS to "insert" data for long-term storage and access,</li> <li>• manages the processing of service requests from the DPS to provide data to be used as input for data processing,</li> <li>• provides subscription events and event triggers to the CSS subscription server</li> <li>• provides sub-setting requests to the EcDsHdfEosServer for sub-setting science data files.</li> </ul> <p>The EcDsScienceDataServer supports:</p> <ul style="list-style-type: none"> <li>• Single requests, one at a time</li> <li>• Multiple concurrent requests</li> <li>• Asynchronous request processing</li> <li>• Request processing buffered from Remote Procedure Call (RPC) threads</li> <li>• Multiple threads within a single user session</li> </ul>
EcDsHdfEosServer	Server	Developed	<p>The EcDsHdfEosServer provides science data sub-setting capabilities for earth science data configured with a sub-setting service.</p> <p>EcDsHdfEosServer supports:</p> <ul style="list-style-type: none"> <li>• Single requests, one at a time</li> <li>• Asynchronous request processing</li> <li>• Request processing buffered from RPC threads</li> </ul>

**Table 4.1.1.4-1. SDSRV CSCI Processes (2 of 2)**

Process	Type	COTS / Developed	Functionality
EcDsSdSrvGui	GUI	Developed	The EcDsSdSrvGui provides an operator interface for : <ul style="list-style-type: none"> <li>receiving descriptor files and dynamic link libraries (dll) for configuring ESDTs into the EcDsScienceDataServer</li> <li>monitoring active EcDsScienceDataServer requests</li> </ul> The EcDsSdSrvGui supports: <ul style="list-style-type: none"> <li>Single requests, one at a time</li> </ul>
Sybase	Server	COTS	Provides the management of spatial data types of an earth science catalog of metadata for the SDPS. Includes capabilities for searching and storing the catalog.
Spatial Query Server (SQS)	Server	COTS	Provides the capability to manage spatial data types of earth science catalog metadata for the SDPS (including specialized spatial searches).

#### 4.1.1.5 Science Data Server Process Interface Descriptions

Table 4.1.1.5-1 provides descriptions of the interface events shown in the SDSRV CSCI architecture diagram.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (1 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Distribution	One per distribution request	<i>Library:</i> DsDdC <i>Class:</i> DsDdRequestMgrC	<i>Process:</i> EcDsScienceDataServer <i>Library:</i> DsSr <i>Class:</i> DsSrWorkingCollection	The EcDsScienceDataServer sends distribution requests to the EcDsDistributionServer for various categories of data. The distribution services are essentially identical for all data categories.
Register Events	One per ESDT installation	<i>Library:</i> EcSbSrSh <i>Class:</i> EcSbEvent	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDeEventCustomizer	The EcDsScienceDataServer sends the subscription events for an Earth Science Data Type to the EcSbSubServer when an ESDT is installed into the system.
Trigger Events	One per subscription event	<i>Library:</i> EcSbCI <i>Class:</i> EcCIEvent	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsBtSbsrvNotifier	The EcDsScienceDataServer sends event triggers to the EcSbSubServer when a subscription event has occurred on an Earth Science Data Type.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (2 of 11)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Send Acquire	One per acquire	<i>Library:</i> DsCI <i>Classes:</i> DsCIRequest DsCICommand DsCIESDTReferenceCollector	<i>Processes:</i> EcCsEmailParser, EcSbSubServer <i>Library:</i> EcSbSv <i>Class:</i> EcSbSubscription	An "acquire" (instruction to obtain data) is created by the EcCsEmailParser or the EcSbSubServer and sent to the EcDsScienceDataServer.
Get Info for EDN	One per request	<i>Library:</i> DsCI <i>Class:</i> DsCIESDTReference	<i>Process:</i> EcCsEmailParser	The EcCsEmailParser sends requests to the EcDsScienceDataServer for the Expedited Data Set Notification (EDN) information.
Send Event ID	One per ESDT installation	<i>Library:</i> EcSbSrSh <i>Class:</i> EcSbEvent	<i>Process:</i> EcSbSubServer <i>Class:</i> DsDeEventCustomizer	The EcSbSubServer sends Event IDs to the EcDsScienceDataServer when ESDTs are installed.
Request Data Archive	One per Archive request	<i>Libraries:</i> DsStCmn DsStSt <i>Classes:</i> DsStStagingDisk DsStStagingDiskController	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsGeESDT	The EcDsScienceDataServer sends Archive requests to the EcDsStArchiveServer for various categories of data. The archive services are essentially identical for all data categories and consist of requests to Retrieve files, Store files, Copy files, Create/Destroy Staging Disk or extend the staging disk.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (3 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Metadata	One per request to store, search, delete, update, Earth Science Metadata	<i>Library:</i> DsDb <i>Class:</i> DsDbInterface via the Sybase Open Server, SQS, and Sybase Open Client COTS	<i>Processes:</i> EcDsScienceDataServer, SQS	The EcDsScienceDataServer and SQS send requests to store, search, delete, or update Earth Science Metadata. The results are sent back to the SQS or EcDsScienceDataServer. The M&O staff must manually change a configured parameter in order for the EcDsScienceDataServer to communicate directly with the Sybase Server. The default configuration is for the EcDsScienceDataServer to communicate via the SQS to the ECS inventory.
Request ESDT Install	One per new ESDT installation	<i>Library:</i> DsAd <i>Class:</i> DsAdDataTypeCollector	Operations staff/User <i>Process:</i> EcDsSdSrvGui <i>Class:</i> DsGuSdDataType	The Operations staff or a user sends ESDT installation information for adding the descriptor, dynamic link library (dll), version ID, and archive configuration information for a new ESDT to the EcDmDictServer.
Retrieve Metadata	One to many per metadata request	<i>Libraries (Sybase):</i> Libtcl.so Libtli.so Libsybdb.so <i>Class:</i> Sybase Open Client /ct_lib	<i>Process:</i> Sybase SQL Server	The Sybase SQL Server retrieves metadata from the SDSRV Inventory database.
Request Subsetting	One per request to reduce resolution	<i>Library:</i> DsCsSh <i>Classes:</i> DsCsConformant DsCsNonConformant	<i>Process:</i> EcDsScienceDataServer <i>Classes:</i> DsESDTLsL70R DsESDTLsL70RWRS	The EcDsScienceDataServer sends requests to the EcDsHdfEosServer to reduce the resolution of an archived earth science data product using configured services for spatial / temporal reduction.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (4 of 11)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Return Subsetting status	One per sub-setting request	<i>Library:</i> DsCsSh <i>Classes:</i> DsCsConformant DsCsNonConformant	<i>Process:</i> EcDsHdfEosServer <i>Classes:</i> DsESDTLsL70R DsESDTLsL70RWRS	The EcDsHdfEosServer sends the status of sub-setting requests to the EcDsScienceDataServer.
Request Spatial Metadata	One per request to store, search, delete, or update spatial Earth Science Metadata.	<i>Library:</i> DsDb <i>Class:</i> DsDbInterface	<i>Process:</i> EcDsScienceDataServer <i>Library:</i> DpPrDssIF <i>Class:</i> DsDbInterface	The EcDsScienceDataServer sends requests to the SQS to store search, delete, or update spatial Earth Science metadata in the SDSRV database. Metadata Results are sent back to the EcDsScienceDataServer via the Sybase Server and the SQS or directly from the Sybase Server to the EcDsScienceDataServer. The results include the status of the SQL Server and SQS Server commands. The SQS handles the translation of spatial metadata data types (understood by the EcDsScienceDataServer and SQS) to relational data types (understood by SQS and the Sybase SQL Server) and vice versa.
Request Granule Deletion	One per granule delete request	<i>Library:</i> DsCI <i>Class:</i> DsCIRequest DsCICommand DsCIESDTRreference Collector	<i>Process:</i> EcDpPrDeletion <i>Library:</i> DpPrDssIF <i>Class:</i> DpPrDSSInterface	The EcDpPrDeletion sends delete requests to the EcDsScienceDataServer for particular granules (interim data) in the SDSRV archives.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (5 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Data Insert	One per data insert request from EcDpPrDM or EcInGran	<i>Library:</i> DsCI <i>Class:</i> DsCIRequest, DsCICommand	<i>Processes:</i> EcDpPrDM, EcDpPrEM, EcDpAtInsertExeTarFile, EcDpAtInsertStaticFile, EcDpAtInsertTestFile, EcDpPrQaMonitorGUI  <i>Process:</i> EcInGran <i>Library:</i> InPreprocess <i>Class:</i> InDataServerInsertionTask	The EcInGran, EcDpPrEM, EcDpAtInsertExeTarFile, EcDpAtInsertStaticFile, EcDpAtInsertTestFile, EcDpPrDM and EcDpPrQaMonitorGUI processes send requests to the EcDsScienceDataServer to insert a particular file or files into the archive. Inserted data is accompanied by metadata. The metadata is catalogued in the SDSRV inventory as a granule of a particular ESDT short name and version. For EcInGran, this data can be algorithms, Level 0 (L0) data, standard products, ancillary data, correlative data or calibration data. For the EcDpPrEM and EcDpPrDM processes, these files can be granules or PGE tar files. For the EcDpPrQaMonitorGUI, these files are metadata updates. For the EcDpAtInsertExeTarFile, EcDpAtInsertStaticFile, and EcDpAtInsertTestFile processes these files can be processing output, static files received with PGEs, PGE Tape Archive (TAR) files, Algorithm Packages (APs), Science Software Archive Packages (SSAPs), or Delivered Algorithm Packages (DAPs), failed PGE tar files, or production history files.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (6 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Product	One per product order request	<i>Library:</i> DpAtSrv <i>Class:</i> DpAtSrv	<i>Process:</i> EcDmV0ToEcsGateway  <i>Library:</i> RequestProcessing <i>Class:</i> DmGwAcquireRequest <i>Process:</i> EcDpAtStageDAP	The EcDmV0ToEcsGateway forwards requests from an external user to be distributed by the EcDsDistributionServer upon receipt of the data from the EcDsStStagingDiskServer. The EcDpAtStageDAP sends requests to the EcDsScienceDataServer for particular data granules to be pushed, via the FTP service, onto the DPS science processor as input for data processing or for SSIT work.
Request MCF	One per set of external data received by ECS	<i>Library:</i> DsCI <i>Class:</i> DsCIDescriptor	<i>Processes:</i> EcDpPrEM, EcDpPrDM, EcDpAtGetMCF <i>Library:</i> DpPrDssIF <i>Class:</i> DpPrDSSInterface  <i>Process:</i> EclnGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocessTask	The EclnGran, EcDpAtGetMCF, EcDpPrDM, and EcDpPrEM processes request the Metadata Configuration File (MCF) template, from the EcDsScienceDataServer, prior to a data insert request.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (7 of 11)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Search Inventory	One per service request	<i>Library:</i> DsCI <i>Classes:</i> DsCIESDTReferenceCollector, DsCIRequest, DsCICommand	<i>Process:</i> EcPIPReEditor_IF <i>library:</i> PICore1 <i>class:</i> PIDataType <i>Process:</i> EcDmV0ToEcsGateway <i>Library:</i> RequestProcessing <i>Class:</i> DmGwInvSearchRequest	The EcPIPReEditor_IF and EcDmV0ToEcsGateway processes send requests to the EcDsScienceDataServer to search the SDPS Inventory (archives). In response, ESDT Universal References (URs) for the granules are returned from the EcDsScienceDataServer.
Request Browse Data	One per browse request	<i>Library:</i> DsCI <i>Classes:</i> DsCIESDTReferenceCollector, DsCIRequest, DsCICommand	<i>Library:</i> RequestProcessing <i>Class:</i> DmGwBrowseRequest	The EcDmV0ToEcsGateway submits requests for browse data to the EcDsScienceDataServer to acquire reduced resolution products to support a product request.
Send ESDT Installation Information	One per new ESDT installation	<i>Library:</i> EcDmDdClient <i>Class:</i> DmDdCISchemaRequest	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDeDataDictController	The EcDsScienceDataServer sends ESDT installation information, to the EcDmDictServer, whenever a new ESDT is installed. This data consists of Valid and Collection level metadata.
Insert ESDT Advertisements	One per advertisement insert request	<i>Libraries:</i> IoAdCore IoAdSubs <i>Classes:</i> IoAdApprovedAdv IoAdGroup IoAdProvider IoAdProduct	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDeIOSController	The EcIoAdServer receives requests to insert advertisements for data types (ESDTs) from the EcDsScienceDataServer including both data product and signature service advertisements.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (8 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Send Errors/Status	Once per distribution request completion	<i>Library:</i> EcUt <i>Class:</i> EcLgErrorMsg	<i>Process:</i> EcDsScienceDataServer	Error conditions and status of data distribution are sent from the EcDsScienceDataServer (for acquires that are synchronous) or the EcDsDistributionServer (if the acquire is asynchronous and the EcDsDistributionServer gets the request) to the Operations staff or users.
Request Management Services	One service per request	<i>Library:</i> EcAgInstrm <i>Class:</i> EcAgManager	<i>Process:</i> EcDsScienceDataServer	The EcMsAgSubAgent provides a basic management library of services to the CSCIs, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include: <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> – The EcMsAgSubAgent forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (9 of 11)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Push Data Instructions	One per distribution request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Classes:</i> DsDdRequestMgrC, DsDdGranuleC	<i>Process:</i> EcDsScienceDataServer  <i>Library:</i> DsSr <i>Class:</i> DsSrWorkingCollection	The EcDsScienceDataServer assembles instructions to send data and sends the instructions to the EcDsDistributionServer. The EcDsDistributionServer sends a request to the EcDsStStagingDiskServer to push the data, via the FTP service, followed by a signal file, to the destination specified in an acquire instruction by particular ESDTs that function this way.
Request Communications Support	One service per request	To simplify the interface table for the Request Communications Support event, refer to the CSS sections of Appendix B, Software Libraries, for the libraries and classes used as the interfaces to fulfill the services requested by ECS processes.	<i>Process:</i> EcDsScienceDataServer	The DCCI CSCI Process Framework provides a library of services available to each SDPS or CSMS process. The services required to perform the specific process assignments are requested by the process from the Process Framework. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.
Validate metadata	One per data insert request.	<i>Library:</i> DsCI <i>Class:</i> DsCIDescriptor	<i>Process:</i> EclnGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocessTask	The EcDsScienceDataServer validates the metadata files that the EclnGran process has populated.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (10 of 11)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Request L7 Product	One per request	<i>Library:</i> EcDmLmClient <i>Classes:</i> DmLmCIRequest, DmLmCIRequestServer	User <i>Library:</i> DmLmExIf <i>Class:</i> DmLmInfoMgrIF	The EOS Data Gateway within the V0 IMS requests Landsat 7 Products from the SDPS (via the EcV0ToEcsGateway) through the EDC Dorrان Billing and Accounting System for users.
Acquire PGE Tar File	One per request	<i>Library:</i> DpPrDssIF <i>Class:</i> DpPrDSSInterface	<i>Process:</i> EcDpPrEM	The EcDpPrEM process acquires a tar file for any PGE not currently local to the science processor from the EcDsScienceDataServer. The executable is extracted from the tar file and used during PGE execution.
Request Search	One per input pointer in metadata or per granule pointer in linkage file	<i>Library:</i> DsCI <i>Class:</i> DsCIQuery	<i>Process:</i> EcInGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreProcessTask	The EcInGran process sends a search request to the EcDsScienceDataServer for a granule corresponding to particular ESDT short name and version, which has a particular local granule id.
Return MCF Template	One per MCF template populated	<i>Library:</i> DsCI <i>Class:</i> DsCIDescriptor	<i>Process:</i> EcInGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocessTask	The EcInGran populates the MCF template, and returns the populated MCF template to the EcDsScienceDataServer.
Send Distribution Notification	One per distribution	E-mail	<i>Process:</i> EcDsScienceDataServer	The EcInEmailGWServer receives distribution notifications, via e-mail, from the EcDsScienceDataServer.
Request DAPs	One per DAPs request	<i>Library:</i> DpAtDsrv <i>Class:</i> DpAtDsrv	<i>Process:</i> EcDpAtAcquireDAP <i>Class:</i> DpAtDsrv	The EcDpAtStageDAP requests DAPs from the SDSRV Archives based on the UR. In response, the DAPs are returned and stored on the local AITTL disk.
Request SSAP Information	One per SSAP information request	<i>Library:</i> DpAtDsrv <i>Class:</i> DpAtDsrv	<i>Process:</i> EcDpAtSSAPGui <i>Library:</i> DpAtSSAP <i>Class:</i> DpAtSSAPManager	The EcDpAtSSAPGui sends requests to the EcDsScienceDataServer for information about SSAPs, including names of existing SSAPs and the components associated with a specific SSAP.

**Table 4.1.1.5-1. SDSRV CSCI Process Interface Events (11 of 11)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request PGE Insert	One per insert request	<i>Library:</i> PICore2 <i>Class:</i> PIResourceRequirement	<i>Processes:</i> EcDpAtInsertExeTarFile, EcDpAtInsertStaticFile, EcDpAtInsertTestFile <i>Class:</i> DpAtDsrv	The EcDpAtInsertExeTarFile, EcDpAtInsertStaticFile, and EcDpAtInsertTestFile send PGE insert requests to the EcDsScienceDataServer for data that defines a PGE and allows it to be scheduled and executed.
Insert SSAP Information	One per SSAP	<i>Library:</i> DpAtDsrv <i>Class:</i> DpAtDsrv	<i>Process:</i> EcDpAtSSAPGui <i>Class:</i> DpAtSSAPManager	The EcDpAtSSAPGui sends requests to the EcDsScienceDataServer to insert new or update existing SSAP information.
Request Data	One per data granule request from DPS or DMS	<i>Library:</i> DsCI <i>Classes:</i> DsCIESDTReferenceCollector, DsCIRequest, DsCICommand	<i>Process:</i> EcDpPrQaMonitorGUI <i>Library:</i> DpPrQaMonitor <i>Class:</i> DpPrQaMonitor  <i>Processes:</i> EcDpPrDM, EcDpPrEM <i>Library:</i> DpPrDssIF <i>Class:</i> DpPrDSSInterface	The EcDpPrQaMonitorGUI sends requests to the EcDsScienceDataServer to retrieve data granules and product history information. The EcDpPrDM and EcDpPrEM processes submit requests to the EcDsScienceDataServer for a particular data granule to be provided. The data is pushed, via the FTP service, onto the DPS science processor to be used as input for PGE processing or for SSIT work.

#### 4.1.1.6 Science Data Server Data Stores

Table 4.1.1.6-1 provides a description of the data stores for the SDSRV CSCI, and the conceptual model of the data store. The physical model for the SDSRV data stores can be found in the Science Data Server Database Design and Schema Specifications for the ECS Project (CDRL 311).

**Table 4.1.1.6-1. SDSRV CSCI Data Stores**

Data Store	Type	Description
ECS Inventory	Database	<p>The ECS Inventory (archives) contains the metadata describing the earth science data for the Earth Science Data Types at a specific DAAC. The metadata describes:</p> <ul style="list-style-type: none"> <li>• Collection level information</li> <li>• Browse data</li> <li>• Science data (as granules)</li> <li>• Quality Assessments</li> <li>• Algorithm Packages</li> <li>• Delivered Algorithm Packages</li> <li>• Production History</li> </ul> <p>The ECS catalog also contains systems data for the dynamic configuration of the EcDsScienceDataServer.</p> <p>The ECS catalog also contains implementation of the “ECS Data Model” for Attribute Validates checking.</p> <p>The ECS catalog also contains system data for ESDT Configuration.</p>

## 4.1.2 Data Distribution Software Description

### 4.1.2.1 Data Distribution Functional Overview

The Data Distribution (DDIST) CSCI monitors and controls processing for distribution requests. Data Distribution processing consists of directing the STMGT CSCI to place data for distribution in working storage and creating packing lists, and directing the STMGT CSCI to copy data on to tape or push data as required via the FTP, and sending notifications for pulls completed via the FTP. Data handled electronically is either pushed via the FTP to a user-specified location or placed in a directory to be pulled. If data is to be pulled, once the data is ready, the DDIST CSCI sends an electronic message to the user providing the required information for the user to pull the data. If data is to be distributed via tape, a complete packing list is generated as well as an inventory list for each tape generated. The DDIST CSCI has a GUI interface with the administration/operations staff (Admin. /Ops). The GUI provides error conditions and status to operations staff and enables the operations staff to set parameters and control operations including suspending, canceling, and resuming requests, changing the priorities of requests, performing multiple selects, and setting threshold sizes. The DDIST CSCI provides limited automatic error response by suspending requests when most errors are encountered. The physical media type supported is 8mm tape.

The DDIST CSCI determines the number of tapes for an order, the files to go on the tape(s), generates packing lists, and tape inventory lists. The DDIST CSCI directs the STMGT CSCI to pack one tape for a given request at a time.

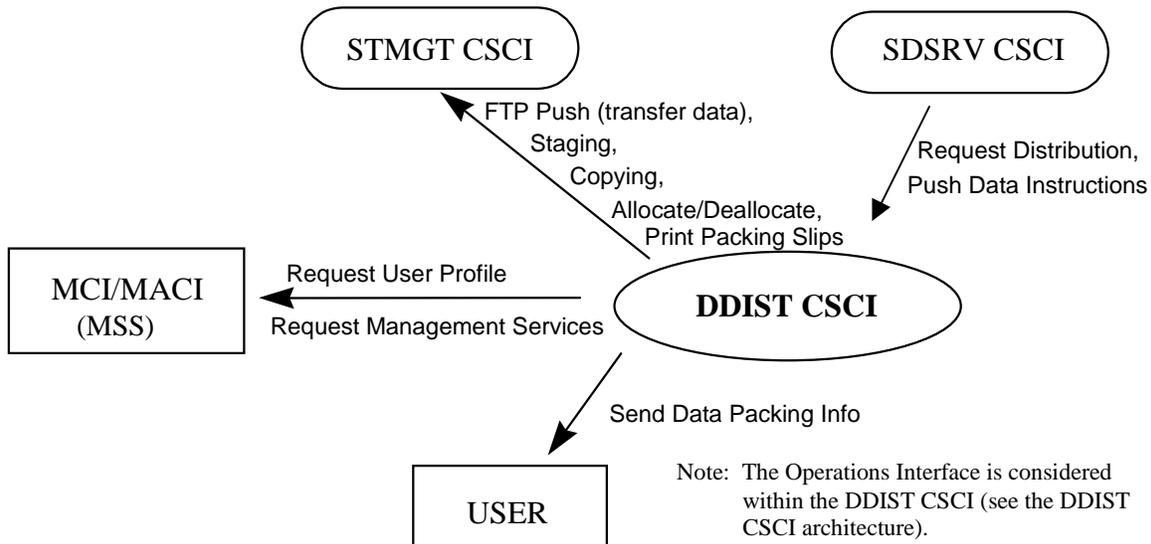
The DDIST CSCI has an interface with the following:

- STMGT CSCI
- SDSRV CSCI
- Administrator/Operations staff (through GUI or command line)
- MSS (MCI/MACI)

The Administrator/Operations staff and the SDSRV CSCI control the DDIST CSCI activities. The DDIST CSCI receives direction to perform its functions from calls to the STMGT CSCI.

#### 4.1.2.2 Data Distribution Context

Figure 4.1.2.2-1 is the DDIST CSCI context diagram. The diagram shows the events sent to the DDIST CSCI and the events the DDIST CSCI sends to other CSCIs and Users. Table 4.1.2.2-1 provides descriptions of the events (by service name) shown in the DDIST CSCI context diagram.



**Figure 4.1.2.2-1. DDIST CSCI Context Diagram**

**Table 4.1.2.2-1. DDIST CSCI Interface Events (1 of 2)**

Event	Interface Event Description
Request User Profile	The DDIST CSCI requests a user profile to obtain the e-mail addresses from the MCI. These addresses are used to send e-mail to the User.
FTP Push (transfer data)	The DDIST CSCI requests the push of granules staged by the STMGT CSCI via the FTP Service.

**Table 4.1.2.2-1. DDIST CSCI Interface Events (2 of 2)**

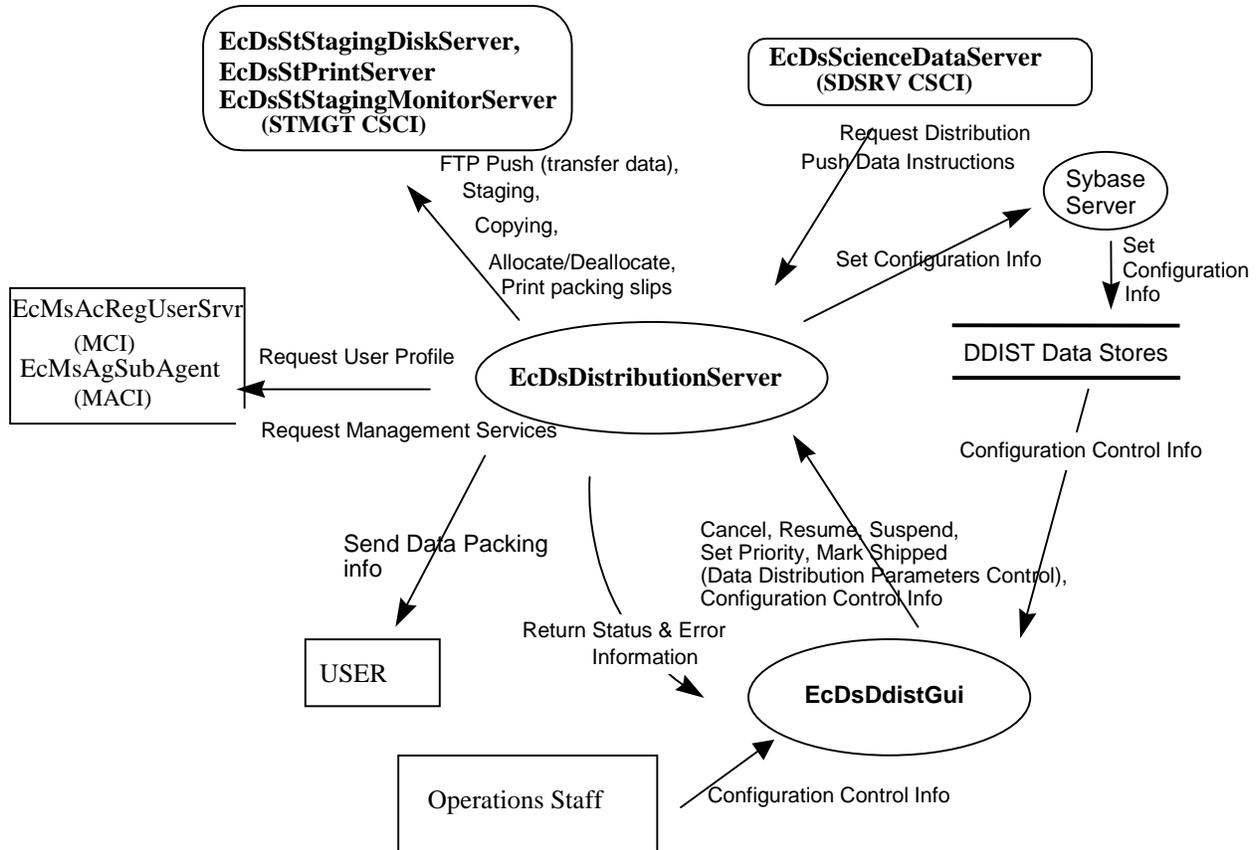
Event	Interface Event Description
Request Management Services	<p>The MACI and MCI provide a basic management library of services to the CSCIs, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> - The MACI forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul> <p>The MCI also interfaces with other CSCIs or CSCs to perform the following:</p> <ul style="list-style-type: none"> <li>• <b>User Profile Request</b> – The MCI provides requesting CSCIs or CSCs with access to user profile information such as e-mail address and shipping address to support their processing activities.</li> </ul>
Copying	The DDIST CSCI requests copy of granules staged by the STMGT CSCI.
Staging	Data is staged on disk to be pushed or distributed to a user or to be stored in the SDPS data archives (inventory).
Allocate/Deallocate	Space allocations and deallocations for data being distributed or having been distributed, respectively.
Request Distribution	A request sent from the SDSRV CSCI to the DDIST CSCI for science data or a product to be sent to a specified user.
Send Data Packing Info	Notification sent to the user via E-mail about a data product to be or has been distributed. Data handled electronically is either pushed, via the FTP service, to a user-specified location or placed in a directory to be pulled via the FTP service by the user.
Push Data Instructions	The SDSRV CSCI assembles instructions to send data and sends the instructions to the DDIST CSCI. The DDIST CSCI sends a request to the STMGT CSCI to push the data, via the FTP service, followed by a signal file, to the destination specified in an acquire instruction.
Print Packing Slips	The DDIST CSCI requests to print a file on a given staging disk. The DDIST CSCI also requests to print out a packing list file associated with a distribution request, which has been successfully completed.

### 4.1.2.3 Data Distribution Architecture

The DDIST CSCI is two SDPS developed processes with the addition of the Sybase Server COTS hardware and software process package as a data repository identified as:

- EcDsDistributionServer - Data Distribution
- EcDsDdistGui - Data Distribution GUI
- Sybase Server - Data Repository (storage area)

Figure 4.1.2.3-1 is the DDIST CSCI architecture diagram. The diagram shows the events sent to the DDIST CSCI processes and the events the DDIST CSCI processes send to other processes and the Operations staff.



**Figure 4.1.2.3-1. DDIST CSCI Architecture Diagram**

#### 4.1.2.4 Data Distribution Process Descriptions

Table 4.1.2.4-1 provides descriptions of the processes shown in the DDIST CSCI architecture diagram.

**Table 4.1.2.4-1. DDIST CSCI Processes (1 of 2)**

Process	Type	COTS/ Developed	Functionality
EcDsDistribution Server	Server	DEV	This process provides the control and coordination for data distribution through request processing.
EcDsDdistGui	GUI	DEV	This process enables operations to initiate, track, and manipulate distribution requests by using input GUI controls and database information.

**Table 4.1.2.4-1. DDIST CSCI Processes (2 of 2)**

Process	Type	COTS/ Developed	Functionality
Sybase	Server	COTS	The process contains the request list and has a set of stored procedures, which updates the request configuration, provides the request configuration to GUI operations and checkpoints the state of the CSCI for fault recovery purposes.

#### 4.1.2.5 Data Distribution Process Interface Descriptions

Table 4.1.2.5-1 provides descriptions of the interface events shown in the DDIST CSCI architecture diagram.

**Table 4.1.2.5-1. DDIST CSCI Process Interface Events (1 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request User Profile	One per address request	<i>Library:</i> DsDdSSh <i>Class:</i> DsDdMedia	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia	The EcDsDistributionServer sends requests to for user profiles to the EcMsAcRegUserSrvr. The e-mail addresses are obtained from the user profiles and used for e-mail to the user.
FTP Push (transfer data)	One per data store	<i>Library:</i> DsDdFtpPush <i>Class:</i> DsDdFtpPushMedia	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdScheduler	The EcDsDistributionServer sends requests to EcDsStStagingDiskServer to store data to a local staging disk prior to distribution.
Copying	One per data copy operation	<i>Library:</i> DsDdS <i>Class:</i> DsDdGranuleS	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules	The EcDsDistributionServer sends requests to the EcDsStStagingDiskServer to copy data from the data archives for distribution.
Staging	One per data stage operation	<i>Library:</i> DsDdS <i>Classes:</i> DsDdMediaDist DsDdGranuleS	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules	The EcDsDistributionServer sends requests to the EcDsStStagingDiskServer to allocate space on a local disk to be pushed or distributed to a user or stored in the data archives.

**Table 4.1.2.5-1. DDIST CSCI Process Interface Events (2 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Allocate/ Deallocate	One per space allocation or de-allocation	<i>Library:</i> DsDdS <i>Class:</i> DsDdMedia	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia	The EcDsDistributionServer sends requests to the EcDsStStagingDiskServer for space allocations and deallocations for data to be distributed or having been distributed, respectively.
Request Distribution	One per request for science data or product order	<i>Library:</i> DsDdSSH <i>Classes:</i> DsDdScheduler, DsDdRequestMgrReal, DsDdDCERequestMgrConcrete	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDdRequestMgrReal	The EcDsScienceDataServer sends requests to the EcDsDistributionServer for science data or a product to be sent to a specified user.
Configuration Control Info	One per configuration sent	<i>Library:</i> DsDdSSH <i>Classes:</i> DsDdDistListS, DsDdDistFileS, DsDdDistRequestS	Operations staff <i>Process:</i> EcDsDistributionServer <i>Classes:</i> DsDdConfiguration DsDdPfConfigFile	The Operations staff enters configuration control information (queues, thresholds, suspend and resume status) via the EcDsDdistGui or command line to be sent to the DDIST data stores.
Set Configuration Info	One per scheduling request	<i>Libraries:</i> DsDdSSH, DsDdC <i>Classes:</i> DsDdRequestMgrBaseC, DsDdConfiguration, DsDdDistRequestS	Operations staff <i>Process:</i> EcDsDdistGui <i>Classes:</i> DsDdConfiguration DsDdPfConfigFile	Current configuration information entered by the Operations staff via the EcDsDdistGui is sent to the Sybase database via the EcDsDistributionServer. The Operations staff can access the configuration information from the database for expedient data distribution or product order distribution scheduling.
Cancel	One per priority cancel request	<i>Library:</i> DsDdC <i>Class:</i> DsDdRequestMgrBaseC	Operations staff <i>Process:</i> EcDsDdistGui <i>Class:</i> DsGuiDistRequest	The Operations staff uses the EcDsDdistGui to cancel the priority of a request.
Resume	One per resume request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Class:</i> DsDdRequestMgrC	Operations staff <i>Process:</i> EcDsDdistGui <i>Class:</i> DsGuiDistRequest	The Operations staff uses the EcDsDdistGui to resume requests when most errors are encountered.

**Table 4.1.2.5-1. DDIST CSCI Process Interface Events (3 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Suspend	One per suspend request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Class:</i> DsDdRequestMgrC	Operations staff <i>Process:</i> EcDsDdistGui <i>Class:</i> DsGuiDistRequest	The Operations staff uses the EcDsDdistGui to suspend a request(s).
Set Priority	One per priority change	<i>Library:</i> DsDdS <i>Classes:</i> DsDdMedia, DsDdRequestListS, DsDdRequestMgrReal, DsDdDistRequestS	Operations staff <i>Process:</i> EcDsDdistGui <i>Class:</i> DsGuiDistRequest	The Operations staff uses the EcDsDdistGui to change the priority of a distribution request.
Mark Shipped	One per tape request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Class:</i> DsDdRequestMgrC, DsDdMedia	<i>Process:</i> EcDsDdistGui <i>Class:</i> DsGuiDistRequest	The Operations staff uses the EcDsDdistGui to mark the tape request for shipment.
Return Status & Error Information	One per Distribution Request	<i>Library:</i> MsAcCIntSh <i>Class:</i> EcAcOrderCMgr	<i>Process:</i> EcDsDistributionServer <i>Classes:</i> DsDdMedia, DsDdBaseQueue	The EcDsDistributionServer sends Distribution Request status and error information to the Operations staff.
Send Data Packing Info	One per distributed data location	<i>Library:</i> DsDdSSH <i>Class:</i> DsDdMedia	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia	The EcDsDistributionServer sends notifications to the user via e-mail with the location of data to be distributed or has been distributed.
Push Data Instructions	One per distribution request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Classes:</i> DsDdRequestMgrC, DsDdGranuleC	<i>Process:</i> EcDsScienceDataServer	The EcDsScienceDataServer assembles instructions to send data to the EcDsDistributionServer. The EcDsDistributionServer sends a request to the EcDsStArchiveServer to push the data, via the FTP service, followed by a signal file to the destination specified in an acquire instruction by particular ESDTs that function this way.

**Table 4.1.2.5-1. DDIST CSCI Process Interface Events (4 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Management Services	Upon initial system start-up or per CSCI request.	<i>Library:</i> EcAgInstrm <i>Class:</i> EcAgManager	<i>Process:</i> EcMsAgSubAgent	<p>The EcMsAgSubAgent provides a basic management library of services to the processes, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li> <b>Lifecycle commands</b> - The EcMsAgSubAgent forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.           </li> </ul> <p>The MCI also interfaces with other CSCIs or CSCs to perform the following:</p> <p><b>User Profile Request</b> – The MCI provides requesting CSCIs or CSCs with access to user profile information such as e-mail address and shipping address to support their processing activities.</p>
Print packing slips	As many needed per distribution request	<i>Library:</i> DsStPrinter <i>Class:</i> DsStPrinter	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDsReadytoShipQueue	<p>The EcDsDistributionServer sends requests to the EcDsStPrintServer to print a file on a given staging disk. The EcDsDistributionServer requests the EcDsStPrintServer to print out a packing list file associated with a distribution request, which has been completed successfully.</p>

### 4.1.2.6 Data Distribution Data Stores

Table 4.1.2.6-1 provides descriptions of the individual DDIST CSCI data stores entitled collectively “DDIST Data Stores” in the DDIST CSCI architecture diagram. More details on these database tables can be found in the Data Distribution Database Design and Schema Specifications for the ECS Project.

**Table 4.1.2.6-1. DDIST CSCI Data Stores**

<b>Data Store</b>	<b>Type</b>	<b>Description</b>
DsDdFile	Sybase	This data store holds the distribution files maintained/processed by the EcDsDistributionServer. Table Abbreviation "F" is used as the standard naming convention for stored procedures.
DsDdGranule	Sybase	This data store holds the distribution granules maintained/processed by the EcDsDistributionServer. Table Abbreviation "G" is used as the standard naming convention for stored procedures.
DsDdParameterList	Sybase	This data store holds the GIParameter list for each request maintained/processed by the EcDsDistributionServer. The EcDsScienceDataServer provides data from external metadata (i.e., via the MCF). Request information is initiated here first. Table abbreviation "PL" is used as the standard naming convention for stored procedures.
DsDdRequest	Sybase	This data store holds the distribution requests maintained/processed by the EcDsDistributionServer. Table abbreviation "R" is used as the standard naming convention for stored procedures.

### 4.1.3 Storage Management Software Description

#### 4.1.3.1 Storage Management Functional Overview

The Storage Management (STMGT) CSCI stores/archives, manages, and retrieves non-document earth science data and provides a user friendly graphical user interface (GUI) for operations. The STMGT CSCI manages all physical storage resources for all the DSS CSCIs and processes including: tape robotic archive, RAID disk cache, on-line storage, and peripheral devices used for ingesting data from and distributing data to physical media such as various tape sizes or drive types.

The STMGT CSCI manages both long-term high capacity archival of data (data repository) and short term/temporary storage (working storage/cache management). The STMGT CSCI controls associated file access services to the archive, handles short-term data storage needs for the INGST CSCI, the DDIST CSCI, the SDSRV CSCI, and the PRONG CSCI. The STMGT CSCI also provides access to physical media peripheral devices for both the INGST CSCI and the DDIST CSCI.

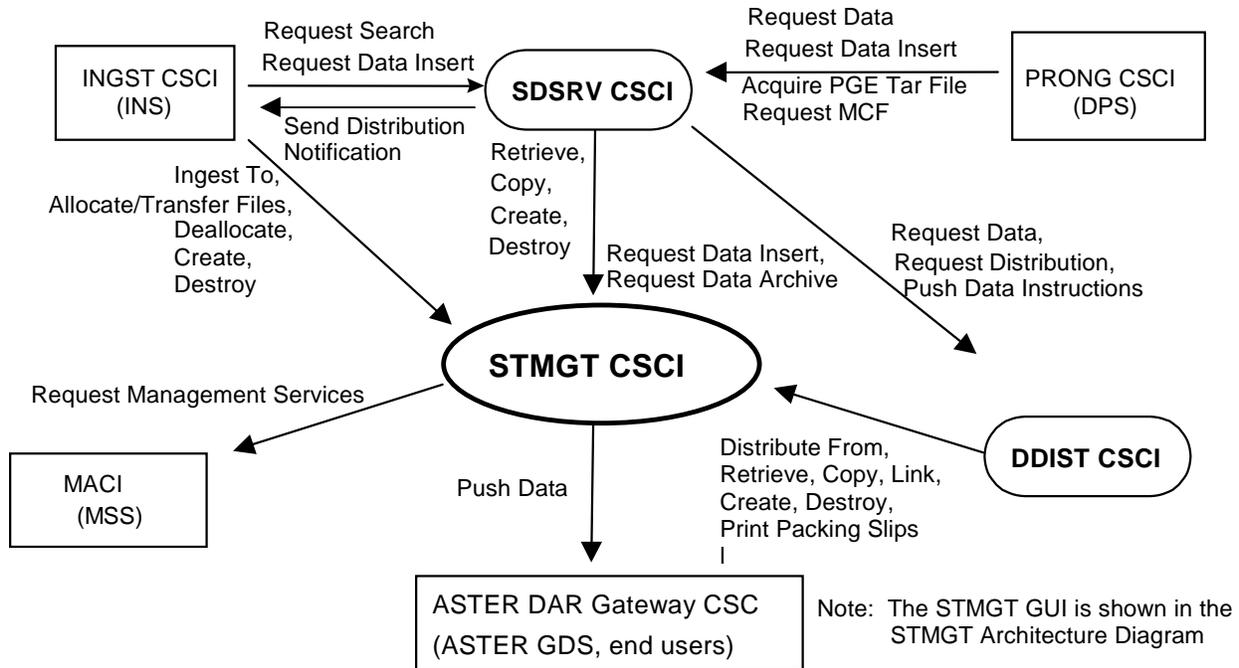
During data ingest, the STMGT CSCI provides interfaces to enable ingest and obtain access to disk space, FTP services, and shared resource peripheral devices. The STMGT CSCI copies files into the archive for permanent storage. During data distribution, the SDSRV CSCI and the DDIST CSCI copy files from the archive and allocates magnetic disk space for staging the files. The DDIST CSCI also allocates the peripheral devices shared with the INGST CSCI for copying of files to hard media, or to copy files for electronic distribution. The STMGT CSCI maintains a user pull area to allow for electronic pull distribution.

The STMGT CSCI provides retrieval and storage methods to the DDIST CSCI and the SDSRV CSCI to support storing and providing data for their client CSCIs. The PRONG CSCI is a client CSCI in both storage and retrieval requests by retrieving lower level data via FTP Push Acquire through the SDSRV and DDIST CSCIs and by storing data via insert request to the SDSRV CSCI. In addition to the product files created by the PRONG CSCI, the following types of files are stored for the PRONG CSCI: intermediate product files (interim files), production history files, metadata files, and lower level data files such as raw science data. The STMGT CSCI stores files as a result of insert requests to the SDSRV CSCI by the INGST CSCI and the PRONG CSCI. The STMGT CSCI retrieves files from the archive to satisfy sub-setting requests submitted to the SDSRV CSCI and by acquire requests submitted to the SDSRV CSCI and routed through the DDIST CSCI.

The STMGT GUI provides a simple and consistent interface to set various system parameters, identify errors, analyze the underlying problem(s), and develop corrective measures. The persistence of the data is maintained in a database through a STMGT GUI interface. The GUI provides a method to manage system resources such as servers, cache thresholds, on-line storage availability, and peripherals. The GUI also provides the operator with the capability to track the status of files, tapes, and drives for an enhanced level of quality control.

#### **4.1.3.2 Storage Management Context**

Figure 4.1.3.2-1 is the STMGT CSCI context diagram. The diagram shows the events sent to other CSCIs and events received from other CSCIs. The STMGT CSCI has a direct interface with the INGST CSCI.



**Figure 4.1.3.2-1. STMGT CSCI Context Diagram**

Table 4.1.3.2-1 provides descriptions of the interface events shown in the STMGT CSCI context diagram.

**Table 4.1.3.2-1. STMGT CSCI Interface Events (1 of 3)**

Event	Interface Event Description
Request Data Archive	The SDSRV CSCI sends archive requests to the STMGT CSCI for various categories of data. The archive services are essentially identical for all data categories and consist of requests to retrieve files, store files, copy files, or create/destroy staging disk temporary files.
Allocate/Transfer Files	The INGST CSCI sends requests to the STMGT CSCI to allocate peripheral devices for data ingesting and distribution.
Distribute From	The DDIST CSCI sends requests to the STMGT CSCI to copy files from staging disks to an allocated peripheral resource.
Ingest To	The INGST CSCI sends requests to the STMGT CSCI to copy files from peripheral resources to staging disk areas.
Deallocate	The INGST CSCI sends requests to the STMGT CSCI to deallocate previously allocated peripheral resources.
Retrieve	The SDSRV CSCI sends requests to the STMGT CSCI to retrieve data or products from the archival storage.
Create	The INGST, SDSRV, and DDIST CSCIs send requests to the STMGT CSCI to allocate an area on shared staging disks for data transfer.
Copy	The SDSRV and DDIST CSCIs send requests to the STMGT CSCI to copy data within staging disks and between staging disks.

**Table 4.1.3.2-1. STMGT CSCI Interface Events (2 of 3)**

Event	Interface Event Description
Link	The DDIST CSCI sends requests to the STMGT CSCI to link files from read-only cache to a staging disk specified in the request.
Destroy	The INGST, SDSRV, and DDIST CSCIs send requests to remove the reference to an area(s) on staging disks so the area(s) can be used again.
Print Packing Slips	The DDIST CSCI sends requests to the STMGT CSCI to print the packing list associated with distribution requests.
Request Data	The PRONG CSCI sends data retrieval requests to the SDSRV CSCI. The SDSRV CSCI sends the data retrieval request to the DDIST CSCI. The DDIST CSCI queues the request in a queue with the appropriate priority. When the request is taken from the queue, the STMGT CSCI is passed the data retrieval request from the DDIST CSCI for a particular data granule to be pushed onto the DPS science processor, via the FTP service. The data granule is to be used as input for PGE processing or for SSIT work.
Request Data Insert	The PRONG CSCI sends data insert requests to the SDSRV CSCI. The SDSRV CSCI sends the data insert request to the STMGT CSCI. The STMGT CSCI receives the data insert request for a particular file or files to be inserted into the archive, and their metadata be catalogued into the SDSRV inventory, as a granule of a particular ESDT short name and version. These files can be processing output, static files received with PGEs, PGE Tape Archive (TAR) files, APs, SSAPs or DAPs, failed PGE tar files, or production history files. The INGST CSCI sends requests to the SDSRV CSCI to insert data into the data inventory including metadata.
Acquire PGE Tar File	The PRONG CSCI sends requests to the SDSRV CSCI to acquire a tar file for any PGE not currently local to the science processor. The executable is extracted from the tar file and used during PGE execution in the PRONG CSCI.
Request Management Services	<p>The MACI provides a basic management library of services to the CSCIs, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> – The MACI forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>
Request Search	The INGST CSCI sends a search request to the SDSRV CSCI for a granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Request MCF	The template is sent to INGST CSCI by the SDSRV CSCI to populate the file to create a MCF.
Send Distribution Notification	The SDSRV CSCI sends a distribution notification, via e-mail, to the INGST CSCI when data being distributed is to be ingested.
Push Data	The STMGT CSCI pushes data (i.e., EDS), via the FTP service, to the ASTER DAR Gateway for data distribution per user request. A signal file is also sent to indicate the completion of the file transfer by particular ESDTs that function this way.

**Table 4.1.3.2-1. STMGT CSCI Interface Events (3 of 3)**

Event	Interface Event Description
Request Distribution	The SDSRV CSCI sends distribution requests to the DDIST CSCI for various categories of data. The distribution services on those data are essentially identical for all data categories. In response, data packaging information is sent back to the user via e-mail.
Push Data Instructions	The SDSRV CSCI assembles instructions to send data to users, sends the instructions to the DDIST CSCI and the DDIST CSCI sends a request to the STMGT CSCI FTP Distribution server to push the data followed by a signal file to the destination specified in an acquire instruction.

### 4.1.3.3 Storage Management Architecture

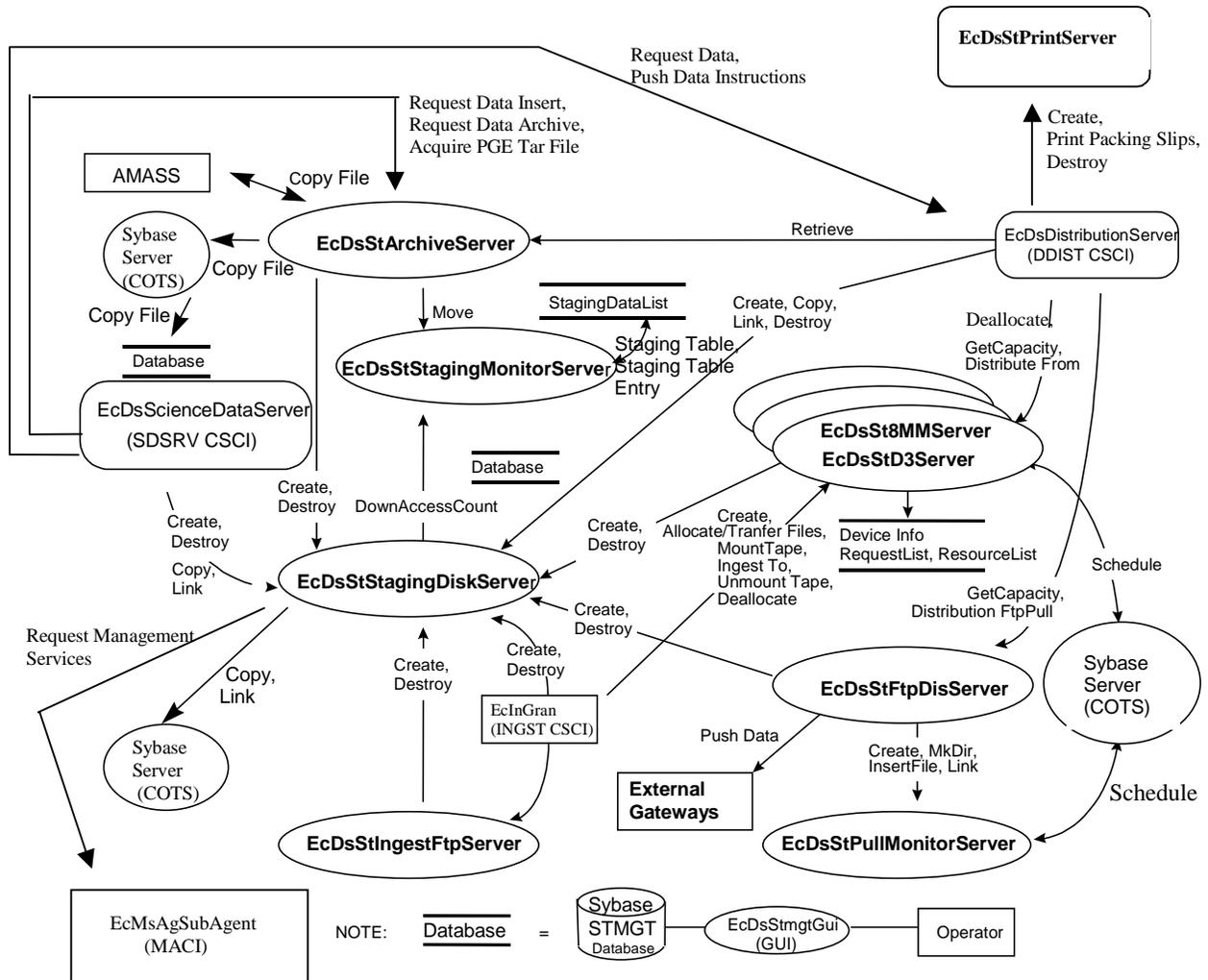
Figure 4.1.3.3-1 is the STMGT CSCI architecture diagram. The diagram shows the events sent to the STMGT CSCI processes and the events the STMGT CSCI processes sends to other processes or gateways for remote systems such as ASTER GDS. Table 4.1.3.4-1 provides descriptions of the interface events shown in the STMGT CSCI architecture diagram.

The STGMT CSCI is composed of the following processes:

- EcDsStArchiveServer, EcDsStmgtGui (used for archiving data)
- EcDsStStagingMonitorServer, EcDsStStagingDiskServer, EcDsStmgtGui (used for staging data)
- EcDsSt8MMServer, EcDsStD3Server, EcDsStIngestFtpServer, EcDsStFtpDisServer, EcDsStPrintServer, EcDsStmgtGui (used for resource management)
- EcDsStPullMonitorServer (used to monitor data transfers)

The STMGT GUI software is an interface with the database to set parameters and configurations to control the servers.

The Archival Management and Storage System (AMASS) is an automated library management system. See the AMASS R Overview by EMASS, version 4.9.1, dated August 1998, document number 600705 for more information about the AMASS management and storage system.



**Figure 4.1.3.3-1. STMGT CSCI Architecture Diagram**

#### 4.1.3.4 Storage Management Process Descriptions

Table 4.1.3.4-1 provides descriptions of the processes shown in the STMGT CSCI architecture diagram.

**Table 4.1.3.4-1. STMGT CSCI Processes (1 of 2)**

Process	Type	COTS/ Developed	Functionality
EcDsStArchiveServer	Server	Developed	An Archive Server provides access to stored data. There can be multiple archive servers running at a given site, each with its own type of data or storage media. Distinctions between Archive Servers are based on the Archive Id as part of the metadata for each ESDT. For requests retrieving files from the Archive, the staging disk is located on the same host as the Archive. For data being inserted, based on network architecture, move files to staging disk located on a node with the appropriate network access. The server id can be configured differently based on an ESDT in the SDSRV and INGEST CSCIs for flexibility.
EcDsStStagingMonitorServer EcDsStStagingDiskServer	Servers	Developed	The Staging Monitor Server manages the group of data files retrieved from the archive and placed into a cache area on a staging disk. A list of these data files is maintained so subsequent data retrieval requests are fulfilled immediately without requiring an additional archive access. The Staging Monitor Server also deletes files with zero access to prevent the cache area from becoming too full. The STMGT CSCI supports multiple staging monitors.  The Staging Disk Server manages shared disk space. The Staging Disk Server enables disk space allocations and file reservations between staging directories and from non-staging to staging directories. The STMGT software supports multiple instances of the Staging Disk Server.
(ResourceManager) EcDsSt8MMServer, EcDsStD3Server, EcDsStIngestFtpServer, EcDsStFtpDisServer, EcDsStPrintServer	Servers	Developed	The Resource Manager process schedules access to shared peripheral devices. Queues are maintained for requests based on priority and request receipt time. Each type of resource pool has its own resource manager. Individual resource manager processes identified are 8-mm tape, D3Tape, IngestFtp, DistributionFtp, and printer.
EcDsStPullMonitorServer	Server	Developed	The Pull Monitor Server manages the files in the user pull area. As files are retrieved (i.e., electronically pulled) from the user pull area by respective ECS users or as the files become stale (their time-out periods have expired), the Pull Monitor Server deletes them. Several algorithms are available for monitoring and maintaining the data levels at a specified capacity.
AMASS	Server	COTS	Provides a Unix File System interface to the robotics to control the media where data is written and read.

**Table 4.1.3.4-1. STMGT CSCI Processes (2 of 2)**

Process	Type	COTS/ Developed	Functionality
EcDsStmgtGui	GUI	Developed	This GUI enables the Operations staff to store and retrieve information from Sybase tables during the Ingest process for data storage or distribution.
Sybase	Server	COTS	The Sybase Server interacts with other STMGT CSCI servers to copy files to be stored in the ECS archives via AMASS, to store schedules for media distribution processing, to create and delete staging disk storage areas, and to allow Operations staff to insert or update data distribution information.

#### 4.1.3.5 Storage Management Process Interface Descriptions

Table 4.1.3.5-1 provides descriptions of the interface events shown in the STMGT CSCI architecture diagram.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (1 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Allocate/Transfer Files	One allocation per request	<i>Library:</i> DsStRes <i>Class:</i> DsStResourceProvider	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia <i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGran and EcDsDistributionServer send requests to the EcDsStStagingDiskServer to allocate peripheral devices for data ingesting and distribution.
Distribute From	One data copy from staging disk per request	<i>Library:</i> DsStTape <i>Class:</i> DsStTape	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules	The EcDsDistributionServer sends requests to the EcDsSt8MMServer or the EcDsStD3Server to copy files from staging disks to an allocated peripheral resource.
Ingest To	One data copy from peripheral device(s) per request	<i>Library:</i> DsStTape <i>Class:</i> DsStTape	<i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGran sends requests to the EcDsSt8MMServer or the EcDsStD3Server to copy files from peripheral resources to staging disk areas.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (2 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Deallocate	One deallocation per request	<i>Class:</i> DsStResourceProvider	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia <i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcDsDistributionServer and EcInGran send requests to the EcDsStStagingDiskServer to deallocate the previously allocated disk space areas on the local disk.
Copy file	One file copy per request	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingMonitor	<i>Process:</i> EcDsStArchiveServer <i>Class:</i> DsStArchiveReal	The EcDsStArchiveServer sends a request for a Unix file copy out of the AMASS cache by buffered read/write software. The copied file is stored in the Sybase Server database.
Request Data	One granule per retrieval request	<i>Library:</i> DsStSt <i>Class:</i> DsStArchive	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDbInterface <i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules	The EcDsDistributionServer sends requests to the EcDsStArchiveServer for a particular data granule(s) to be provided.
Request Data Insert	One granule insertion per request	<i>Library:</i> DsStSt <i>Class:</i> DsStArchive	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsGeESDT	The EcDsScienceDataServer sends requests to the EcDsStArchiveServer to insert data into the SDPS archives, including metadata.
Copy	One file copy per request	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingDisk	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules <i>Process:</i> EcDsScienceDataServer <i>Library:</i> DsGe <i>Class:</i> DsGeESDT	The EcDsDistributionServer and EcDsScienceDataServer send requests to the EcDsStStagingDiskServer to copy data within staging disks and between staging disks.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (3 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Create	One area allocation per request	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingDisk	<i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF <i>Process:</i> EcDsScienceDataServer <i>Library:</i> DsGe <i>Class:</i> DsGeESDT <i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia	The EcInGran, EcDsScienceDataServer, and EcDsDistributionServer send requests to the EcDsStStagingDiskServer to allocate areas on the local disk to store data. In addition, the EcDsStArchiveServer, EcDsStIngestFtpServer, EcDsStFtpDisServer, EcDsSt8MMServer, and EcDsStD3Server send requests to EcDsStStagingDiskServer for space allocations. The EcDsStFtpDisServer sends a request to the EcDsStPullMonitorServer for space allocation. The EcDsDistributionServer sends a request to the EcDsStPrintServer for space allocation for spooling data for printing.
Link	One link per file in a request	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingDisk	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules <i>Process:</i> EcDsScienceDataServer <i>Library:</i> DsGe <i>Class:</i> DsGeESDT	The EcDsDistributionServer and the EcDsScienceDataServer send requests to the EcDsStStagingDiskServer to link files from the read-only cache to a staging disk specified in the request.
Acquire PGE Tar File	One PGE file per request	<i>Library:</i> DsStSt <i>Class:</i> DsStArchive	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDbInterface	The EcDsScienceDataServer sends requests to the EcDsStArchiveServer to retrieve PGE tar files for use during data processing activities.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (4 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Destroy	One per destruction	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingDisk	<i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGran, EcDsScienceDataServer, and EcDsDistributionServer send requests to remove the reference to an area(s) on staging disks so the area(s) can be reused. In addition, the EcDsStArchiveServer, EcDsStIngestFtpServer, EcDsStFtpDisServer, EcDsSt8MMServer, and EcDsStD3Server send requests to the EcDsStStagingDiskServer to remove references for space allocations. The EcDsDistributionServer sends a request to the EcDsStPrintServer to remove the reference for space allocation for spooling data for printing.
Push Data	One per acquire instruction	<i>Library:</i> DsStDisFtp <i>Class:</i> DsStDistributionFtp	<i>Process:</i> EcDsDistributionServer <i>Classes:</i> DsDdScheduler DsDdMedia	The EcDsDistributionServer receives instructions to distribute data and the EcDsStFtpDisServer FTP pushes the data, via the FTP service. A signal file is also sent to indicate the completion of the file transfer by particular ESDTs that function this way.
InsertFile	One file per insert request into the Pull cache	<i>Library:</i> DsStPull <i>Class:</i> DsStPullMonitor	<i>Process:</i> EcDsStFtpDisServer <i>Class:</i> DsStDistributionFtp	The EcDsStFtpDisServer sends requests to the EcDsStPullMonitorServer to insert files into the Pull cache. In response, the EcDsStPullMonitorServer returns status to indicate whether the file needs to be transferred to the cache or is already resident.

**Table 4.1.3.5-1. STMG CSCI Process Interface Events (5 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Get Capacity	One calculation per request	<i>Library:</i> DsStRes <i>Class:</i> DsStResourceProvider	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdMedia	The EcDsDistributionServer determines the effective maximum capacity of a media type to sent the EcDsSt8mm server or EcDsStD3 server, and the EcDsStFtpDis server. This is used to determine the number of media needed to satisfy a given request.
Mount Tape	One per physical tape	<i>Library:</i> DsStTape <i>Class:</i> DsStTape	<i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGran process sends requests to the EcDsSt8MMServer or EcDsStD3Server to load tapes to hardware peripherals for reading or writing to the tapes.
Unmount Tape	One per physical tape	<i>Library:</i> DsStTape <i>Class:</i> DsStTape	<i>Process:</i> EcInGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGran process sends requests to the EcDsSt8MMServer or EcDsStD3Server to unload and detach tapes from hardware peripherals after reading or writing to the tapes.
DownAccess Count	One per file copied or linked	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingMonitor	<i>Process:</i> EcDsStStagingDiskServer <i>Class:</i> DsStStagingDiskReal	The EcDsStStagingDiskServer sends requests to the EcDsStStagingMonitorServer to decrease the access count to a given file. This is done after a file has been copied or a link to a file in the cache has been removed.
Staging Table	One per staging table activity	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingTable	<i>Process:</i> EcDsStStagingMonitorServer <i>Class:</i> DsStStagingManager	The EcDsStStagingMonitorServer stores and retrieves the entire staging table, which is a list of currently allocated staging directories.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (6 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Management Services	Upon initial system start-up or per process request.	<i>Library:</i> EcAgInstrm <i>Class:</i> EcAgManager	<i>Process:</i> EcMsAgSubAgent	The EcMsAgSubAgent provides a basic management library of services to the processes, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include: <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> – The EcMsAgSubAgent forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>
Push Data Instructions	One set of instructions per distribution request	<i>Libraries:</i> DsDdB, DsDdC, DsDdl <i>Classes:</i> DsDdRequestMgrC, DsDdGranuleC	<i>Process:</i> EcDsScienceDataServer	The EcDsScienceDataServer assembles instructions to send data and sends the instructions to the EcDsDistributionServer. The EcDsDistributionServer sends a request to the EcDsStFtpDisServer to push data, via the FTP service. A signal file is also sent to indicate the completion of the file transfer by particular ESDTs that function this way.
Move	One for each file per request	<i>Library:</i> DsStStSh <i>Class:</i> DsStStagingMonitor	<i>Process:</i> EcDsStArchiveServer	The EcDsStArchiveServer sends requests to the EcDsStStagingMonitorServer to move data from the archives to a staging disk.
MkDir	One per directory creation	<i>Library:</i> DsStPull <i>Class:</i> DsStPullMonitor	<i>Process:</i> EcDsStFtpDisServer <i>Class:</i> DsStDistributionFtp	The EcDsStFtpDisServer sends requests to the EcDsStPullMonitorServer to create directories in the user pull area to which files are linked and from which the external requester can pull files.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (7 of 8)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request Data Archive	One per archive request	<i>Libraries:</i> DsStCmn DsStSt <i>Classes:</i> DsStStagingDisk	<i>Process:</i> EcDsScienceDataServer <i>Classes:</i> DsDdRequestMgrReal, DsGeESDT	The EcDsScienceDataServer sends archive requests to the EcDsStArchiveServer for various categories of data. The archive services on those data are essentially identical for all data categories and consist of requests to retrieve files, store files, copy files, or create/destroy an area on a staging disk.
Staging Table Entry	One per request for new staging	<i>Library:</i> DsStSt <i>Class:</i> DsStStagingTable	<i>Process:</i> EcDsStStagingDiskServer <i>Class:</i> DsStStagingManager	The EcDsStStagingDiskServer stores and retrieves entries in the staging table. The staging table entries contain the size allocated for the staging disk, the access permissions, the directory identifier, the request id, and the owner of the disk.
Distribution FtpPull	One file per pull request	<i>Library:</i> DsStPull	<i>Process:</i> EcDsDistributionServer	The EcDsDistributionServer sends a request to the EcDsStFtpDisServer to check for the presence of a file or move a file to the cache area.
Retrieve	One granule per retrieval request	<i>Library:</i> DsStSt <i>Class:</i> DsStArchive	<i>Process:</i> EcDsScienceDataServer <i>Class:</i> DsDbInterface <i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDdGranules	The EcDsScienceDataServer and EcDsDistributionServer send requests to the EcDsStArchiveServer to retrieve data from the SDPS archives.

**Table 4.1.3.5-1. STMGT CSCI Process Interface Events (8 of 8)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Schedule	One per media	<i>Library:</i> DsStRes	<i>Processes:</i> EcDsSt8MMServer, EcDsStD3Server	The EcDsSt8MMServer and EcDsStD3Server use database tables obtained via the Sybase Server to determine if a drive is available to handle the request.
Print Packing Slips	One per distribution request	<i>Library:</i> DsStPrinter <i>Class:</i> DsStPrinter	<i>Process:</i> EcDsDistributionServer <i>Class:</i> DsDsReadyToShipQueue	The EcDsDistributionServer sends requests to the EcDsStPrintServer to print a file on a given staging disk. The EcDsDistributionServer only prints out the packing list file associated with a distribution request when the request has been completed successfully.

#### **4.1.3.6 Storage Management Data Stores**

Table 4.1.3.6-1 provides descriptions of the individual data stores (entitled collectively “Database”) in the STMGT CSCI architecture diagram. More detailed information on these database tables can be found in the CDRL 311 document on Storage Management.

**Table 4.1.3.6-1. STMGT CSCI Data Stores (1 of 3)**

Data Store	Type	Description
DsStDevice	Sybase	The data store (database table) to contain an entry for each peripheral device the STMGT CSCI uses to service requests to ingest or distribute data. Since this data store is a look-up for entries in the Request entity, this data is initialized prior to software installation.
DsStBackup	Sybase	Stores a reference to every file currently being backed-up related to Archive Backup and Restore functionality.
DsStBackupHistory	Sybase	Stores a history of every file successfully backed-up related to Archive Backup and Restore functionality.
DsStCache	Sybase	This data store identifies every instance of a cache related to Pull Monitor Cache Management. The current default is for only one existing cache.
DsStCacheDirectory	Sybase	This data store contains an entry for each directory with a Storage Management cache. An entry is inserted into the data store every time a new cache is created, or a directory is added to an existing cache.
DsStCacheFile	Sybase	This data store contains an entry for each file Storage Management Pull Monitor is currently processing (originally implemented via the pull_list table). An entry is inserted into the entity for each file retrieved from the Archival Management And Storage System (AMASS). DsStFileLocation (originally implemented via the pull_link table) tracks the individual cache locations of (or links to) the file.
DsStConfigParameter	Sybase	<p>This data store contains an entry for information to configure and initialize each DsStServerType supported by Storage Management. The data consists of information currently accessed through configuration files (*.CFG) plus information as it pertains to the status and node of operation for each server. An entry is inserted for each parameter that a server uses.</p> <p>Two types of parameters can be defined within the constructs of the DsStConfigParameter table, startup and run-time. Startup parameters require the associated server be restarted in order for the parameters to be used. Run-time parameters can be changed without restarting the server (i.e., the server periodically queries the configuration table for new values).</p>
DsStDeleteLogCache File	Sybase	This data store contains a historic record of each file the STMGT CSCI deletes from its (Pull Monitor) cache (or the DsStCacheFile table). This entity maintains a history of file usage and cache usage for reporting and analysis purposes. An entry is inserted into the entity via a delete trigger in the DsStCacheFile table.
DsStErrorAttribute	Sybase	This data store is required for the DsStErrorDetails class. This data store provides a mapping between character mnemonics and numeric error codes. It defines the attributes for each error, and provides adequate characterization for appropriate retry/recovery procedures from the error attributes.
DsStErrorText	Sybase	This data store provides text descriptions and suggested recovery actions for each error code, and presents errors in a meaningful manner.

**Table 4.1.3.6-1. STMGT CSCI Data Stores (2 of 3)**

Data Store	Type	Description
DsStEventLog	Sybase	<p>This data store contains a history of events and COTS errors encountered by the STMGT CSCI. The STMGT CSCI inserts records into the table using the stored procedure DsStELInsert.sp. The calling sequence is: DsStELInsert @EventNumber=value, @EventMessage=value, @EventDate=value, @EventType=value.</p> <p>The STMGT CSCI inserts a new ERROR_LOG entry each time an event occurs or an error is encountered. The Operations staff has the capability to purge this entity periodically based on a date/time value.</p>
DsStFileLocation	Sybase	<p>This data store maintains the location(s), in a cache, of each file recorded in the DsStCacheFile table. As each file is retrieved from the archive and written to one of the Storage Management caches, an entry is inserted in the entity. The entry must correspond to an existing DsStCacheFile entry.</p> <p>Upon insertion of a DsStFileLocation record, the corresponding DsStCacheFile record is updated by incrementing or decrementing the ActiveLinkCount via a Trigger and setting the LastAccessDate to the current system date and time.</p>
DsStNextId	Sybase	<p>This data store is used to track the automatic, sequential generation of unique identifying keys for various tables in the Storage Management database (DsStErrorLog, DsStDeleteLogCacheFile, DsStBackupHistory, DsStRestoreHistory, and DsStConfigParameter.TimerId)</p>
DsStOffsite	Sybase	<p>This data store is used for mapping the off-site identifiers (e.g., GSF, ERC,) with their appropriate Cell location (i.e., gsf.nasa.gov) and identifying the specified Archive directory for (remote) backup.</p>
DsStSchedule	Sybase	<p>This data store contains an entry for schedule requests of a peripheral device the Storage Management receives. An entry is inserted into the entity every time a peripheral device is reserved to service a request to ingest or distribute data. The unit of measure for the estimated duration is minutes.</p>
DsStServerType	Sybase	<p>This data store contains all types of servers administered and configured by Storage Management and their associated descriptions. 8 types of standard servers are currently pre-populated with the database construction due to no user interface currently existing to administer (e.g., Archive, Staging Monitor, Pull Monitor, Distribution FTP, 8MM Tape, Staging Disk, Ingest FTP, D3...)</p>
DsStVolumeGroup	Sybase	<p>This data store contains 'volume group' information (the section of the ECS Archive being accessed) from configuration files such as the path currently pointed to and a history of paths related ONLY to a specific Archive server type.</p>
DsStSlot	Sybase	<p>This data store contains an entry for each peripheral stacker device's slots the EcDsStArchiveServer and EcDsDistributionServer use to service ingest or data distribution requests, respectively. Since this data store is a look-up entity for entries in the Request entity, this data is initialized prior to software installation.</p>

**Table 4.1.3.6-1. STMGT CSCI Data Stores (3 of 3)**

<b>Data Store</b>	<b>Type</b>	<b>Description</b>
DsStStacker	Sybase	This data store contains an entry for each peripheral stacker the STMGT CSCI uses to service ingest or data distribution requests. Since this data store is a look-up entity for entries in the Request entity, this data is initialized prior to software installation.
DsStStagingDisk	Sybase	Stores information (e.g., staging disk size, owner, disk number, and priority request id) about requests for staging disk services.
DsStArchiveRequest	Sybase	Stores all requests for archive services until they are completed.
DsStDistributedFile	Sybase	Contains an entry for each file STGMT is currently processing related to a DsStFtpRequest entry.
DsStFile	Sybase	Contains an entry for each file STGMT is currently processing related to a DsStArchiveRequest entry.
DsStFtpRequest	Sybase	Stores information (e.g., pull directory name and parameter list for FTP request) about FTP specific requests.
DsStGenericRequest	Sybase	Stores common information to all STMGT requests (e.g., checkpoint state, request status, and type of operation, and owner name) regardless of type.
DsStRestore	Sybase	Stores information needed for the restoration from backup for files in the archive.
DsStRestoreHistory	Sybase	Historical records of all archive file restoration activities.
DsStStgMonRequest	Sybase	Contains information (e.g., unique file name, original file name, file size, and compression type) for Staging Monitor specific requests.
DsStVersion	Sybase	Contains version information about the installed database. Data includes the date of installation, the version number of the database installed, and the latest version number available for the loaded database.

#### **4.1.4 Data Server Subsystem Hardware**

##### **4.1.4.1 Access Control and Management Hardware CI Description**

The Access Control and Management HWCI (ACMHW), provides access to the Data Server subsystem for subsystem and direct “push/pull” user access, provides tools and capabilities for system administration, and supports the infrastructure of the Data Server. This HWCI controls logical data server access, maintains sessions, provides sub-setting support, directs service requests to other appropriate Data Server Subsystem configuration items, and supports the control and data flow for electronic distributions. The Access Control and Management hardware is logically divided into the Administration Stations (AS) and the Access/Process Coordinators (APCs). The number, type, and configuration of ASs and APCs depend on site requirements and the number of data servers supported. Table 4.1.4.1-1 provides descriptions of the ACMHW.

**Table 4.1.4.1-1. Access Control and Management HWCI Descriptions**

<b>Server Name</b>	<b>Class/Type</b>	<b>Description</b>
Administration Stations	OPS Workstation	SUN workstations
Access/Process Coordination	APC Data Server	Two SGI Servers with Multi-processor Capabilities and a SUN Server

Administration Stations (AS) hosts provide access to the Administration Services for one or more data servers. These services provide Data Server Administrators with the capability to modify and monitor the configuration of the data server. The data server configuration includes resource availability, number and location of items, data server schema, advertised services, data types and archiving strategy. In addition, this set of services includes the capability to perform Archive maintenance functions. The ASs are mid-sized workstations executing GUI packages to accommodate the imposed I/O and processing requirements.

The Access/Process Coordinators (APCs) are the interface to the data server services. The APCs support session establishment, management, and control, and are used to access the data server services. Sessions management (from a user perspective) provides a variety of data server resources including results sets, cached compute-on-demand data objects, search contexts, etc. These resources impose a computational load and an I/O load on the APC processors. A greater I/O load is imposed by the APCs functioning as a data throughput mechanism for electronic data distribution in Release 5A and for data manipulation via sub-setting in Release 5A. APC platforms also support the ingest, storage, and distribution of the Browse data. The Browse data hardware accommodates the different DAAC sizes. At the smaller DAACs, Browse data resides on a RAID disk, at larger sites, like GSFC, Browse data is stored in the EMASS Automated Media Library (AML) robotic libraries handling optical media for HP optical drives. Each APC consists of four platforms configured in pairs as follows: each pair is an SGI host acting as a server and running a Science Data Server database and a SUN host running the ECS Science Data Server custom code. One pair is primary, while the other is the standby. The APCs provide the computer resources, search engines, and tools to operate on data retrieved from repositories. Algorithms operating on site data can execute on an APC or a computer in the Data Processing Subsystem.

The APC SGI server host accommodates electronic ingest of Browse data and data from sources external to the DAAC, including electronic distribution, and manages the requests to the Data Server. APC storage supports functions such as sub-setting, storing user session context, keeping track of user session interactions that can be suspended or resumed, and the Browse collection.

Two identical AS workstations supply AS fail-over/recovery capability via redundant operation. Either workstation can be used independently as an operator workstation and in the event of a failure of one, the other can assume the full role. The two APC servers in a standby configuration share a common disk pool. This disk pool is configured as an outboard stack of RAID disk drives dual-ported to the two servers. One of the servers is configured as primary, the other as a standby secondary. The active server maintains the current system configuration files on disk. In some cases, both servers are active with separate primary responsibilities and shared secondary responsibilities. The servers can accommodate degraded mode fail-over capability in the event of

a failure. When a failure on a primary APC is detected, the operator initiates a fail-over procedure. During a fail-over, the backup APC server reads the system status files from the shared disk and begins operating as primary.

Three types of network failures can affect the DSS. If the FDDI cable between a host and the FDDI concentrator were damaged, a new cable would be required. No other configuration would be required. If an individual port on the FDDI concentrator fails, the attached host must be moved to another port, and should be replaced quickly. Note the above failures result in a service interruption only to the workstations. Since all servers/processors are attached to two hubs, they can communicate as normal in the event of a cable or concentrator fault, and the applications are unaffected by the event.

Recovery/fail-over for HWCIs is described in the 920-TDx-014 series of documents. There is a version for each DAAC, indicated by the letter appearing in place of the “x.” The document provides the recovery procedure for each host.

#### **4.1.4.2 Data Repositories Hardware CI Description**

Data Repositories (DRs) HWCI (DRPHW) are hardware to store and maintain data permanently. Different technologies are used to instantiate DRs depending on the volume and type of data to be stored, the access patterns of the data, and additional unique requirements imposed on the repository (i.e., data maintenance requirements, backup and restore functions, media management and control, etc.).

DRs are classified as “permanent”, meaning the services to monitor and maintain data integrity for large data holdings are supported by this repository's storage technology. A copy of all data at a site not considered temporary is eventually maintained in a site permanent DR.

The File and Storage Management System (FSMS) host platform is an SGI machine. In DRPHW CIs there are at least two such hosts to serve as a primary and a backup. At the sites with more than two FSMS hosts, one of the hosts serves as a backup to all other hosts and the WKSHW host if any (See Section 4.1.4.3 for the WKSHW Description).

The Data Server's servers and workstations are directly connected to the DAAC FDDI network and HIPPI fabric. The Data Server processors/servers contain dual-attached station (DAS) cards, dual-homed to separate FDDI concentrators. This provides redundancy so full connectivity exists to the servers even in the event of a concentrator failure. The workstations contain single-attached station (SAS) cards and each are connected to a single concentrator, and they are also split across concentrators so they are not all connected to the same unit. The FDDI concentrators are in turn connected to the FDDI switch.

Table 4.1.4.2-1 provides descriptions for the Data Repository HWCI.

**Table 4.1.4.2-1. Data Repository HWCI Descriptions**

Item Name	Class/Type	Description
Data Repository	Archive Robotics	STK Powderhorn or EMASS AML-E, site dependent
	Magnetic Tape Drives	STK Redwood or IBM Magstar, site dependent
	SMP Server Workstation (FSMS Host)	SGI Server with Multi-processor Capabilities.

#### 4.1.4.3 Working Storage Hardware CI Description

Working Storage HWCI (WKSHW) of the Data Server supplies storage for temporary file and buffer storage within the Data Server architecture. This pool contains the interim processing data. WKSHW provides the staging capacity for data acquires and inserts of the interim data.

The logical configuration of the WKSHW is consistent at all DAAC sites. The physical WKSHW accommodates sites with a variety of data storage capacities and data rates supported.

All interim product data used by the Data Processing Subsystem are staged in the WKSHW for a maximum period of 90 days (most interim products are far more short-lived). At most sites, disk storage is supplied for the interim products. Only at EDC, where interim product data accumulation is very significant, archival robotics and tapes are used for this storage as a second tier of WKSHW. Separates AMASS supports the functioning of the robotic WKSHW. Table 4.1.4.3-1 provides descriptions for the Working Storage HWCI.

**Table 4.1.4.3-1. Working Storage HWCI Descriptions**

Item Name	Class/Type	Comments
Working Storage Primary Tier	RAID (host attached)	
Working Storage Secondary Tier	Tape Robotics	At applicable sites

Using a RAID for storage implementation provides fault tolerance of the WKSHW. The RAID provides degraded mode of operations for a single disk failure. Second tier storage RMA is equivalent to the rest of the robotic library storage in the archive repository (See Section 4.1.4.2 for the Data Repository Hardware Description). The WKSHW host is backed up by a standby in the DRPHW configuration.

#### 4.1.4.4 Distribution and Ingest Peripheral Management Hardware CI Description

The hardware of the Distribution and Ingest Peripheral Management (DIPHW) supports the media distribution methods for data dissemination from the system and hard media ingest of data into the system. Hard media distribution and ingest is used in an assortment of data recording peripherals. Robotic control is used where applicable to minimize operator involvement.

Data distributed from the data server is buffered for a full day shift (8 hours at most sites). The buffering of the data is provided by the Distribution Storage Management hardware in the data server.

The distribution and ingest peripheral hardware supply the hard media for inter-site, user data distribution scheduling and management. This HWCI contains media drives, jukeboxes/stackers, server hosts, and disk storage for network distribution.

Staging disks in the Distribution and Ingest configuration items of the DSS serve as a buffer to the data pull process. The buffered data pull optimizes performance of the data retrieval for distribution or data processing/archiving after ingest.

The Distribution and Ingest Management hardware includes SUN server controlled recording devices for both hard media data distribution and hard media data ingest.

**Equipment complement:** RAID (host attached), 8-mm tape drives and stackers, 3480/3490 drives, CD Recordable, printers, optical scanner, FAX, two SUN servers in a load sharing configuration.

## 4.2 Ingest Subsystem Overview

The Ingest Subsystem (INS) ingests data into Science Data Processing Segment (SDPS) repositories in accordance with approved ICDs. Data is accepted from a variety of external data providers in a variety of formats predefined within SDPS regarding the expected metadata and metadata characteristics. The INS supports a variety of ingest requests and preprocesses the data for archiving into the SDPS. The preprocessing depends on the attributes of the ingested data such as data type, data format, and the level to which the ingested data has been processed from raw instrument data.

The data types are formally referred to as Earth Science Data Types (ESDTs). An ESDT is a defined data set associated with a given mission/instrument or identified grouping and is registered in an SDPS ESDT Baseline List. The ESDT is identified with a short name, a long name, a collection description, and information on file type, metadata, formats, and services provided such as sub-setting by a given attribute. An example of an ESDT is AST\_L1A; the short name for the ASTER reconstructed Level 1A data set, unprocessed instrument digital counts with radiometric (LR) and geometric (LG) coefficients attached. ESDTs can also be ancillary data, algorithms, correlative and calibration data.

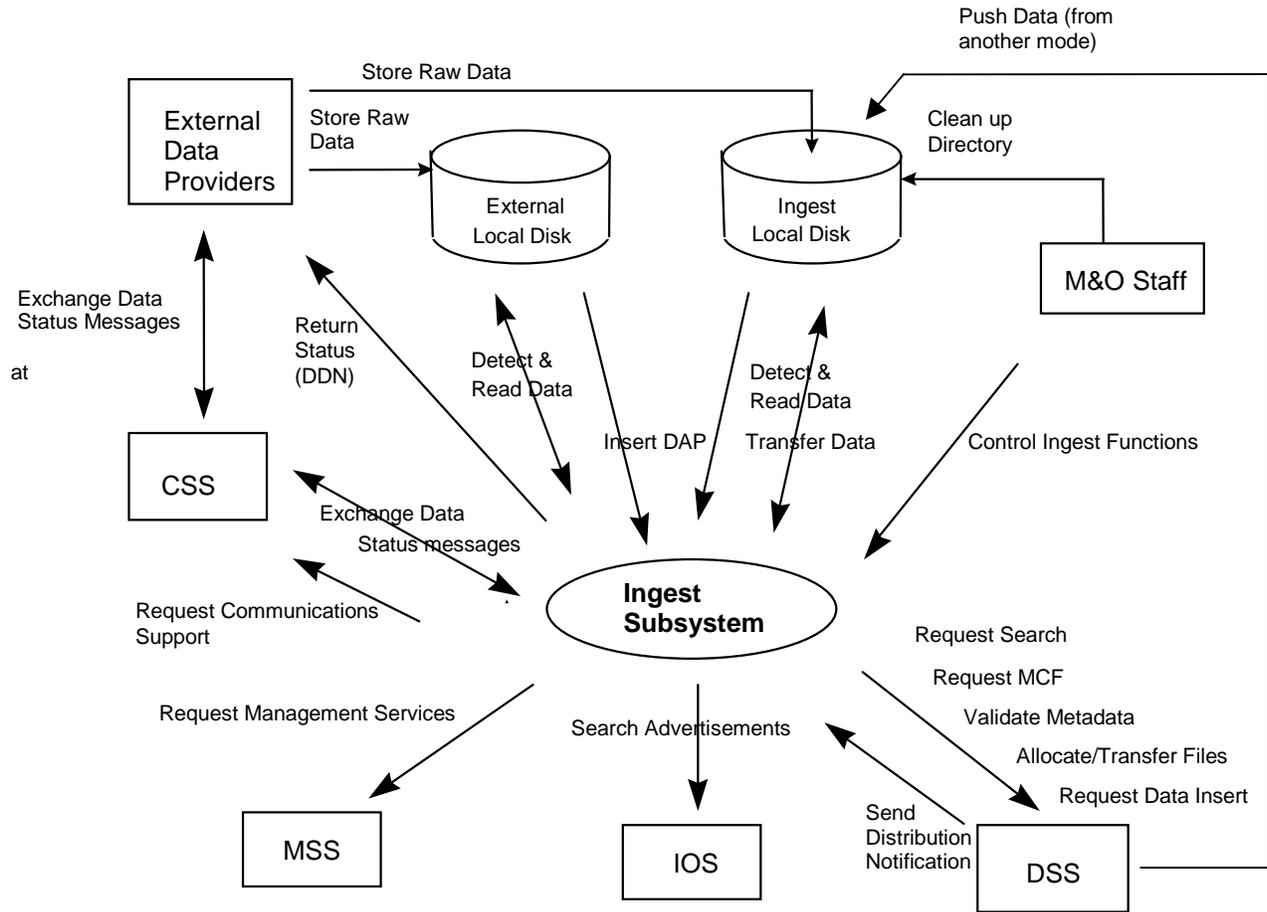
The INS software processes execute in a specific pattern based on the ESDT being ingested. The processes include an automated ingest process, a polling ingest process, a media ingest process, and a cross mode ingest process. Ingest processes provide for the receipt of external data, which is archived within the ECS SDPS archival system. Specific ingest process procedures are established to support each unique INS interface and allow the processing interface parameters to be modified as interface and mission requirements evolve. For a given incoming data set corresponding to an ESDT, the INS performs data preprocessing, metadata extraction, and directs the DSS SDSRV CSCI to perform metadata validation.

Data is staged (prepared for transfer) to one of two areas depending on the data level, ESDT, and other data set specific characteristics:

- Level 0 (L0) data received from external data providers and other selected data (EDOS ancillary data) is staged to the INS working storage area. Metadata is extracted and quality checked on the working storage area. The L0 data is transferred to an archive data repository in the DSS for long-term storage.
- Non-L0 data (such as non-EDOS ancillary data and L1A - L4 data from external facilities) is staged directly to the working storage area in the DSS. Extraction of metadata and quality checking are performed on the data by the INS software residing in the DSS processor hardware. The non-L0 data is transferred to a DSS archive data repository for long-term storage.

## Ingest Subsystem Context

Figure 4.2-1 is the INS context diagram. The diagram shows the events sent to the INS from other SDPS or CSMS subsystems and the events the INS sends to other SDPS or CSMS subsystems, the Operations staff, and external providers. Table 4.2-1 provides descriptions of the interface events shown in the Ingest Subsystem context diagram.



**Figure 4.2-1. Ingest Subsystem Context Diagram**

**Table 4.2-1. Ingest Subsystem Interface Events (1 of 2)**

Event	Interface Event Description
Exchange Data Status Messages	Data status messages are sent to and from the CSS Gateways via Remote Procedure Calls (RPCs). A Data Availability Notice (DAN) is sent to the INS by the External Data Providers and afterwards additional data status messages are exchanged with the INS. For Landsat 7 data exchanges, a Data Delivery Notice (DDN) is sent from the Landsat 7 Processing System (LPS) to the INS and a Data Availability Acknowledgement is sent to the LPS by the INS.
Return Status (DDN)	The INS returns the status of a request received from an External Data Provider by transmitting a Data Availability Acknowledgement (DAA) and/or a Data Delivery Notice (DDN) to the External Data Provider directly.
Request MCF	The INS requests the Metadata Configuration File (MCF) template, from the DSS, for a particular ESDT short name prior to a data insert request.
Validate Metadata	The DSS validates the metadata files that the INS has populated.
Store Raw Data	The raw data (L0) provided from the external provider to the ECS. Some external providers put this data on an external local disk for ECS to pull while others push the data onto a local INS internal disk.
Request Communications Support	The CSS provides a library of services available to each SDPS and CSMS subsystem. The services required to perform the specific subsystem assignments are requested by the subsystem from the CSS. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.
Detect & Read Data	The INS polls for data files, Delivery Record files, or distribution notification files in an agreed upon location (External to ECS or Ingest internal Local Disk).
Clean up Directory	The Operations staff sends clean up instructions to the Ingest Local Disk for data clean up. Currently, delete and remove Unix commands are executed from the Unix command line to clean up the Ingest local disk.
Insert DAP	Delivered Algorithm Packages (DAPs) are located on a Local Disk (external or internal to a DAAC) and are inserted into the SDPS via the automated polling ingest interface.
Control Ingest Functions	The Operator controls the Ingest function by monitoring requests, changing database parameters, viewing history, and performing manual media ingest via a GUI.
Allocate/Transfer Files	The INS accesses and allocates/deallocates staging disks and transfers data files into the DSS. Deallocation of staging disks deletes data after it has been archived.
Request Data Insert	The INS sends requests to the DSS to insert a particular file or files into the archive. Inserted data is accompanied by metadata. The metadata is catalogued in the SDSRV inventory as a granule of a particular ESDT short name and version.

**Table 4.2-1. Ingest Subsystem Interface Events (2 of 2)**

Event	Interface Event Description
Search Advertisements	The Interoperability Subsystem (IOS) receives requests to search for advertisements and returns Universal References (URs) for CSMS managed objects (hosts, servers, routers, other devices). The INS uses the advertisement information to locate the relevant data servers to interact with.
Send Distribution Notification	The DSS sends a distribution notification, via e-mail, to the INS when data being distributed is to be ingested.
Push Data (from another mode)	The DSS pushes data, via the FTP service, to the Ingest local disk when it is distributing data to be ingested.
Request Search	The INS requests a search, by the DSS, for the granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Transfer Data	The INS retrieves data from the ingest local disk and stores distribution notification files and PDRs for cross mode ingest on the ingest local disk.
Request Management Services	<p>The MSS provides a basic management library of services to the subsystems, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> - The MSS forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>

### Ingest Subsystem Structure

The INS is one CSCI and one HWCI. Ingest backup hardware runs in the Test Mode as long as there are no failures. The configuration items are:

- Ingest (INGST) CSCI provides the software capability to acquire data by various methods and transfers the data into the SDPS. These methods include an Automated transfer from prior request information, Polling with or without Delivery Records for data placed at predetermined locations, a Media transfer method which includes reading tapes and a cross mode ingest method. The INGST CSCI also stores and manages request information, and provides for data preprocessing storage and insertion into the appropriate SDPS storage location.
- Ingest Client HWCI (ICLHW) supports INGST in bringing data into the SDPS from an external interface. This HWCI also includes an Ingest Workstation for execution of the Ingest GUI.

### Use of COTS in the Ingest Subsystem

- Rogue Wave's Tools.h++

The Tools.h++ class libraries provide basic functions and objects. These libraries must be installed with the INS software for any of the INS processes to run.

- Rogue Wave's DBTools.h++

The DBTools.h++ class libraries interact with the Sybase SQL database server. These libraries must be installed with the INS software to interact with Sybase. The INS uses an interface software process control file (PCF) to obtain access to the Sybase Server.

- Rogue Wave's Net.h++

This is a C++ class library to provide an object-oriented interface to Inter-Process Communication (IPC) and network communication services. The Net.h++ framework enables developed code to be portable to multiple operating systems and network services. These libraries must be installed with the INS software to support the interface to other subsystems.

- Integrated Computer Solutions' (ICS) Builder Xcessory (built on X/Motif)

The Builder Xcessory GUI builder tool modifies the displays of Ingest GUIs. The tool also generates the C++ code to produce Ingest GUIs at run time. There is no operational part of the Builder Xcessory needed at run-time.

- Sybase (xaClient, SQL Server)

This set of Sybase products provides a relational database to store INS related information and must be installed on the platform where INS software resides.

- Tivoli Client

This product provides the interface to monitor the INS software for system administration purposes. Although Tivoli Client is part of MSS, this COTS product must be installed on the platform where the INS resides for Ingest status to be available at the system level.

- DCE Client

This product provides the communications between INS and other subsystems. DCE can reside on one or both sides of the interface and must be installed on the platform where the INS resides. Although the DCE Client is part of the CSS, this COTS product must be installed on the platform where the INS software resides for INS to run in the ECS operational and test environments.

- DCE Driver

This product provides the communications to support a Personal Computer (PC) environment. The DCE Driver must be installed on the computer where MS Access is installed. Although the DCE Driver is part of the CSS, this COTS product must be installed on the platform where the INS software resides for INS to run.

- HP OpenView Client

This product provides system administration capabilities to control INS software applications (startup and shutdown). The HP OpenView Client must be installed on the platform where

the INS software resides. Although HP OpenView Client is part of the MSS, this COTS product must be installed on the platform where the INS resides for INS to run.

- **UNIX Network Services**

DNS, NFS, E-mail/Bulletin Board, FTP, TCP/IP and the other Unix services provided are obtained from the CSS and are described in section 4.8 of this document.

## **4.2.1 INGST Computer Software Configuration Item Description**

### **4.2.1.1 INGST Functional Overview**

The INGST CSCI supports a variety of interfaces to external systems. The application-level protocol set up for data transfer is potentially different for each of the external interfaces. As a result, a separate ingest software application is required to facilitate data transfer for each interface. To minimize the software development effort and make it easier to accommodate interfaces to new external systems, data ingest from external systems is categorized, based on common characteristics and ingest processes.

#### **1) Automated Network Ingest Interface**

Automated Network Ingest occurs when a Data Availability Notice (DAN) is supplied to the SDPS. The SDPS receives the DAN and schedules automated network data transfer from the source. The DAN describes the location of the available data. External data providers are responsible for developing application software to interact with CSMS automated network ingest software.

#### **2) Automated Polling Ingest Interface**

- Polling with Delivery Record -- The SDPS periodically checks an agreed-upon network location for a Delivery Record file. The Delivery Record file contains information identical to that in a DAN. The Delivery Record describes the location of the available data. The data location could be on a working storage device within SDPS, where an external data provider has previously transferred the data.
- Polling without Delivery Record -- The SDPS periodically checks an agreed-upon network location for available data. All data in the location make up a collection of ingest data of one specific ESDT, with one file per data granule.

#### **3) Manual Media Ingest Interface (via a GUI)**

Manual data transfer mechanisms -- data can be transferred from physical media. Physical Media Ingest enables authorized institutions or science users to provide data on hard media and provides a backup procedure for facilities to submit data to the SDPS when automated network data transfer is temporarily unavailable. The hard media must contain information identical to the Delivery Records described above, in a standard file format, or the data provider must separately provide Delivery Records to a specified SDPS location in the standard file format. Hard media data transfer involves data transfer from one of several ingest peripheral types found at a DAAC.

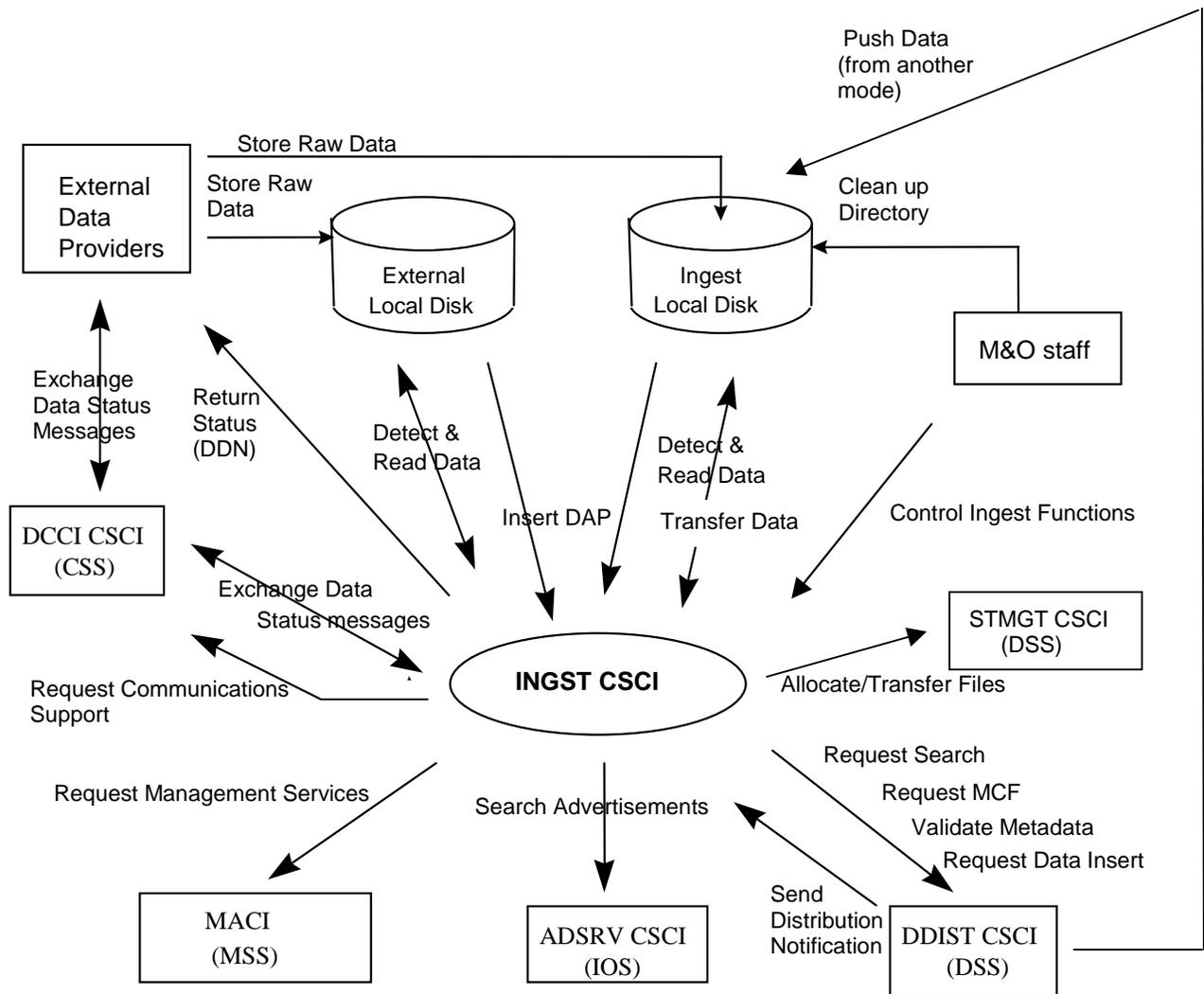
#### **4) Cross Mode Ingest Interface**

The INGST CSCI receives a distribution notice, via e-mail, of data files transferred, via the FTP service. The distribution notification is used to create a Delivery Record File (describes the location of the available data). The Delivery Record file is put in an agreed-upon network location. The polling with Delivery Record process checks the location for the Delivery Record files.

The INGST CSCI includes the processes for ingesting data as described and provides a process for managing requests, and for inserting granule data into the SDPS.

##### **4.2.1.2 INGST Context**

Figure 4.2.1.2-1 is the INGST CSCI context diagram. The diagram shows the events sent to the INGST CSCI and the events the INGST CSCI sends to other CSCIs. Table 4.2.1.2-1 provides descriptions of the interface events shown in the INGST CSCI context diagram.



**Figure 4.2.1.2-1. INGST CSCI Context Diagram**

**Table 4.2.1.2-1. INGST CSCI Interface Events (1 of 3)**

Event	Interface Event Description
Exchange Data Status Messages	Data status messages are sent to and received from the DCCI CSCI via Remote Procedure Calls (RPCs). A Data Availability Notice (DAN) is sent to the INGST CSCI and afterwards additional data status messages are exchanged between the INGST CSCI and the external providers. For Landsat 7 data exchanges, a Data Delivery Notice (DDN) is sent from the Landsat 7 Processing System (LPS) to the INS and a Data Availability Acknowledgement is sent to the LPS by the INS.

**Table 4.2.1.2-1. INGST CSCI Interface Events (2 of 3)**

Event	Interface Event Description
Return Status (DDN)	The INGST CSCI returns the status of a request received from an External Data Provider by transmitting a Data Delivery Notice (DDN) to the External Data Provider directly.
Request MCF	The INGST CSCI requests the MCF template, from the SDSRV CSCI, for a particular ESDT short name prior to a data insert request.
Send Distribution Notification	The DDIST CSCI sends a distribution notification, via e-mail, to the INGST CSCI when data being distributed is to be ingested.
Push Data (from another mode)	The DDIST CSCI pushes data, via the FTP service, to the Ingest local disk when it is distributing data to be ingested.
Request Search	The INGST CSCI requests a search, via the SDSRV CSCI, for the granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Transfer Data	The INGST CSCI retrieves data from the ingest local disk and stores distribution notification files and PDRs for cross mode ingest on the ingest local disk.
Validate Metadata	The SDSRV CSCI validates the metadata files that the INGST CSCI has populated.
Store Raw Data	The raw data (L0) provided from the external provider to the SDPS. Some external providers put this data on an external local disk for SDPS to pull while others push the data onto a local INGST CSCI internal disk.
Request Communications Support	The DCCI CSCI provides a library of services available to each SDPS and CSMS CSCI. The services required to perform specific CSCI assignments are requested by the CSCIs from the DCCI CSCI. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.
Detect & Read Data	The INGST CSCI polls for data files, Delivery Record files, or distribution notification files in an agreed upon location (External to ECS or Ingest internal Local Disk).
Clean up Directory	The M&O staff sends clean up instructions to the Ingest Local Disk for data clean up. Currently, delete and remove Unix commands are executed from the Unix command line to clean up the Ingest local disk.
Insert DAP	Delivered Algorithm Packages (DAPs) are located on a Local Disk (external or internal to a DAAC) and are inserted into the SDPS via the automated polling ingest interface.
Control Ingest Functions	The M&O staff control the Ingest function by monitoring requests, changing database parameters, viewing history, and performing manual media ingest via a GUI.
Allocate/Transfer Files	The INGST CSCI accesses and allocates/deallocates staging disks and transfers data files into the STMGT CSCI staging disks. Deallocation of staging disks deletes data after it has been archived.

**Table 4.2.1.2-1. INGST CSCI Interface Events (3 of 3)**

Event	Interface Event Description
Request Data Insert	The INGST CSCI sends insert requests, to the SDSRV CSCI, for a particular file or files to be inserted into the archives. Inserted data is accompanied by metadata. The metadata is catalogued in the SDSRV inventory (archives) as a granule of a particular ESDT short name and version.
Search Advertisements	The ADSRV CSCI receives requests to search for subscription event advertisements and returns Universal References (URs) for CSMS managed objects (hosts, servers, routers, other devices). The INGST CSCI uses the advertisement information to locate the relevant data servers to interact with.
Request Management Services	<p>The MACI provides a basic management library of services to the CSCIs, implemented as client or server applications, using the DCCI CSCI Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> - The MACI forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>

### 4.2.1.3 INGST Architecture

The Automated Network Ingest Interface (EcInAuto) sets up ingest sessions with external data providers, like Landsat 7 LPS, via the CSMS Gateways. External data providers submit Data Availability Notices (DANs) to request a data ingest session. The Polling Ingest Interface (EcInPolling) polls accessible file system locations to detect data to be ingested. This process submits an equivalent DAN or the information for INGST to create a DAN. The Media Ingest Interface (EcInGUI) enables authorized science users or institutions to submit a DAN and the data to be ingested via physical media. The Cross-Mode Ingest Interface (EcInEmailGWServer) receives distribution notifications, via e-mail, and stores them as files in a location, which is polled. This process detects the notification files and creates Delivery Record files, which are put in a polling directory and detected by the Polling Ingest Interface.

The Automated Network Interface, the Polling Ingest Interface, and the Media Ingest all submit ingest requests (containing DANs) to the Ingest Request Manager (EcInReqMgr) and the EcInReqMgr submits data granule requests to the Ingest Granule Server (EcInGran). The EcInGran manages subsequent request processing. The EcInGran invokes a Data Transfer task to transfer data from external locations. The EcInGran also invokes a data preprocessing task to preprocess ingested data (e.g., process metadata and validate metadata parameters) and invokes the Data Server Insertion Task to insert data into the Data Server.

Figure 4.2.1.3-1 is the INGST CSCI architecture diagram. The diagram shows the events sent to the INGST CSCI processes and the events the INGST CSCI processes send to other processes.



#### 4.2.1.4 INGST Process Descriptions

Table 4.2.1.4-1 provides the descriptions of the processes shown in the INGST CSCI architecture diagram.

**Table 4.2.1.4-1. INGST CSCI Processes (1 of 2)**

Process	Type	Source	Functionality
EclnAuto	Server	Developed	<p>Provides fundamental capabilities for data ingest into the SDPS, upon receipt of a DAN. This process can be tailored for a specific interface. RPCs are used to request ingest services to schedule data transfer from the source. EclnAuto also</p> <ul style="list-style-type: none"> <li>manages single requests at a time</li> <li>invokes an RPC to the EclnReqMgr to begin request processing</li> <li>checks DAN information</li> <li>sends and receives data status messages</li> <li>cleans up request information</li> </ul>
EclnPolling	Client	Developed	<ul style="list-style-type: none"> <li>Creates the appropriate polling request</li> <li>detects new files of interest at tunable periods of time in either external or local disk locations (by checking an agreed upon network location for available data)</li> <li>creates a unique identifier for the request</li> <li>submits requests</li> <li>reports the status of the ongoing requests</li> </ul>
EclnGUI	GUI	Developed	<p>Provides Maintenance and Operations personnel the capability, via GUI Interface,</p> <ul style="list-style-type: none"> <li>to perform physical media ingest (to ingest data from hard media)</li> <li>to monitor the ingest history log, to monitor the status of ongoing ingest requests</li> <li>to initiate an ingest request and to modify ingest configuration parameters</li> </ul>
EclnReqMgr	Server	Developed	<ul style="list-style-type: none"> <li>Manages the ingest request traffic and the processing of the ingest requests, and</li> <li>provides the capability to process multiple ingest requests concurrently by placing the request in a queue</li> <li>In the event of a failure, the EclnReqMgr process restores on-going requests from the Ingest database</li> </ul>
EclnEmailG WServer	Server	Developed	<ul style="list-style-type: none"> <li>Receives e-mail distribution notification messages</li> <li>Stores e-mail messages into files</li> <li>Detects new files of interest at a regular time interval, which can be configured, on a local disk</li> <li>Creates a polling request and puts it on a local disk location</li> </ul>

**Table 4.2.1.4-1. INGST CSCI Processes (2 of 2)**

Process	Type	Source	Functionality
EclnGran	Server	Developed	<p>Provides services to perform the required data preprocessing and the subsequent data insertion into the appropriate Data Server. The preprocessing of data consists of:</p> <ul style="list-style-type: none"> <li>• converting the data (if needed)</li> <li>• extracting the metadata into the standard SDPS metadata format (if needed)</li> <li>• performing required metadata existence and parameter range checks</li> <li>• updating the metadata with ingest specific metadata (e.g., start and stop date/time for ingest)</li> </ul> <p>EclnGran coordinates the ingest granule processing including:</p> <ul style="list-style-type: none"> <li>• performing data preprocessing</li> <li>• sending an insertion request to the appropriate Data Server</li> <li>• updating the granule state</li> <li>• transferring data files into Ingest</li> <li>• building file lists</li> <li>• grouping files with a valid ESDT</li> </ul>
Sybase	Server	COTS	<p>Stores and provides access to the INS internal data. In particular, the database stores the Ingest operations databases -- Ingest History Logs and the Ingest request checkpoint state, and template information. See Section 4.2.1.6 INGST Data Stores.</p>

#### 4.2.1.5 INGST Process Interface Descriptions

Table 4.2.1.5-1 provides descriptions of the interface events shown in the INGST CSCI architecture diagram.

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (1 of 6)**

Event	Event Frequency	Interface	Initiated By	Event Description
Use RPC & Exchange Data Status Messages	One per RPC from CSS	<i>Class:</i> InAutoIngestIF_1_0_Mgr	<i>Process:</i> EcCsLandsat7 Gateway	The EcCsLandsat7Gateway initiates a session with Auto Ingest by invoking a Remote Procedure Call (RPC). DAN messages are received from the Gateway, and DAA messages are sent to the Gateway.

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (2 of 6)**

Event	Event Frequency	Interface	Initiated By	Event Description
Detect and Read Data	One per poll from EclnPolling	Various ID directories on various local disks	<i>Class:</i> InPollingIngestSession	The EclnPolling polls for data files or Delivery Record files in an agreed location (Local Disk).
Retrieve Data	One per Science Data retrieval	FTP Pull/ Directory on local disk with information	<i>Process:</i> EclnGran	The EclnGran retrieves Science Data for a given ESDT from the Local Disk (external or Ingest Local Disk).
Clean up Directory	One per Unix command to delete or remove	Directories on local disk	M&O staff/ Unix command	The M&O staff send clean up instructions to the Ingest Local Disk for data clean up. The Unix commands for delete and remove are executed from the Unix command line to clean up the Ingest Local Disk.
Record & Retrieve Request Info	One per request	Ingest database	<i>Processes:</i> EclnGUI, EclnPolling, EclnAuto <i>Library:</i> InDBaccUt	Requests are recorded into the Ingest database for reference and are a source for restarts and re-initializations of outstanding requests.
Send Request	One per request to Request Manager	<i>Class:</i> InRequestManager	<i>Library:</i> InGuiUt <i>Classes:</i> InAutoNtwkIngestMgr, InPollingIngestSession, InMediaIngestRPUtil	Processing requests from one of the three ingest processes (EclnAuto, EclnPolling, and EclnGUI) are sent to the EclnReqMgr.
Insert DAP	One per request	Local disk	<i>Class:</i> InPollingIngestSession	Delivered Algorithm Packages (DAPs) are stored on the Local Disk for insertion into the SDPS with the Ingest Polling process.
Transfer Data	Upon detection	Local Disk	<i>Process:</i> EclnEmailGWServer	The EclnEmailGWServer sends distribution notification files and Delivery Record files to an agreed upon location (on the Ingest local disk).

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (3 of 6)**

Event	Event Frequency	Interface	Initiated By	Event Description
Control Ingest Functions	One per Ingest Operation	<i>Process:</i> EclnGUI <i>Library:</i> InGuiUt <i>Classes:</i> InRequestControllerRPUtil, InMediaIngestRPUtil, InHistoryLogRPUtil, InOperatorToolsRPUtil	M&O staff	The M&O staff control the Ingest function by monitoring and updating requests, changing database parameters, viewing history, and performing manual media ingest via a GUI.
Update File & Granule Info	One per file or granule update	Ingest database	<i>Process:</i> EclnGran <i>Library:</i> InDBaccUt <i>Classes:</i> InRequestProcessData, InRequestFileInfo	The EclnGran process updates file and granule information obtained from the Ingest database.
Update Ingest Tunable Parameters	One per update of stored parameters	Ingest database	<i>Process:</i> EclnGUI <i>Library:</i> InGuiUt <i>Class:</i> InOperatorToolsRPUtil	The EclnGUI is the interface to the Ingest database to update the stored parameters affecting the functions of the EclnAuto, EclnPolling, EclnReqMgr, and EclnGran processes.
Retrieve Data for Reports	One per data request	Ingest database	<i>Process:</i> EclnGUI <i>Library:</i> InGuiUt <i>Class:</i> InHistoryLogRPUtil	The EclnGUI obtains data from the Ingest database to generate reports.
Send Distribution Notification	One per distribution request	E-mail	<i>Process:</i> EcDsDistributionServer	The EclnEmailGWServer receives distribution notifications via e-mail from the EcDsDistributionServer.

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (4 of 6)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Request Data Search	One per input pointer in input metadata or per granule pointer in linkage file	<i>Library:</i> DsCI <i>Classes:</i> DsCIESDTReferenceCollector, DsCIQuery	<i>Process:</i> EcInGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocessTask	The EcInGran process sends a search request to the EcDsScienceDataServer for a granule corresponding to a particular ESDT short name and version, which has a particular local granule id.
Detect Data	One per poll from EcInEmailGWServer	Directory on local disk	<i>Process:</i> EcInEmailGWServer	The EcInEmailGWServer polls for notification files in an agreed upon location (on the ingest local disk).
Push Data (from another mode)	One per distribution	Directory on local disk	<i>Process:</i> EcDsDistributionServer	The EcDsDistributionServer pushes data, via the FTP Service, to the ingest local disk when it is distributing data to be ingested.
Create Staging Disk	One per request	<i>Process:</i> EcDsStStagingDiskServer <i>Library:</i> DsStSt <i>Class:</i> DsStStagingDisk	<i>Process:</i> EcInGUI <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EcInGUI is used to create an area on the staging disk for the delivery record file. The reference to the EcDsStStagingDiskServer is determined from the Ingest database. The amount of staging disk to request is determined from the delivery record file.
Read D3 Tape	One or more per request	<i>Process:</i> EcDsStD3Server <i>Library:</i> DsStRes	<i>Process:</i> EcInGUI <i>Library:</i> InGuiUt <i>Class:</i> InMediaIngestRPUtil	The EcInGUI reads the delivery record file to determine the type and amount of data to be read. The delivery record file is in the first tar set on the tape. Data files from the D3 tape are also read via the EcInGUI.

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (5 of 6)**

Event	Event Frequency	Interface	Initiated By	Event Description
Return Status (DDN)	One per request	External Data Provider EcCsLandsat7Gateway	<i>Process:</i> EclnReqMgr <i>Class:</i> InRequest	The EclnReqMgr returns status of a request to the External Data Providers or CSS Gateway via a Data Delivery.
Query & Obtain Data	One per query of Ingest Database	Ingest database	<i>Process:</i> EclnReqMgr <i>Library:</i> InDBaccUt	The EclnReqMgr queries the Ingest database for ingest processing information and obtains data from the database.
Request Granule Processing	One per granule processing request	<i>Class:</i> InGranuleAsync_S	<i>Process:</i> EclnReqMgr <i>Class:</i> InRequest	The EclnReqMgr sends processing requests to the EclnGran process for granule processing.
Notify of Completion	One per granule completion	<i>Library:</i> InGranuleC <i>Class:</i> InGranuleAsync_C	<i>Process:</i> EclnGran <i>Class:</i> InGranuleAsync_S	The EclnGran process sends a completion notification to the EclnReqMgr when a granule for a request is completed.
Request Data Insert	One per insert into the archive	<i>Library:</i> DsCI <i>Class:</i> DsCIRequest	<i>Process:</i> EclnGran <i>Library:</i> InPreprocess <i>Class:</i> InDataServerInsertionTask	The EclnGran process requests a file or files to be inserted into the SDSRV archives, and the associated metadata is catalogued in the SDSRV inventory (archives), as a granule of a particular ESDT short name and version.
Allocate Staging Disks	One per Science Data file activity	<i>Library:</i> DsStSt <i>Classes:</i> DsStStagingDisk	<i>Process:</i> EclnGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EclnGran process accesses, allocates and deallocates staging disk space via the EcDsStStagingDiskServer. De-allocation of staging disks deletes data after it has been archived.
Request MCF	One per access of MCF	<i>Library:</i> DsCI <i>Class:</i> DsCIDescriptor	<i>Process:</i> EclnGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocessTask	The EclnGran process requests the MCF template from the EcDsScienceDataServer.

**Table 4.2.1.5-1. INGST CSCI Process Interface Events (6 of 6)**

<b>Event</b>	<b>Event Frequency</b>	<b>Interface</b>	<b>Initiated By</b>	<b>Event Description</b>
Validate Metadata	One per metadata validation	<i>Library:</i> DsCI <i>Class:</i> DsCIDescriptor	<i>Process:</i> EclnGran <i>Library:</i> InPreprocess <i>Class:</i> InDataPreprocess Task	The EclnGran process requests the EcDsScienceDataServer to perform a validation of the metadata files.
Get URs (Search Advertisements)	One per advertisement	<i>Library:</i> IoAdSearch <i>Class:</i> IoAdApprovedAdvSearch Command	<i>Process:</i> EclnReqMgr <i>Library:</i> InUpdateUR <i>Class:</i> InUpdateUR	The EclnReqMgr receives Universal References from the EcIoAdServer as a result of an advertisement request. Ingest uses the Advertisement Information to locate the relevant Data Server to contact for data requests.
Control Start/Stop (Request Management Services)	One per start or stop system instruction	<i>Classes:</i> InAutoNtwkIngestMgr, InRequestServer, InGranuleServer	<i>Process:</i> EcMsAgSubAgent	The EcMsAgSubAgent process sends start and stop lifecycle commands to begin or terminate the EclnAuto, EclnReqMgr, EclnGran, and EclnEmailGWServer processes.
Manage Modes (MM) (Request Communications Support)	One per Mode Management Message	<i>Classes:</i> InAutoNtwkIngestMgr, InRequestMgr, InGranuleServer	<i>Process:</i> EcMsAgSubAgent	The EcSbSubServer issues mode management information (which it receives from the EcMsAgSubAgent) to the EclnAuto, EclnReqMgr, EclnGran and EclnEmailGWServer processes.
Transfer Files	One per Science Data file activity	<i>Library:</i> DsStRes <i>Class:</i> DsStResourceProvider	<i>Process:</i> EclnGran <i>Library:</i> InResource <i>Class:</i> InResourceIF	The EclnGran process transfers Science Data files to the EcDsStStagingDiskServer.

#### 4.2.1.6 INGST Data Stores

The INGST CSCI uses the COTS product Sybase to store related INGST information on a physical medium. The stored information is divided into four functional areas:

1. Checkpoint and reactivate ingest processing
2. Summary or historical information for collecting and reporting metrics
3. Ingest configuration (e.g., thresholds) and template information
4. Validation tables for the INS GUI and software

Table 4.2.1.6-1 provides descriptions of the individual data stores used by the INGST CSCI. The architecture diagram shows a single data store entitled “Ingest Data Stores” for simplification.

**Table 4.2.1.6-1. INGST CSCI Data Stores (1 of 2)**

Data Store	Type	Description
InRequestProcessHeader	Sybase	Provides checkpoint storage of ingest request processing information associated with a given ingest request. Upon request process completion, copies of these records are stored in InRequestSummaryHeader data store and the request processing ingest information is deleted.
InRequestProcessData	Sybase	Provides checkpoint storage of data granule processing information associated with a given ingest request. Upon request process completion, copies of these records are stored in the InRequestSummaryData data store and the granule processing data information is deleted.
InRequestFileInfo	Sybase	Provides checkpoint storage of file information associated with a data granule within a given ingest request.
InRequestSummaryHeader	Sybase	Provides long-term storage of summary request-level statistics associated with a given ingest request. Summary records are copied upon ingest request processing completion and the processing records are deleted from the system.
InRequestSummaryData	Sybase	Provides long-term storage of summary data type statistics associated with a given data granule in a given ingest request. Summary records are copied upon ingest request processing completion and the processing records are deleted from the system.
InSourceMCF	Sybase	Initially, pre-populated with the valid metadata types for each file type. It “points” to the metadata and indicates “how” to handle the data in a standard object description language (ODL) format.
InSystemParameters	Sybase	Stores current system thresholds that limit ingest request traffic and data volume.
InExternalDataProviderInfo	Sybase	Stores thresholds on ingest request traffic and data volume for External Data Providers.
InValGranuleServerUR	Sybase	Provides validation for the Granule Server Universal References (URs).
InGranuleServerInfo	Sybase	Stores thresholds on granule traffic and data volume for each Granule Server.

**Table 4.2.1.6-1. INGST CSCI Data Stores (2 of 2)**

<b>Data Store</b>	<b>Type</b>	<b>Description</b>
InDataTypeTemplate	Sybase	Initially, pre-populated with current, valid Earth Science Data Types (ESDTs) that the INS is capable of ingesting.
InESDTMap	Sybase	Stores the information for special mappings of the ESDT and the Client data type.
InFileTypeTemplate	Sybase	Initially, pre-populated with all valid file types that make up an ESDT.
InMediaType	Sybase	Stores the valid values of the media type available that can be ingested.
InNextAvailableID	Sybase	Stores the next available RequestID to be given.
InValDataGranuleState	Sybase	Stores all the valid values for a data granule state.
InValIngestType	Sybase	Stores all the valid values for an ingest type.
InValNotifyType	Sybase	Stores all the valid values for a notify type.
InValParameterClass	Sybase	Initially, pre-populated with all the valid values for a parameter class.
InValRequestState	Sybase	Stores all the valid values for a request state.
InEDPAddressMap	Sybase	Initially, pre-populated with the IP address for an External Data Provider.
InCurrentDataTypeMap	Sybase	Initially pre-populated with current valid Earth Science Data Types (ESDTs) Ingest is capable of ingesting and the current Ingest version id for each one.

## **4.2.2 Ingest Subsystem Hardware**

### **4.2.2.1 Ingest Client Hardware CI Description**

The Ingest Client HWCI (ICLHW) Server accommodates the required ingest volumes, including I/O, and processing capabilities to support internal data transfers associated with metadata validation and extraction, and to transfer data to the Data Server or Data Processing Subsystem. The disks are sized to accommodate the functionality and provide contingency space for the transfer of more than one day's worth of data within a 24-hour period.

The Ingest Server is a 64-bit SGI machine. Dual processors are installed on the Ingest Server (See 920-TDx-001 series of base-line documents).

The Ingest Server is configured with at least 256 MB of memory with one-way interleaving to support the processors.

The SGI architecture provides configuration for I/O subsystems that attach to the backplane. These I/O subsystem items are referred to as IO cards. Each IO card provides serial and parallel connections, two fast-wide differential SCSI-2 channels, and space for two HIO controller cards. An HIO controller card offers a HIPPI card, a FDDI card, and a card supporting three SCSI-2 channels.

The number of IO cards specified for each Ingest Server is determined by allocating HIO slots to the FDDI and HIPPI interfaces, and counting the number of SCSI-2 interfaces required. The number of internal and external SCSI-2 devices supported by the system determines the number

of SCSI-2 interfaces required. The first SCSI-2 channel is delegated to internal devices like CD-ROMs, floppy disk drives, and tape drives. Internal disks ranging in aggregate size from four GB to eight GB are allocated to the second SCSI-2 channel. External disk arrays are allocated to subsequent SCSI-2 channels and the number of channels is based on the required throughput of the external file systems (See 920-TDx-001 and 922-TDx-009 series of base-line documents).

The internal disks on an Ingest Server are used to provide swap space for the operating system and to provide file space for the operating system and applications (See 920-TDx-001 and 922-TDx-009 series of base-line documents).

The external disk arrays are SCSI-2 based RAID units from SGI. The implementation of these ingest buffer arrays are RAID Level 3 and RAID Level 1 for the database and logs (See 922-TDx-009 series of base-line documents). The SGI RAID units use one redundant disk for each four data disks in the RAID Level 3 configuration, and these are built into groups of five disks, with up to four groups (20 disks) per RAID enclosure.

Each enclosure contains two controllers that can access one or more groups of disks in the enclosure. Both controllers can access a group of disks within an enclosure, however, only one controller can access the group at a time. This dual attachment enables the striping of disk volumes across controllers for high throughput and for implementing fail-over of controllers.

A FDDI subnetwork is implemented at each site. Each server of ICLHW is dual-attached to the SDPS FDDI subnetwork (See 920-TDx-001, 921-TDx-002, 921-TDx-003, and 921-TDx-004 series of base-line documents).

A central HIPPI switch HIPPI network is used to implement the ICLHW and Data Repositories with switched 800 Mbps interface ports connected directly to the ICLHW and Data Repository hosts (See 920-TDx-001, 920-TDx-002, 921-TDx-003, AND 921-TDx-004 series of base-line documents).

Recovery/fail-over for HWCIs is described in the 920-TDx-014 series of documents. There is a version for each DAAC, indicated by the letter appearing in place of the "x." The document provides the recovery procedure for each host

#### **4.2.2.2 Ingest Workstation Description**

The Ingest Workstation is provided to execute the Ingest GUI. This workstation enables the operator to remotely monitor the Ingest Servers and the Ingest processes, from media ingest to remote ingest.

The Ingest Workstation is a 64-bit SGI machine. For information on the processor used on the Ingest Workstation see the 920-TDx-001 series of base-line documents.

The Ingest Workstation is equipped with at least 128 MB of memory (See 920-TDx-001 series of base-line documents).

The Ingest Workstation is equipped with four EISA slots, with a transfer rate of at least 33 MB/second. A FDDI interface card and a graphics subsystem each use an EISA slot. Additionally, the Ingest Workstation is equipped with two fast SCSI-2 connections.

The Ingest Workstation internal disks, providing an aggregate space of eight GB, provide swap space and file system space for the operating system and applications (See 920-TDx-001 series of base-line documents). There are no external disk arrays.

A FDDI subnetwork is implemented at each site. The Ingest Workstation uses a single-attached FDDI interface to connect to the SDPS FDDI subnetwork.

Recovery/fail-over for HWCI is described in the 920-TDx-014 series of documents. There is a version for each DAAC, indicated by the letter appearing in place of the "x." The document provides the recovery procedure for each host.

### 4.3 Client Subsystem Overview

The Client Subsystem (CLS) is a set of CSCIs and processes to access the services and data available in ECS and the other systems interoperable with the ECS. The CLS also includes the services needed to implement an ECS interface for an application such as automated or custom data access. An accessed service can be remote (i.e., via wide-area network to other sites) or local (i.e., to a database manager at the user's site).

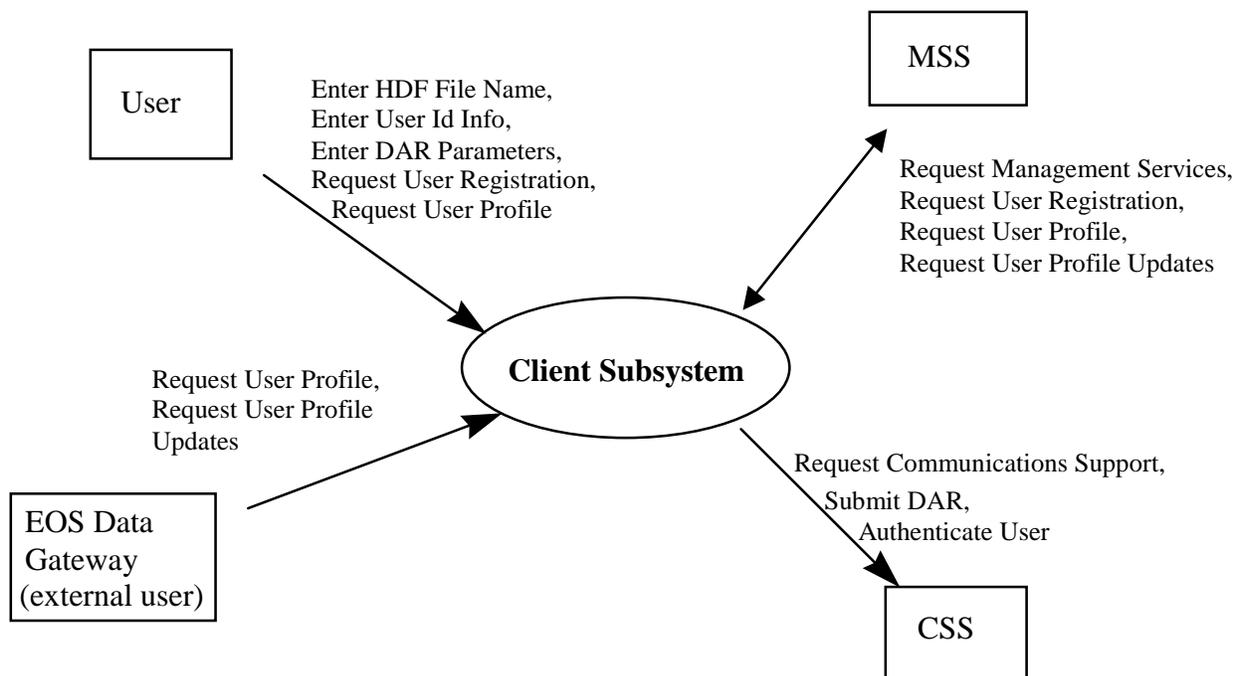
The CLS CSCIs and processes fall into the following general categories:

- An intuitive desktop manager to manage desktop objects (files) in the user's local file space, and represent applications and data in the domain of the client (applications in addition to the those available in CLS).
- Application programs accessible through user interfaces to implement the range of functionality available in the CLS.

In addition, the workstations operating within an ECS CLS contains infrastructure support software as part of the CSS and platform support software.

#### Client Subsystem Context

Figure 4.3-1 is the Client Subsystem context diagram. The diagram shows the events sent to the CLS and the events the CLS sends to other SDPS or CSMS subsystems.



**Figure 4.3-1. Client Subsystem Context Diagram**

The search and retrieval of data are performed by the EOS Data Gateway, the Version 0 Client (Web version), ported to the ECS environment. The EOS Data Gateway is treated as an external entity since the design and design documentation is controlled under another contract. Documentation on the V0 Web Client (EOS Data Gateway) design can be accessed through the Universal Resource Locator <http://harp.gsfc.nasa.gov/~imswww/pub/manuals/imsdesign.html>. Table 4.3-1 provides descriptions of the interface events shown in the Client Subsystem context diagram.

**Table 4.3-1. Client Subsystem Interface Events (1 of 2)**

Event	Interface Event Description
Request User Registration	Users submit a request to be a registered user of the ECS. This enables special privileges not awarded to guests, such as the ability to order data that could cost money (such as ordering data on media that comes at a cost). The request is transferred to the MSS for processing. In response, the CLS receives a user registration response that the request has been received. The user receives the actual account information through other means.
Request User Profile	A User Profile Request is a search for a User Profile. There are two methods used, one is by an encrypted user name and password and the other is by user identification (ID). In response, the CLS receives the user profile, which contains information about a user that must be maintained. This includes mailing, billing, and shipping addresses, phone number, electronic mail address, etc.
Request User Profile Updates	The user can update their User Profile through the EOS Data Gateway. This includes their addresses (user, shipping, billing, and e-mail) and other important information. This updated profile information (profile2.odl) is forwarded through the CLS to the MSS. The EOS Data Gateway uses the profile2.odl file rather than a live interface with the CLS as its source of user information.
Enter User ID Info	A user name and password for authenticating the user. The user name and password is turned into a User Authentication Request to the CSS (via a request for communications support).
Enter DAR Parameters	Parameters required for submittal of Data Acquisition Requests (DARs) as specified in the ASTER GDS Interface Requirements Document (IRD)/the user enters Interface Control Document (ICD). Upon completion of the selection or modification of DAR parameters, the user may submit a DAR.
Enter HDF File Name	This is a file name for a Hierarchical Data Format (HDF) file. The user opens the file to see the data in the file.

**Table 4.3-1. Client Subsystem Interface Events (2 of 2)**

Event	Interface Event Description
Request Management Services	<p>The MSS provides a basic management library of services to the subsystems, implemented as client or server applications, using the CSS Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> - The MSS forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>
Request Communications Support	<p>The CSS provides a library of services available to each SDPS or CSMS subsystem. The services required to perform the specific subsystem assignments are requested by the subsystem from the CSS. These services include: Distributed Computing Environment (DCE) support, file transfer services, Network &amp; Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode information.</p>
Authenticate User	<p>A request to authenticate the user given a user name and password. This uses the DCE services to authenticate the user. In response, a user authentication response is sent back as to whether the user name and password are valid.</p>
Submit DAR	<p>The user submits a DAR after selecting or modifying DAR parameters to the CSS. As the result of a DAR submission, the user receives a DAR ID. This is a string of characters used to track a DAR. The user receives notification every time data resulting from this DAR is received by the system.</p>

### Client Subsystem Structure

The Client Subsystem is one CSCI:

- The Workbench (WKBCH) CSCI includes the set of ECS applications and libraries that provide access to the ECS data and services. In Release 5A, there are three tools: the User Registration Tool (URT), the EOSView, and the Java DAR Tool (JDT). The URT is an HTML based tool. The EOSView is an X/Motif application resident on a science user's workstation. The Java DAR Tool is a java-based web application that can be accessed through a web browser.

The CLS contains no HWCIs. The DMS hardware (Interface Servers) provides the processing and storage for the WKBCH software. In addition, the User Profile Gateway Server is used to provide user profile information to the EOS Data Gateway for ECS users.

The Interface Servers are SUN Ultra 3000 Server class machines. Detailed specifications can be found in the site specific hardware design diagram, 920-TDx-001. Because of their common configuration, these servers can be used interchangeably. The Workbench software executed on these hosts enables user access to the ECS data and services. The Interface Servers also provide storage for user session data and the Java Earth Science Tool (JEST) map data. User session data is considered critical and thus stored in a Redundant Array of Inexpensive Disks (RAID) for high availability.

Detailed mappings can be found in the site-specific hardware/software mapping in baseline document number 920-TDx-002.

A SUN SPARC Storage Array Model 114, is dual ported between both hosts and provides storage for the user session data as described. A detailed configuration is specified per disk partition, and can be found in baseline document number 922-TDx-009.

Custom code and client applications are loaded on the internal disks of all hosts to prevent dependencies on specific hosts or peripherals. Real time or transaction oriented data (i.e., user session data) is stored in the RAID. The Interface Servers are both “hot” and share the resident RAID device. In the event of a host failure, the operational server assumes total ownership of the RAID and its processes. While in this state, the operational server is recognized to be running in degraded mode until recovery is completed.

#### Use of COTS in the Client Subsystem

- Netscape Navigator

The Netscape Navigator Web browser accesses the CLS inside a DAAC. The users can use the Web browsers they already have at their facilities.

- Netscape Enterprise Server

The Netscape Enterprise Server is used to serve the Web pages for the User Registration Tool.

- XVT Software Inc.’s XVT

The XVT is used as a widget set and development tool for the EOSView application of the WKBCH CSCI. There is no operational unit of XVT used at run-time.

- Interactive Data Language (IDL)

IDL is used by EOSView to provide the visualization features for users.

- RogueWave’s Tools.h++

The Tools.h++ class libraries provide strings and collections to the DAR Tool and the User Registration Tool.

### **4.3.1 Workbench Computer Software Configuration Item Description**

#### **4.3.1.1 Workbench Functional Overview**

The Workbench (WKBCH) CSCI is a set of application programs, which implement the core functionality of the CLS science user interface. The V0 Client, ported to the ECS environment performs the data search and retrieval. The EOS Data Gateway is treated as an external entity since the design and design documentation is controlled under another contract. The WKBCH CSCI provides users the capability to register as users of the system, submit data acquisition requests for the ASTER instrument data, and to see data products in HDF format.

The User Registration Tool (URT) handles requests by users to become registered users of the ECS. URT requests specific mailing address, E-mail address, and phone number to pass to the MSS for processing. The user is contacted directly to receive the ECS login information. After

the submission of the user registration request, the CLS is not involved in the rest of the transaction.

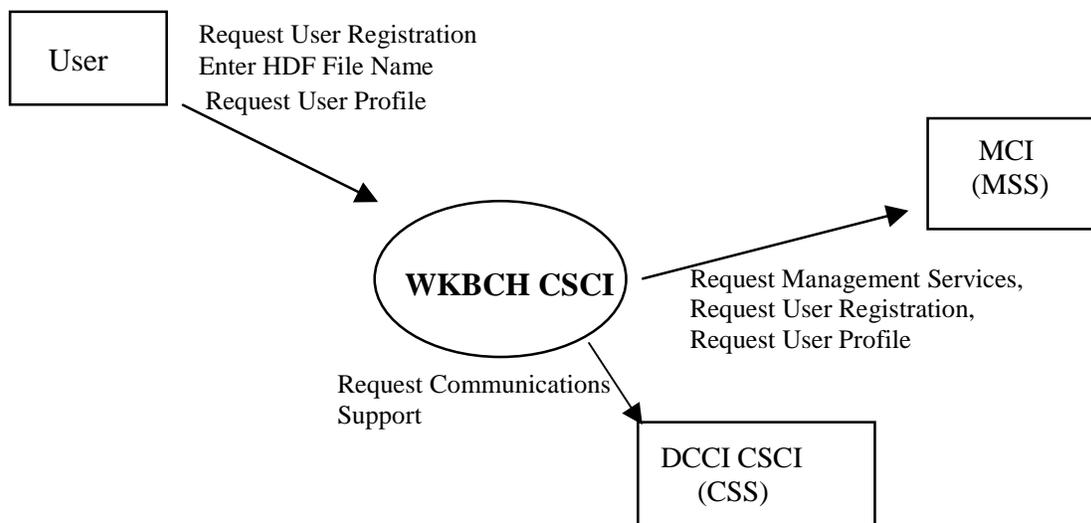
The Java DAR Tool handles user requests to acquire ASTER data from the satellite. The user specifies when and where the data is to be taken. The DAR is submitted to the ASTER GDS in Japan for review. The acceptance of the DAR by Japan is not immediate and the Java DAR Tool can not determine the DAR status immediately. The Java DAR Tool is a java-based web tool that runs on Sun workstations and PCs.

EOSView is an HDF-EOS viewer that enables users to visualize data they receive from the ECS. EOSView can take any HDF-EOS data file and perform visualization functions while it does not provide sophisticated data analysis functions found in COTS products such as IDL. EOSView is a GUI application used on UNIX platforms using X/Windows and Motif.

HDF files can be dragged and dropped on the EOSView icon to initiate the tool with the specified HDF file.

#### 4.3.1.2 Workbench Context

Figure 4.3.1.2-1 is the WKBCH CSCI context diagram. The diagram shows the events sent by WKBCH to other SDPS and CSMS subsystems and events sent to WKBCH from the other SDPS and CSMS subsystems.



**Figure 4.3.1.2-1. WKBCH CSCI Context Diagram**

Table 4.3.1.2-1 provides descriptions of the interface events shown in the WKBCH CSCI Context Diagram.

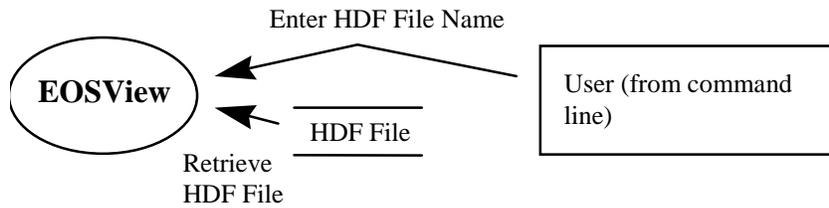
**Table 4.3.1.2-1. WKBCH CSCI Interface Events**

Event	Interface Event Description
Request User Registration	A user submits a request to be a registered user of the ECS. Registered users are given special privileges not awarded to guests, such as the ability to order data on a media that comes at a cost. There is an immediate response to the user that the User Registration Request was received by ECS. The user receives the actual account information through other means.
Request User Profile	A User Profile Request is a search for a User Profile. There are two methods used, one is by an encrypted user name and password and the other is by user identification (ID). In response, the WKBCH CSCI receives the user profile, which contains information about a user that must be maintained. This includes mailing, billing, and shipping addresses, phone number, electronic mail address, etc.
Enter HDF File Name	This is the name of an HDF file to be opened in EOSView. A file name passed to EOSView enables EOSView to present the file contents to the user. This file can be obtained through any means (i.e., from a search, browse, acquire, or from a friend). The EOSView enables the user to manipulate an HDF file into multiple types of displays. Images, metadata, and actual data values can be viewed. Multiple images can be animated.
Enter User Id Info	The user name and password that identifies the user to the ECS.
Request Communications Support	The DCCI CSCI provides a library of services available to each SDPS and CSMS CSCI. The services required to perform the specific CSCI assignments are requested by the CSCI from the DCCI CSCI. These services include: DCE support, file transfer services, Network & Distributed File Services, Bulk Data transfer services, file copying services, name/address services, password services, Server Request Framework (SRF), Universal Reference (UR), Error/Event logging, message passing, Fault Handling services, User Authentication services, and Mode Information.
Request Management Services	<p>The MACI provides a basic management library of services to the subsystems, implemented as client or server applications, using the DCCI CSCI Process Framework. The basic management library of services include:</p> <ul style="list-style-type: none"> <li>• <b>Lifecycle commands</b> - The MACI forwards commands to managed hosts in the network to start and to stop applications. On startup, it passes a parameter identifying the mode (e.g., OPS, SHARED, test, training) for the application to run.</li> </ul>

### 4.3.1.3 Workbench Architecture

EOSView and the DAR Tool run on the user's workstation. For the URT, a Web browser is used on the workstation to access Common Gateway Interface (CGI) scripts located inside the DAAC. Since these tools have no interfaces to each other and have distinct operations, their uses are described separately. Figure 4.3.1.3-1 is the EOSView architecture diagram. The diagram shows the events sent to the EOSView tool.

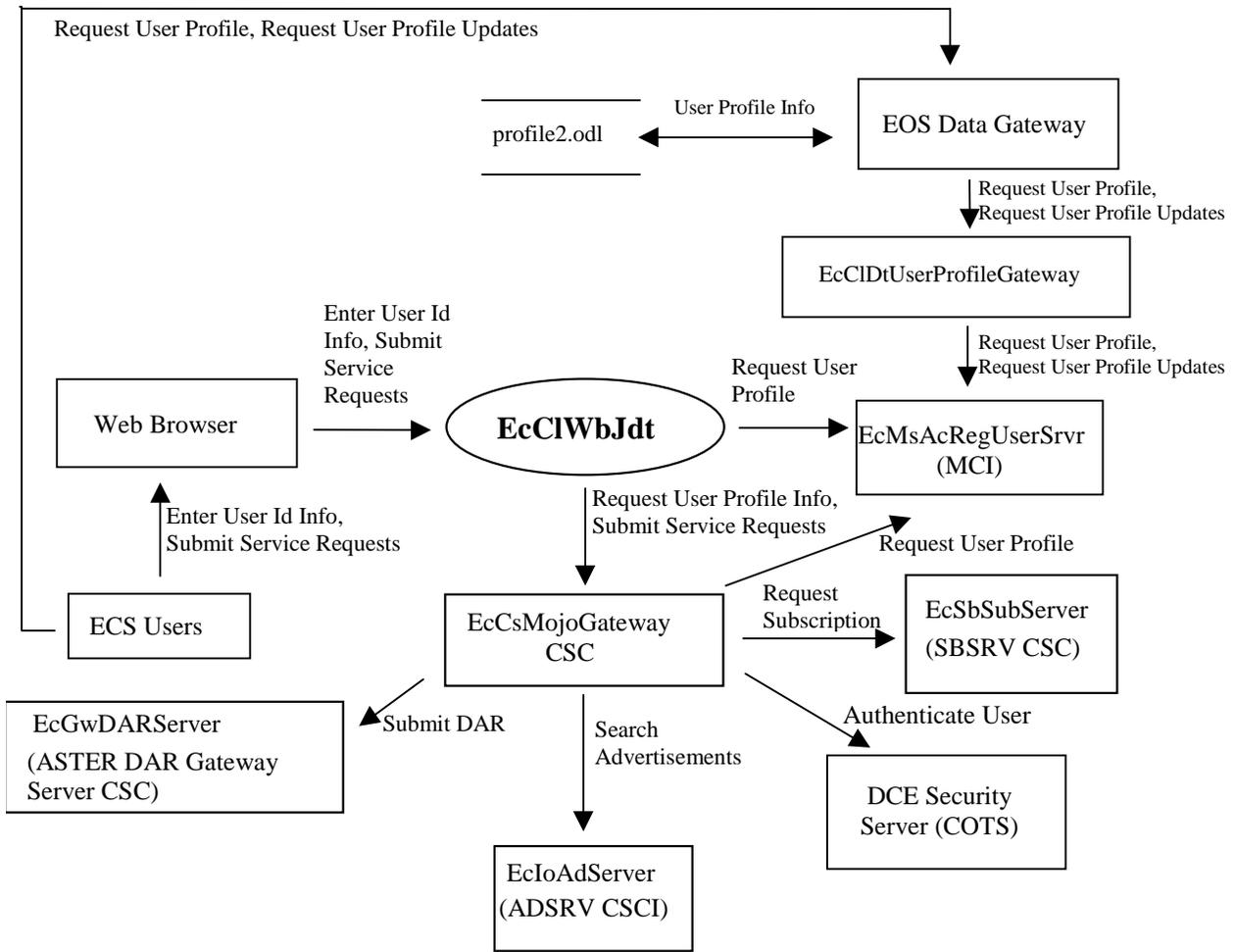
Since EOSView is a stand-alone application, it has no interfaces and gets initialized from the command line.



**Figure 4.3.1.3-1. EOSView Architecture Diagram**

Figure 4.3.1.3-2 is the Java DAR Tool architecture diagram. The diagram shows the events sent to the JDT process and the events the JDT process sends to other CSCIs, CSCs, or processes.

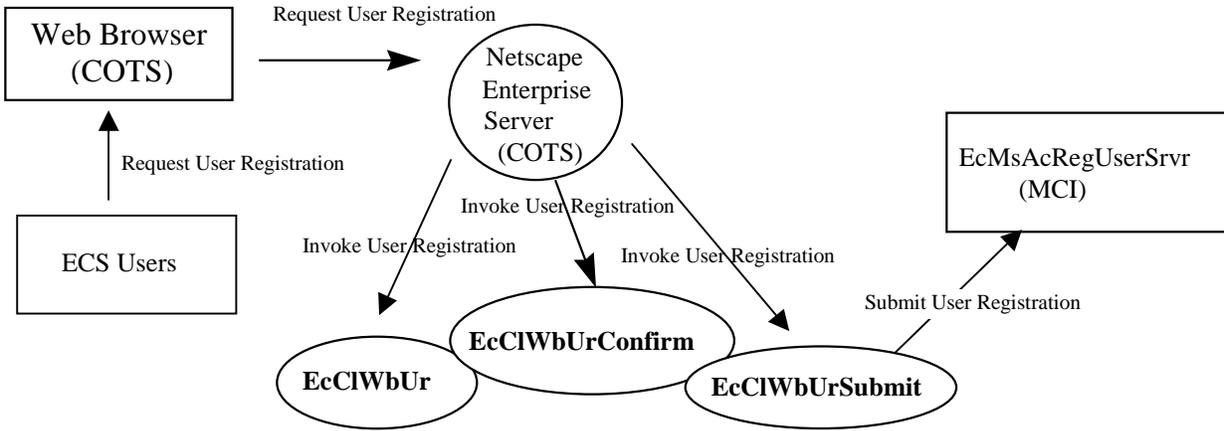
The Java DAR Tool is initiated from the web browser as an applet and can be initiated from the command line as a Java application. The Java DAR Tool uses the CSS MOJO Gateway as the gateway to all ECS services. JDT submits DARs to the CSS MOJO Gateway, which in turn submits them to the DAR Communications Gateway CSC. DARs can be a DAR submission or a modification to an existing DAR. After the DAR is successfully submitted, the Java DAR Tool submits a subscription on behalf of the user to get notification when the data associated with the DAR is ingested into the ECS. The Java DAR Tool retrieves the service advertisement from the Advertising Service to determine the parameters to send to the Subscription Server.



**Figure 4.3.1.3-2. DAR Tool Architecture Diagram**

Figure 4.3.1.3-3 is the URT architecture diagram. The diagram shows the events sent to the URT processes and the events the URT processes send to other CSCIs, CSCs, or processes.

The URT is an HTML application and resides inside each DAAC. The HTML pages are served from the Netscape Enterprise Server located on the INTHW-1 server. The URT communicates with the MSS User Profile Server to submit the registration request.



**Figure 4.3.1.3-3. URT Architecture Diagram**

**4.3.1.4 Workbench Process Descriptions**

Table 4.3.1.4-1 provides descriptions of the processes shown in the EOSView, DAR Tool and the URT Architecture Diagrams.

**Table 4.3.1.4-1. WKBCH CSCI Processes (1 of 2)**

Process	Type	COTS/ Developed	Functionality
EOSView	GUI	developed	This is the end user tool that provides data visualization functions for the ECS data. It is used by general users of the system and personnel within the DAAC and SCF for Quality Assurance (QA) checks of products.
EcCIWbUr, EcCIWbUrConfirm, EcCIWbUrSubmit	CGI	developed	These are the CGI scripts that display the URT user interface and provide the capability to submit a user registration request. There is a data entry screen, a confirmation screen, and finally a program to submit the request to the MSS.
EcCIWbDtDART	GUI	developed	This is a Java GUI that enables users to submit DARs to the ASTER GDS through the CSS DAR Communications Gateway (via CSS MOJO Gateway). When the DAR is submitted, a DAR Identifier is returned to the user. A subscription is submitted on behalf of the user, asking for notification whenever a data granule with the specified DAR ID is inserted into the SDPS archives. The Java DAR Tool also has the capability to modify DARs in accordance with the ASTER ICD.

**Table 4.3.1.4-1. WKBCH CSCI Processes (2 of 2)**

Process	Type	COTS/ Developed	Functionality
EcCIDtUserProfile Gateway	Server	Developed	The User Profile Gateway is a retrieval engine for users via the EOS Data Gateway. This enables users to be independent of DCE. The server listens for calls on a socket from the EOS Data Gateway. Server Supports: <ul style="list-style-type: none"> <li>Multiple concurrent requests.</li> </ul>

### 4.3.1.5 Workbench Process Interface Descriptions

Table 4.3.1.5-1 provides descriptions of the process interface events shown in the EOSView, Java DAR Tool, and the URT Architecture Diagrams.

**Table 4.3.1.5-1. WKBCH CSCI Process Interface Events (1 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Enter HDF File Name	One per user identified file	Read from command line	User	The user types a file name on the EOSView user interface to tell the GUI which file to open.
Retrieve HDF File	One file per request	File name provided by the user as read from the script file that captured it while active.	Process: EOSView	The EOSView process retrieves the HDF File from a data store based on the file name provided by the user.
Submit Service Requests	Per user request	Web Browser	User	The user submits service requests via the web browser. The EcCIWbJdt accepts the requests of the user and submits the requests to the EcCsMojoGateway, which in turn sends the requests to the EcSbSubServer, the EcGwDARServer, or the EcIoAdServer.

**Table 4.3.1.5-1. WKBCH CSCI Process Interface Events (2 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
User Profile Info	One per user profile retrieved or stored to the file	<i>Library:</i> C++ Library <i>Class:</i> ofstream	<i>Process:</i> EOS Data Gateway	The EOS Data Gateway retrieves and stores user profile information in the profile.odl file. The EOS Data Gateway sends requests to the EcMsAcRegUserSrvr to obtain user profile information and to update user profile information.
Submit DAR	One per request to DAR	<i>Class:</i> EcGwDARSubmitDarRequest_C <i>MOJO Class:</i> EcMjDarSubmitDarProxy	<i>Process:</i> EcCIWbJdt	The EcCIWbJdt submits the DAR Submit request (and all other DAR related requests via the EcCsMojoGateway) to the EcGwDARServer. The EcGwDARServer interfaces directly with the ASTER GDS, and, in the event of a DAR Submit Request, returns a DAR ID to the EcCsMojoGateway. The EcCsMojoGateway, in turn, returns the DAR ID to the EcCIWbJdt. The EcCsMojoGateway handles all ECS service requests from the EcCIWbJdt via proxies.
Enter User Id Info	Once per session	Web Browser	User	A user name and password for authenticating the user. The user name and password are turned into Authenticate User request to the DCE Security Server (COTS).
Request User Profile	One per request	<i>Library:</i> MsAcCInt <i>Class:</i> MsAcUsrProfile Rwnet.h* RWSocketPortal	<i>Processes:</i> EcCIWbJdt, EcCIDtUserProfileGateway	The EcCIWbJdt automatically sends a request to the EcMsAcRegUserSrvr to get the user's profile. External users send requests, via the EcCIDtUserProfileGateway to the EcMsAcRegUserSrvr to get or update user profile information.
Request User Profile Info	Once per session	<i>Servlet:</i> MessageManager	<i>Process:</i> EcCIWbJdt	The EcCIWbJdt sends the user name and password to the EcCsMojoGateway for user authentication and use of ECS data and services.

**Table 4.3.1.5-1. WKBCH CSCI Process Interface Events (3 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Authenticate User	Once per session	<i>Library:</i> EcSelogincontext.a <i>Class:</i> EcSelogincontext	<i>Process:</i> EcCsMojoGateway	The EcCsMojoGateway sends the user name and password to the DCE Security Server to authenticate the user. In response, the EcCsMojoGateway receives an authentication status.
Request Subscription	One per notification request	<i>Library:</i> EcSbCI <i>Class:</i> EcCISubscription <i>MOJO Class:</i> EcMjECSSbsrvProxy	<i>Process:</i> EcCsMojoGateway	The EcCsMojoGateway passes a subscription request to the EcSbSubServer. This is a request for notification upon a specific event occurring in the system. An example would be subscribing to the insert of a particular granule type. A valid subscription request results in the return of a subscription identifier. The subscription Identifier is not returned to the user. <b>Note: This is the Request for Communications Support needed by the Java DAR Tool.</b>
Request User Profile Updates	One per user profile request	<i>Library:</i> MsAcCInt <i>Class:</i> MsAcUsrProfile Rwnet.h* RWSocketPortal	User	The user requests profile updates via the EOS Data Gateway and the EcCIDtUserProfileGateway. The EOS Data Gateway forwards the requests to the EcMsAcRegUserSrvr to retrieve or update the user profile information.
Search Advertisements	One per advertising search	<i>Libraries:</i> IoAdCore, IoAdSubs <i>Class:</i> IoAdApprovedAdvSearchCommand <i>MOJO Class:</i> EcMjECSAdsrvProxy	<i>Process:</i> EcCIWbJdt	The EcCIWbJdt infrastructure is used to search the EcIoAdServer, via the EcCsMojoGateway, to find the signature service advertisement for the subscription event related to the ASTER data. This provides the EcCIWbJdt with the parameters needed to be filled in before sending the subscription request to the EcSbSubServer.

**Table 4.3.1.5-1. WKBCH CSCI Process Interface Events (4 of 4)**

Event	Event Frequency	Interface	Initiated By	Event Description
Request User Registration	One per user request	forklexec standard Unix calls	User	This is the request by the user to become registered as an ECS user.
Invoke User Registration	One per User Registration Request	forklexec standard Unix calls	<i>Process:</i> Netscape Enterprise Server	The Netscape Enterprise Server initiates the URT CGI scripts, passing in the data from the HTML forms the user completed in the User Registration Request.
Submit User Registration	One per registration request to MSS	<i>Libraries:</i> MsAcCInt, MsAcComm  <i>Classes:</i> EcAcUsrRequest Mgr, MsAcUsrRequest	<i>Process:</i> EcCIWbUrSubmit	The URT CGI script takes the confirmed user inputs and submits the registration request to the EcMsAcRegUserSrvr.

#### 4.3.1.6 Workbench Data Stores

Table 4.3.1.6-1 provides descriptions of the WKBCH CSCI data storage areas shown on the EOSView, Java DAR Tool, and URT Architecture Diagrams. To simplify the table, the list of data stores is limited to the areas shown.

**Table 4.3.1.6-1. WKBCH CSCI Data Stores**

Data Store	Type	Functionality
HDF File	File	A listing of the HDF files accessible by EOSView.
Session Data	File	The Java DAR Tool maintains user session data, which includes submitted and in process DARs, search criteria and search results.
Profile2.odl	File	This file is where the WKBCH writes the user profile information. This is required since the EOS Data Gateway does not have a "live" link to the User Profile Gateway to retrieve it. The WKBCH writes the profile information to the file and EOS Data Gateway uses it upon startup.