FLIGHT PROGRAMS AND PROJECT DIRECTORATE

Operations Agreement Between the Earth Observing System (EOS) Data and Operations System (EDOS) and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS)

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Revision D

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

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Operations Agreement Between the Earth Observing System (EOS) Data and Operations System (EDOS) and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS)

February 2016

Revision D

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Preface

This Operations Agreement (OA) is controlled jointly by the Earth Observing System (EOS) Data and Operations System (EDOS) project manager and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS) project manager. This document is under the configuration management of the EDOS project configuration management board (PCMB). Configuration change requests (CCRs) to this document shall be submitted to the EDOS PCMB, along with supportive material justifying the proposed change. Changes to this document shall be made by document change notification (DCN) or by complete revision.

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Abstract

This OA provides a detailed definition for the exchange of information between the EDOS and
ASTER GDS during the operational period of the Terra mission.

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428-OA-EDOS/ASTER	Revision 3	November 2010	EDOS 10-0016
428-OA-EDOS/ASTER	Revision D	February 11, 2016	428-EDOS-34

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Section 1. Introduction

1.1 Purpose

This section presents the agreement for the operational interface between EDOS and the ASTER GDS. The purpose of this document is to clearly define activities between EDOS and ASTER operations personnel, and to facilitate coordination between interfacing parties to assure that services are well coordinated and efficient. This document covers ASTER support from launch throughout the Terra mission's duration.

1.2 Scope/Intended Users

This document is intended for all parties needing information describing the operational interface between EDOS and the ASTER GDS. This is in support of the Terra mission and includes console operators, system engineers and software engineers responsible for implementing or upgrading either EDOS or the ASTER GDS systems. The agreements in this document reflect the EOS Terra operational phase only.

1.3 Document Organization

This document is organized into seven sections, two appendices, and an acronym list.

a. Section 1 introduces the document and defines its purpose, scope, and contents. Conventions used in preparing the document, as well as procedures for maintaining the document are provided.

b. Section 2 contains a list of applicable documents. The list includes specifications, standards, and other applicable references.

c. Section 3 provides an overview of EDOS and the ASTER GDS.

d. Section 4 provides descriptions of EDOS data processing and construction of EDOS products delivered or provided to the ASTER GDS.

e. Section 5 provides the delivery method for each of the EDOS products delivered to the ASTER GDS.

f. Section 6 provides the methods and procedures for product anomaly resolution, contingency operations due to a disruption in delivery service, and failure recovery from system outages at either the ASTER GDS or at the EDOS Level Zero Processing Facility (LZPF).

g. Section 7 provides methods of performing maintenance on either EDOS or the ASTER GDS system.

h. Section 8 identifies the points-of-contact for EDOS and the ASTER GDS.

i. Appendix A presents a list of EDOS-ASTER GDS product construction attributes.

j. Appendix B provides details on the guidelines used by EDOS in order to delete raw data files.

k. An Acronym List follows Appendix B.

1.4   Conventions

The following conventions are used in this document:

a. The terminology used in this document attempts to be consistent with that in other Earth Science Data and Information System (ESDIS), Earth Science Mission Operations (ESMO), and EDOS documents, and attempts generally to be consistent with that used in similar documents for other Flight Projects Directorate Documentation. Any exception to standard usage is noted and the reason for the exception explained.

b. The term "EDOS" is used throughout this document to denote the operation, facilities and/or systems that provide EDOS services. These terms are used in this document only for convenience and do not specify an independent EDOS organization.

1.5   Interface Responsibilities

Operational interface responsibilities are defined in terms of the EDOS and the ASTER GDS. Product construction and/or delivery agreements in this OA are subject to the bilateral control of the EDOS and the ASTER GDS. The EDOS project manager and the ASTER project manager jointly approve the OA upon resolution of issues and discrepancies as agreed upon by all parties.

1.6   Updates to the Operations Agreement

Changes to product construction attributes for ASTER GDS data services are sent to EDOS via email. EDOS requires at least 24-hour advance notice of construction attribute changes. The EDOS facility trouble-shooter will determine the impact of the changes on system operations processing and will inform the ASTER GDS when the change will be made at EDOS. It is anticipated that these changes will be made very rarely. Official changes to this OA shall be made by DCN or by complete revision as described in the Preface.

Section 2. Documents

2.1   General

This section identifies documents that directly apply in defining this interface and those reference documents that indirectly apply to obtain background information relative to the interface.

2.2   Applicable Documents

The following applicable documents, of the exact date of issue indicated, apply to this OA in their entirety unless cited otherwise herein:

a. GSFC, 428-ICD-EDOS/ASTER, Interface Control Document (ICD) Between the EDOS and the ASTER GDS, Revision 6, August 2013

b. GSFC/ 428-EDOS-F&Prs.001, Earth Observing System (EOS) Data and Operations System (EDOS) Functional and Performance Requirements Specification (F&PRS), August 2014, Original

c. Request For Comment (RFC) 1123, Requirements for Internet Hosts - Application and Support, October 1989.

d. RFC 768, User Datagram Protocol, August 1980.

e. RFC 792, Internet Control Message Protocol, September 1981.

f. RFC 959, File Transfer Protocol, October 1985.

g. GSFC/MO&DSD, 560-EDOS-0106.0002, Earth Observing System (EOS) Data and Operations System (EDOS) Operations Concept Document, Revision 1, April 1996, (with DCN 006, September 3, 2002).

h. Memorandum of Understanding (MOU) between the United States National Aeronautics and Space Administration and the Ministry of International Trade and Industry of Japan (concerning Cooperation in the Flight of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on the NASA Polar Orbiting Platform and Related Support for the International Earth Observing System, November 25, 1994.

i. GSFC/FP&PD, 428-ICD-EDOS/EGS, Interface Control Document (ICD) Between the Earth Observing System (EOS) Data and Operations System (EDOS) and the EOS Ground System (EGS) Elements, Revision 5, May 15, 2009.

j. 423-ICD-002, Interface Control Document Between the Earth Observing System (EOS) Networks and the Earth Observing System Data and Information System (EOSDIS) Subsystems, February 2010

k. 428-OA-EDOS/EDC, August 2011, Revision 3

l. 428-UG-EDOS/DRT, June 2014

2.3 Reference Documents

The following reference document relates to the EDOS/ASTER interface and should be used as a background reference document:

    a. EOS Real-time Processing System (ERPS) User's Guide, September 2000.

Section 3. EDOS and ASTER GDS Overview

3.1 EDOS Operational Overview

The EDOS Project maintains and operates a multi-mission high-rate telemetry data handling, processing and delivery system for the Earth Science Mission Operations, GSFC Code 428. EDOS provides capabilities for spacecraft data that adhere to recommendations established by the Consultative Committee for Space Data Systems (CCSDS). On a daily basis, the EDOS system captures high-rate spacecraft science data at 8 remote ground stations, transfers the data to the GSFC LZPF over high-rate networks, performs level-zero processing, and delivers approximately 1 Terabyte of science data products to end-users around the world.
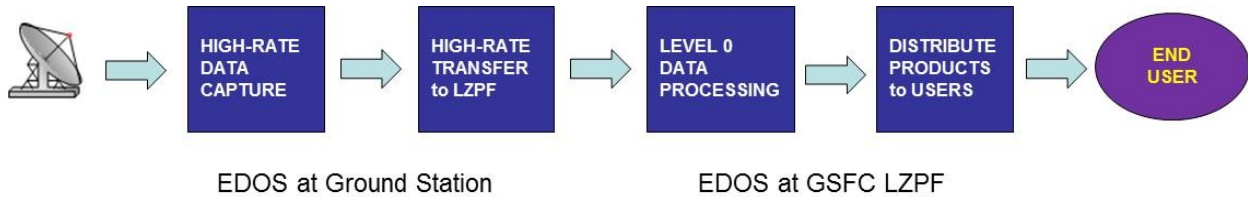
3.1.1 EDOS Architecture and Functionality

EDOS elements are distributed over various ground stations and 2 central facilities at GSFC as described below. See Figure 3.2.1-1 for a simplified view of the centralized EDOS Architecture. EDOS also provides the capability of capturing, processing and delivering the level zero data directly to end-users from the ground site, provided adequate network bandwidth is available
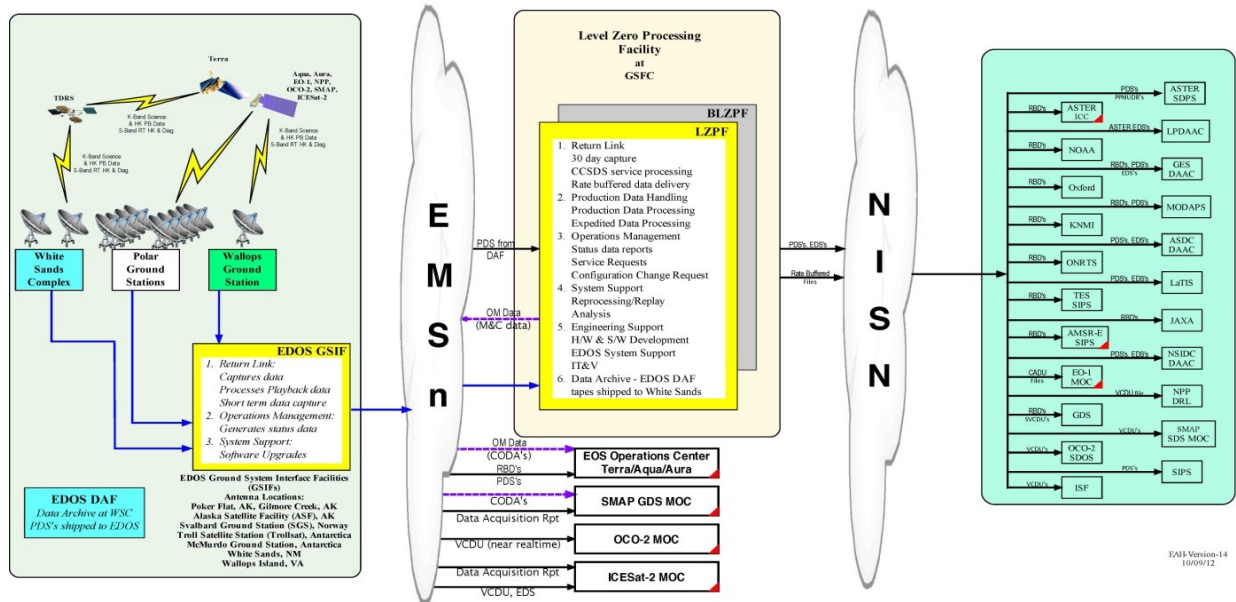

Figure 3.2.1-1 EDOS Architecture Diagram

Ground Station Interface Facilities (GSIFs) The GSIFs are located at the White Sands Complex (WSC) near Las Cruces, New Mexico; the Alaska Satellite Facility (ASF) at the University of Alaska, Fairbanks, Alaska; the Fairbanks Command & Data Acquisition Station (FCDAS) at Gilmore Creek, near Fairbanks, Alaska; the USN North Pole Ground Station in Fairbanks, Alaska; the Svalbard Ground Station "SvalSat" (SGS) in Spitsbergen, Norway; the Troll Ground Station "TrollSat" in Antarctica operated by KSAT; and at the Wallops Flight Facility (WFF) in Wallops Island, Virginia. For the McMurdo ground station, the WSC GSIFs are used with science data relayed via TDRSS. At each GSIF location and for each supported ground station antenna, EDOS has a dedicated data driven capture device (Ebox-S) to capture and pre-process high rate return link data from the spacecraft on a 24x7 data-driven mode of operation and to forward the data to GSFC at a reduced rate over the high rate Internet Protocol (IP) network. The EDOS system incorporates capabilities allowing the prioritization of data flows based on mission programmatic needs via Quality of Services (QoS). The GSIF also provides a short-term (30-day) data storage capability of the pre-processed data in the event of an extended WAN outage.

Level Zero Processing Facility (LZPF) At the LZPF located at the GSFC in Greenbelt, Maryland, the LZPF processors (Ebox-R) ingest data received from the GSIFs and perform the Level-0 service processing per mission specific interface requirements. The data products are distributed to the end-users external facilities and archived at the LZPF on physical media based on mission requirements. The LZPF also provides a short-term on-line data storage capability for reprocessing of data. The Backup Level Zero Processing Facility (BLZPF) provides a complete backup LZPF operational facility at a separate location in the event of catastrophic failure of the LZPF.

Data Archive Facility (DAF) The physical media containing the archived mission Level-0 products are stored at a facility at WSC. This facility is designated as the EDOS Data Archive Facility (DAF). The EDOS DAF stores life-of-mission Level-0 products for those missions having requested long-term archive support.

EOS Mission Support Network (EMSn) The EMSn supports communications and mission data flows between the ground stations and EDOS facilities at GSFC. The network connection(s) from GSFC to external customer facilities are provided by National Aeronautics and Space Administration (NASA) Communication Services Office (CSO). In addition to the EMSn, EDOS also uses open network connections (Internet 2, NISN Corporate Network, etc.) to provide high-rate science data delivery from remote ground stations to GSFC. A simplified view of the EDOS network architecture is given in Figure 3.2.1-2 below.
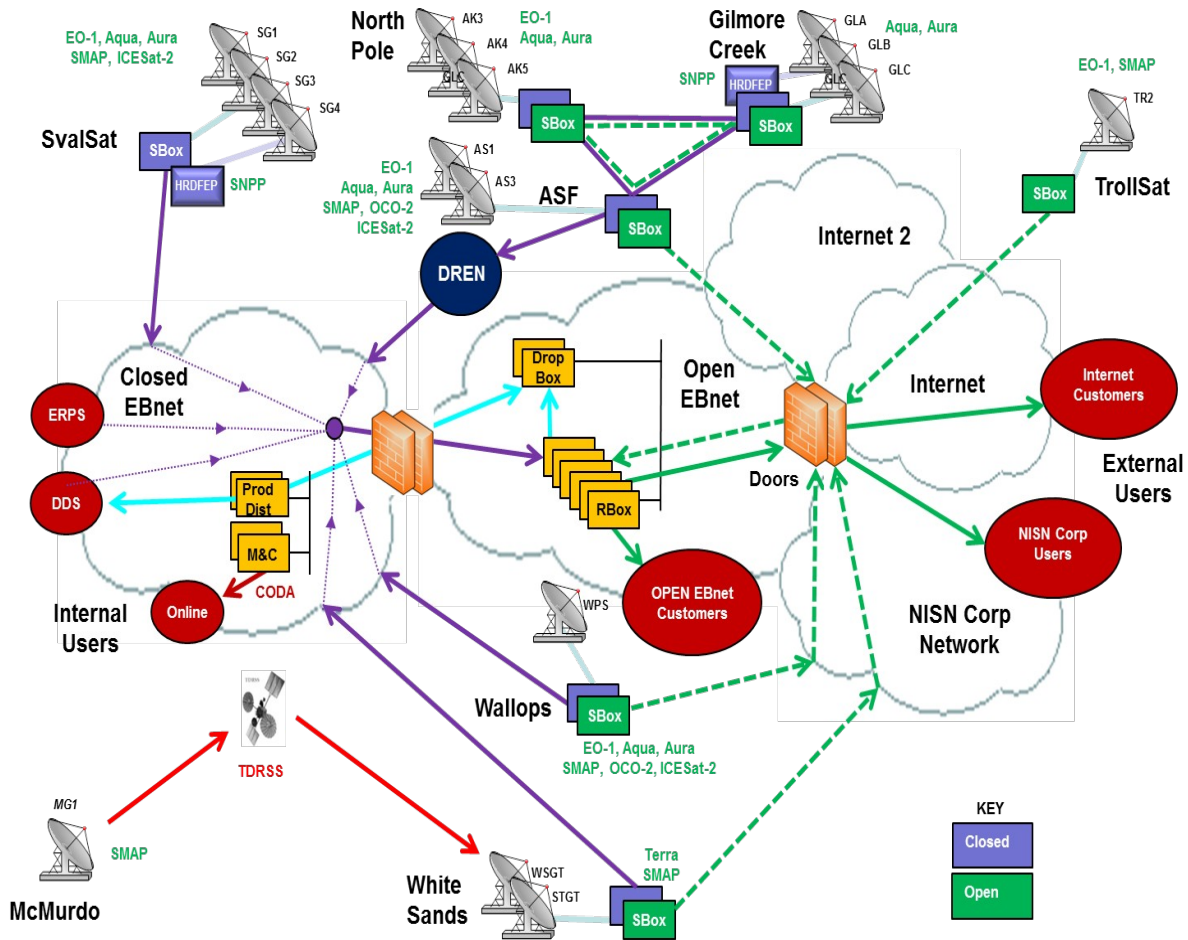
Figure 3.2.1-2 EDOS Network Architecture Diagram

3.2   ASTER GDS Overview

EDOS interfaces with the ASTER GDS for data processing. . The ASTER Data Archive and Distribution Subsystem (DADS), which is part of the GDS, performs data archival, develops the production plan, and distributes products. EDOS electronically sends ASTER instrument data packaged in Production Data Sets (PDSs) to ASTER GDS. Expedited data sets (EDSs) are electronically transmitted from EDOS to the Land Processing (LP) distributed active archive center (DAAC).

The Communications and System Management System (CSMS) is one of the subsystems supporting ASTER GDS. The CSMS facilitates the ASTER GDS internal/external communications through the ASTER data network (ADN). The ADN electronically interfaces with an EMSn gateway in the United States (U.S.) for electronic exchange of data with the EDOS.

Section 4. Data Processing and Product Construction

4.1 General

This section provides a summary of EDOS processing and the products that are constructed for the ASTER GDS. EDOS - ASTER GDS initial product construction attributes are shown in Appendix A.

4.2 ASTER GDS

4.2.1 General

EDOS will make the following data services and products available to the ASTER GDS: Science PDSs and associated PDS Physical Media Unit Delivery Record (PPMUDR).

4.2.2 PPMUDR Construction

PPMUDR files are generated in 8-hour increments based on the spacecraft time. Once an 8-hour increment of science data has been generated into PDSs, one PPMUDR and one PDS Master Construction Record (MCR) file are electronically transferred to ASTER GDS.

The electronically transferred PPMUDR file maintains the integrity of the group and mode sets for the given 8-hour processing period. The wait time is 3 hours for live products before PPMUDR and MCR files are generated and transferred to ensure completeness of the 8-hour processing period.

One PPMUDR file is sent to the same directory as the science PDSs. This PPMUDR file acts like a signal file since no other signal file is transmitted. .

The PPMUDR file identifies all the PDSs within the 8 hours of processed science spacecraft data. The PDS MCR file contains a copy of the PDS construction record for each PDS within each 8-hour set of PDSs. The construction records in the MCR file are ordered by mode set.

During data reprocessing and archived data deliveries the PPMUDR files will be transferred immediately following the transfer of the requested PDSs.

The content of the PPMUDR is detailed in the EDOS - ASTER ICD, applicable document A.

4.2.3 Science PDS Processing and Construction

ASTER science and engineering PDSs are forward ordered by CCSDS packet secondary header time, ordered by Application Process Identifier (APID), and forward ordered by source sequence count per APID. Missing packets will be identified. Packets from a previous PDS and duplicate packets are excluded from the current PDS. PDSs will contain multiple APIDs in the order described in the EDOS - ASTER ICD, applicable document A.

EDOS provides the capability to construct a PDS according to the following selectable duration attributes: all packets from one or more Spacecraft Contact Sessions (SCSs), up to 24 hours of mission data, or all packets from a fixed time interval. The PDS size is constrained by the length of the time interval covered by its contents. The interval must be a period evenly divisible into 24 hours (e.g., 12 hours, 8 hours, 6 hours, 4 hours, 3 hours, or 2 hours) up to 24 hours' worth of data, and no smaller than the average time between SCSs. The initial construction attribute for PDS time duration will be two (2) hours.

EDOS will send PDSs to the ASTER GDS electronically as they are generated. EDOS will provide Science and Engineering data PDSs electronically to the ASTER GDS for the Visible and Near Infrared Radiometer (VNIR [1]), VNIR (2), and the Thermal Infrared Radiometer (TIR). The PDSs will be constructed for each ASTER data group (i.e., three PDSs containing VNIR (1), VNIR (2), and TIR packets, respectively) and operation mode as indicated in the EDOS - ASTER ICD. However, if EDOS does not receive packets for one or more groups (PDSs) in the group set, then that group set only consists of the groups for which packets where received. PDSs are electronically delivered with no consideration to ordering. Using electronic transfer allows PDSs to be transferred to the ASTER GDS concurrently.

The PDSs follow the PPMUDR. Each PDS contains two or more files, a construction record in one file and one or more files with CCSDS packets. The initial construction attribute for ASTER PDS file size is 0.5 GB. The ASTER GDS may select a different PDS file size of 1 GB, 1.5 GB, or 2 GB. However, the same file size must be selected for EDSs and science PDSs.

4.3 LP DAAC

4.3.1 General

EDOS will make two data products available to the ASTER GDS through the Land Processing DAAC (LP DAAC): EDSs and EDS Delivery Records.

4.3.2   EDS Processing

EDSs are built when the quick-look flag is set in the packet secondary header or when EDOS receives a request from the EOS operations center (EOC)to provide the ASTER GDS with an EDS for an entire SCS.

EDSs containing science and engineering data will be ordered by CCSDS packet secondary header time, APID, and source sequence counter per APID. All packets within an EDS will be used for PDS construction. The initial construction attribute for ASTER EDS file size is 0.5 GB. The ASTER GDS may select a different ASTER EDS file size of 1 GB, 1.5 GB, or 2 GB. However, the same file size must be selected for the EDSs and science PDSs.

EDOS will electronically transmit ASTER EDSs to the LP DAAC for follow-on transfer to ASTER GDS. Requests for expedited data are sent by ASTER GDS to the EOC for processing. Expedited data requests are expected to be no more than two percent (2%) of each day's data.

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Section 5. Data Transmission

5.1   General

The following paragraphs describe the conventions for data delivery from EDOS to the ASTER GDS.

5.2   ASTER GDS

5.2.1   PPMUDR Transmission

A PPMUDR will be sent electronically from EDOS to the ASTER GDS identifying the 8 hours of science data delivered electronically. For the electronic data, the wait time is 3 hours for live products before PPMUDR file is generated and transferred to ensure completeness of the 8-hour processing period. EDOS will initiate file transfer of the PPMUDR by initiating a transfer session with the ASTER GDS host. EDOS will then place the PPMUDR in the directory identified by the ASTER GDS. Changes to the password will be provided to EDOS by ASTER.

5.2.2   Science PDS Delivery

In order to facilitate electronic transmissions of the PDS, PPMUDR without Ground Message Header (GMH), and MCR data from EDOS to the ASTER GDS, the following information is provided: (**Note:** The IP address is provided separately from this document.)

TCP/IP Address:	Provided separately
File transfer method:	passive FTP
Host Name:	Provided separately
User ID	Provided separately
Destination Directory	Provided separately
Password	Provided separately

PDSs will be constructed as discussed in paragraph 4.2.3 of this agreement. The PDS format for science PDSs is specified in the EDOS - ASTER ICD, applicable document A. EDOS electronically transfers ASTER science PDSs as they are generated to the ASTER GDS. All PDSs, nominal and reprocessed, are transferred into the same directory on the ASTER GDS. EDOS performs two different verifications to ensure that the data transfer has completed successfully. For the first verification, each file is checked immediately after transfer to ascertain the remote file size is the same as the local file size. If there is a discrepancy, the file

delivery will be retried 3 times. If unsuccessful, the file will be marked locally as failed. At this point, the PPMUDR without GMH and MCR will be generated but not sent.

EDOS Operations will take corrective action to send the failed PDS, PPMUDR without GMH, and MCR at a later time.

As a second verification, EDOS will check the host directory to make sure that all the files are there and that they are the correct size once all files for the 8-hour group have been sent. If a local file has been deleted prior to the check, EDOS will assume that the remote file has the correct size. If the check fails, EDOS Operations will take corrective action and replace the missing file or files.

Once both checks are successful, the PPMUDR without GMH, and the MCR, are sent out. These checks guarantee that ASTER GDS will only receive complete data sets.

5.3   LP DAAC

5.3.1   General

Information related to creation of EDSs destined for the ASTER GDS may be obtained from the EDOS - EGS ICD and the EDOS – DAAC OA.

5.3.2   EDS Delivery

Expedited data sets are transferred electronically from EDOS to the LP DAAC. Transmission of expedited products to the LP DAAC will be initiated within three hours of receipt of the last bit of data at EDOS for a SCS.

5.4   Service Requests

This section describes the procedures for ASTER GDS to request data or other services from EDOS.

5.4.1   Service Requests for Operational Changes

EDOS customers use e-mail to request changes to services provided to the production facilities. E-mail is used to request changes to passwords and IP addresses for any EDOS provided service. The request contains the point of contact for obtaining sensitive information. However, the e-mail does not contain any IP address or passwords. Once the changes have been received, accepted and successfully implemented, the changes will remain in effect for future passes. All requests should be e-mailed to the EDOS operator account at GSFC-EDOS-OPS@mail.nasa.gov.

5.5   Data Redelivery

EDOS maintains a 30-day physical archive of captured data to be used for reprocessing on request. The ASTER GDS can request missing data files or data segments needed for reprocessing using e-mail and the Web based reorder tool.

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Section 6. Anomaly, Contingency and Failure Recovery

6.1   General

This section presents the operational methods used to address data-related problems, backup, or contingency plans to accommodate system outages at either EDOS or the ASTER GDS. The section also covers the priority of data delivery following restoration of a system or facility outage.

6.2   Fault Isolation and Resolution

6.2.1   General

EDOS is the point of contact for any data transmission or data set related problems encountered by the ASTER GDS for EDOS generated products.   EDOS will notify the ASTER GDS via e-mail of anomalies affecting the ASTER GDS.

The following sections discuss the anomaly, contingency, and failure recovery procedures for each data service. The EDOS standard priority scheme for recovery will address EDOS failures, interface failures, and ASTER GDS failures. The priority scheme will not address any data anomalies in the space to ground link.

6.2.2   Transmission Conflict Resolution

If for any reason a transmission conflict exists (large data volume, electronic communication outage, etc.), EDOS stores the data for 24 hours, ensuring that no data is lost. In all cases of electronic communications outage, the ASTER GDS will be apprised of EDOS processing status.

If for any reason, the ASTER GDS is required to switch from the Level 0 server to the backup Level 1 server, a series of e-mails will be transmitted between the two groups. One set of e-mails will request the change to the backup server and when the problem is fixed another set of e-mails will be exchanged to restore data back to the Level 0 server. However, the e-mails do not contain any sensitive information.

6.3 Fault Recovery for Electronic Transmissions

6.3.1 PPMUDR Transmissions (to GDS)

6.3.1.1 General

If at the end of eight hours the transfer of the PPMUDR fails, the EDOS operator will notify the ASTER GDS by e-mail to coordinate problem resolution. If the ASTER GDS receives the PPMUDR successfully but later determines there is a problem with the PPMUDR, the ASTER GDS will send an email to EDOS Operations.

6.3.1.2 PDS Electronic Transmissions

In the event of an electronic communication outage with the ASTER GDS, EDOS Operations will have three options. EDOS would send e-mail notice to ASTER GDS informing them of the problem. This option would best serve a problem in the EDOS facility. If the outage is under 24 hours, the first option is to store the PDS data, ensuring no data loss. Once communications are re-established, EDOS would deliver the PPMUDRs, the PDS files, and the PDS MCRs generated during the outage electronically on a first in- first out basis.

The second option would be to utilize the ASTER GDS capability to switch from the primary to a backup server. If a transmission failure occurs in the transfer of L0 PDS data from EDOS to GDS, EDOS would send e-mail notice to ASTER GDS informing them of the problem. The GDS would then study the problem and reply to the e-mail to EDOS. After EDOS receives a reply from GDS, EDOS could, if necessary, switch the destination for sending the L0 PDS data to alternate L0 receiving server at GDS. This procedure is intended for exchanging error information in advance so that both the GDS and EDOS understand the problem and know that switching of L0 receiving server has taken place, in advance.

The third option would be to switch to contingency mode as described in Section 6.4.

6.4 Fault Recovery for Products

6.4.1 General

If an electronic communication outage between EDOS and the GDS impedes the delivery of PDS files, EDOS will hold the data for later delivery. As soon as the communications get restored EDOS will electronically transfer the backlogged files within the current production. It is expected that EDOS could sustain a communication outage for as long as 10 days without major impact on data production.

6.4.2 Science EDS/PDS Reprocessing

The Web based re-order tool should be used to report problems with the data within a PDS. EDOS will investigate the problem and will resend the PDS electronically if required.

If the affected data is anomalous and partial in its content and is less than 30 days old (from time of capture at EDOS), EDOS will reprocess the affected data, construct a new PDS, and include it along with other PDSs being delivered electronically to the ASTER GDS. If the affected data is more than 30 days old (from time of capture at EDOS) and the raw data files have been deleted, EDOS will not be able to reprocess that data.

If the problem with the data was that the product was missing (not delivered), EDOS will resend the PDSs electronically if the data is available on disk. If not on disk, and under 30 days old, the data will be reprocessed.

6.5 Contingency Operations: Problems at White Sands Complex (WSC)

6.5.1 General

In the case of a WSC Ground Stations Tracking and Data Relay Satellite System (TDRSS) Ground Terminal contingency, ERPS will receive return link housekeeping Real-time and EDOS will receive return link playback data from either the EOS Polar Ground Stations (Alaska Ground Station (AGS) and SGS) or the Wallops Ground Station (WGS). While in this contingency mode, EDOS will not receive science data.

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Section 7. Maintenance

7.1 General

This section describes the user maintenance items that are needed on the EDOS system.

7.2 Password Changes

The user passwords should be changed every 60-90 days. Passwords must be changed before 90 days when the passwords expire. The users account manager sends an e-mail to the EDOS Operations at least 10 days before the passwords expire. However, the e-mail does not contain any sensitive information. Password changes are coordinated between the ASTER GDS users account manager and EDOS Operations.

As an option, EDOS has implemented a private/public key pair (ssh authorization key pair) to handle the transfer of the data products which eliminates the need for periodic password changes. This option could be implemented for ASTER at a later date.

7.3 IP Address Changes

EDOS is notified, via e-mail, when a user is requesting an IP address change. This usually happens when a user is switching to a new server due to problems with the old server. System administration submits the request for the firewall change to open the port for the new IP address. Once the firewall issues are resolved, then database administration will update the EDOS database tables with the new IP address. Any directory changes or password changes are also completed at this time.

7.4 Software Upgrades

Software upgrades are made by software maintenance to fix anomalies, implement new features, or respond to security scans to mitigate vulnerabilities. All changes will be tested independently prior to being installed on the operational systems.

EDOS usually installs new software releases on the test string and performs regression and acceptance testing of the new release. The new release can also be installed on the BLZPF for additional testing before going operational. Following successful acceptance testing of changes

on the test string, the new release is installed on the operational system. Successful operation will be determined by spot-checking all types of products produced on both strings.

7.5   Security Changes

This section addresses the process associated with the connectivity to the ASTER GDS servers by EDOS in compliance with NASA and GSFC security requirements. All interconnected systems adhere to National Institute of Standards and Technology Special Publication 800-53 for connecting to external systems. Information contained in the ICD and this OA collectively covers the technical Interconnection Security Agreement requirements.

Security upgrades are installed on the system as required. The system is scanned periodically to check for vulnerabilities as required.

7.6   Backup Level Zero Processing Facility (BLZPF)

The purpose of the EDOS BLZPF is to support nominal data operations if the LZPF (prime) system becomes incapacitated for an extended duration of time.   The BLZPF can support nominal day-to-day data processing, data delivery and data storage for supported missions.

The BLZPF is a part of the Backup EOS Operations Center (BEOC) system. The BLZPF is a full system located in the BEOC in Bldg. 13 and provides the same functionality as the LZPF (prime) system.

The BLZPF will have two modes of operation: (1) Contingency mode that is used for external and internal testing and (2) Emergency Mode that is used for an unplanned event.   Once an emergency is declared, EDOS has 24 hours to establish operations at the BLZPF.

7.7   Planned Outages

Notification of planned (regular) maintenance on either side will be communicated via e-mail. Software upgrades are planned activities that require operations down time to implement the new software. The transition from the LZPF to the BLZPF will normally be a planned activity. This can be done to support internal testing, software acceptance testing, testing upgraded hardware and new mission testing.

7.8   Emergency Outages

Notification of an emergency situation on either side will be communicated via e-mail or black phone. In the advent a catastrophic event stops processing in Bldg. 32, EDOS Operations will have 24 hours to resume full processing in the BLZPF and users will be notified.

Section 8. Point-of-Contact

8.1   General

Verbal communication is available with EDOS seven days a week, 24 hours a day to discuss operations support, special requirements or urgent requests, to facilitate fault isolation, and to coordinate exception tests.

8.2   EDOS Points-Of-Contact

EDOS personnel should be called for data-related troubleshooting. An EDOS analyst is available 7 days a week, 24 hours a day.

a.   Attention EDOS Analysts

Telephone Number:	(301) 614-5432
Facsimile (Fax) Number:	(301) 614-5434

Mailing Address:	Attn: Rose Wood
	NASA
	Goddard Space Flight Center
	Building #32, Room #W025C
	Greenbelt, MD 20771
	USA

E-mail Address:	GSFC-EDOS-OPS@mail.nasa.gov
EDOS operations manager:	Rose Wood
	301-575-4775

8.2.1 EDOS project manager

The EDOS project manager should be contacted for changes to this agreement or to discuss special requirements not addressed herein.

b. EDOS Project Manager:	Terri Wood
Telephone Number:	(301) 614-6432
Fax Number:	(301) 614-5434

Mailing Address:	Attn: Terri Wood
	NASA
	Goddard Space Flight Center, Code 428
	Building #32, Room #E130 C
	Greenbelt, MD 20771
	USA

E-mail Address:	Terri.Wood-1@nasa.gov

8.3 ASTER GDS Points-Of-Contact

8.3.1 General

ASTER GDS personnel should be called for data-related troubleshooting.

8.3.2 ASTER GDS

a. ASTER GDS Manager: Kunjuro Omagari
Telephone Number: 81-3-6435-6902
Fax Number: 81-3-3432-3760

    Mailing Address: Japan Space Systems
                                    ASTER GDS
                                    The KiKai Shinko Kaikan Building

                                    3-5-8, Shibakoen, Minato-ku, Tokyo
                                    105-0011, Japan

    E-mail Address: Omagari-Kunjuro@jspacesystems.or.jp

b. ASTER GDS Manager: Akira Miura
Telephone Number: 81-3-6435-6859
Fax Number: 81-3-3432-3760

    Mailing Address: Japan Space Systems
                                      ASTER GDS
                                    The KiKai Shinko Kaikan Building

                                    3-5-8, Shibakoen, Minato-ku, Tokyo
                                    105-0011, Japan

    E-mail Address: Miura-Akira@jspacesystems.or.jp

The ASTER GDS operator will be available on weekdays (except Sat., Sun., and Japanese national holiday) during the hours of 00:30 GMT to 09:00 GMT via e-mail.

    GDS Operator:
    Telephone Number: 81-3-6435-6946
    Fax Number: 81-3-3432-3760
    E-mail Address: operators@jspacesystems.or.jp

c. Remote Sensing Research Group Leader: Koki Iwao
Telephone Number: 81-29-862-6710
Fax Number: N/A

Mailing Address:	National Institute of Advanced Industrial Science and Technology
	Central 7, Higashi 1-1-1, Tsukuba, Ibaraki 305-8567, Japan
E-mail Address:	iwao.koki@aist.go.jp

8.4   LP DAAC Points-Of-Contact

LP DAAC personnel should be called for data-related troubleshooting. A LP DAAC analyst will be available seven days a week, 24 hours a day via black phone, fax or e-mail:

LP DAAC Operations Controller:	Marcus Goetz
Telephone Number:	(605) 594-2699
Fax Number:	(605) 594-2530
Mailing Address:	Earth Resources Technology (ERT), Inc.
	Contractor to the U.S. Geological Survey (USGS)
	Earth Resources Observation and Science (EROS) Center
	47914 252nd Street
	Sioux Falls, SD 57198

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Appendix A. EDOS – ASTER GDS Product Construction Attributes

This appendix contains the EDOS - ASTER GDS initial product construction attributes.

Delivery Service and Method of Delivery	Product/ Destination	Contents		Duration	File Size (max)	Deliver
		VC	APID			
Expedited Data FTP	VNIR (1) Observation/ LP DAAC	17 = x'11'	x'101' + x'103'	When Quick-look flag set or as arranged with EOC	0.5 GB	Y
	VNIR (1) Calibration/ LP DAAC	17 = x'11'	x'105' + x'107'			Y
	VNIR (1) Test/LP DAAC	17 = x'11'	x'109' + x'10B'			Y
	VNIR (2) Observation/ LP DAAC	30 = x'1E'	x'111' + x'113'			Y
	VNIR (2) Calibration/ LP DAAC	30 = x'1E'	x'115' + x'117'			Y
	VNIR (2) Test/LP DAAC	30 = x'1E'	x'119' + x'11B'			Y
	TIR Observation/LP DAAC	23 = x'17'	x'131' + x'133' + x'132'			Y
	TIR Calibration/LP DAAC	23 = x'17'	x'135' + x'137' + x'136'			Y
	TIR Test/LP DAAC	23 = x'17'	x'139' + x'13B' + x'13A'			Y

Delivery Service and Method of Delivery	Product/ Destination	Contents		Duration	File Size (max)	Deliver
Non-Science PDS	Housekeeping/AOS	1= x'1'	1= x'1'	2 Hours	0.5 GB	N
	Health and Safety/AOS	2 = x'2'	2 = x'2'			N
Science **PDS** **FTP**	VNIR (1) Observation/ GDS	17 = x'11'	x'101 + x'103	2 Hours	0.5 GB	Y
	VNIR (1) Calibration/ GDS	17 = x'11'	x'105' + x'107'			Y
	VNIR (1) Test/GDS	17 = x'11'	x'109' + x'10B'			Y
	VNIR (2) Observation/ GDS	30 = x'1E'	x'111' + x'113'			Y
	VNIR (2) Calibration/ GDS	30 = x'1E'	x'115' + x'117'			Y
	VNIR (2) Test/GDS	30 = x'1E'	x'119' + x'11B'			Y
	TIR Observation/GDS	23 = x'17'	x'131' + x'133' + x'132'			Y
	TIR Calibration/GDS	23 = x'17'	x'135' + x'137' + x'136'			Y
	TIR Test/GDS	23 = x'17'	x'139' + x'13B' + x'13A'			Y

Appendix B. Raw Data File Deletion Guidelines

B.1   General

EDOS has a core requirement to store raw spacecraft data on non-volatile physical media for 30 days. EDOS has another requirement to maintain a long-term archive of all Level 0 data sets they produce. This archive will be maintained at WSC for the life of the mission.

The following are the guidelines to describe how EDOS will recycle the captured raw data capture files.

1. EDOS shall store all raw data files from a given day for 30 days.
2. EDOS shall store all files with raw data from any given 2-hour period that has any open reorder requests until that request has been filled.
3. EDOS shall store all files with raw data from any given 2-hour period for 30 days after any open reorder requests have been filled, unless the instrument teams, through the DAACs, indicate that the data reorder request has been filled.

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Abbreviations and Acronyms

ADN   ASTER Data Network

AGS   Alaska Ground Station

APID   Application Process Identifier

ASTER   Advanced Spaceborne Thermal Emission and Reflection Radiometer

BEOC Backup EOS Operations Center

BLZPF   Backup Level Zero Processing Facility

CCR   Configuration Change Request

CCSDS   Consultative Committee for Space Data Systems

CODA Customer Operations Data Accounting

CSMS Communications and System Management Segment

CSO   Communication Services Office

DAAC Distributed Active Archive Center

DADS Data Archive and Distribution Subsystem

DAF   Data Archive Facility

DCN   Document Change Notice

EDOS EOS Data and Operations System

EDS   Expedited Data Set

EDU   EDOS Data Unit

EGS   EOS Ground System

E-mail electronic mail delivery

EMSn EOS Mission Support Network

EOC   EOS Operations Center

EOS   Earth Observing System

EROS Earth Resources Observation and Science

ERPS EOS Real-time Processing System

ERT   Earth Resources Technology

ESMO Earth Science Mission Operations

F&PRS   Functional and Performance Requirements Specification

FCDAS   Fairbanks Command & Data Acquisition Station

FTP   File Transfer Protocol

GB   Gigabyte

GDS   Ground Data System

GMH   Ground Message Header

GMT   Greenwich Mean Time

GSFC Goddard Space Flight Center

GSIF Ground Station Interface Facility

ICD   Interface Control Document

IP   Internet Protocol

LP DAAC   Land Processing DAAC

LZPF Level Zero Processing Facility

MCR Master Construction Record

MO&DSD   Mission Operations and Data Systems Directorate

MOU Memorandum of Understanding

NASA National Aeronautics and Space Administration

OA   Operations Agreement

PCMB Project Configuration Management Board

PDS   Production Data Set

PPMUDR   PDS Physical Media Unit Delivery Record

QoS   Quality of Services

RFC   Request for Comment

SCS   Spacecraft Contact Session

SGS   Svalbard Ground Station (Norway)

TCP   Transmission Control Protocol

TDRSS   Tracking and Data Relay Satellite System

Terra   First Spacecraft of the Morning Series

TIR   Thermal Infrared Radiometer

U.S.   United States

UDP   User Datagram Protocol

USGS U.S. Geological Survey

VNIR Visible and Near Infrared Radiometer

WGS Wallops Ground Station

WSC White Sands Complex