

**Interface Control Document
between the EOSDIS Core
System (ECS) and the Science
Investigator-led Processing
Systems (SIPS)
Volume 0
Interface Mechanisms**

Revision J

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National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

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**Interface Control Document between the EOSDIS Core System
(ECS) and the Science Investigator-led Processing Systems (SIPS)
Volume 0, Interface Mechanisms**

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Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes 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.

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Abstract

This document provides the design specifications for implementing the ECS-SIPS interface requirements maintained and controlled in ESDIS document 423-42-03, Interface Responsibilities for Standard Product Generation Using Science Investigator-led Processing Systems.

It specifies internetworking, interface mechanisms, filenaming conventions and handshaking message formats for data exchange between the ECS DAAC(s) and the SIPS. These data exchanges include transfer of data files from ECS to SIPS for standard product generation, transfer of metadata configuration files from ECS to SIPS to support standard product metadata generation, and transfer of SIPS standard products, algorithm packages, metadata, production histories, ancillary data and QA data to ECS. If authorized, SIPS may also produce EOS special products and pass them to the ECS for archiving and distribution using these same mechanisms.

Information specific to each SIPS is published in a SIPS-unique ICD volume. At a minimum, that volume includes brief descriptions of the SIPS and its mission, context information for the ECS-SIPS interface, ECS to SIPS-unique network topology, literature references, lists of data types with volume and frequency specifications, and any SIPS-unique ECS-SIPS requirements. The SIPS may interact with one or more DAACs using the same ECS services and mechanisms at each DAAC. The SIPS-unique volumes state the interfaces with particular DAACs. The current defined SIPS include ACRIM III, SAGE III SCF, MODAPS, MOPITT, AMSR-E, ICESat, and TES.

Keywords: *checksum, ESDT, secure, distribution, ingest, interface, linkage, ODL, polling, standard products, subscription, SIPS, XML*

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Revision B	03/15/2000	All	CCR 423-41-57-008-R3
Revision C	11/17/2000	All	CCR 423-41-57-015
Revision D	05/01/2001	All	CCR 423-41-57-016
Revision E	11/14/2001	All	CCR 423-41-57-019-R2
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Appendix A. Work-Off Plan

Appendix B. File Transfer Quick Reference Summary

Abbreviations and Acronyms

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1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirements List (CDRL) item 029 whose requirements are specified in Data Item Description (DID) 209/SE1, was a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Contract (NAS5-60000) and is required under contract NAS5-03098.

1.2 Scope

This document specifies the interface design to implement the ECS requirements documented and controlled in ESDIS document 423-42-03, Interface Responsibilities for Standard Product Generation Using Science Investigator-led Processing Systems. It includes specifications for data exchange between the ECS DAAC and the Science Investigator-Led Processing System (SIPS) that fall under the following topics:

1. Internetworking
2. Interface mechanisms
3. Filenaming conventions
4. Handshaking message formats
5. Error handling and fallback procedures
6. Security

Data exchanges addressed include --

- a. Transfer of data from ECS to SIPS for standard product generation
- b. Transfer of metadata configuration files from ECS to SIPS to support standard product metadata generation
- c. Transfer to ECS of SIPS standard products and other files resulting from or associated with SIPS standard product generation

Also addressed are special services to ensure that data granules received from the SIPS are associated with defined collections in the archives.

If authorized, SIPS may also produce EOS special products and use these same mechanisms to pass them to the ECS for archiving and distribution.

This document describes the ECS interfaces and services applicable and available to all SIPS.

For each SIPS, a separate volume documents data types to be transferred and/or archived with data volumes and frequencies as well as unique aspects of the interface between the particular SIPS and the particular interfacing DAAC(s). The SIPS may interact with one or more DAACs using the same ECS services and mechanisms at each DAAC. All interfaces to be implemented between a particular SIPS and ECS are specified in the SIPS-unique volume. Table 1-1 lists current SIPS and published or planned SIPS-unique volumes.

This document does not include ECS Release or Drop schedules. Information about schedules for implementation of external interfaces is contained in the SDPS Program Schedule.

Certain implementation details are not suitable for, or specified in, this document. Such items as contact address, telephone or fax numbers, internet host id's, values for operator tunable parameters such as number of retries on failure or timeouts should be documented in an Operations Agreement or Operations Procedures document under the control of the DAAC and with concurrence of the SIPS. The term "Operations Agreement(s)" in this document refers to such a document though the particular documentation name may vary from DAAC to DAAC.

The Earth Science Data and Information System (ESDIS) Project has responsibility for the development and maintenance of this ICD. Any changes in the interface requirements must be agreed to, and assessed at the ESDIS Project Level. This ICD will be approved under the signature of the ESDIS Project Manager.

Table 1-1. SIPS ICD Volumes (1 of 2)

SIPS	Interfacing DAAC(s)	Document Title	Document ID Number
ACRIM III SCF	ASDC	Interface Control Document between the ESDIS Project and ACRIM III Project for Standard Data Production Using the ACRIM III Science Investigator-led Processing System (SIPS)	423-41-57-1
SAGE III SCF	ASDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing System (SIPS) Volume 2 ECS SAGE III SCF Data Flows	423-41-57-2
MOPITT SCF	ASDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing Systems (SIPS) Volume 5 ECS-MOPITT Data Flows	423-41-57-5
MODAPS	LP DAAC, NSIDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing Systems (SIPS) Volume 6 ECS-MODIS SIPS (MODAPS) Data Flows	423-41-57-6

Table 1-1. SIPS ICD Volumes (2 of 2)

SIPS	Interfacing DAAC(s)	Document Title	Document ID Number
AMSR/E	NSIDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing Systems (SIPS) Volume 7 ECS-AMSR-E Data Flows	423-41-57-7
TES	ASDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing Systems (SIPS) Volume 10 Tropospheric Emission Spectrometer (TES) ECS Data Flows	423-41-57-10
ISIPS (GLAS)	NSIDC	Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-led Processing Systems (SIPS) Volume 11 ECS - ICESat Science Investigator-led Processing System Data Flows	423-41-57-11

1.3 Purpose

This document is written to formalize the interpretation and general understanding of the interfaces between ECS and the SIPS in general. Taken in conjunction with the other volumes of this ICD referenced in Table 1-1, this volume provides clarification and elaboration of those interfaces to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system. This document provides a point of mutual control of external interface definitions via the ESDIS Configuration Control Board (CCB).

1.4 Status and Schedule

This document contains interface specifications for all data exchange between ECS and SIPS. If new SIPS are approved, corresponding SIPS-unique volumes will be approved and published.

This ICD has been submitted as an ECS Project CCB approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted for consideration by Contractor and Government CCBs under the normal change process at any time.

Within this document there may be some TBRs, TBSs and/or TBDs. A Work-off Plan is provided as Appendix A. The work-off plan provides the following information:

- a. ICD I/F Issue No.
- b. ICD Reference Paragraph
- c. ICD Issue Priority
- d. ICD Issue Type - Description
- e. Work-off Plan Task(s)
- f. Projected Resolution Date

g. Risk Assessment

1.5 Organization

Section 1 provides information regarding the identification, scope, purpose and objectives, and organization of this document.

Section 2 lists related non-SIPS-unique documents that were used as sources of information for this document or that provide additional background information to aid understanding of the interface implementations.

Section 3 is an overview of the interfaces for data exchange between ECS and the SIPS.

Section 4 is a detailed presentation of the data exchange framework for ECS-SIPS interfaces. Again, this is limited to implementation information applicable to any SIPS. Specifically, the following topics are discussed: applicable internetworking protocols, network topology, data transfer methodologies, error conditions and error handling, backup methods, and data exchange security.

Section 5 explains some critical requirements for providing data and metadata to the ECS. It contains guidelines that must be followed to ensure the interfaces function and is not intended to be a comprehensive discussion of ECS data and metadata.

Appendix A contains Work-off Plan for all TBRs, TBSs and/or TBDs for data exchange mechanisms.

Appendix B is a quick reference summary of the characteristics of the polling with delivery record mechanism for the SIPS interface.

A list of abbreviations and acronyms is also provided.

2. Related Documentation

The latest versions of all documents below should be used. The latest ESDIS Project documents can be obtained from URL: <https://romulus.gsfc.nasa.gov/htbin/cm/emdshome.cgi>. ESDIS documents have a document number starting with either 423 or 505. The latest EOSDIS Core System (ECS) documents can be obtained from URL: <https://cicero.eos.nasa.gov/esdis>.

2.1 Parent Documents

The parent document is the document from which this interface control document's scope and content are derived.

423-46-04	EMD Task 201 Statement of Work for ECS SDPS Maintenance & System Evolution
423-46-01	Functional and Performance Requirements Specification for the Earth Observing Data and Information System (EOSDIS) Core System Science Data Processing System
423-42-03	Goddard Space Flight Center, Interface Responsibilities for Standard Product Generation Using Science Investigator-led Processing Systems (SIPS)

2.2 Applicable Documents

The following documents are referenced within this interface control document, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

various	Operations Agreement (or Operations Procedures Document, etc.) between a given DAAC and a SIPS. The particular document name is called out in each SIPS-unique volume of this ICD.
160-TP-013	The Role of Metadata in EOSDIS
TBD	Release 7.21 Segment/Design Specifications for the EMD Project
420-EMD-001	Release 7 Implementation Earth Science Data Model
423-35-01	Interface Control Document (ICD) between the Earth Observing System (EOS) Mission Support network (EMSn) and Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Elements: ECS Distributed Active Archive Center (DAAC), EOSDIS Operations Center (EOC), and Systems Monitoring and Coordination Center (SMC)

505-10-20 System Interface Control Plan for the Earth Science Data and Information System (ESDIS) Project

ECSinfo Data Pool ECS Metadata DTDs:

<http://ecsinfo.gsfc.nasa.gov/ECSInfo/ecsmetadata/dtds/DPL/ECS/index.html>

2.3 Information Documents

2.3.1 Information Documents Referenced

The following documents are referenced herein and, amplify or clarify the information presented in this document. These documents are not binding on the content of this document.

TBD	Release 7.21 Mission Operations Procedures
ISO 7498	International Organization for Standardization, Basic Reference Model for Systems Interconnection
none	ECS Science Data Processing Segment (SDPS) Program Schedule
RFC 791	Postel, J. Internet Protocol, Sep-01-1981, (Status: STANDARD)
RFC 793	Postel, J. Transmission Control Protocol, Sep-01-1981, (Status: STANDARD)
RFC 821	Postel, J. Simple Mail Transfer Protocol, Aug-01-1982, (Status: STANDARD)
RFC 0959	Postel, J. & J.K. Reynolds, File Transfer Protocol, Oct-01-1985, (Status: STANDARD)
RFC 1321	Rivest, R., The MD5 Message-Digest Algorithm, April 1992
CCSDS 641.0-B-1	Consultative Committee for Space Data Systems (CCSDS), Recommendation for Space Data System Standards: PVLSPEC - Parameter Value Language Specification, 5/92 (http://www.ccsds.org/blue_books.html)
JPL D-7669, Part-2.	Planetary Data System Standards Reference, Version 3.2, Chapter 12: Object Description Language (ODL) Specification and Usage, July 24, 1995 (http://pds.jpl.nasa.gov/stdref/stdref.htm)

2.3.2 Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of this document.

170-EMD-001	HDF-EOS Library User's Guide for the EMD Project, Volume 1: Overview and Examples
170-EMD-002	HDF-EOS Library User's Guide for the EMD Project, Volume 2: Function Reference Guide
175-EMD-001	HDF-EOS Interface Based on HDF5, Volume 1: Overview and Examples
175-EMD-002	HDF-EOS Interface Based on HDF5, Volume 2: Function Reference Guide
420-TD-069	ODL Restrictions, ECS Specific and ODL Library Specific

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3. Interface Overview

3.1 Summary of Data Flows

Table 3-1 summarizes the data flows between ECS and the SIPS that are specified in Section 4. The table shows four categories of data exchange interfaces.

1. In response to standing orders (subscriptions) from a SIPS, ECS sends Distribution Notices (DNs) and data files, including Level 0 data, ancillary data and orbit and attitude data.
2. The ECS provides a Metadata Configuration File (MCF) for each data collection to be ingested by ECS using a procedure to be developed between the DAAC(s) and the SIPS and documented in the Operations Agreement(s). The SIPS uses the MCF in conjunction with metadata tools provided in the SDP Toolkit to produce metadata for delivered products that conforms to the ECS standard.
3. The SIPS provides metadata, standard product data granules, browse data, ancillary data, production history, QA granules, algorithm package TAR files and file linkage information as appropriate to the ECS via a standardized electronic polling with delivery record mechanism. Each delivered granule is accompanied by metadata that conforms to its defined Earth Science Data Type (ESDT) collection; that is, the metadata format and content conform to the respective MCF.

In the table below, the Destination "SIPS" is a location designated by the SIPS. If the particular DAAC and the SIPS agree, this could be a staging location resident at the DAAC. The methods or procedures that the SIPS uses to interact with this staging location are not under the control of this document.

Table 3-1. ECS and SIPS Interface Overview (1 of 2)

Item No.	Source	Destination	Message	Data	Transfer Mechanism
Subscription transfer of Products from ECS to SIPS					
1	SIPS	ECS	Data Subscription Request	N/A	e-mail
1a	SIPS	ECS	Subscription Update	N/A	e-mail
1b	SIPS	ECS	Subscription Cancellation	N/A	e-mail
2	ECS	SIPS	Subscription Acknowledgment	N/A	e-mail
2a	ECS	SIPS	Subscription Event Notification	N/A	e-mail
3	ECS	SIPS	N/A	Newly ingested data from ECS archive needed for Higher Level Standard Product generation.	ECS standard distribution options (ftp or scp push, ftp pull, media) as supported by the DAAC
4	ECS	SIPS	Distribution Notice	N/A	e-mail or scp push
Metadata Configuration Files					
5	ECS	SIPS	N/A	ECS Metadata Configuration File	As agreed between DAAC(s) and SIPS.
Polling with Delivery Record Ingest					
6	SIPS	ECS	Product Delivery Record (PDR)	N/A	Polling interface. FTP or scp Pull initiated by ECS
7	SIPS	ECS	N/A	ECS-compatible Metadata File for each granule transferred	FTP or scp Pull initiated by ECS
8	SIPS	ECS	N/A	Higher Level Standard Products	FTP or scp Pull initiated by ECS
9	SIPS	ECS	N/A	Browse Data files	FTP or scp Pull initiated by ECS
10	SIPS	ECS	N/A	Ancillary Data	FTP or scp Pull initiated by ECS

Table 3-1. ECS and SIPS Interface Overview (2 of 2)

Item No.	Source	Destination	Message	Data	Transfer Mechanism
11	SIPS	ECS	N/A	QA Granules	FTP or scp Pull initiated by ECS
12	SIPS	ECS	N/A	Delivered Algorithm Package TAR files	FTP or scp Pull initiated by ECS
13	SIPS	ECS	N/A	Production History files	FTP or scp Pull initiated by ECS
14	SIPS	ECS	N/A	Linkage files	FTP or scp Pull initiated by ECS
15	ECS	SIPS	Product Delivery Record Discrepancy (PDRD) (Short/Long)	N/A	Initiated by ECS. FTP Push and/or e-mail. For scp providers, scp and/or e-mail.
16	ECS	SIPS	Production Acceptance Notification (PAN) (Short/Long)	N/A	Initiated by ECS. FTP Push and/or e-mail. For scp providers, scp and/or e-mail.

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4. Data Exchange Framework

4.1 Internetworking Protocols and Network Topology

ECS provides internetworking services that are based on protocols and standards corresponding to layers 1 through 4 of the Open Systems Interconnection (OSI) Reference Model. These include, respectively, the physical, datalink, network, and transport layers. The transport layer protocol provides data consistency functions. The network, datalink and physical layers play significant roles in defining external interfaces (i.e., between ECS and non-ECS networks/systems). In particular, ECS routers provide the physical demarcation points between ECS networks and external networks/systems. The routing software resident on the routers provides network layer services, while the interfaces on the router make up the datalink/physical layers.

4.1.1 Transport Layer Protocol

The transport layer protocol used for communications between ECS processes and non-ECS processes is the Transmission Control Protocol (TCP) specified in RFC 793. TCP is a reliable connection-oriented, end-to-end protocol designed to fit into a layered hierarchy of protocols that support multi-network applications. It provides for reliable inter-process communication between pairs of processes in host computers attached to networks within and outside of ECS.

The interface between TCP and an application process consists of a set of calls much like the calls an operating system provides to an application process for manipulating files. For example, there are calls to open and close connections and to send and receive data on established connections.

4.1.2 Network Layer Protocols

The network layer provides the functional and procedural means to exchange network data units (i.e., packets) between devices over network connections, both for connection-mode and connectionless-mode communications. It relieves the transport layer of any concern regarding routing and relay operations associated with network connection. The basic function of the network layer is to provide the transparent transfer of data between devices. It should be noted that the network layer delivers packets only to a device, not an individual process. It remains up to the transport layer protocol to include, beforehand, the additional information needed to permit addressing to an individual process. Network layer protocols supported by ECS networks include Internet Protocol (IP) plus various routing protocols.

4.1.2.1 Internet Protocol (IP)

The Internet Protocol (IP) specified in RFC 791 is the network protocol that ECS supports, based on its dominance in industry usage and wide-community support. As part of IP support, Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP) are also supported.

4.1.2.2 Routing

ECS generally uses Routing Information Protocol (RIP) for route exchanges with external networks. Other more robust routing protocols such as Border Gateway Protocol (BGP-4) can also be used depending on the need and center routing policies. The specific routing implementation for each DAAC is specified in the ICD Between the EMSn and ECS Elements.

4.1.3 Physical/Datalink Protocols

Physical and Datalink protocols may differ among the various ECS-SIPS interfaces, so detailed information may be found in a SIPS-unique volume for each SIPS (see Table 1-1).

4.1.4 Network Topology

Network topologies differ from SIPS to SIPS, so topology diagrams may be found in the SIPS-unique volume for each SIPS (see Table 1-1).

4.2 Communications Protocols

ECS provides various communications services that are based on protocols and standards corresponding to the applications level of the Open Systems Interconnection (OSI) Reference Model. Three of these services are the Simple Mail Transport Protocol (SMTP), File Transfer Protocol (FTP) and secure shell.

4.2.1 Simple Mail Transport Protocol

All electronic mail (e-mail) message exchange is achieved through the use of Internet e-mail messages. The protocol for Internet e-mail transfer is the Simple Mail Transfer Protocol (SMTP) defined in RFC 821.

4.2.2 File Transfer Protocol

File transfers between ECS and the external provider host computers are accomplished through the use of standard File Transfer Protocol (FTP). FTP, as described in RFC 959, is an Internet standard for file transfers that supports downloading of files by a user (acting as a client) from a remote server.

4.2.3 Secure Shell

The ECS supports secure shell for secure transfer of data. Secure shell is a suite of TCP/IP-based applications supporting secure remote access, file transfer and data tunneling. It uses public key authentication and passwords are encrypted. It provides strong encryption in a client-server architecture. The ECS supports secure file transfer via the Secure CoPy (scp) application in the secure shell suite.

4.3 Subscriptions for Ordering Level 0 and Ancillary Data

ECS receives Level 0 data from EDOS or another participating Mission Operations Center and archives it. ECS also receives and archives ancillary and orbit and attitude data needed by the SIPS for producing higher-level products. Each SIPS obtains these data or any other data routinely ingested by the ECS that is required for EOS standard product generation through the ECS Subscription Service. A subscription is an advance standing order to the ECS subscription service for data expected to be archived. A subscription for Level 0 or Ancillary data, for example, may be triggered by the insert of a new granule of the given data type into the ECS archive. Since subscriptions are triggered by data insert events, they cannot be placed for data already in the ECS archive.

Further information on the ECS subscription service may be found in document TBD, Release 7.21 Segment/Design Specification.

4.3.1 Subscription Request

Typically, the SIPS operator e-mails a subscription request for each data type to the DAAC operator, who registers each subscription on behalf of the SIPS. The operator uses a custom graphical user interface at an ECS console to enter the subscription. Table 4.3.1-1 is a suggested format for the SIPS to use for supplying e-mail subscription requests to the DAAC operator. The format of the notice and the distribution method should be agreed-on with the DAAC. (A DAAC does not necessarily support all ECS distribution options.) The DAAC operator may respond with a subscription request acknowledgment (see Section 4.3.2).

How the identification and password for ftp Push deliveries are furnished to the DAAC should be agreed on with DAAC User Services. Accounts for secure distribution (scp; see Section 4.7.4) must be arranged with the DAAC in advance.

Table 4.3.1-1. E-Mail Subscription Request Format (1 of 2)

Message Field	Description	Type	Format/ Size ¹ (bytes)	Value or Content with Value
Subject of email message	Subject of message identifies the purpose of the message	Variable String	ASCII (255 B)	e.g., 'L0 Data Subscription Request'
Note: the following rows define the body of the email message.				
User ID	An ID created by the user to be included in automated subscription notification messages to the user	Variable String	ASCII (17 B max) ¹	'User ID: <User ID>' where User ID ² consists of up to 8 alphabetic or numeric characters.
First Name	User's first name	Variable String	ASCII (32 B max)	'first name: <alphabetic characters>'
Middle Initial	User's middle initial	Fixed String	ASCII (17 B max)	'middle initial: <alpha character>'
Last Name	User's last name	Variable String	ASCII (31 B max)	'last name: <alphabetic characters>'
Telephone	User's telephone number	Variable String	ASCII (33 B max)	'telephone: <numeric characters and hyphens>'
Email address	User's email address for receipt of automated subscription notification messages	Variable String	ASCII	Email Address: <email address>
Notification Text	SIPS-provided text uniquely describing the event for which a subscription is requested. If the request includes a distribution option this text will be included in the distribution notice for the delivery.	Variable String	ASCII (374 B including 255 B of free text) ¹	'notification text: <free text>' ²
ESDT Shortname	ECS defined Short Name of Earth Science Data Type (collection). Defined in the ESDT descriptor.	Fixed String	ASCII (18 B including 12 B for <ESDT> and <version>) ¹	'ESDT: <Shortname.version>' ²
Event	Always insertion of a granule into the ECS archive.	Fixed String	ASCII (13 B)	'event: INSERT'
FTP Push (optional)	Include to request that the associated granule be pushed to the SIPS automatically when the event is triggered.	Fixed String	ASCII (16 B)	'FTP Push: Enable'
scp (optional)	Granules and distribution notice are both pushed to a designated SIPS host using Secure Copy. See Section 4.7 for conditions for using this distribution type.	Fixed String	ASCII (11 B)	'scp: Enable'
FTP Host (required only with FTP Push or scp)	Host Name to which the granule is to be pushed.	Variable String	ASCII (89 B)	e.g., 'FTP Host: host.riverdale.com'
FTP Destination (required only with FTP Push or scp)	Directory Location to which the granule (and, for scp, distribution notice) should be pushed.	Variable String	ASCII (1040 B) ³	e.g., 'FTP Destination: /usr/xx/yy/'

Table 4.3.1-1. E-Mail Subscription Request Format (2 of 2)

Message Field	Description	Type	Format/ Size ¹ (bytes)	Value or Content with Value
FTP Pull (optional)	Include to request that associated granules be staged at the DAAC for pull by the SIPS. Note: This delivery method available with prior agreement by the DAAC.	Fixed String	ASCII (16 B)	'FTP Pull: Enable'
Media (optional)	Include to request that the associated granule be sent automatically to the SIPS on specified physical media instead of via ftp. Note: A DAAC may not support all media types.	Variable String	ASCII (13 B) ¹	'Media: <type>' where type may be DLT, CD-ROM or DVD
start date	Instruction for subscription to begin on and include the specified start date.	Fixed String	ASCII (28 B)	'start date: MM/DD/YYYY-HH:MM'
expiration date	Instruction for subscription to include and end on the specified expiration date.	Fixed String	ASCII (33 B)	'expiration date: MM/DD/YYYY-HH:MM'
Qualifier Statement (optional)	A freeform text string containing a set of one or more logical comparison statements ANDed together. Qualifiers may be spatial, temporal, integer, string or floating point	Variable String	ASCII (1024 B)	

¹Field length includes a content category, a colon, 1 blank, and a value string.

²Angle brackets (“<” and “>”) enclose user-provided information (User ID, ESDT, and free text).

³FTP Destination consists of path name and file name, in which the path cannot exceed 254B and total cannot exceed 1040B.

4.3.2 Subscription Request Acknowledgment

DAAC operators use the subscription acknowledgment email to confirm receipt of a new subscription request or update or cancellation of an existing subscription. The original request message is retained and the status and SubscriptionID are appended as defined by Table 4.3.2-1. These email messages are created manually by a DAAC operator.

Table 4.3.2-1. Format of Subscription Request Acknowledgment¹

Message Field	Description	Type	Format/ Max Size (Bytes)	Content with Value
Email Subject	Describes purpose of message.	Variable String	ASCII (256 B)	'e.g., 'L0 Data Subscription Request' Acknowledgment'
All fields as in primary message	The original Subscription Request/Update/Cancel Email message fields are included for reference	Variable String	ASCII (2812 B)	N/A
Status	DAAC operator-provided text indicating the results of the attempt to insert, update, or cancel a subscription.	Variable String	ASCII (256 B) ²	'status: accepted' OR 'status: failed; <free text>' example of <free text>: matching subscribable event description could not be found
SubscriptionID	The ID generated by the Subscription Server when the subscription is successfully entered. Used for subscription cancellations or updates via Email to the DAAC Operator.	Fixed String	ASCII (23 B) ²	'SubscriptionID: NNNNNNNN', where NNNNNNNN is an integer

¹This table defines contents in addition to the contents of the preceding request message.

²This field length includes a content category, a colon, 1 blank, and a value string.

4.3.3 Subscription Update

Update of an existing subscription is accomplished by supplying the Subscription ID to the operator and supplying the parameters to be changed. The format and content of the Subscription Update email message are defined in Table 4.3.3-1. Content of this message should be supplied in the order defined in the table, for consistency and to allow for automation. Each message field begins on a new line.

Table 4.3.3-1. Subscription Update Format

Message Field	Description	Type	Format/ Max Size (bytes)	Value or Content with Value
Subject of email message	Subject of message identifies the purpose of the message	Fixed String	ASCII (32 B)	'L0 Data Subscription Request Update'
Note: the following rows define the body of the email message.				
User ID	An ID created by the user to be included in automated subscription notification messages to the user.	Variable String	ASCII (17 B max) ¹	'User ID: <User ID>' where User ID ² consists of up to 8 alphabetic or numeric characters.
First Name	User's first name	Variable String	ASCII (32 B max)	'first name: <alphabetic characters>'
Middle Initial	User's middle initial	Fixed String	ASCII (17 B max)	'middle initial: <alpha character>'
Last Name	User's last name	Variable String	ASCII (31 B max)	'last name: <alphabetic characters>'
Subscription ID	The Subscription ID returned by the DAAC in the Subscription Request Acknowledgment.	Variable String	ASCII (16 B)	'Update: NNNNNNNN', where NNNNNNNN is the Subscription ID (integer)
Update <field> From ³	Current value of field to be changed in the existing subscription.	Variable String	ASCII ⁴	e.g., 'Update Expiration Date From: MM/DD/YYYY-HH:MM'
Update <field> To ³	New value of field to be used when updating the subscription.	Variable String	ASCII ⁴	e.g., 'Update Expiration Date To: MM/DD/YYYY-HH:MM'

¹This field length includes a content category, a colon, 1 blank, and a value string.

²Angle brackets ("<" and ">") enclose user-provided information (User ID, ESDT, and free text).

³More than one set of update to/from fields may be included in the request.

⁴Maximum number of bytes for the field to be updated is provided in Table 5.8.1-2.

4.3.4 Subscription Cancellation

Cancellation of an existing subscription is accomplished by supplying the Subscription ID to the operator and requesting cancellation. The format and content of the Subscription Cancellation email message are defined in Table 4.3.4-1. Content of this message should be supplied in the order defined in the table, for consistency and to allow for automation. Each message field begins on a new line.

Table 4.3.4-1. Subscription Cancellation Format

Message Field	Description	Type	Format/ Max Size (bytes)	Value or Content with Value
Subject of email message	Subject of message identifies the purpose of the message	Fixed String	ASCII (32 B)	'L0 Data Subscription Request Cancellation'
Note: the following rows define the body of the email message.				
User ID	An ID created by the user to be included in automated subscription notification messages to the user	Variable String	ASCII (17 B max) ¹	'User ID: <User ID>' where User ID consists up to 8 alphabetic or numeric characters.
First Name	User's first name	Variable String	ASCII (32 B max)	'first name: <alphabetic characters>'
Middle Initial	User's middle initial	Fixed String	ASCII (17 B max)	'middle initial: <alpha character>'
Last Name	User's last name	Variable String	ASCII (31 B max)	'last name: <alphabetic characters>'
Subscription ID	The Subscription ID returned by the DAAC in the Subscription Request Acknowledgment. It is suggested that the original subscription be included as the body of the message with the Cancel option specified.	Variable String	ASCII (16 B)	'Cancel: NNNNNNNN', where NNNNNNNN is the Subscription ID (integer)

¹This field length includes a content category, a colon, 1 blank, and a value string.

²Angle brackets ("<" and ">") enclose user-provided information (User ID, ESDT, and free text).

4.3.5 Subscription Event Notification

When a subscription event occurs, the ECS automatically sends a subscription event notification via e-mail. The e-mail subject of the event notification is

Notification for Event: <ESDT Shortname.version >:INSERT.

Table 4.3.5-1 defines the notification format and Figure 4.3.5-1 is an example of the notification content.

If the subscription request includes no distribution option (i.e., FTP Push, FTP Pull, scp or Media), the subscription event triggers only this Subscription Event Notification. The user can then decide on a case-by-case basis whether to order the data announced in the Event Notifications. If a distribution option is specified on the subscription request, each event also triggers an automatic data distribution.

Table 4.3.5-1. Subscription Event Notification Format

Message Field	Description	Type	Format/ Max Size (Bytes)	Content with Value
Subscription Notification	Name of message and granule UR. UR is in the format UR:<serverID>:<GranuleID> In the example below, in Figure 4.3-1, the Granule ID consists of: Basetype - "SC" (Science) Subtype - "AM1EPHN0.001" (ESDT ShortName.VersionID) Database ID -"25625" (uniquely distinguishes between granules)	Variable String	ASCII (118 B including 89 B for UR)	Subscription Notification: : UR:.....
ESDT Information	ESDT Shortname, ESDT Version ID, and ESDT subscription Event Type (INSERT)	Variable String	ASCII (n/a)	See Figure 4.3.5-1
User Information	User ID provided in the subscription.	Variable String	ASCII (n/a)	See Figure 4.3.5-1
User String	The Notification Text from the Subscription Request.	Variable String	ASCII (n/a)	See Figure 4.3.5-1
Subscription ID	Identifier for the subscription for this event.	Variable String	Integer (n/a)	See Figure 4.3.5-1
Qualifier List	From the Subscription Request Qualifier Statement	Variable String	ASCII (n/a)	See Figure 4.3.5-1
Qualifying Metadata Attribute Value	List of metadata attributes and values that matched the Qualifier List. May be integer, date, float, string or spatial.	Variable String	ASCII (n/a)	See Figure 4.3.5-1

EXAMPLE ONLY	EXAMPLE ONLY
Subscription Notification:	
UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[FN3:DSSDSRV]:21:SC:AM1EPHN0.001:25625	
ESDT Information: AM1EPHN0.1:INSERT	
User Information: labuser	
User String: test 37176	
Subscription ID: 210	
Qualifier List:	
QAPercentOutOfBoundsData(Ephemeris): min = 1; max = 100	
QAPercentMissingData(Ephemeris): min = 1; max = 100	
Qualifying Metadata:	
Attribute	Value
QAPercentOutOfBoundsData(Ephemeris)	0
QAPercentMissingData(Ephemeris)	1

Figure 4.3.5-1. Subscription Event Notification Example

4.3.6 Data Distribution

4.3.6.1 Introduction

The triggering granule can be pushed (via ftp or scp) to a SIPS-specified host address and directory, can be mailed from the DAAC on physical media (DLT, CD-ROM or DVD) or staged on a DAAC server for ftp pick-up by the SIPS. Note that media selection or ftp staging server must be agreed in advance by the DAAC as a DAAC does not necessarily support all ECS distribution options. ECS then automatically sends a Distribution Notice (DN) that includes the information needed for retrieving the data. There are two DN formats, one for ftp pull, ftp push and scp deliveries (see Section 4.3.6.4) and one for physical media deliveries (see Section 4.3.6.5). If the subscription delivery is made on physical media, a packing list is provided. For all media selections except scp, the distribution notice is an e-mail.

A SIPS-unique volume of this ICD describes the particular implementation for each SIPS (see Table 1-1 for a list of SIPS- specific volumes).

4.3.6.2 Metadata Distribution

The ECS distributes a metadata file for each granule. The metadata may be furnished in either of two formats: (1) an ODL file with filename extension .met or (2) an XML file with filename extension .xml. There are five document type definitions (DTD) for XML metadata distributions, namely BrowseGranuleMetadata.dtd, DAPGranuleMetadata.dtd, PHGranuleMetadata.dtd, QAGranuleMetadata.dtd, and ScienceGranuleMetadata.dtd. They can be found at <http://ecsinfo.gsfc.nasa.gov/ECSInfo/ecsmetadata/dtds/DPL/ECS/index.html>.

The distribution metadata format is irrespective of the format in which the metadata was provided to the ECS. The default distribution format is XML. Which metadata format is provided is configurable by the DAAC on the basis of the email address for the distribution notice. If the SIPS prefers to receive metadata in ODL format, it should arrange this with the DAAC in advance.

4.3.6.3 Checksums

The ECS supports three checksum types: Unix CKSUM, ECS, which is produced by the internal ECS checksum algorithm, and MD5. Checksumming is applied only to files of FILE_TYPE SCIENCE, HDF-EOS or HDF.

Whether checksum information will be included in DNs for a SIPS is determined by a DAAC-maintained checksum distribution list consisting of email addresses for users that will receive checksum information. If a SIPS is not on that list, no checksums will be included in its DNs. Whether checksums will be included in the DNs for a SIPS should be recorded with the relevant email address in the Operations Agreement between the SIPS and the DAAC.

If the SIPS is on the checksum distribution list, it will receive checksums for a DAAC-configurable percentage of the data it receives. Which files will have checksums is not predictable.

The checksum type furnished on the DN will be the type that is in the ECS database. If there is no checksum in the database, no checksum will be provided on the DN. If a checksum is to be provided on a DN, and a stored checksum is found, then the checksum is recomputed and verified before distribution. If a checksum verification does not succeed, the distribution fails.

If a checksum for a file has been stored in the ECS, the checksum information (checksum type, checksum origin, and checksum value) is included in the metadata file that is distributed.

A standalone JAVA ECS checksum utility is available from the DAAC to enable the SIPS to compute the ECS-type checksum.

4.3.6.4 Distribution Notice for FTP or SCP Deliveries

The DN for ftp or scp deliveries includes file names and locations for retrieving the data.

The file names are the names of the files as inserted into the ECS archive, or the LocalGranuleID if provided in the granule's metadata. The LocalGranuleID overrides the insert name. If there is

more than one file in a granule, a sequence number is added to the end of the LocalGranuleID for each file upon distribution.

The DN for ftp or scp deliveries is defined in Table 4.3.6-1. The DN is preceded by a delimited, DAAC-configurable preamble. Thereafter, each row of the table represents a single PARAMETER = VALUE statement in the DN. Figure 4.3.6-1 is an example of the standard DN. A failed distribution notice is sent whenever all items in an order request fail and the request has reached the terminal state. An example is shown in Figure 4.3.6-2.

For ftp data deliveries, the e-mail subject of a system-generated DN is

<DAAC name> ECS Order Notification Order ID: <Order ID>

where DAAC name is configurable by the DAAC. The email address to which ECS sends the DN is documented in an Operations Agreement(s) between the particular DAAC(s) and the SIPS. The DAAC operator uses this information from the Operations Agreement when entering the subscription request.

For an scp data delivery, the DN file is secure-copied to the same directory as the data, as specified in the subscription request. The DN file name is <requestID>.notifyscp, where <requestID> is a unique alphanumeric string of maximum 50 characters. If transfer of the DN to the user via secure copy fails, the DN is sent via email. If a secure copy subscription data delivery fails, the failure DN is sent via email.

Table 4.3.6-1. FTP or SCP Distribution Notice Contents (1 of 4)

Keyword	Description	Type	Format/ Size¹ (bytes)	Keyword: Value²
(None, customized preamble)	Each distribution notice message begins with an explanatory preamble. The preamble file is specific to the DAAC, to the delivery media type and to success or failure of the delivery. The preamble ends with a special character sequence: a blank line followed by a line of 10 "+" characters followed by another blank line. To parse the message, the parser can be written either to skip the delimiter portion or to search for KEYWORD: (distribution notice keyword as defined in this table followed by a colon).	Free text	NA	The preamble ends with a special character sequence: a blank line followed by a line of 10 "+" characters followed by another blank line. The preamble shall not contain keyword plus colon sequences or "+" signs.
ORDERID	ECS internal identification code for the SIPS's data order. The value is 'NONE' for orders not recorded in the ECS Order Tracking Database.	Variable String	ASCII (max 19 B including max 10 B for <value>)	'ORDERID: <value>' where <value> consists of 10 alphabetic or numeric characters or 'NONE'
REQUESTID	ECS internal identification code for the data distribution request. (Each order consists of one or more requests.) The value is 'NONE' for orders not recorded in the ECS Order Tracking Database.	Variable String	ASCII (max 21 B including max 10 B for <value>)	'REQUESTID: <value>' where <value> consists of 10 alphabetic or numeric characters or 'NONE'.
USERSTRING	If an order originates from a subscription request, USERSTRING will have the value of Notification Text in the subscription request.	Variable String	ASCII (max 267 B including 255 B for value)	'USERSTRING: <value>'
FINISHED	Time at which ECS stages data for pull by the SIPS or ftp's to the SIPS' host directory.	Fixed String	ASCII (29 B including 19 B for date and time)	'FINISHED: MM/DD/YYYY <blank>HH:MM:SS'
[Blank line]	ASCII line feed code 010			
FAILURE	Simple notification that the request failed. Will be provided if the request was canceled or the request failed. If the request failed, the cause or individual granule status may or may not be known. The Failure field will be present if each granule in the request has STATUS: DISTRIBUTION FAILED. If "FAILURE" is present, it is followed by a failure message as in Figure 4.3-2b.	Fixed String	ASCII (8 B)	'FAILURE'

Table 4.3.6-1. FTP or SCP Distribution Notice Contents (2 of 4)

Keyword	Description	Type	Format/ Size¹ (bytes)	Keyword: Value²
<failure message>	Message describing failure (provided only if "FAILURE" is present).	Variable String	ASCII (25 B)	'<failure message>' (Will consist of one of two messages: 'The request was cancelled' or 'The request failed')
MEDIATYPE	This type indicates data transmission via ftp pull, ftp push or scp. Note: A DAAC does not necessarily support all ECS distribution options.	Variable String	ASCII (18 B including 7 B for <type>)	'MEDIATYPE: <type>' where <type> is FtpPush, FtpPull or scp
MEDIAFORMAT	There is only one media format for ftp or scp orders	Variable String	ASCII	'FILEFORMAT'
FTPHOST	Name or IP address of workstation where data were made available for ftp pull by the SIPS.	Variable String	ASCII (73 B including 64 B for host name or IP address)	e.g., 'FTPHOST: shark'
FTPDIR	File directory location without filename.	Variable String	ASCII (263 B max including 8 B for FTPDIR:)	'FTPDIR: <directory>'
FTPEXPR	Time after which ECS is free to remove the requested data from the ftp pull area. Not used when data is pushed to the SIPS's host directory.	Fixed String	ASCII (28 B including 19 B for date and time)	'FTPEXPR: MM/DD/YYYY <blank>HH:MM:SS'
MEDIA	Media number within request	Fixed String	ASCII (12 B)	'MEDIA 1 of 1'
MEDIAID	No value provided.	Fixed String	ASCII (8 B)	'MEDIAID:'
[Blank line]	ASCII line feed code 010			
GRANULE	Indicates start of a data granule. Value is the UR for that data granule. (Repeat for each granule.) (Indent by 1 tab.)	Variable String	ASCII (98 B including 89 B for UR)	'GRANULE: <UR>'
ESDT	Specifies the short name and Version ID (001 through 255) of the data's Earth Science Data Type. (Repeat for each granule.) (Indent by 1 tab.)	Fixed String	ASCII (18 B including 8 B for the ESDT name and 3 B for the version)	'ESDT: <ESDT Short Name.VersionID>'
STATUS: DISTRIBUTION FAILED	Appears only if distribution of the granule has failed. Followed by '<space>-<space>' and a Failed Status Explanation In a Failed request (that is, when the FAILURE field is present), this field may not be present even though the granule could not be distributed.	Variable String	ASCII	'STATUS: DISTRIBUTION FAILED - <failed status explanation>'

Table 4.3.6-1. FTP or SCP Distribution Notice Contents (3 of 4)

Keyword	Description	Type	Format/ Size¹ (bytes)	Keyword: Value²
[Blank line]	ASCII line feed code 010			
FILENAME	The filename for a file in the present granule. Set to the LocalGranuleID metadata parameter (plus sequence number if more than one file in a granule), if available. Otherwise, set to the file name as inserted into the ECS archive. (Repeat for each file in present granule.) (Indent by 2 tabs.) In event of a failure, the FILENAME may be 'N/A'. No file name is given if the request failed (FAILURE field present) Note: Filename extensions for metadata files may be either .met or .xml.	Variable String	ASCII. 265 bytes max if LocalGranuleID is not used. For LocalGranuleID, 90 B max (plus sequential identifier for multi-file granules).	'FILENAME: <name>' or 'N/A'
FILESIZE	The uncompressed file's size in Bytes. (Repeat for each file in present granule.) (Indent by 2 tabs.) In event of a failure, FILESIZE may be '0'	Variable String	ASCII (20 B including 12 B for file size)	'FILESIZE: <size>' where size is a decimal value
FILECKSUMTYPE	The checksum type of the FILECKSUMVALUE parameter for the file. Checksums are provided only if the SIPS is on the DAAC's checksum distribution list.	Variable String	ASCII (up to 79 B including up to 64 B for checksum type)	'FILECKSUMTYPE: <checksum type>' where checksum type is 'ECS', 'CKSUM' or 'MD5'
FILECKSUMVALUE	The value of the checksum recorded with the file in the ECS database. Present only if a FILECKSUMTYPE is provided. The checksum is verified before distribution if required by the DAAC's Checksum Verification Percentage parameter. If the SIPS pulls the file using FTP compression, the checksum value furnished will be for the uncompressed file.	Variable string representing signed or unsigned integer or hexadecimal string (with alpha characters all lower case)	ASCII (up to 271 B including up to 255 for checksum)	'FILECKSUMVALUE: <numeric value, signed or unsigned>' or, for MD5, 'FILECKSUMVALUE: <32-character hexadecimal string>'
[blank line]	ASCII line feed code 010 Follows each FILENAME / FILESIZE / FILECKSUMTYPE / FILECKSUMVALUE entry			

Table 4.3.6-1. FTP or SCP Distribution Notice Contents (4 of 4)

Keyword	Description	Type	Format/ Size¹ (bytes)	Keyword: Value²
Failure Notification	If the request failed, this message and the list of requested granules may be appended at the end.	Variable String	ASCII	'None of the requested granules are considered distributed. The requested granules were: <Granule UR list>'

¹This field length includes a keyword, a colon, 1 blank, and a value string.

²Angle brackets (“<” and “>”) enclose information to be supplied by ECS at distribution time.

Thank you for using the Earth Observing System Distribution System. For more information on your request please contact User Services.

+++++

ORDERID: 0400002119

REQUESTID: 0400002504

USERSTRING:

FINISHED: 03/19/2002 14:28:32

MEDIATYPE: FtpPull

MEDIAFORMAT: FILEFORMAT

FTPHOST: f2spg01.hitc.com

FTPDIR: 0400002257qdRhSc

FTPEXPR: 03/21/2002 23:59:59

MEDIA 1 of 1

MEDIAID:

GRANULE: UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[FN2:DSSDSRV]:17:SC:L70R.002:17720

ESDT: L70R.002

STATUS: DISTRIBUTION FAILED - Granule retrieval failed. Please contact User Services

FILENAME: N/A

FILESIZE: 0

GRANULE: UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[FN2:DSSDSRV]:17:SC:L70R.002:18889

ESDT: L70R.002

FILENAME: L72SGS249922408010_B81.07848a3

FILESIZE: 428313600

FILECKSUMTYPE: CKSUM

FILECKSUMVALUE: 948573930871237645834572348975

FILENAME: L72SGS249922408010_MTP.07848a3

FILESIZE: 65535

FILECKSUMTYPE: CKSUM

FILECKSUMVALUE: 948573930994887211737375723489

Figure 4.3.6-1. Example Distribution Notice for a Subscription FTP or SCP Distribution

```

ORDERID: 0400004256
REQUESTID: 0400004272
USERSTRING: Testing
FINISHED: 04/12/2007 18:31:50

FAILURE
The request was cancelled
MEDIATYPE: FtpPush
MEDIAFORMAT: FILEFORMAT
FTPHOST: origin.hitc.com
FTPDIR: /home/labuser/testdir

None of the requested granules are considered distributed.
The requested granules were:
  GRANULE:
UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[EDF:DSSDSRV]:20:SC:AE_Land.086:2
0396
  STATUS: DISTRIBUTION FAILED - Request Canceled

  GRANULE:
UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[EDF:DSSDSRV]:20:SC:AE_Land.086:2
0316

```

Figure 4.3.6-2. Example of a Distribution Notice for a Failed FTP or SCP Request

4.3.6.5 Physical Media Delivery Distribution Notice

For each physical media shipment, the ECS sends an e-mail DN to the customer as soon as the shipment is made. The same notice is produced as a hard copy packing list and included in each shipment.

The DN for physical media distributions, defined in Table 4.3.6-2, is different from the DN sent for ECS ftp distributions.

For a successful or partially successful order, the e-mail subject header is

<DAAC name> ECS Order Shipment Notification Order ID: <Order ID>

and for a failed order (all units in the order rejected), it is

<DAAC name> ECS Order Rejection Notification Order ID: <Order ID>

where DAAC name is configurable by the DAAC.

Notice that the preamble format differs from that for the ftp DN and that the customer address information is included in the DN. Figure 4.3.6-3 is an example physical media distribution notice as described in Table 4.3.6-2. Figure 4.3.6-4 is an example physical media order rejection notice.

A separate directory is dedicated to each granule on the media and the directory name is the Unit ID for that granule. The physical media DN points to the correct directory for each granule.

There are no "Failed" physical media DNs. Rather, the final status of each granule is reported as either Complete or Canceled.

The Packing List that is included in each order is simply a printed copy of the distribution notice.

Table 4.3.6-2. Physical Media Distribution Notice Content (1 of 3)

Item	Description	Format/Size	Example
Preamble	Free text explanation customized by the DAAC. Note that this preamble may not conform to the specification for the FTP DN preamble.	Variable length text file Note: delimiter characters are part of the customized text and thus may vary.	(See Figure 4.3.6-3.)
Support Contacts	Optional DAAC contact information Up to 11 lines of text . No entry will appear for null values.	Variable Strings Support Contacts: <First_Name><space><Middle_Initial><space><Last-Name> <Title> <Organization> <Address> <City>,<space><State><space><Zip> <Country> <Phone> <Fax> <E-Mail>	(See Figure 4.3.6-3)
Blank line	ASCII line feed code 010		
OrderID/RequestID	ECS Customer Order number and Request ID as recorded in ECS Order Tracking Database	Fixed String (40B, including 10 for OrderID, 1 colon and 10 for RequestID)	'OrderID/RequestID:<space>0000009055:0000012914'
Completion Date	Date on which Distribution Notice was generated	Fixed String (36B) YYYY-MM-DD HH:MM:SS	'Completion<space>Date:<space>2000-12-21<space>12:18:22'
[Blank line]	ASCII line feed code 010		

Table 4.3.6-2. Physical Media Distribution Notice Content (2 of 3)

Item	Description	Format/Size	Example
Shipping Address	Shipping Address as specified in the order. No entry will appear for null values.	Variable Strings Shipping Address: <First_Name><space><Middle_Initial><space><Last-Name> <Title> <Organization> <Address> <City>,<space><State><space><Zip> <Country> <Phone> <Fax> <E-Mail>	(See Figure 4.3.6-3)
[Blank line]	ASCII line feed code 010		
Number of granules Or Number of files	If data has been pulled from ECS archive, this will be Number of granules in the request. If data was pulled from Data Pool, the Number of files in the request will be given.	Variable string: Up to 20 bytes plus a numeric value.	'Number of granules: 2'
Media	Sequence Number of the media item to which the following directory information applies and total Number of media furnished for the request	Variable string: At least 12 bytes	'Media<space>1<space>of 3'
[Blank line]	ASCII line feed code 010		
[Underline]			
[Media_ID]	Composite of RequestID and VolumeID	<RequestID>_<VolumeID>	'0400000875_001'
Media_type	CD-ROM, DLT, or DVD. Note that a DAAC may not support all ECS media options.	Variable String (6B max)	'CD-ROM'
Media Format:	Formats include Rockridge for DVD, TAR or TARFORMAT for DLT, DEFAULT for CD-ROM.	Variable string (14 B plus the format type)	'TARFORMAT'
[Underline]			

Table 4.3.6-2. Physical Media Distribution Notice Content (3 of 3)

Item	Description	Format/Size	Example
Headings for following five items: Directory, Status, Granule ID, FILECKSUMTYPE, File Name FILECKSUMVALUE	The FILECKSUMTYPE and FILECKSUMVALUE headings are present only if the SIPS is on the DAAC's checksum distribution list.		
[Blank line]	ASCII line feed code 010		
[Directory]	ID assigned to a granule by the product distribution module and also used as the name of the directory containing that granule on the media.	Variable String (to 5B). Directory numbering may be continuous or restart for each volume.	'2'
Status	Processing status of the granule: either Completed or Canceled	Variable String (9B)	'Canceled'
[Granule ID]	ECS granule ID	Variable String (32B max)	'SC:AST_L1A.002:1390'
[FILECKSUMTYPE]	The checksum type of the FILECKSUMVALUE parameter for the file. Checksums are provided only for SIPS that are on the DAAC's checksum distribution list. A blank line (ASCII line feed code 010) is inserted if a checksum is required but not provided.	Variable String (up to 64 B)	'<checksum type>' where checksum type is 'ECS', 'CKSUM', or 'MD5'
[File Name]	File names for the granule including metadata (.met or .xml) file.	Variable String (up to 255 B)	'AST_L1A.002_2003950631.hdf' 'AST_L1A.002_2003950631.hdf.met'
[FILECKSUMVALUE]	The value of the checksum recorded with the file in the ECS database. Present only if a FILECKSUMTYPE is provided. A blank line (ASCII line feed code 010) is inserted if a checksum is required but not provided.	Variable string representing signed or unsigned integer (up to 255 B) or 32-character hexadecimal string (with alpha characters all lower case)	'<numeric value, signed or unsigned>' or for MD5 '<32-character hexadecimal string>'
[Blank line]	ASCII line feed code 010		

Thank you for using the Earth Observing System Distribution System. For more information on your request contact the DAAC.

Please include the data below in any correspondence with the DAAC.

Thank You!

+++++

Support Contacts:
EDF
1616 McCormick Drive
Landover, MD 20716
Phone: (111)111-1111
Fax: (111)111-1111
E-Mail: userservice@email

+++++

OrderID/RequestID: 0300016813:0300018199
Completion Date: 2005-05-02 15:45:28

Shipping Address
Joan Requester
Ms
ECS
1616 McCormick Drive
Landover, MD 22222
UNITED STATES
Phone: 111-111-1111
Fax: 111-111-1111
E-Mail: Richard_F_Strub@raytheon.com

Number of files: 8
Media 1 of 1

Directory File Name	Status	Granule ID	MEDIA TYPE: CDROM	MEDIA FORMAT : RockRidge
1 labtest_13683 labtest_13683.xml	Completed	SC:AST_L1BT.001:17863		
2 labtest_13684 labtest_13684.xml	Completed	SC:AST_L1BT.001:17864		
3 pg-PR1B0000-2000112102_027_001 pg-PR1B0000-2000112102_027_001.xml	Completed	SC:AST_L1B.002:17696		
4 MOD09GHK.A2002123.h11v05.003.2002128130140.hdf MOD09GHK.A2002123.h11v05.003.2002128130140.hdf.xml	Completed	SC:MOD09GHK.003:17825		

Figure 4.3.6-3. Example Physical Media Distribution Notice

Thank you for using the Earth Observing System Distribution System. We apologize for not being able to distribute the requested data. For more information on your request contact the DAAC.

Thank You!

+++++

OrderID/RequestID: 0300016845:0300018231
 Completion Date: 2005-05-03 09:48:02

Shipping Address

Joan Requester
 Ms
 ECS
 1616 McCormick Drive
 Landover, MD 22222
 UNITED STATES
 Phone: 301-925-0771
 Fax: 301-925-0651
 E-Mail: He_Liu@raytheon.com

Number of files: 15
 Media 1 of 1

MEDIA TYPE: CDROM MEDIA FORMAT :

RockRidge

Directory	Status	Granule ID
1	Canceled	SC:AST_L1BT.001:17867
2	Canceled	SC:AST_L1BT.001:17863
3	Canceled	SC:AST_L1BT.001:17864
4	Canceled	SC:AST_L1A.002:17695
5	Canceled	SC:AST_L1B.002:17696
6	Canceled	SC:AST_L1B.003:17698
7	Canceled	SC:AST_L1B.001:16788
8	Canceled	SC:MOD021KM.004:17860
9	Canceled	SC:MOD13A1.004:17871
10	Canceled	SC:MOD11A1.004:17870
11	Canceled	SC:MOD09A1.004:17851
12	Canceled	SC:MOD03.001:17764
13	Canceled	SC:MOD09GHK.003:17825
14	Canceled	SC:MOD09A1.004:17821
15	Canceled	SC:MOD09GHK.003:17827

Figure 4.3.6-4. Example Physical Media Order Rejection Notice

4.3.6.6 Electronic Distribution Failure Recovery

An FTP or scp Push of data from the ECS may fail, leaving a partial file in the designated SIPS directory. The SIPS' server should allow overwrite of the partial file. File sizes provided in the ECS Distribution Notice can be checked against those on the SIPS server. Failure procedures should be covered in the Operations Agreement between the SIPS and the DAAC.

It is suggested that the SIPS have procedures in place for verifying that all files required for a standard product processing run have been received. This should cover the possibility that the files have been pushed to the specified directory but the DN hasn't been received, or that the subscription process itself has failed at some point because of internal problems.

If a subscription delivery fails, ECS provides failure information in the distribution notice (see Section 4.3.1.1). The SIPS operator can then acquire the file(s) by using the search and order capability of the ECHO client (WIST). The operator uses the collection name and other attributes (such as data date and time) provided in the DN to search for the required data.

Alternatively, the SIPS may contact DAAC user services to request physical media exchange or other back-up assistance.

Non-fatal errors in the scp push of DNs to the SIPS are retried. A fatal error in the scp push of a DN results in an email message to a configurable address for DAAC operations. The SIPS should discuss subsequent recovery procedures with the DAAC and the procedures should be documented in the Operations Agreement.

4.4 Transfer of Metadata Configuration Files for SIPS-Produced Collections

The correct transfer of metadata information for population of the ECS inventory is essential to the ECS/SIPS interface. The key mechanism for ensuring correct transfer of metadata files to the ECS is a metadata template file associated with each ESDT called the Metadata Configuration File (MCF). Each SIPS must use a MCF as template for producing metadata for each data collection that is to be archived in ECS (see Section 5.2). Upon ingest, the metadata structure received with the SIPS data is compared against an MCF generated for the given ESDT by the ECS. If the metadata structure and content provided by the SIPS is not consistent with the ECS MCF, the ingest will fail. To ensure compatibility, the SIPS should use ECS-generated MCFs and the metadata population tools developed by ECS and distributed with the SDP Toolkit. Even seemingly minor modification of the MCF structure introduces a risk that the metadata produced will not support ingest of the data granule into the ECS.

The procedures by which metadata for SIPS ESDTs are developed and a SIPS obtains MCFs from the DAAC(s) must be agreed on with the DAAC(s) and should be documented in Operations Agreement(s) between the particular DAAC(s) and the SIPS.

The following procedure is suggested:

Each time a SIPS determines that a new ESDT is to be produced or that an existing ESDT is to be revised, the SIPS operator provides the required information to the ECS science engineering group at the ECS Development Facility (EDF) as specified in the Operations Agreement(s) between the DAAC and the SIPS. An EDF engineer develops the new ESDT descriptor and provides it and its associated MCF to the SIPS for review. The new ESDT is then merged into the ECS and delivered to the DAAC. The DAAC operator obtains the MCF using the ECS ESDT Maintenance GUI and forwards the final MCF to the SIPS, which uses it to produce the metadata for the new or updated data type.

4.5 Transfer of Higher-Level Products to ECS

The SIPS makes available products for ingest by the ECS. For each SIPS, these products are specified in a SIPS-unique volume. Data is transferred from the SIPS to the ECS by a Polling with Delivery Record (PDR) mechanism as defined in TBD document "Release 7.21 Segment/Design Specification for the EMD Project." This section (Section 4.5) of this ICD provides detailed specifications for this interface methodology.

The PDR interface is used to transfer the SIPS's science data granule products, metadata, browse data, quality assessment data, production history, Failed PGE data and algorithm packages to ECS Ingest. All products supplied for ingest by ECS must be compliant with EOSDIS format and standards and be accompanied by ECS conformant metadata in either ODL or (for science files only) XML format. The transfer protocol documented in this section must be used to ensure that ECS can link files to the correct granules during ingest.

4.5.1 Overview of Polling Ingest Methodology

The purpose of the ECS-SIPS electronic interface is to support the delivery of data files from the SIPS to ECS. To accommodate the polling with delivery record interface, a single PDR server directory will be identified for each SIPS to ECS interface. The data files and the Product Delivery Records (PDRs) are placed on this server directory by the SIPS. At the end of the data exchange process, the SIPS removes the PDR, the PAN or PDRD file and where necessary the data from the server directory.

The SIPS makes the directory sub-tree available to ECS with the allowable privileges. The ECS uses either of two file transfer methods to retrieve the PDR and data from the SIPS server directory. The standard method is ftp. Secure transfer, using scp, is also available by prior agreement between the SIPS and the DAAC (see Section 4.7 for a description of available data exchange security options). ECS notifications to the SIPS (PDRD and PAN) are provided by email or ftp or both, unless the DAAC has configured the SIPS interface for scp transfers. In that case, ECS notifications to the SIPS are sent by email or scp or both.

Implementation of the Polling with Delivery Record Ingest consists of the following steps (Figure 4.5-1 shows the standard transfer method using ftp):

- (1) The SIPS places data files in specified locations on the PDR Server.

- (2) The SIPS generates a PDR and places it on the PDR Server in a previously specified directory.
- (3) ECS polls the PDR Server directory at operator-tunable intervals, detects a PDR, and acquires the PDR file via ftp (or scp).
- (4) Once a PDR has been detected and acquired by ECS, the PDR is validated. In the event that the PDR is invalid, ECS automatically returns a Product Delivery Record Discrepancy (PDRD) to an operator-configurable address provided by the SIPS. If an error is detected in the PDR, processing is terminated and none of the specified files are transferred to the ECS server for processing until a corrected PDR is received and successfully processed. If the PDR is valid, ECS schedules to pull the files specified in the PDR using ftp (or scp) and in this case no PDRD is sent.
- (5) ECS pulls the specified files from the PDR Server to be ingested or otherwise processed. The files are then archived.
- (6) ECS sends a Production Acceptance Notification (PAN) to an operator-configurable address provided by the SIPS. The PAN reports either success or error found for each data type in the PDR.
- (7) Upon determining that no further action can or should be taken with respect to the PDR, the SIPS deletes the PAN or PDRD, the PDR and if necessary the associated data from the PDR server.

Address information and operator tunable parameters for the transfer of the PDR, PDRD and PAN are documented for each individual SIPS in an Operations Agreement(s) between the DAAC(s) and the SIPS. Examples include the SIPS's unique identifier, PDR server address and directory, e-mail addresses, contact telephone numbers, and the time between ECS Ingest receiving a failure and sending a new PDRD/PAN. Associated procedures are included in the TBD Release 7.21 Mission Operations Procedures.

The Polling Ingest with PDR transfer mechanism is fully automated. In the context of this transfer mechanism, the following sections address the PDR, PDRD and PAN. Error conditions and error handling/backup methods are then discussed.

Sections 4.5.2 through 4.5.5 give details of this interface methodology specific to the ECS-SIPS interface. A quick reference summary is provided in Appendix B.

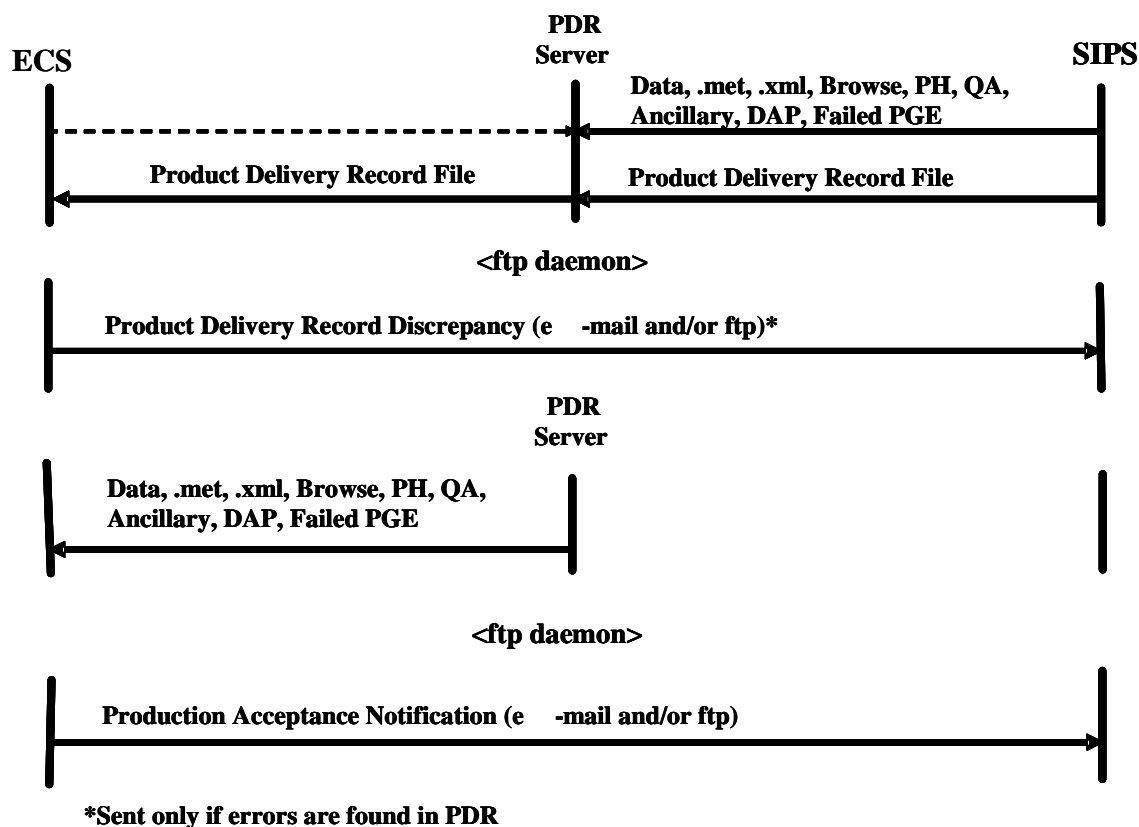


Figure 4.5-1. Polling with Delivery Record File Transfer Mechanism (standard method using ftp)

4.5.2 PDR File Naming Convention

The PDR file name must be unique within the PDR Server directory and have a ".PDR" file extension. The file name with path must be no longer than 255 characters. For the purpose of error tracking, ECS recommends that the file name contain the file creation date as part of the file name. PDRD and PAN messages returned by ECS will use the same name as the reference PDR except that the file name extension will be changed to ".PDRD" or ".PAN" respectively. An example PDR File Naming Convention is depicted in Figure 4.5-2. Note that the SIPS designation is free text that may consist of any identifier that has meaning to the SIPS operators. The ".PDR" as a filename extension is the only requirement for the ECS ingest processing (except that there must be some part of the file name preceding the extension).

Table 4.5-1. Example File Naming Convention For SIPS Product Delivery Record

Field	Description	Format/ Type Max Size (Bytes)	Value
SIPS Designation	Identifier meaningful for the SIPS	ASCII String (21)	Free text
PDR Creation Date	Date when PDR was created (optional)	ASCII (15)	.yyyymmddhhmmss
Filename extension	Extension for PDR filename (required)	ASCII String (4)	‘.PDR’

EXAMPLE ONLY	EXAMPLE ONLY
FILENAME = LATIS123.20010719123845.PDR	

Figure 4.5-2. Example PDR File Naming Convention

4.5.3 Product Delivery Record (PDR)

a. SIPS PDR Server Directory

The purpose of the PDR is to announce the availability of data and associated files for transfer to ECS and to provide linkage information for the files. It contains file names, file size, data types, data type versions, location, and linkage information. The PDR is generated by the SIPS and placed in a pre-specified directory on the PDR Server after the files referenced in the PDR have been placed in their respective directories. The address of the SIPS's PDR Server and the directory name are operator-configurable items that are documented in an Operations Agreement(s) between the DAAC(s) and the SIPS. ECS regularly polls the PDR Server, detects/acquires/validates the PDR, and schedules to pull the data.

b. PDR Format

The PDR is comprised of Parameter-Value Language (PVL) Statements. The required PDR PVL parameters are depicted in Table 4.5-2. The PDR PVL statements are ASCII strings, having at most 256 characters, in the form: "Parameter = Value." Each statement ends with a semicolon. Comments can be included if preceded by /* and closed with */. The Value strings shown in Table 4.5-2 include pre-defined values shown by single quote marks and SIPS determined values which include ASCII strings, International Standards Organization (ISO) times, and integers to be filled in with appropriate values by the SIPS processor during PDR creation.

An example PDR PVL file is provided in Figure 4.5-3. The maximum allowed file length for a PDR is 1 megabyte. PDRs are validated to check that all required fields contain valid values and that the format of the PDR is correct and consistent with the standards. PDRs that adhere to the defined message standards shown in Table 4.5-2 are accepted and processed. Additional information on PVL valid characters can be found in Parameter Value Language Specification (document referenced in Section 2.3.1).

c. Linkages

This section is a general description of how to use the PDR structure to furnish file relationships to the ECS. Please see Table 4.5-4 for details about types of files that can be provided via this interface, linkage relationships and actual values to be used in the PDR statements.

When associated files are ingested into the ECS, pointers have to be set to link them. There are two ways to provide the association information on the PDR. Tables 4.5-2 and 4.5-4 give the specification for each of two types of file groups, or FILE_GROUP objects, which provide these linkages.

(1) In the usual case, a FILE_GROUP contains:

- a single science data granule consisting of one or more files,
- the science data granule's mandatory metadata file,
- optionally, any of several types of associated files to which pointers may have to be set (browse, quality assessment, production history).
- optional metadata for some of the associated files (browse and quality assessment).

DAP and Failed PGE tar files are delivered in separate file groups like science granules, but the only associated file for each of these is its required metadata file.

(2) If a browse, quality assessment or production history file is to be linked to multiple science granules, the link information must be specified using a "linkage file" transmitted with the file but after all associated science granules have been ingested. Although a linkage file must be used with multiple linkages, the linkage file may also be used to assign a one to one linkage between a browse, quality assessment or production history file and a single science granule previously ingested.

The browse, quality assessment or production history file and its associated linkage file must comprise one FILE_GROUP in a PDR. Each linkage FILE_GROUP may contain only one file type to be linked (BROWSE, QA or PRODHIST), an associated metadata file if needed, and one linkage file. The linkage file specifies a list of one or more science granules previously delivered and ingested with which to link the browse, quality assessment or production history file.

A PDR may have multiple Linkage FILE_GROUPS. The second file group in Table 4.5-2 is a linkage group and an example is given at the end of Figure 4.5-3.

If one or more of the pointers in a Linkage file cannot be resolved, the ingest fails and an error message is returned to the SIPS (See section 4.5.5).

Table 4.5-3 defines the parameters for a Linkage file and Figure 4.5-4 is an example Linkage file. Table 4.5-4 provides guidelines for both types of file linkage.

d. Checksums

The SIPS may include a checksum for any science, HDF or HDF-EOS file in the PDR. Three checksum types are supported: Type CKSUM is a 32-bit unsigned value produced by the unix cksum command. Type ECS is a 64-bit signed value produced by the internal ECS checksum algorithm. Type MD5 is the 128-bit Message Digest output of the RFC 1321 algorithm, represented as a 32-character hexadecimal string (with alpha characters all lower case). (For details of the algorithm see RFC 1321 at <http://www.faqs.org/rfcs/rfc1321.html>.)

The DAAC can set provision of checksum in the PDR to mandatory for specific SIPS.

A standalone JAVA ECS checksum utility is available from the DAAC to enable the SIPS to compute the ECS type checksum.

The DAAC maintains a DAAC-configurable checksum verification percentage parameter for the SIPS, which determines for what percentage of the SIPS's data the ECS will verify checksums upon ingest. If a required checksum verification does not succeed, data ingest fails. Agreement on the checksum verification percentage for ingest should be recorded in the Operations Agreement between the SIPS and the DAAC.

If the SIPS does not provide checksums on the PDR, the ECS may compute and record checksums for the SIPS science files using the ECS algorithm. To safeguard system performance, the percentage of ingested files without checksums for which the ECS will compute checksums is DAAC-configurable.

Table 4.5-2. Product Delivery Record PVL Parameters (1 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
ORIGINATING_SYSTEM	Originator of Delivery Record. Identifier for the SIPS.	Variable String	ASCII (20 B)	Free text, e.g. LATIS123 (not an IP address)
TOTAL_FILE_COUNT	Total number of files to transfer	Integer	ASCII (4 B)	1-9999
EXPIRATION_TIME	SIPS designated ISO time for deletion of data from originating system. This parameter is specified in the Operations Agreement(s) between the DAAC(s) and the SIPS.	Fixed String	ASCII (20 B) ²	GMT in the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time.

Table 4.5-2. Product Delivery Record PVL Parameters (2 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
OBJECT	<p>Start of file group parameters (repeat for each DATA_TYPE/group of files)</p> <p>Note that associated browse granule, quality assessment, production history, and metadata (.met or .xml) files must be in the same FILE_GROUP as the data file(s) to ensure that they will be linked to the data when they are ingested into the ECS.</p> <p>If a Browse granule, quality assessment or production history file is sent separately from its associated science data, its FILE_GROUP must include a linkage file, illustrated by the last FILE_GROUP in this table.</p>	Fixed String	ASCII (10 B)	'FILE_GROUP'
DATA_TYPE	ECS-implemented Earth Science Data Type (ESDT) for science data granule, DAP tar file or Failed PGE tar file. There can be only one DATA_TYPE in a FILE_GROUP.	Variable String	ASCII (8 B)	ESDT for science data granule or a generic data type (DAP or FAILPGE).
DATA_VERSION	ESDT version number (if this is omitted, system will default to the last version installed in ECS)	Integer	ASCII (3 B)	3-Digit version number
NODE_NAME	Name of network node on which the files in the file group are staged for pickup.	Variable String	ASCII (64 B)	Name or IP address

Table 4.5-2. Product Delivery Record PVL Parameters (3 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
OBJECT	Start of file parameters for a Metadata file. There can be multiple metadata files in a FILE_GROUP in accordance with Table 4.5-4, but only one per FILE_SPEC. Repeat FILE_SPEC for each metadata file type needed in the file group. Note: ECS supports ingest of ODL (.met) and XML (.xml) metadata for science files. The DTD for science file metadata is M2XTGranuleMetadata.dtd at http://ecsinfo.gsfc.nasa.gov/ . ECS does not support ingest of XML metadata for non-science files.	Fixed String	ASCII (9 B)	'FILE_SPEC'
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	directory
FILE_ID	Metadata File name	Variable String	ASCII ¹	metadata file name (ends in .met or .xml)
FILE_TYPE	Metadata File Type. See Table 4.5-4.	Variable String	ASCII (20 B)	'METADATA' or 'BROWSE_METADATA' or 'QA_METADATA'
FILE_SIZE	Length of file in bytes	Unsigned 32 bit Integer	ASCII (10 B)	< 2 GB
END_OBJECT	End of file parameters for Metadata file	Fixed String	ASCII (9 B)	'FILE_SPEC'
OBJECT	Start of file parameters for science data file (repeat for all files in the granule) or DAP or Failed PGE	Fixed String	ASCII (9 B)	'FILE_SPEC'
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	directory
FILE_ID	File name of granule, as defined by SCF, used for distribution if no LocalGranuleID in the metadata	Variable String	ASCII ¹	science data file name

Table 4.5-2. Product Delivery Record PVL Parameters (4 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
FILE_TYPE	File Type of the data. See Table 4.5-4.	Variable String	ASCII (20 B)	'HDF-EOS', or 'HDF' or 'SCIENCE' or 'ALGORITHM'
FILE_SIZE	Length of file in bytes	Unsigned 32 bit Integer	ASCII (10 B)	< 2 GB
FILE_CKSUM_TYPE	Type of checksum, presently either 32-bit unsigned value (type CKSUM) or 64-bit signed value (type ECS). Optional and allowed only for science files (e.g, FILE_TYPE = SCIENCE, HDF, or HDF-EOS but not metadata, DAP, BROWSE or PRODHIST).	Variable String	ASCII (max 64 B)	'CKSUM', 'ECS' or 'MD5'
FILE_CKSUM_VALUE	Checksum value. Required if the optional FILE_CKSUM_TYPE parameter is present.	Variable String	ASCII (max 255 B)	'<signed or unsigned numeric string>' or, for MD5, '<32-character hexadecimal string>' (with alpha characters all lower case)
END_OBJECT	End of file parameters for data file	Fixed String	ASCII (9 B)	'FILE_SPEC'
OBJECT	Start of file parameters for browse data, quality assessment or production history file. Repeat as needed.	Fixed String	ASCII (9 B)	'FILE_SPEC'
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	Directory
FILE_ID	File name of browse data file, quality assessment or production history file as defined by SCF, used for distribution, if no LocalGranuleID in the metadata	Variable String	ASCII ¹	browse data, quality assessment or production history file name
FILE_TYPE	File Type for Browse, quality assessment or production history per Table 4.5-4.	Variable String	ASCII (20 B)	'BROWSE' or 'QA' or 'PRODHIST'
FILE_SIZE	Length of file in bytes	Unsigned 32 bit Integer	ASCII (10 B)	< 2 GB
END_OBJECT	End of file parameters for Browse, quality assessment or production history data file	Fixed String	ASCII (9 B)	'FILE_SPEC'

Table 4.5-2. Product Delivery Record PVL Parameters (5 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
END_OBJECT	End of file group parameters (repeat for each DATA_TYPE/group of files)	Fixed String	ASCII (10 B)	'FILE_GROUP'
OBJECT	Start of file group parameters (repeat for each DATA_TYPE/DATA_VERSION group of files) for a Linkage file group. If a Browse, QA or production history file is sent separately from the related DATA_TYPE/DATA_VERSION granules, it must be sent after the data granules have been ingested and placed in a separate FILE_GROUP that includes a LINKAGE file. A linkage file must be used whenever multiple pointers to the linked file are needed.	Fixed String	ASCII (10 B)	'FILE_GROUP'
DATA_TYPE	For a linkage FILE_GROUP, use the generic data type Browse, QA or PH	Variable String	ASCII (12 B)	'Browse' or 'QA' or 'PH'
DATA_VERSION	ESDT version number. For a linkage FILE_GROUP, this currently defaults to 001.	Integer	ASCII (3 B)	3-Digit version number
NODE_NAME	Name of network node on which the files in the file group are staged.	Variable String	ASCII (64 B)	Name or IP address of network node where files are located
OBJECT	Start of file parameters for Browse, quality assessment or production history file	Fixed String	ASCII (9 B)	'FILE_SPEC'
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	directory
FILE_ID	File name of browse data, quality assessment or production history file, as defined by science processing system. Used by ECS for distribution if no Local Granule ID in the metadata.	Variable String	ASCII ¹	browse, QA or production history file name
FILE_TYPE	File Type. See Table 4.5-4.	Variable String	ASCII (20 B)	'BROWSE' or 'QA' or 'PRODHIST'
FILE_SIZE	Length of file in bytes	Unsigned 32 bit Integer	ASCII (10 B)	< 2 GB
END_OBJECT	End of file parameters for Browse, quality assessment or production history data file	Fixed String	ASCII (9 B)	'FILE_SPEC'
OBJECT	Start of file parameters for optional metadata file for Browse or quality assessment. There is no metadata option for production history.	Fixed String	ASCII (9 B)	'FILE_SPEC'

Table 4.5-2. Product Delivery Record PVL Parameters (6 of 6)

Parameter	Description	Type	Format/ Max Size (Bytes)	Value
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	Directory
FILE_ID	File name of metadata file for browse data or quality assessment file, as defined by science processing system. Used by ECS for distribution if no Local Granule ID in the metadata.	Variable String	ASCII ¹	browse or QA metadata file name
FILE_TYPE	File Type for browse or QA metadata file. See Table 4.5-4.	Variable String	ASCII (20 B)	'BROWSE_METADATA' or 'QA_METADATA'
FILE_SIZE	Length of file in bytes	Unsigned 32-bit integer	ASCII (10 B)	< 2 GB
END_OBJECT	End of file parameters for Browse or QA metadata file	Fixed String	ASCII (9 B)	'FILE_SPEC'
OBJECT	Start of file parameters for Linkage file	Fixed String	ASCII (9 B)	'FILE_SPEC'
DIRECTORY_ID	File directory location (i.e., a path name)	Variable String	ASCII ¹	directory
FILE_ID	File name of Linkage file that identifies how to link browse, QA or production history file to associated data file(s)	Variable String	ASCII ¹	Linkage file name
FILE_TYPE	File Type for Linkage file. See Table 4.5-4.	Variable String	ASCII (20 B)	'LINKAGE'
FILE_SIZE	Length of file in bytes	Unsigned 32 bit Integer	ASCII (10 B)	< 2 GB
END_OBJECT	End of file parameters for Linkage file	Fixed String	ASCII (9 B)	'FILE_SPEC'
END_OBJECT	End of file group parameters for a Linkage group (repeat for each DATA_TYPE/group of files)	Fixed String	ASCII (10 B)	'FILE_GROUP'

¹ Size does not exceed a total of 256 bytes when DIRECTORY_ID and FILE_ID are combined.

² Only used when PDR server is not under ECS control.

EXAMPLE ONLY	EXAMPLE ONLY
ORIGINATING_SYSTEM = SIPS1234; /* SIPS Processor Identifier */	
TOTAL_FILE_COUNT = 8;	
EXPIRATION_TIME = 1998-06-18T14:00:00Z;	
OBJECT = FILE_GROUP; /* Example for a Science Data Granule */	
DATA_TYPE = SIPS_DATA; /* Valid ECS ESDT Shortname */	
DATA_VERSION = 003;	
NODE_NAME = calibsrv.nasa.gov;	
OBJECT = FILE_SPEC;	
DIRECTORY_ID = SIPS1/CAL1;	
FILE_ID = 7SIPSCALP.01A; /* 'Per SIPS file naming convention */	
FILE_TYPE = SCIENCE; /* Allowed values pre-defined per Table 4.5-4 */	
FILE_SIZE = 1000000;	
END_OBJECT = FILE_SPEC;	
OBJECT = FILE_SPEC;	
DIRECTORY_ID = SIPS1/CAL2;	

**Figure 4.5-3. Example PDR PVL for Data Granule, Failed PGE and a Linkage Group
(1 of 2)**

```

FILE_ID = 7SIPSCALP.02A.MET; /* Per SIPS file naming convention but must have .MET or .xml extension */
FILE_TYPE = METADATA; /* Required with Science file per Table 4.5-4 */
FILE_SIZE = 2000;
END_OBJECT = FILE_SPEC;
OBJECT = FILE_SPEC;
    DIRECTORY_ID = SIPS1/BROWSE;
    FILE_ID = 7SIPSCALP.01A.BROWSE; /* per SIPS naming convention */
    FILE_TYPE = BROWSE; /* a browse mapped one-to-one to the science granule, delivered with the science granule */
    FILE_SIZE = 1000000;
END_OBJECT = FILE_SPEC;
END_OBJECT = FILE_GROUP;
OBJECT = FILE_GROUP; /* Example for a Failed PGE file */
    DATA_TYPE = FAILPGE; /* Generic data type for Failed PGE */
    DATA_VERSION = 001; /* defaults to 1; presently no significance */
    NODE_NAME = calibsrv.nasa.gov;
    OBJECT = FILE_SPEC; /*Failed PGE file*/
        DIRECTORY_ID = SIPS1/FAILPGE;
        FILE_ID = 7SIPSCALP.01A.FAILPGE;
        FILE_TYPE = SCIENCE; /* per Table 4.5-4 */
        FILE_SIZE = 1929430;
    END_OBJECT = FILE_SPEC;
    OBJECT = FILE_SPEC; /* required metadata file for Failed PGE per Table 4.5-4 */
        DIRECTORY_ID = SIPS1/FAILPGE;
        FILE_ID = 7SIPSCALP.01A.FAILPGE.met;
        FILE_TYPE = METADATA; /* per Table 4.5-4 */
        FILE_SIZE = 2934;
    END_OBJECT = FILE_SPEC;
END_OBJECT = FILE_GROUP;
/* An example of a Browse delivered after the associated science granule has been ingested */
OBJECT = FILE_GROUP;
    DATA_TYPE = Browse; /* Generic data type of file to be linked, Browse */
    DATA_VERSION = 001; /* defaults to 1; presently no significance */
    NODE_NAME = calibsrv.nasa.gov;
    OBJECT = FILE_SPEC;
        DIRECTORY_ID = SIPS1/BROWSE;
        FILE_ID = 7SIPSBRO.JANUARY1998; /* Per SIPS file naming convention */
        FILE_TYPE = BROWSE; /* Allowed values pre-defined per Table 4.5-4 */

```

```

FILE_SIZE = 5040105;
END_OBJECT = FILE_SPEC;
OBJECT = FILE_SPEC; /* Optional metadata file for Browse */
    DIRECTORY_ID = SIPS1/BROWSE;
    FILE_ID = 7SIPSBRO.JANUARY1998.met;
    FILE_TYPE = BROWSE_METADATA;
    FILE_SIZE = 1798;
END_OBJECT = FILE_SPEC;
OBJECT = FILE_SPEC;
    DIRECTORY_ID = SIPS1/BROWSE/LINKS;
    FILE_ID = LINKFILE011998.PVL; /* per SIPS file naming convention */
    FILE_TYPE = LINKAGE; /* Allowed values pre-defined per Table 4.5-4 */
    FILE_SIZE = 2000;
END_OBJECT = FILE_SPEC;
END_OBJECT = FILE_GROUP
/*-----*/
/* Repeat FILE_GROUP objects for each different file group */
/*-----*/

```

**Figure 4.5-3. Example PDR PVL for Data Granule, Failed PGE and a Linkage Group
(2 of 2)**

Table 4.5-3. Linkage File PVL Parameters

Parameter	Description	Type/Format (Length in Bytes)	Value
Suggested comment	Type of file and file name being linked (browse, QA or production history). (Note: ECS uses PDR to determine file but comment may be useful for visual checks.)		/*<string>*/
GROUP	Start of linkage file	Fixed String	'LINKAGE_POINTERS'
NUM_POINTERS	Number of Granules to be linked (number of GRANULE_POINTERS)	Integer	1-9999
GRANULE_POINTER_n nn	Pointer in LGID reference format (per Section 5.4). Repeat with suffix nnn=_001, _002, ... for each granule to be linked.	Variable String	LGID:ShortName:VersionID:Identifier
END_GROUP	End of Linkage File	Fixed String	'LINKAGE_POINTERS'
END	Required ODL END statement		

```

/*linkage for browse file <filename>*/
GROUP = LINKAGE_POINTERS
  NUM_POINTERS = 3
  GRANULE_POINTER_001 = "LGID:CERES01:001:ceres0110010119.122357001.dat"
  GRANULE_POINTER_002 = "LGID:CERES01:002:ceres0120010119.122357001.dat"
  GRANULE_POINTER_003 = "LGID:CERES01:003:ceres0130010119.122357001.dat"

END_GROUP = LINKAGE_POINTERS
END

```

Figure 4.5-4. Example Linkage File

Table 4.5-4. FILE_TYPE Values and Linkages for PDR (1 of 2)

PDR FILE_TYPE Value	File Description	PDR Linkage Guidelines
BROWSE	Science Browse Data Granules	Supply in same FILE_GROUP as its data granule(s) or, if on separate PDR, in its own FILE_GROUP with Linkage file. May be accompanied by a BROWSE_METADATA file in the same FILE_GROUP. In a linkage FILE_GROUP for Browse data, use DATA_TYPE Browse.
BROWSE_METADATA	ECS-Compliant Metadata (.met) File for a Browse file	Supply in the same FILE_GROUP as its related Browse file. Optional (but must be used if the BrowseDescription attribute is to be associated with the browse granule)
ALGORITHM	Science Algorithm Package TAR file	Supplied in its own FILE_GROUP. Must be accompanied by a METADATA file in same FILE_GROUP. DATA_TYPE is DAP.
HDF	Science Data Granule in HDF	Must be accompanied by a METADATA file in same FILE_GROUP
HDF-EOS	Science Data Granule in HDF containing HDF_EOS objects.	Must be accompanied by a METADATA file in same FILE_GROUP
LINKAGE	PVL file providing browse, production history or QA pointer information to update science granule metadata already in the archive. Must be used whenever multiple pointers to a single Browse, production history or QA file are to be set.	Supply in FILE_GROUP with the FILE_TYPE to be linked. DATA_TYPE for the FILE_GROUP is that of the file to be linked (Browse, PH or QA).

Table 4.5-4. FILE_TYPE Values and Linkages for PDR (2 of 2)

PDR FILE_TYPE Value	File Description	PDR Linkage Guidelines
METADATA	ECS-Compliant Metadata File. Use this FILE_TYPE to supply metadata for a granule of any DATA_TYPE for which a special metadata file type has not been specified (Browse and QA have special metadata types). Note: the METADATA file may be either .met or .xml but XML metadata is supported only for science data.	Supply in same FILE_GROUP as its data granule. Required.
PRODHIST	Production History Granule	Supply in same FILE_GROUP as its data granule or, if on separate PDR, in own FILE_GROUP with a Linkage file. Production History never has a metadata file of its own. In a linkage FILE_GROUP for production history file, the DATA_TYPE is PH.
QA	Quality Assessment Granule. These are essentially QA information files	Supply in same FILE_GROUP as its data granule or, if on a separate PDR from its data granule, in its own FILE_GROUP with a Linkage file. May be accompanied by a QA_METADATA file in the same FILE_GROUP. In a linkage FILE_GROUP for QA, the DATA_TYPE is QA.
QA_METADATA	ECS-Compliant Metadata (.met) File for a QA file	Supply in the same FILE_GROUP as its related QA file. Optional
SCIENCE	Science Data Granule in unspecified format. Includes QA Data and Failed PGE files.	Must be accompanied by a METADATA file in same FILE_GROUP.

4.5.4 Product Delivery Record Discrepancy (PDRD)

The Product Delivery Record Discrepancy (PDRD) is sent by ECS to the SIPS via ftp and/or e-mail (or via scp and/or email), only in the event that the PDR cannot be successfully validated. The subject of the e-mail message is the PDRD file name. The e-mail address (or ftp address) is an operator-tunable parameter documented for each SIPS in an Operations Agreement(s) between the DAAC(s) and the SIPS. The PDRD identifies the error/success dispositions for file groups in the PDR resulting from ECS's attempt to validate the PDR. The same file-naming convention is used for the PDRD as for the PDR, except that the file name extension is '.PDRD' instead of the '.PDR'. There are two forms of PDRD, a short form (Table 4.5-5) and long form (Table 4.5-6). The short form is used when the first error encountered in each file group within the PDR is the same or the first error found applies to each group. The long form is used when one or more file groups in the PDR have invalid parameters; some file groups may be error-free. For each file group, if an error is encountered when the PDR is processed, ECS halts processing and reports the error that it just encountered for that file group. None of the remaining conditions in that file group are validated. ECS processing then continues on with the next file group in the PDR. The dispositions in the Long PDRD will be reported for all file groups in the order listed in the PDR. In the event that a PDRD is returned to the SIPS, none of the files are transferred to the ECS for processing, and the SIPS must correct the errors and resubmit the entire PDR for processing.

The PDRD consists of PVL Statements. Short and Long PDRD PVL examples are provided, respectively, in Figure 4.5-5 and Figure 4.5-6.

EXAMPLE ONLY

EXAMPLE ONLY

```
MESSAGE TYPE = SHORTPDRD;
DISPOSITION = "DATABASE FAILURES";
```

Figure 4.5-5. Example Short PDRD PVL

EXAMPLE ONLY

EXAMPLE ONLY

```
MESSAGE_TYPE = LONGPDRD;
NO_FILE_GRPS = 3;
DATA_TYPE = SIPS_DATA1;
DISPOSITION = "INVALID DATA TYPE";
DATA_TYPE = SIPS_DATA2;
DISPOSITION = "INVALID FILE ID";
DATA_TYPE = SIPS_DATA3;
DISPOSITION = "SUCCESSFUL";
```

Figure 4.5-6. Example Long PDRD PVL

Table 4.5-5. Short Product Delivery Record Discrepancy PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²	Explanation
MESSAGE_TYPE	Short Product Delivery Record Discrepancy	Fixed String/ ASCII (9)	SHORTPDRD	
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	One of the following:	
			“INVALID FILE COUNT”	TOTAL_FILE_COUNT parameter is either missing or <= 0 - not retryable
			“ECS INTERNAL ERROR”	Memory allocation error, if doing a cross- mode/DAAC ingest and the version ID for the DDIST data type is not in the InCurrentDataTypeMap database table, if the PDR file name is null, if the PDR file can't be found or has a size of 0, or if the PDR can't be copied from the local to the remote Request directory - could be either retryable or not retryable ³ depending on why the error occurred
			“DATABASE FAILURES”	Error in accessing the Ingest database - could be either retryable or not retryable ³ depending on why the database access failed (execution of stored procedures already gets retried)
			“MISSING OR INVALID ORIGINATING_SYSTEM PARAMETER”	ORIGINATING_SYSTEM parameter is missing or empty - not retryable
			“DATA PROVIDER REQUEST THRESHOLD EXCEEDED”	This will not occur unless the data provider request threshold is lowered while Polling is in the middle of processing - retryable
			“DATA PROVIDER VOLUME THRESHOLD EXCEEDED”	If the size of a request will cause the data provider volume threshold to be exceeded - retryable
			“SYSTEM REQUEST THRESHOLD EXCEEDED”	This will not occur unless the data provider request threshold is less than the system request threshold - retryable
			“SYSTEM VOLUME THRESHOLD EXCEEDED”	If the size of a request will cause the system volume threshold to be exceeded - retryable

¹In any given instance, only one disposition value is provided. In cases where multiple errors may exist, the disposition value corresponding to the first error encountered will be provided.

²Each parameter/value is followed by an EOL mark.

³It is recommended that these errors not be retried without prior agreement with the DAAC.

Table 4.5-6. Long Product Delivery Record Discrepancy PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Long Product Delivery Record Discrepancy	Fixed String/ASCII (8)	LONGPDRD
NO_FILE_GRP (to follow)	Number of File Groups in the PDR	Integer/ASCII (4)	Number of File Groups in the PDR

For each file group in the PDR

Parameter	Description	Type/Format (Length in Bytes)	Value ²	Explanation
DATA_TYPE	ECS Data Type	ASCII String (20)	DATA_TYPE in PDR	
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	One of the following:	
			“SUCCESSFUL”	No error
			“INVALID DATA TYPE” ³	The DATA_TYPE parameter is missing from the file group or the value along with its appropriate Version ID is not in the Ingest database - not retryable
			“INVALID DIRECTORY” ³	The DIRECTORY_ID parameter is missing or empty for a file - not retryable
			“INVALID FILE SIZE”	The FILE_SIZE parameter is missing, empty, greater than 2 GB or 0 for a file - not retryable
			“INVALID FILE ID” ³	The FILE_ID parameter is missing or empty for a file - not retryable
			“INVALID NODE NAME” ³	The NODE_NAME parameter is missing or empty for the file group - not retryable
			“INVALID FILE TYPE” ³	The FILE_TYPE parameter is missing or empty for a file or the value is not in the Ingest database for the given data type - not retryable
			“UNSUPPORTED CHECKSUM TYPE”	The checksum type given on the PDR is not supported by the ECS – not retryable
			“MISSING FILE_CKSUM_VALUE PARAMETER”	The FILE_CKSUM_TYPE parameter is present on the PDR but the FILE_CKSUM_VALUE is not – not retryable
			“MISSING FILE_CKSUM_TYPE PARAMETER”	The FILE_CKSUM_VALUE is present but FILE_CKSUM_TYPE is not – not retryable
			“INVALID FILE_CKSUM_VALUE”	The FILE_CKSUM_VALUE is present but syntactically incorrect – not retryable

¹For each file group, only one disposition value may be provided. In cases where multiple errors may exist, the disposition value corresponding to the first error encountered will be provided.

²Each parameter/value statement is followed by an EOL mark.

³Null string check only

4.5.5 Production Acceptance Notification (PAN)

After ECS has attempted to ingest and archive the data, ECS automatically sends a “Production Acceptance Notification” (PAN) via e-mail or ftp (or via email or scp) to the SIPS. The PAN file announces the completion of data transfer and archival, and identifies any errors or problems that have been encountered. The e-mail, ftp or scp address and actions to be taken in case of data or archival failure are specified for each SIPS, in an Operations Agreement(s) between the DAAC(s) and the SIPS.

The naming convention for the PAN is the same as that used for the PDR, except that the file name extension is PAN instead of PDR. The subject of an e-mail PAN is the PAN file name. There are two forms of the PAN, a short (Table 4.5-7) and a long (Table 4.5-8) form. The short form of the PAN is sent to acknowledge that all files have been successfully transferred, or to report errors that are not specific to individual files but which have precluded processing of any and all files (e.g., ftp failure). If all files in a request do not have the same disposition, the long form of this message is employed. For each file in a file group, if an error is encountered, ECS halts processing and reports the error that it just encountered for that file. Remaining conditions in that file are not validated. ECS processing then continues on with the next file in the file group. If there are no more files to process in the file group, ECS processing then continues on with the next file group in the PDR.

The PAN consists of PVL Statements. Short and Long PAN PVL examples are provided, respectively, in Figure 4.5-7 and Figure 4.5-8.

If one or more of the pointers in a Linkage file cannot be resolved, the ingest fails and the PAN is sent with the disposition message “REFERENCED GRANULE NOT FOUND” or “REFERENCED GRANULE DUPLICATED”.

EXAMPLE ONLY	EXAMPLE ONLY
<pre>MESSAGE_TYPE = SHORTPAN; DISPOSITION = "POST-TRANSFER FILE SIZE CHECK FAILURE"; TIME_STAMP = ;</pre>	

Figure 4.5-7. Example Short PAN PVL

EXAMPLE ONLY**EXAMPLE ONLY**

```
MESSAGE_TYPE = LONGPAN;  
NO_OF_FILES = 3;  
FILE_DIRECTORY = /SIPS1/CAL1;  
FILE_NAME = 7SIPSCALP.01A;  
DISPOSITION = "UNABLE TO ESTABLISH FTP/KFTP CONNECTION";  
TIME_STAMP =          ;  
FILE_DIRECTORY = /SIPS1/CAL2;  
FILE_NAME = 7SIPSCALP.02A;  
DISPOSITION = "ECS INTERNAL ERROR";  
TIME_STAMP =          ;  
FILE_DIRECTORY = /SIPS1/CAL2;  
FILE_NAME = 7SIPSCALP.03A;  
DISPOSITION = "SUCCESSFUL";  
TIME_STAMP = 1996-04-28T23:59:59Z;
```

Figure 4.5-8. Example Long PAN PVL

Table 4.5-7. Short Production Acceptance Notification PVL Parameters (1 of 2)

Parameter²	Description	Type/ Format (Length in Bytes)	Value²	Explanation
MESSAGE_TYPE	Short Production Acceptance Notification Definition	Fixed String/ASCII (8)	SHORTPAN	
DISPOSITION	Disposition of Ingest Request ¹	Variable String/ASCII (64)	One of the following:	
			“SUCCESSFUL” ⁴	No error
			“NETWORK FAILURE” ^{5, 8}	Ftp service not available - retryable
			“UNABLE TO ESTABLISH FTP/KFTP CONNECTION” ⁸	Cannot open ftp/scp data connection - retryable
			“ALL FILE GROUPS/FILES NOT FOUND” ⁵	Data file not available when trying to ftp it or data file not found or has a size of 0 after it has been ftp'd - may or may not be retryable ⁹
			“FTP/KFTP FAILURE” ^{5, 8}	Other ftp errors - may or may not be retryable
			POST-TRANSFER FILE SIZE CHECK FAILURE” ⁵	Size of data file in the PDR is incorrect or the entire data file did not get ftp'd - first case is not retryable, the second case is retryable
			FTP/KFTP COMMAND FAILURE” ^{5, 7}	Ftp/scp command syntax error, ftp/scp command not implemented, bad ftp/scp command sequence, or ftp/scp command not implemented for a parameter - not retryable
			“DUPLICATE FILE NAME IN GRANULE” ⁵	Duplicate file name in granule - not retryable
			“METADATA PREPROCESSING ERROR” ⁴	Error in generating metadata file - may or may not be retryable ⁹
			“LINKAGE FILE PREPROCESSING ERROR” ⁴	Error in preprocessing linkage file - may or may not be retryable ⁹
			“RESOURCE ALLOCATION FAILURE” ⁵	Unable to create or extend the staging disk - may or may not be retryable ⁹
			“ECS INTERNAL ERROR” ⁶	Error in accessing the Ingest database, memory allocation error, invalid request volume, error in parsing the PDR file, error in warm starting a request, and any other errors not covered by the other error codes - may or may not be retryable ⁹
			“INCORRECT NUMBER OF METADATA FILES”	Number of input metadata files is not within the minimum and maximum limits - not retryable
			“INCORRECT NUMBER OF SCIENCE FILES” ⁴	Number of input science files it not within the minimum and maximum limits - not retryable
			“INCORRECT NUMBER OF FILES” ⁴	No input files or the number of input files of a particular type (i.e., Browse) is not with the minimum and maximum limits - not retryable

Table 4.5-7. Short Production Acceptance Notification PVL Parameters (2 of 2)

Parameter ²	Description	Type/ Format (Length in Bytes)	Value ²	Explanation
			“DATA CONVERSION FAILURE” ⁴	Error in preprocessing science files, validating metadata or adding file to appropriate group in the insert command - not retryable
			“REQUEST CANCELLED” ⁶	Granule has been cancelled or failed by the operator – may or may not be retryable ⁹
			“INVALID OR MISSING FILE TYPE” ⁴	If the input file type has a null or invalid internal file type in the Ingest database - not retryable
			“FILE I/O ERROR” ⁴	Error when copying files which were generated by the Ingest preprocessing to the staging disk - may or may not be retryable ⁹
			“DATA ARCHIVE ERROR” ⁴	Archive error - may or may not be retryable ⁹
			“REFERENCED GRANULE NOT FOUND” ⁴	No granule UR found for granule referenced in a linkage file - may or may not be retryable ⁹
			“REFERENCED GRANULE DUPLICATED” ⁴	Multiple granules URs found for granule referenced in a linkage file - not retryable
			“CHECKSUM VERIFICATION FAILURE” ⁴	If checksum on ingest is required but the checksum in the PDR could not be verified when recomputed by ECS – not retryable
TIME_STAMP ³	ISO Time when the ECS completed transfer of the file. Does not necessarily indicate successful ingest.	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates “Zulu” time	

¹In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

²Each parameter/value statement is followed by an EOL mark.

³The time stamp is present only in certain circumstances. If the time stamp is null, the value will be 20 spaces (character 20 hex). See the footnotes on the values for “Disposition” to determine when the time stamp is null.

⁴Dispositions for which there will always be a time stamp.

⁵Dispositions for which the time stamp will always be null.

⁶Dispositions for which the time stamp is sometimes null, i.e., when the file has not been ftp'd.

⁷kftp is not supported; the reference is an artifact of an earlier design.

⁸It is recommended that these be automatically retried but retries should be limited to 10-minute intervals for 3 hours.

⁹It is recommended that these errors not be retried without prior agreement with the DAAC.

Table 4.5-8. Long Production Acceptance Notification PVL Parameters

Parameter ²	Description	Type/Format (Length in Bytes)	Value ²
MESSAGE_TYPE	Long Production Acceptance Notification	Fixed String/ASCII (7)	LONGPAN
NO_OF_FILES	Number of Files in PDR	ASCII (4)	TOTAL_FILE_COUNT parameter in PDR

For each File in the PDR

FILE_DIRECTORY	ASCII string specifying file directory location	ASCII (<256) Equivalent to PDR length	DIRECTORY_ID parameter in PDR
FILE_NAME	File names on system creating PDR	ASCII (<256) Equivalent to PDR length	FILE_ID parameter in PDR
DISPOSITION ¹	Disposition of Ingest Request	Variable String/ASCII (64)	See Table 4.5-7 for List of Disposition messages with explanations.
TIME_STAMP ³	ISO Time when the ECS completed transfer of the file. Does not necessarily indicate successful ingest.	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time.

¹In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.

²Each parameter/value statement is followed by an EOL mark.

³The time stamp is present only in certain circumstances. If the time stamp is null, the value will be 20 spaces (character 20 hex). See the footnotes on the values for "Disposition" to determine when the time stamp is null.

4.5.6 SIPS-ECS Electronic Data Exchange Error Handling/Back-up Methods

During the course of data exchange via ftp, the following typical error conditions may arise:

- Failure to establish TCP/IP connection
- Erroneous ftp command
- File not found (listed in PDR, but not found on disk)
- File not readable due to permissions

Should a problem develop during an ftp file transfer due to any of the above error conditions, an operator-tunable number of attempts are made to pull the data. In the event that problems cannot be resolved within this operator-tunable number of attempts, the DAAC and SIPS operations personnel should coordinate recovery efforts.

4.6 Ordering Archived Data for Reprocessing (Deleted)

4.7 Data Exchange Security

The ECS implements EOSDIS security policy by supporting the following standard file transfer methods:

If the ECS is using ftp to poll the SIPS's disk, standard ftp login procedures including the use of a password for the purposes of security are used.

For ftp connections to the ECS, User IDs and passwords are needed and are maintained by the ECS. It is recommended that User IDs and passwords be changed, via the ECS administrator, periodically (on the order of every six months) or whenever a system compromise is suspected.

Significantly improved security can be obtained by implementing Secure Shell, which is a drop-in replacement for the Berkeley r- commands in a Unix environment. For SSH, the ECS uses Reflection for Secure IT (RSIT; formerly f-Secure). The SIPS may continue to use f-Secure SSH or may elect to use Open SSH. Use of Secure Shell services is by advance agreement with the DAAC; procedures, responsibilities and configurations must be documented in an Operations Agreement with the DAAC.

4.7.1 Firewalls

The ECS SDPS is protected by a firewall at each DAAC. The firewall severely restricts activity crossing to and from each facility. Standard ECS services such as Secure Shell or ftp are permitted but controlled. Extensive testing has demonstrated that existing connectivity remains unaffected, although in some circumstances an ftp client that supports passive mode is required. A SIPS may be given write access to a designated ECS PDR Server only if the server is outside the ECS firewall.

4.7.2 Encryption

The ECS supports encrypted data ingest and data distribution with the limitations described in Sections 4.7.3 and 4.7.4, respectively. The ECS itself uses only secure copy for secure ingest and secure distribution.

The SIPS must obtain either OpenSSH freeware or RSIT, actual version to be determined with the advice of DAAC operations and ECS.

Both OpenSSH and RSIT encrypt data as well as commands. The preferred product is RSIT. It can be configured not to encrypt the data while OpenSSH always encrypts the data. If the SIPS adopts RSIT, better performance can be obtained in many situations by not encrypting data. The DAAC may elect not to support data encryption.

Three ciphers are supported:

- (1) Cipher None with pass phrase authentication is the preferred cipher. This is available only when the SIPS implements RSIT. It supports an interface without data encryption.
- (2) aes128 (advanced encryption standard) forces data encryption but is faster than triple DES.
- (3) triple DES (Digital Encryption Standard) is an older standard that is still supported but file transfer is slow and it is not recommended.

By using a ssh public/private key pair, connection between machines can be established automatically. This makes it easier to automate the ingest and distribution process and eliminates the burden of managing passwords. A configuration file must reside on the machine that acts as ssh server (`~/.ssh/authorized_keys2` under OpenSSH). The public key is useless without the private key because the connections can only be established when both keys are in place, and it is not possible to derive one key from the other. Therefore, if the public key is lost or stolen, there is no effect on security. Several other options are also possible in this configuration file.

4.7.3 Secure Ingest

The ECS supports encryption of the SIPS data ingest interface using SSH (Secure SHell). The SIPS must receive ESDIS approval to use an encrypted interface because there is a potential for performance impact at the DAAC. Once ESDIS approval is obtained, the SIPS should contact DAAC operations to set up the account. The ECS contractor will provide guidance with configuration issues in coordination with the DAAC.

The SSH server software must be installed on the same SIPS host where SIPS PDRs and data are staged and which is polled by the ECS ingest software. If the SIPS has selected FTP for transfer of PDRDs and PANs from the ECS, they must be transferred to the same host.

The SIPS may elect to use pass phrase authentication but the procedure for configuring this must be coordinated with the DAAC and documented in the Operations Agreement with the DAAC.

4.7.4 Secure Distribution

This option encrypts the destination host's authentication information.

Secure distribution of ECS data is available for subscription orders only. Prior arrangements must be made with the DAAC to set up the secure account. Open SSH, F-secure SSH or RSIT must be installed on the destination host. The DAAC needs to know the destination host name, destination directory name and password. If the SIPS elects to use pass phrase authentication, configuration procedures must be coordinated with the DAAC and documented in the Operations Agreement with the DAAC.

The SIPS chooses secure distribution of an order by including the scp (secure copy) option in its e-mail Subscription Request to the DAAC (see Table 4.3-1). The ordered granules and the distribution notice are pushed by the DAAC to the designated SIPS destination. If the destination host has not been correctly configured with Open SSH, F-secure SSH, or RSIT, an error condition will result. Recovery procedures should be agreed on with the DAAC and included in the Operations Agreement.

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5. SIPS Data and Metadata

This section addresses only those aspects of the subject that are critical for ensuring ECS-SIPS data exchange interface functionality. For more information about ECS metadata requirements, see “The Role of Metadata in EOSDIS” and “Release 7 Implementation Earth Science Data Model.”

5.1 Earth Science Data Type (ESDT)

An ESDT consists of the descriptor file and Dynamic Link Library (DLL) code necessary for a granule to be ingested into ECS and to enable search, order and distribution. A versioned ESDT must be installed in the ECS before granules of that datatype and version can be ingested. The SIPS coordinates with the DAAC(s) specified for the ECS-SIPS interface to ensure there is an ESDT resident for each SIPS datatype and version.

All data granules stored in ECS are members of Earth Science Data Type Collections. These collections and the granules themselves are described in the ECS inventory database using metadata, that is, “data about data”. The metadata is organized according to a data schema called the ECS data model. The core of the ECS model contains many parameters which may be used to describe the data; additionally, the ECS data model is extensible through the use of Product Specific Attributes (PSAs) to describe aspects of a particular collection or granule which are not covered by the core model. Thus each collection is described by a set of metadata attributes with defined values on the collection level; and on the granule level, a defined set of metadata attributes with defined valid domains. The mechanism used within ECS to define the collection level attributes and granule level valids is called the ESDT descriptor.

The ESDT descriptor is developed by ECS for each ESDT collection. ECS developers work jointly with the science team to determine how to best describe the collection using the ECS data model and to identify any PSAs required. This needs analysis consists of identifying the end user base for the product, the ways in which end users are likely to search for the product, the kinds of descriptions which end users will likely require to make proper use of the product and any services (such as subsetting) which are necessary to provide to users. In this context, the science team itself is one class of end user, but other likely classes of end user are considered as well. The result of this joint science team/ECS needs analysis is instantiated in the ESDT descriptor and in DLL Routines, which provide the data services for the collection within ECS.

5.2 Metadata

5.2.1 Metadata Files for ECS Ingest

The SIPS must provide an ECS-compliant metadata file for each granule that is to be inserted in the ECS archive. An ECS-compliant metadata configuration file (MCF) should be used as the template to create the metadata file.

Once the ESDT descriptor is established, all granules of the associated collection must conform to the descriptor by providing values for the attributes defined in the descriptor. Further, the attribute values must be valid within the domain defined for that attribute as stated in the descriptor. The ECS Science Data Processing (SDP) Toolkit provides metadata tools that make this task easier. The SDP Toolkit requires as input a Metadata Configuration File (MCF), a template of the metadata which is derived from the ESDT descriptor. Using data derived in the data processing and the metadata tools in the SDP Toolkit, the SIPS software populates the MCF template. If all the required attribute fields are thus populated with values that are valid according to the collection, the metadata will conform to the ESDT descriptor. MCFs to be used in SIPS Processing are provided by the DAAC as explained in Section 4.4.

Both the MCF and the metadata produced using the SDP Toolkit (either as a stand alone file or as metadata encapsulated within HDF-EOS) are written in Object Definition Language (ODL). ODL is described in “Object Description Language (ODL) Specification and Usage” referenced in Section 2.3.1 of this document. The particular characteristics of ODL are not important for metadata produced using the SDP Toolkit metadata tools because the tools will produce correct ODL. In the case where the metadata delivered within a FILE_GROUP is not produced using the SDP Toolkit metadata tools, the metadata nevertheless must conform to the ODL structures found in the associated MCF file. If metadata is to be furnished as an XML file, it must conform to an ECS DTD (see Section 4.3.6.2).

5.2.2 Checksums in Distributed Metadata

When the ECS generates a metadata file for a granule being distributed, it determines whether a checksum(s) is available for the granule file(s). If it is, then the checksum type, checksum origin, and checksum value are added to the metadata file.

5.3 Unique Granule Identification

Each SIPS provides granules for ingest by ECS at the DAAC(s) specified for the ECS-SIPS interface in the relevant SIPS-unique volume. Each granule must have a unique identifier, which the SIPS provides in the metadata file for the granule as LocalGranuleID. For the SIPS interface documented in this ICD, use of the LocalGranuleID attribute is expanded beyond the standard ECS usage. Each SIPS should review its existing LocalGranuleID formats against the uniqueness requirement specified in Section 5.3.1.

5.3.1 LocalGranuleID Format

When the SIPS supplies a granule to ECS for archival and distribution, it must assign a unique identifier to that granule and provide the identifier in the metadata as LocalGranuleID. The SIPS may use any convention for the LocalGranuleID that meets the following criteria:

- The LocalGranuleID for each granule is unique within its collection.
- The LocalGranuleID is a valid filename (with no directory path component) for use under both Unix and Windows-NT.

- The length of LocalGranuleID is variable, but no more than 80 characters.

A SIPS may choose to use the production system product filename as the value of LocalGranuleID if it conforms to these LocalGranuleID criteria. If a SIPS uses ancillary data received from sources other than ECS in production of its standard products, the SIPS is responsible for providing that ancillary data to the ECS for archive. It is likely that filenames from such external sources would not follow the LocalGranuleID conventions. The SIPS may either change to local filename to conform, or else use a conforming LocalGranuleID that is not the local filename. Note also that multi-file granules will have only a single LocalGranuleID.

5.3.2 ECS Use of LocalGranuleID

When the SIPS granule is ingested by ECS, ECS Ingest stores the LocalGranuleID in the corresponding ECS inventory metadata attribute.

Regardless of the SIPS file names originally used for ingesting the granule, the ECS uses the LocalGranuleID to construct the Unix filename (s) when it distributes an archived granule.

As granules are inserted into ECS, each granule is assigned an ECS Universal Reference (UR); however, the UR is not included in the metadata distributed with the granule. To ensure that any SIPS internal identifier provided as a cross reference in the metadata is unique, the LocalGranuleID must conform to the criteria given in Section 5.3.1.

5.4 Granule Cross References

InputPointer is an attribute in the granule metadata in the metadata file supplied to ECS with each granule. It contains pointer(s) to the granule(s) used as input in the production of the granule, including ancillary data granules and orbit parameter granules. The InputPointer attribute is optional for granules that are not EOS Standard Products because the inputs to those granules are not stored in the ECS archive. For all EOS Standard Products, the EOS data policy requires that precursor products be made known and available to the general end user. For these products, the InputPointer is a required attribute.

5.4.1 InputPointer Format

The ECS and its users need InputPointers to determine which input products were heritage products in the generation of granules. In order for InputPointers to be of value to users for searching and ordering EOS data, they should conform to the format specified below.

The format of the InputPointer references for input products depends upon the source of the input product. For input products that are distributed from or archived in the ECS, the InputPointer may be a LGID pointer or a UR pointer. For input products that are not archived by ECS (such as SIPS intermediate products) the External Granule ID Pointer (EGID) standard for reference pointers should be used. Failure to conform to the recommended format for InputPointers will not cause the Ingest or Insert of SIPS produced granules into ECS to fail and no present ECS services

no present ECS services depend upon the format. However any future services that are built to use the standard may not be able to correctly interpret the pointer. There are three defined granule pointer reference formats.

1. The preferred format of InputPointer is a reference based upon the value of the LocalGranuleID of the input product. This method is valid only for collections where the LocalGranuleId conforms to the criteria described in Section 5.3.1 above. This includes collections produced by the SIPS for ingest by ECS, and other granules in the ECS archive that are known by the SIPS to follow the LocalGranuleId criteria. The following LGID Reference format should be used:

LGID:ShortName:VersionID:Identifier

Where

":" is a colon - a separator for the components of the pointer.

"LGID" is a literal string indicating that this pointer is a LocalGranuleID rather than a UR.

"ShortName" is the 8-character ECS ESDT ShortName of the referenced input granule.

"VersionID" is the 3-digit integer (between 001 and 255) ECS ESDT version of the referenced input granule.

"Identifier" is the value of the 80-character (max) LocalGranuleID for the referenced input granule.

Figure 5-1 is an example of an LGID Reference format. In this example, "ceres0120010119.122357001.dat" is the value the SIPS assigned for the LocalGranuleID of a granule of the CERES01 version 002 collection when it delivered the granule to ECS.

Example	Example
LGID:CERES01:002:ceres0120010119.122357001.dat	

Figure 5-1. Example InputPointer LGID Reference Format

2. If the referenced input granule was obtained from the ECS and granules of the input collection either do not conform to the LocalGranuleId criteria in section 5.3.1 above or lack a LocalGranuleID, then the SIPS must provide the ECS UR for the referenced granule. The UR can be extracted from the ECS Distribution Notice.
3. If the referenced input granule is not a member of an ECS collection then neither the UR nor the LGID can be defined. Such a case may occur if an input product is an intermediate product that is not archived in ECS. The SIPS should provide a pointer reference that a

science user can use to obtain the input data directly from the data provider. The following standard format indicates that the referenced granule is not a member of an ECS collection.

EGID:DATAPROVIDER:FILEIDENTIFIER

where

Maximum total number of characters for InputPointer is 255

":" is a colon - a separator for components of the pointer

"EGID" indicates that this is an External Granule pointer that does not point to the ECS archive

"DATAPROVIDER" is a 4-character code assigned by ESDIS for the source of the data (might be a SIPS or some other data provider)

"FILEIDENTIFIER" uniquely identifies the data to the data provider. (Data provider could include a handle of some sort within this component separated by a colon.)

Note: Within the ECS, an EGID pointer is not a valid reference and the ECS will not use such pointers for any purpose.

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Appendix A. Work-Off Plan

Item No.	ICD Location	Priority ¹	Issue Description	Tasks	Planned Resolution	Risk ²
1	Sect 2, 4.3, 4.5, 4.5.6	C	Design specification and mission operations procedures for Rel 7.21 will be published after this ICD update.	Update the TBD references to the Release 7.21 segment/ design spec and mission operations procedures	Summer 2008	Low risk; document will probably be ready soon after the ICD revision is published.

¹Issue priority Definition:

A = Design impact, e.g. unresolved interface

B = Minimal design impact, e.g. content or format of a specific field unresolved.

C = No design impact; e.g., administrative detail such as reference document no. TBS.

²Assess what the risk will be if not resolved by projected resolution date.

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Appendix B. File Transfer Quick Reference Summary

1. **Granule.** There can be only *one* data granule (ESDT) in a FILE_GROUP on a PDR. The data granule may consist of multiple files, however.
2. **Metadata File.** Every data granule *must* be accompanied by a metadata (.met or .xml) file in the same FILE_GROUP (only one per file group).
3. **Browse, Production History, QA.** A data granule may also be accompanied by a browse file and/or a production history file and/or a quality assurance file in the same FILE_GROUP, *provided* that none of these files has multiple granule associations. Optional metadata files may accompany Browse and QA.
4. **Linkage.** Linkage files must be used whenever a new browse or production history or quality assurance file is to be linked to one or more granules already in the archive.
 - a. There can be only one linkage file per FILE_GROUP.
 - b. The pointers in the linkage file must conform to the format specified in Table 4.5-3 of the ECS-SIPS ICD Vol 0.
 - c. Linkage files cannot point to a granule(s) not already in the archive.
 - d. Linkage file ingest failures include PAN disposition messages “referenced granule not found” and “referenced granule duplicated” (if multiple URs are found for a linkage pointer).
5. **LocalGranuleID.**
 - a. Must be unique for each Granule in a given collection (ESDT).
 - b. Must be a valid filename for Unix or Windows-NT with a maximum length 80 characters.
 - c. ECS uses for constructing filename for the granule when it is distributed.
 - d. LocalGranuleId is a required metadata field for all products delivered from a SIPS.
6. **InputPointer.**
 - a. If the referenced input granule was obtained from ECS, the SIPS may use the ECS UR, extracted from the ECS distribution notice.
 - b. Otherwise the convention is, InputPointer is in the format LGID:ShortName:VersionID:Identifier, where Identifier is a LocalGranuleID and is unique within the given collection.
 - c. Non-standard InputPointer references will not affect Ingest or Insert by ECS, but may be confusing to end users and may not be compatible with any future services that might use the standard.

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Abbreviations and Acronyms

ACRIM	Active Cavity Radiometer Irradiance Monitor
ARP	Address Resolution Protocol
ASCII	American Standard Code for Information Interchange
ASDC	Atmospheric Sciences Data Center
BGP	Border Gateway Protocol
CCB	Configuration Control Board
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDRL	Contract Data Requirements List
DAAC	Distributed Active Archive Center
DES	Digital Encryption Standard
DLT	Digital Linear Tape
DCN	Document Change Notice
DTD	(XML) Document Type Definition
DN	Distribution Notice
EBnet	EOSDIS Backbone Network
ECS	EOSDIS Core System
ECHO	EOS ClearingHouse
EDOS	EOS Data and Operations System
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
ESDIS	Earth Science Data and Information System

ESDT	Earth Science Data Type
FTP	File Transfer Protocol
GUI	Graphical User Interface
HDF	Hierarchical Data Format
HDF-EOS	Hierarchical Data Format – Earth Observing System
ICD	Interface Control Document
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force
IP	Internet Protocol
ISO	International Standards Organization
LAN	Local Area Network
LaRC	Langley Research Center
LGID	Local Granule Identifier
MB	10 ⁶ bytes
MCF	Metadata Configuration File
MOPITT	Measurements of Pollution in the Troposphere (instrument)
NSI	NASA Science Internet
ODL	Object Description Language
OSI	Open Systems Interconnection
PAN	Production Acceptance Notification
PDR	Product Delivery Record
PDRD	Product Delivery Record Discrepancy
PRODHIST	Production History
PSA	Product Specific Attribute
PVL	Parameter Value Language

QA	Quality Assurance
RFC	Request For Comments
RIP	Routing Information Protocol
RSIT	Reflection for Secure IT
SAGE	Stratospheric Aerosol and Gas Experiment
SCF	Science Computing Facility
scp	Secure Copy
SIPS	Science Investigator-led Processing System
SMTP	Simple Mail Transport Protocol
SSH	Secure Shell
TAR	Tape Archive
TBD	To Be Determined
TBR	To Be Resolved
TBS	To Be Supplied
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
UR	Universal Reference
WIST	(ECHO) Warehouse Inventory Search Tool

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