BASIC ASSUMPTIONS AND GUIDELINES HANDBOOK FOR EOS NETWORKS REQUIREMENTS

Version 1.3

March 31, 2004

Preface

This document was prepared by Ran Rathore as a EOS network requirements guidelines handbook under the direction of Gordon Knoble, EOS Networks Manager, ESDIS Project. The objective of this handbook is to provide the basic assumptions and guidelines for compiling the requirements for EOS Networks services that would be needed to support the current and future EOS Missions. The data communications to support the ESDIS Project are characterized as internal and external logical networks comprising of several segments of physical networks. The EOS network capabilities currently include the EOS Mission Support network (EMSn) as an EOS internal logical network and EOS Science Support network (ESSn) as an EOS external logical network. EMSn provides the capabilities to support the EOS Missions operations via secured and dedicated network communication links, whereas the ESSn provides the network capabilities to interconnect remote investigators and user facilities to EOSDIS facilities via shared networks. The ESSn is an open computer communications network that serves the needs of NASA's diverse science and research community worldwide. ESSn's mission is to support NASA's scientific goals and objectives by providing reliable global network communications for scientific research. ESSn currently serves the researchers and collaborators worldwide, with high-performance links and gateways connecting to several thousand research, educational, and public commercial networks via the Internet and national research networks in Europe, Asia, and other continents.

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*with cc: to Gordon Knoble **(Gene.G.Knoble@nasa.gov)***

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Section 1 – General Assumption and Guidelines

1.1 General Objectives and Scope

The objective of this EOS network requirements guidelines handbook and ESDIS Project's consolidated EOS network requirements baseline database is to make the network traffic baseline requirements available as a single-source input for the network implementers. The information is to be used for developing the EOS missions-specific level 3 and level 4 network design and implementation requirements without any need for collecting them from several information sources. Since most of the high-level EOS science products data traffic requirements are already documented in this handbook based on the sources and assumptions identified in the next section, this handbook would be treated as the primary source for the EOS science data traffic requirements (including the detailed QA SCFs requirements and list of EOS users). In other words, this handbook should be used as the primary source of inputs for deriving the detailed yearly ramped-up production and reprocessing data traffic requirements for the implementation of network services to support the current and future EOS missions. In addition to this handbook, detailed consolidated EOS missions and science networks traffic baseline requirements will be maintained in ESDIS Project's Network requirements database. The scope of ESDIS Project's network requirements database is limited to operational and science data traffic requirements pertaining to EOS missions identified in the Appendix D. The handbook and data base will be regularly updated two times a year to reflect the latest networks data flow requirements.

Non-science miscellaneous support data (such as Ancillary) flow traffic requirements for science data products of a specific EOS mission's instrument will not be documented in the this EOS Networks guidelines handbook, if they are less than 10% of the total science data products traffic requirements between a pair of source and destination hosts. Such data traffic requirements may be maintained in the ESDIS Traffic Requirements Database (ETRD) or other databases from viewpoint of tracking. However, if the data flow traffic between a pair of source and destination hosts consists of non-science miscellaneous support data only then such data traffic requirement would definitely be documented and included in the handbook from the viewpoint of network connectivity, even if it is insignificant.

The network traffic requirements specified in this handbook based on various CCB-approved documents (including the subsequent changes proposed by CCRs) are to be reviewed periodically by the cognizant EOS network support personnel to identify the possible inconsistencies. Any questions or comments on these baseline requirements should be sent to Ran Rathore **<rrathore@eos.nasa.gov>** with cc: to Gordon Knoble **<Gene.G.Knoble@nasa.gov>**

1.2 EOS Networks Requirements Sources & Guidelines

The following guidelines, assumptions and sources were used for collecting, deriving, and documenting the EOS networks data traffic requirements in this handbook:

1. Collect EOS network traffic requirements from ESDIS in process or CCB approved documents. Non-CCB approved requirements from other sources (if any) should have the prior approval of Jeff Smith and Gordon Knoble before incorporating them into the handbook and database.

2. Refer to the following latest CCB-approved documents as the primary sources for EOS missions and science data traffic requirements pertaining to Terra (AM), Aqua (PM), Aura (Chem), ICESat, and Landsat-7 missions.

   - Appendix D of ESDIS Project Level 2 Requirements, Volume 0 document for Mission-specific network traffic requirements during the pre-launch and on-orbit missions operations
   - Appendix C of ECS Functional and Performance (F&P) requirements specification for multi-level EOS Science Products Data Volumes archival and distribution rates for each EOS Mission and their Instruments.

- Appendix F (Tables F-1) for DAAC-to-DAAC Science Data Traffic Requirements by Instruments
- Appendix F (Tables F-2) for QA SCFs Science Data Traffic Requirements
- Appendix F (Tables F-3) for DAACs or EDOS-to-SIPS and SIPS-to-DAACs Science Data Traffic Requirements

3. Most of the science data traffic estimates provided in ESDIS Project Level 2 requirements (Volume 0) document are based on *February 1996 Technical baseline and Appendix C of ECS F&PR Specification document*. Since 1996 baseline does not reflect the current data traffic rate estimates, EOS Networks Manager has authorized the use of revised science data traffic estimates provided by Yun-Chi Lu (SPSO) in July 1999 as changes to the SPSO Budget Model Baseline.

4. Data traffic estimates for missions (not specified in Appendices D, E, and F of ESDIS Project Level 2, Volume 0 document or Appendix C of ECS F&PR specification) may be taken from relevant CCB-approved GSRDs, MSRDs, IRDs, and ICDs to provide sufficient basis for establishing the networks implementation baseline.

5. Data traffic requirements specified in the latest CCB-approved MSRD, GSRD, and ICDs will supercede the requirements from other information sources including the ESDIS Level 2 Requirements, Volume 0 document.

6. If any of the data rates specified in CCB-approved MSRD, GSRD or ICDs do not match with the data rates provided in Appendices D, E, and F of ESDIS level 2, Volume 0 document; a CCR will be submitted to resolve the differences.

7. Level 0 and level 1 science data products are assumed to arrive at full 100% production rate starting at launch. Level 2 and higher product generation is 50% of full capacity for the first year, ramping up to 75% one year after launch, and reaching 100% two years after launch. Each DAAC's archival capacity to retain the products will be based on the above ramp-up policy.

8. Non-science miscellaneous support data (such as Ancillary) flow traffic requirements for science data products of a specific EOS mission's instrument will not be documented in this EOS Networks guidelines handbook, if they are less than 10 % of the total science data products traffic requirements of that mission's instrument between a pair of source and destination hosts. Such data traffic requirements may be maintained in the ETRD from the viewpoint of tracking. However, if the data flow traffic between a pair of source and destination hosts consists of non-science miscellaneous support data only then it would definitely be documented and included in the handbook from the viewpoint of network connectivity, even if it is insignificant.

9. Any network requirements from sources other than CCB-approved documents or sources identified in this handbook should have the approval of EOS Networks Manager before populating them into any database.

10. Proposed changes to science data traffic requirements have to come through the ESDIS SPSO office or by CCR before they are approved by the EOS Networks Manager for inclusion in the ESDIS network requirements handbook and database. Exceptions will be worked on a case by case basis.

11. The updates to this document from version 1 to version 2 are highlighted in **blue**.

1.3 EOS Networks Service Availability Schedule

EOS network connectivity is to be provided for each mission during pre-launch, on-orbit and a six- month crossover period to successor replacement instruments (if any).

For future EOS missions, such as Aura (Chem), the following time periods will be used as a general guideline to provide the data communication services:

Real Time S-Band Telemetry and Command Data Transport

To and From SCITF (TRW)	L – 16 months to L
To and From EPGS and EDOS	L – 12 months to End of Mission (EOM)
To and From EOC	L – 12 months to End of Mission (EOM)
To and From VAFB	L – 6 months to L + 24 Hours

High Rate X-Band Store and Forward Science Data Transport

EPGS GSIFs to EDOS LZPF	L – 8 months to End of Mission (EOM)

EDOS Rate-Buffered Science Data Transport

EDOS LZPF to EOC	L – 10 months to End of Mission (EOM)

ISTs Connectivity and Data Transport

Data Exchange between EOC & ISTs	L – 8 months to End of Mission (EOM)
Data Exchange between EOC and SCITF IST (TRW)	L – 10 months to L + 3 months

Other Data Transport

Schedules, Status, and Tracking and Acquisition data transport	L – 10 months to End of Mission (EOM)

Voice Communication Service

Between EOC and VAFB	L – 4 months to Launch
Between EOC and SCITF (TRW)	L – 14 months to Launch
Between EOC and following Facilities: EPGN (AGS, SGS, MGS, WGS, WOTIS), EDOS, SN/NCC, FDS, MMFD (B28), ISTS	L – 12 months to End of Mission (EOM)

1.4 Other

- EOS network traffic data traffic requirements in database will not be updated, if the future data rate changes are within + 10% or -10%. The changes within 10 % range will be absorbed into contingency.
- Maximum network circuit link utilization is assumed to be 80 percent by NISN.

Section 2 – EOS/NISN Network Services

2.1 Real-Time-Critical Network Service

- Routed Real Time mission critical level of data networking connectivity with emphasis on meeting real-time telemetry transport through the use of the IP suite
- Engineered with high level of redundancy to achieve the added level of availability
- Employs the same security and connectivity features and limitations as Mission Critical data routed service
- Dictates the use of IP as the standard protocol for data networking. Other protocols are supported on a legacy basis only
- **Availability:** 99.98%, **Service Restoration Time:** Less than 1 Minute (See Note below)
- **Packet Loss:** 0.001%, **Round Trip Time:** Less than 120 ms, **Coverage Period:** 24X7
- Use this service for real times forward link commands and return link housekeeping data with 1-Minute MTTR

Note: A capability for immediately switching to an alternate data path must exist

2.2 Mission-Critical Network Service

- Near real time mission-critical level of data networking connectivity using the IP suite with tightly controlled access and security measures.
- Engineered as a closed system to support EOS mission critical telemetry and data flows with high level of availability, controlled access, and security for critical data flows that require no general Internet access.
- Access to and from the general Internet and other NASA IP services is extremely limited and on a strict exception basis only
- Dictates the use of IP as the standard protocol for data networking. Other protocols are supported on a legacy basis only
- **Availability:** 99.95%, **Service Restoration Time:** 2 Hours (See Note below)
- **Packet Loss:** 0.001%, **Round Trip Time:** Less than 120 ms, **Coverage Period:** 24X7
- Use this service for Real-time (RT) Commands and Housekeeping (HK) and ground mission services to MOC and EOC traffic, such as Predicted Ephemeris and Schedules
- Implemented using EBnet closed network address space and EBnet router connections for EOS missions: Terra, Aqua, Aura
- Implemented using NISN institutional services (IOnet network) for all other missions

Note: The service restoration time represent the time to restore service to the user and assume immediate access to the user's facility to repair/replace equipment if necessary

2.3 Premium Network Service (PIP)

- IP Routed PIP service
- Premium level of data networking connectivity through the use of IP routed Service
- Higher performance level, higher priority for problem resolution, and is not directly connected to the general Internet
- Premium IP connectivity to the general Internet is through a controlled gateway and is implemented on an exception basis only.
- Suitable for networking requirements where the EOS support operations should be isolated from the general Internet, i.e. internal NASA traffic.
- Dictates the use of IP as the standard protocol for data networking. Other protocols are supported on a legacy basis only
- Appropriate where operations needed to be isolated from internet
- **Availability:** 99.50%, **Service Restoration Time:** 4 Hours (See Note below)
- **Packet Loss:** less than 1%, **Round Trip Time:** Less than 100 ms, **Coverage Period:** 24X7
- Use this service for Level 0 data, Data Products, Inter-DAAC data traffic, Operations Management data, SMC data, Real Time (2 Hrs), House Keeping Play Back, Metadata, Institutional Data, Quick -look data, and Notices, ISTs (where connectivity or adequate performance does not exist)
- Implemented as NISN Premium Service or as EBnet open network (uses EBnet address space and EBnet router connections)

Note: This restoral times represent the time to restore service to the user and assume immediate access to the user's facility to repair/replace equipment if necessary

2.4 Standard Network Service (SIP)

- Basic data networking connectivity using the internet protocol suite.
- IP-based Commodity Internet service via Agency's link to internet via Internet peering point(s)
- Dictates the use of IP as the standard protocol for data networking. Other protocols are supported on a legacy basis only
- Basic universal internet connectivity with minimal performance guarantees or restrictions on acceptable use and open to the public to access
- **Availability (to peering point):** 99.50 %, **Service Restoration Time:** less than 24 Hrs (See Note below)
- **Packet Loss:** 1%, **Round Trip Time:** Less than 250 ms, **Coverage Period:** 6 AM (Eastern) Monday through 6 PM (Pacific) Friday
- Use this service for ISTs (where connectivity and adequate performance exists), User Data Flows, QA Data Flows (where connectivity and adequate performance exists), User Query and Response, Ancillary data, and DAAC Outflows to non-NASA investigator sites

Note: This 24 hour restoral times represent the time to restore service to the user and assume immediate access to the user's facility to repair/replace equipment if necessary. This restoral time results from the decreased priority given to standard service as compared to other classes of service and from the fact that standard routed data service equipment is often at a considerable distance from a NASA operating location.

2.5 Network Services Performance Specifications Summary

The performance specifications in the followingTable are stated from NISN-location to NISN-location, e.g., center-to-center or tailsite-to-center, and these specifications apply to connections within U.S. only. The performance beyond NISN's connections to the Internet can not be guaranteed by NISN.

Performance Standards for IP Routed Network Services

Service Category	Availability	Restoral Time	Coverage Period	Acceptable Packet Loss	Round Trip Time
Real-time Critical	99.98%	< 1 minute[1]	24X7	0.001 %	< 120 ms
Mission Critical	99.95%	2 hours[2]	24X7	0.001 %	< 120 ms
Premium	99.50%	4 hours[2]	24X7	< 1.0 %	< 100 ms
Standard	99.50%	< 24 hours[2,3]	6 a.m. Eastern Monday to 6 p.m. Pacific, Friday	1.0 %	< 250 ms

Note 1: A capability for immediately switching to an alternate data path must exist.

Note 2: These restoral times represent the time to restore service to the user and assume immediate access to the user's facility to repair/replace equipment if necessary.

Note 3: The 24 hour restoral time results from the decreased priority given to standard service as compared to the other classes of service and from the fact that standard routed data service equipment is often a considerable distance from a NASA operating location.

Section 3 – EOS Data Types

3.1 Real Time (RT) Data

The s-band forword and return link CCSDS data units such as spacecraft housekeeping and commands that are required to be delivered via EMSn with minimized delay. The real-time data are acquired and transmitted immediately to the ground (as opposed to playback data).

3.2 Rate Buffered (RB) Data

The return link telemetry data that has been received by EDOS from an EOS spacecraft at a specific rate during a spacecraft session and transmitted to the destination at a lower rate negotiated with the destination. EDOS provides a rate buffered service for housekeeping telemetry playback data and certain engineering data.

3.3 Expedited Data Sets (EPDs)

The CCSDS data packets with a single spacecraft ID/APID from a single spacecraft session that includes the EDOS quality and accounting information identifying all packet anomalies and data gaps. The expedited data processing does not include data merging, and redundant packet deletion. The expedited data sets are generated by EDOS using raw instrument or spacecraft packets from a single TDRSS acquisition session and made available for delivery to a user within 3 hours of receipt of the last packet in the session.

3.4 Production Data Sets (PDSs)

The time ordered non-redundant CCSDS data packets on a per orbit basis with a single SCID/APID from one or more sessions spanning a period up to 24 hours. It includes the EDOS quality and accounting information identifying all packet anomalies and data gaps. They are generated from production data processing. The time span, number of packets, or number of orbits encompassed in a single data set are specified by the recipient of the data.

Section 4 – EOS Missions and Instruments Manifests

4.1 Missions Life spans and their Instruments Manifests

MISSIONS	INSTRUMENTS	MISSION LAUNCH DATE	MISSION LIFE SPAN	MISSION END-OF-LIFE DATE
TRMM	CERES, LIS, VIRS, TMI, PR (Japan)	11/27/97	7 Years	**12/31/04**
LANDSAT-7	ETM+	04/15/00	5 Years	04/15/05
QUIKSCAT	SeaWinds	06/20/99	5.25 Years	09/30/04
TERRA (AM)	CERES, MISR, MODIS, ASTER (Japan), MOPITT (Canada)	12/18/99	**8.75 Years**	**09/30/08**
ACRIMSAT	ACRIM III	12/21/99	5 Years	12/31/04
JASON-1 (France)	JMR, Poseidon-2, GPS, DORIS (France)	12/07/01	6 Years	12/07/07
METEOR-3M (Russia)	SAGE III	12/10/01	3 Years	12/10/04
ADEOS II (Japan)	SeaWinds, AMSR, GLI, ILAS-2 (Japan), POLDER (France)	11/01/02	5 Years	11/01/07
AQUA (PM)	AIRS, AMSU-A, CERES, MODIS, AMSR-E (Japan), HSB (Brazil)	05/04/02	**7.25 Years**	**09/30/09**
SORCE	TIM, SIM, SOLSTICE, XPS	12/01/02	5 Years	12/01/07
ICESAT	GLAS, GPS	01/17/03	4.75 Years	09/30/07
AURA (CHEM)	MLS, TES, HIRDLS (UK/US), OMI (Netherlands/Finland)	**06/17/04**	**5.25 Years**	**09/30/09**

4.2 Instruments Data Generation Rates

INSTRUMENTS	AVERAGE DATA GENERATION RATE (Kbps)	PEAK DATA GENERATION RATE (Kbps)	MISSIONS AND PLATFORMS
ASTER	8300	89200	**TERRA**
CERES	16.926	**16.926**	**TERRA, AQUA**
MISR	3800	11000	**TERRA**
MODIS	6847	10800	**TERRA, AQUA**
MOPITT	25	40	**TERRA**
AIRS	1300	1300	**AQUA**
AMSU-A	1.676	1.676	**AQUA**
HSB	4.2	4.2	**AQUA**
AMSR-E	87.392	87.392	**AQUA**
HIRDLS	73	73	**AURA**
TES	4900	6200	**AURA**
MLS	100	100	**AURA**
OMI	760	1080	**AURA**
GLAS	460	460	**ICESAT**
GPS	**5.80**	**5.80**	**ICESAT**
PRAP	**65.6**	**65.6**	**ICESAT**

Section 5 – EOS Network and Applications Overhead Factors

Data Traffic Type	Avg or Peak	Ckt Util Factor (1.25)	Network Protocol OH (1.25)	Total Network OH (NISN)	Application OH Factor (1)	Application OH Factor (2)	Contingency Factor (1.50)	Total ESDIS Over Head Factor (ESDIS)	Total OH (ESDIS x NISN)
L0 Product (EDOS / DAAC)	A	1.25	1.25	**1.563**	None	None	1.50	**1.500**	**2.344**
Ln Products (InterDAAC)	A	1.25	1.25	**1.563**	None	None	1.50	**1.500**	**2.344**
General Science	A	1.25	1.25	**1.563**	None	None	1.50	**1.500**	**2.344**
Real Time (4hr MTTR)	P	1.25	1.25	**1.563**	None	None	1.50	**1.500**	**2.344**
Expedited (1Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0082)	None	1.50	**0.012**	**0.019**
Expedited (Generic) (5Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0417)	None	1.50	**0.063**	**0.098**
Expedited CERES/ MOPITT (5Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0409)	None	1.50	**0.061**	**0.096**
Expedited MODIS (5Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0712)	None	1.50	**0.107**	**0.167**
Expedited MISR (5Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0968)	None	1.50	**0.145**	**0.227**
Expedited ASTER (5Min)	P	1.25	1.25	**1.563**	Expedited Delivery (0.0879)	None	1.50	**0.132**	**0.206**
Rate Buffered (Normal)	A	1.25	1.25	**1.563**	Time to Deliver (50/35)	None	1.50	**2.143**	**3.348**
Rate Buffered (LZPF-EOC)	A	1.25	1.25	**1.563**	Time to Deliver Factor (50/1)	None	1.50	**75.000**	**117.188**
RT Commands	P	1.25	1.00	**1.250**	CLTU Cmd OH (1.40)	None	1.00	**1.400**	**1.750**
RT Return Link Data (From LZPF)	P	1.25	1.00	**1.250**	Path Service OH (1.05)	None	1.00	**1.050**	**1.313**
RT HK Data (To AGDS)	A	1.25	1.00	**1.250**	Path Service OH (1.05)	None	1.00	**1.050**	**1.313**
Store and Forward (GSIF-LZPF)	A	1.00	1.00	**1.000**	EDOS GSIF Time Factor (50/45)	R/S Encoding (1.16)	1.50	**1.933**	**1.933**
Real Time (Clock &Data)	P	1.00	1.00	**1.000**	None	None	1.00	**1.000**	**1.000**
O&M / Mgt / Adm / CODA Msgs	**A**	1.25	1.00	**1.250**	68/40 OH Factor (1.70)	None	1.00	**1.700**	**2.125**
QA SCF Flows	**A**	1.00	1.00	**1.000**	None	None	1.50	**1.50**	**1.50**
SMC	**A**	1.25	1.25	**1.563**	None	None	1.00	**1.000**	**1.563**

Future Policy to Apply Overhead Factors: Since the network overheads pertaining to circuit utilization and protocol layers 1 through 3 or 4 are dependent on the network technology and type of services offered by CSOC/NISN as the service provider to satisfy the EOS data traffic requirements, it would be appropriate for the service provider to apply them. Based on this reasoning, the data traffic requirements submitted to CSOC/NISN should be limited to include the ESDIS Overhead only (***Application layer overheads*** plus **Contingency Factor)** as specified in column 9 of above table based on the specific type of data flows.

Section 6 – EOS Networks Requirements Template for ICDs

All future ICDs should follow the following table format to specify the EOS networks data flow traffic requirements**:**

Source Element and Site Location *(From)*	**Destination Element and Site Location** *(To)*	**Data Type** *[such as Real Time, QA, Ancillary, Expedited, Science Products (L0-Ln), etc.]*	**Network Service Level** *[such as Standard IP Service (SIP), Premium IP Service (PIP) etc.]*	**Data Transport Protocol** *(Such as FTP, UDP, TCP etc.)*
(1)	*(2)*	*(3)*	*(4)*	*(5)*

Network Service Start Time *(such as Launch – 6 months)*	**Network Service End Time** *(such as Launch + 5 Years)*	**Raw Data Volume per Transfer in Megabytes (GB x 1000)**	**Raw Data Transfer Frequency interval in Hours**	**Raw Data Delivery Time per Data Transfer in Minutes**
(6)	*(7)*	*(8)*	*(9)*	*(10)*

Raw Data Volume Transfer Rate in Kbps *(Col 8 x 8000) / (Col 10 x 60.0)*
(11)

Section 7 – EOS Networks Requirements Collection Process

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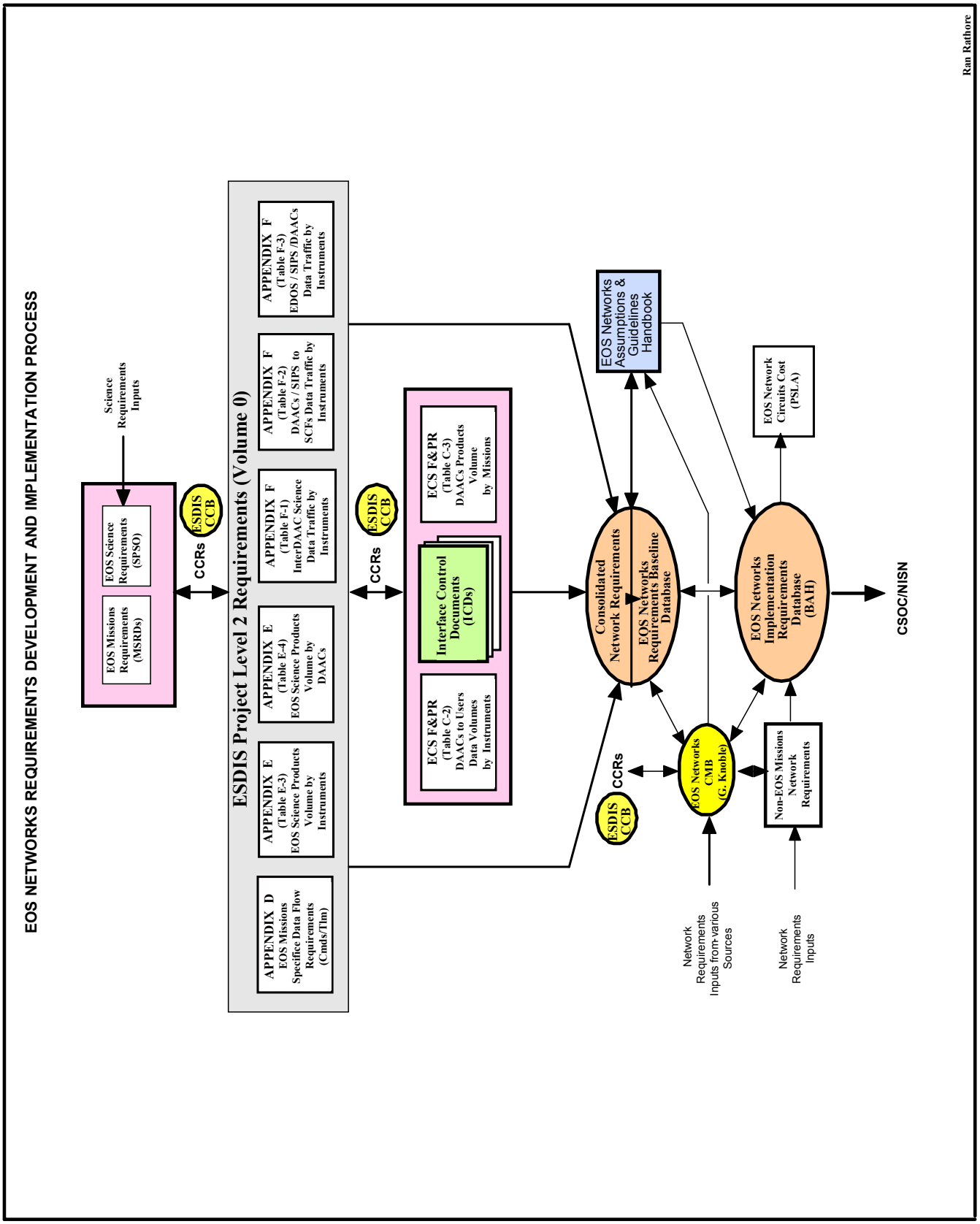
EOS NETWORKS REQUIREMENTS DEVELOPMENT AND IMPLEMENTATION PROCESS
Ran Rathore
Science Requirements Inputs
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Non-EOS Missions Network Requirements
Network Requirements Inputs from various Sources
Network Requirements Inputs

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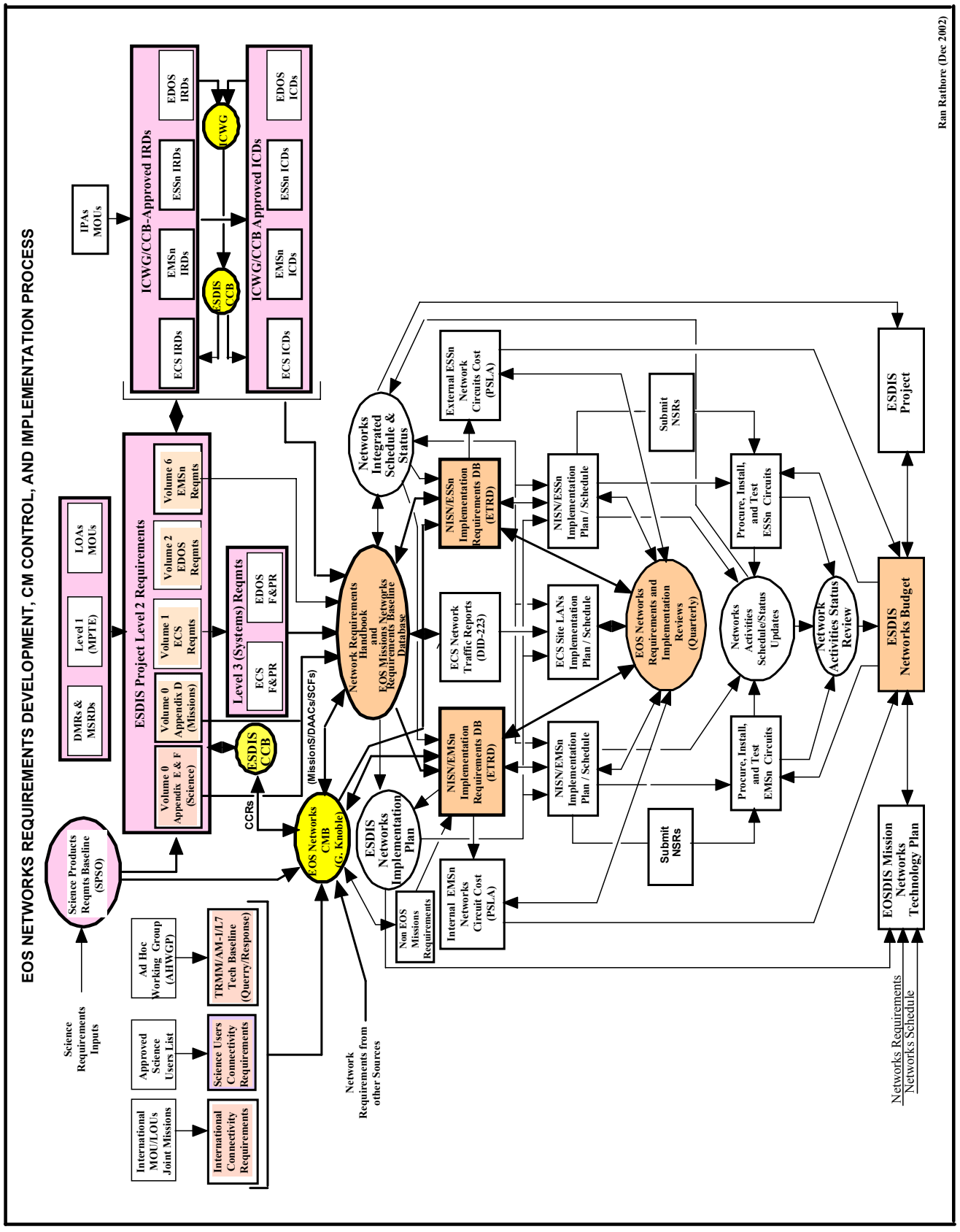
EOS NETWORKS REQUIREMENTS DEVELOPMENT, CM CONTROL, AND IMPLEMENTATION PROCESS
Ran Rathore (Dec 2002)
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Science Users Connectivity Requirements
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Section 9 – EOS Missions Data Traffic Requirements Guidelines

9.1 Missions-Specific Data Traffic Requirements Guidelines

- Following sources were used for developing the official EOS Missions Operational Data Traffic requirements between EPGSs, EDOS, EOC, and others as documented in ESDIS networks database.
  1. ESDIS Project Level 2 Requirements, Volume 0, Appendix D (423-10-01-0), Revision D
  2. EOS AQUA (PM) Ground System Requirement Document (GSRD), Sections 5000 and 5001 (423-11-19-05)
  3. EOS Aura (Chem) Mission Specific Requirements Document (MSRD), Sections 5000 and 5100 (423-10-47)
- EOS network support for a mission (if not specified) may begin up to 18 months prior to launch
- The average and peak raw data generation rates for each instrument on the spacecraft should be taken from Appendix D of ESDIS Project Level 2 requirements, Volume 0 document.
- All data generated by the instruments in the EOS spacecraft are stored in on-board storage for a period of one or more orbits and are dumped from on-board storage to ground stations during the space-to-ground contact period.
- The data received during a space-to-ground contact session corresponding to a complete orbit must be fully transmitted to EDOS LZPF at GSFC prior to next contact. For example, assuming a 100-minute orbit period and a 20-minute contact session with 5 minutes delay time, the orbit worth of raw data with appropriate overheads must be transmitted to EDOS LZPF at GSFC in 75 minutes.
- Near Real-Time is a rate-buffered (RB) data transport service to be initiated within 5 minutes after the receipt of all data for each contact at the GSFC EDOS facility.
- Expedited data to be delivered within 3 hours of a completed spacecraft contact session.
- International Partners (IPs) such as NASDA (Japan) will pick-up data at the designated U.S. Gateway at their own cost with no performance guarantees by the ESDIS Project for delivery of data.
- The data traffic estimate for LandSat 7 is based on IRD between EOSDIS and LandSat 7

Note: The last column of data traffic requirements tables provided in Sections 11 and 12 of this handbook include only the Contingency Peaking Factor (1.50) as the ESDIS overhead factor. Other network related overheads such as Circuit Utilization and Network Protocol overhead factors are left to the discretion of NISN as the service provider of the network service. The user data traffic requirements submitted to NISN do not include these network related overheads, but they may be used by the ESDIS Project for internal estimating purposes

Section 10 – EOS Science Data Traffic Requirements Guidelines

10.1 Science Data Traffic Requirements Guidelines

- Following sources were used for developing the official EOS Science Data Traffic requirements between EOSDIS elements such as EPGSs, EDOS, EOC, DAACs, SIPS, QA SCFs, and others as documented in this handbook and ESDIS networks database.
  1. ESDIS Project Level 2 Requirements/Volume 0 (423-10-01-0) Appendices D, Appendix E (Tables E-3 and E-4), Appendix F (Tables F-1, F-2, and F3) and ECS F&PR Specification (Appendix C).
  2. EOS AQUA (PM) Ground System Requirement Document (GSRD), Sections 5000 and 5001
  3. EOS Aura (Chem) Mission Specific Requirements Document (MSRD), Sections 5000 and 5100
  4. ICDs between ECS and Science Investigator-Led Processing Systems (SIPS) for each of the EOS Missions specific instruments data flows, Volume 0 (423-41-57-0) through Volume 12 (423-41-57-12).
  5. Revised InterDAAC Science Data Traffic requirements spreadsheet (DAAC-to-DAAC Data traffic Table dated July 7, 1999 from Yun-Chi Lu (SPSO), identifying the changes to February 1996 baseline (This source supercedes Source 1).
  6. Email Memos dated July 98 and Dec 22, 99 from G. Bothwell (JPL) to Dr. Ramapriyan for MISR SCFs data traffic requirements
  7. Working Agreement between MODIS Science Team Leader and ESDIS Project regarding the DAAC Processing System (DPS) for MODIS Data Production, July 2000 (423-10-57)
  8. ECS Users Characterization Group requirements for ***Query and Response*** data traffic flows
- The initial science data volumes and network traffic rate estimates for Terra (AM), Meteor-3M, ADEOS II were derived from interaction with Ad Hoc Working Group on Production (AHWGP) as tabulated in CCB approved **February 1996 ECS Technical baseline** (Version 3.01). Additional information was gathered directly from investigators with stringent requirements.
- The current science data traffic estimates for Aqua (PM), ICESat, and Aura (Chem) are based on revised data rate estimates provided by Yun-Chi Lu (SPSO) in July 1999 as changes to SPSO Budget Model Baseline.
- Level 0 data volumes for most of the instruments are estimated based on average data rates and the data volumes for level-1 and higher science data products. The product volumes to be generated for the instruments are based on estimates provided by instrument teams, where available.
- The science data product volumes are estimates for standard products only and they do not include the estimates for special and interim science products.
- Reprocessing of science data products will start at mission launch date plus 1 year and will continue until end of mission plus 1 year.
- The volume of science data to be reprocessed will be twice the volume of products generated during the previous year.
- Since ancillary data volume is very small in comparison to science data products, they may not have been included in science data traffic flows.
- All higher level AMSR-E data products for Aqua (PM) will be archived at the NSIDC DAAC instead of three DAACs (GSFC, EDC and NSIDC DAACs), as specified in ECS F&PR document.
- Science data traffic requirements categories include EDOS-to-DAACs or SIPS, DAAC-to-DAAC, SIPS-to-DAACs, DAACs-to-SIPS, DAAC-to-SCFs, SIPS-to-SCFs, DAACs-to-Users, and SIPS data flows.

Section 11 – Inter-DAAC & SIPS Data Traffic Requirements

This section provides the official 100% (1X) **average raw products data flows traffic** requirements between EDOS, ECS DAACs and Instrument SIPSs based on documents in-process or already approved by ICWG/CCB and/or EOS networks Manager. It does not include the products reprocessing data volumes.

11.1 Data Traffic Ramp-up Assumptions

Production: Level 0 and level 1 data products are assumed to arrive at full production rate starting at launch. Level 2 and higher product generation is 50 % of full capacity (1X) for the first year, ramping up to 75 % one year after launch, and reaching 100% two years after launch. Note that above Ramp-Up factors apply to Level 2 and higher data product volumes only for EOS Missions.

Reprocessing: Reprocessing of data product volumes are limited to a maximum of 200% of L1 and higher level products

Note: Since the ECS DAACs processing capacity is limited to generate and process up to 3 times the archived products after the second year of launch, the products can be reprocessed up to 2 times only. Ramp-up data traffic volumes and schedule for each of the missions are provided in the next section.

SIPS-to-DAACs Data Traffic:

In addition to DAACs, SIPs (under the direct control of PIs or TLs) will also generate the standard products. The **Science Investigator-led Processing Systems (SIPS)** facilities are generally, co-located with PI's/TL's SCFs. The standard products produced at SIPs using the investigator-provided system and software will be sent to appropriate DAACs for archival and distribution.

Since SIPS also generates the higher level standard products, like ECS DAACs; the data exchange between SIPS and ECS DAACs may therefore be classified as inter-DAAC data traffic. SIPS products are sent to the appropriate ECS DAACs for archiving and distribution. The specific assumptions for SIPS science data products ***reprocessing*** if specified in the SIPS ICD will supercede the global assumption.

11.2 Data Traffic Ramp-up Schedule

1. Use the following Inter-DAAC data flow ramp-up factors for all EOS missions in general for L1 & higher products.

All EOS Missions	**L– 6 Months To L+12 Months**	**L+1 Year To L+ 2 Year**	**L+2 year to L+3 Year**	**L+3 year to EOM**	**EOM to EOM + 1 Year**
L1 Products	100% of L1	100% of L1	100% of L1	100% of L1	None
L1 Reprocessing	None	100% of L1	200% of L1	200% of L1	200% of L1
Total L1 Volume	**100%**	**200%**	**300%**	**300%**	**200%**
L2+ Products	50% of L2+	75% of L2+	100% of L2+	100% of L2+	None
L2+ Reprocessing	None	75% of L2+	200% of L2+	200% of L2+	200% of L2+
Total L2+ Volume	**50%**	**150%**	**300%**	**300%**	**200%**

2. Following EOS Missions specific Inter-DAAC data traffic ramp-up schedules may be adjusted based on specific mission's **real launch date**, if there is a significant difference.

Ramp-Up Schedule for TERRA science products based on December 18, 1999 Launch (Launch – 6 Months to End of Mission + 1 Year)

TERRA	6/99 – 12/00	1/01 – 12/01	1/02 – 12/02	1/03 – EOM	EOM + 1 Year
L1 Products	100% of L1	100% of L1	100% of L1	100% of L1	None
L1 Reprocessing	None	100% of L1	200% of L1	200% of L1	200% of L1
Total L1 Volume	**100%**	**200%**	**300%**	**300%**	**200%**
L2+ Products	50% of L2+	75% of L2+	100% of L2+	100% of L2+	None
L2+ Reprocessing	None	75% of L2+	200% of L2+	200% of L2+	200% of L2+
Total L2+ Volume	**50%**	**150%**	**300%**	**300%**	**200%**

Ramp-Up Schedule for AQUA science products based on May 4, 2002 Launch (Launch – 6 Months to End of Mission + 1 Year)

AQUA	11/01 – 4/03	5/03 – 4/04	5/04 – 4/05	5/05 - EOM	EOM + 1 Year
L1 Products	100% of L1	100% of L1	100% of L1	100% of L1	None
L1 Reprocessing	None	100% of L1	200% of L1	200% of L1	200% of L1
Total L1 Volume	**100%**	**200%**	**300%**	**300%**	**200%**
L2+ Products	50% of L2+	75% of L2+	100% of L2+	100% of L2+	None
L2+ Reprocessing	None	75% of L2+	200% of L2+	200% of L2+	200% of L2+
Total L2+ Volume	**50%**	**150%**	**300%**	**300%**	**200%**

Ramp-Up Schedule for AURA science products based on June 17, 2004 Launch (Launch – 6 Months to End of Mission + 1 Year)

AURA	12/03 – 6/05	7/05 – 6/06	7/06 – 6/07	7/07 - EOM	EOM + 1 Year
L1 Products	100% of L1	100% of L1	100% of L1	100% of L1	None
L1 Reprocessing	None	100% of L1	200% of L1	200% of L1	200% of L1
Total L1 Volume	**100%**	**200%**	**300%**	**300%**	**200%**
L2+ Products	50% of L2+	75% of L2+	100% of L2+	100% of L2+	None
L2+ Reprocessing	None	75% of L2+	200% of L2+	200% of L2+	200% of L2+
Total L2+ Volume	**50%**	**150%**	**300%**	**300%**	**200%**

Ramp-Up Schedule for ICESAT science products based on January 2003 Launch (Launch – 6 Months to End of Mission + 1 Year)

ICESAT	7/02 – 12/03	1/04 – 12/04	1/05 - 12/05	1/06 - EOM	EOM + 1 Year
L1 Products	100% of L1	100% of L1	100% of L1	100% of L1	None
L1 Reprocessing	None	100% of L1	200% of L1	200% of L1	200% of L1
Total L1 Volume	**100%**	**200%**	**300%**	**300%**	**200%**
L2+ Products	50% of L2+	75% of L2+	100% of L2+	100% of L2+	None
L2+ Reprocessing	None	75% of L2+	200% of L2+	200% of L2+	200% of L2+
Total L2+ Volume	**50%**	**150%**	**300%**	**300%**	**200%**

11.3 DAAC/SIPS 1X Network Data Traffic Requirements

Note: For each of the source numbers specified for the following data traffic requirements tables, refer to Section 9.1.

11.3.1 1X (100%) DAACs / SIPS Data Traffic for ASTER, CERES, and MISR based on Yun-Chi Lu's (SPSO) Spreadsheets, July 7, 1999 and others with no reprocessing (Source 5 and others)

Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
ASTER (Terra)	GES DAAC @GSFC	LP DAAC @EDC	L2 / MODIS	7.87	24	729	1094
ASTER (Terra)	ASDC DAAC @LARC	LP DAAC @EDC	L2 / MISR	15.788	24	1462	2193
ASTER (Terra)	NSIDC DAAC	LP DAAC @EDC	L2 / MODIS	1.002	24	93	140
CERES (TRMM)	SDPF @GSFC	LaTIS @LARC	L0 +	0.267	24	25	38
CERES (Terra)	EDOS @GSFC	LaTIS @LARC	L0 +	0.216	24	20	30
CERES (Aqua)	EDOS @GSFC	LaTIS @LARC	L0 +	0.216	24	20	30
CERES (Terra)	GES DAAC @GSFC	LaTIS @LARC	MODIS	49.775	24	4,609	6914
CERES (Aqua)	GES DAAC @GSFC	LaTIS @LARC	MODIS	49.775	24	4,609	6914
MISR (Terra)	GES DAAC @GSFC	ASDC DAAC @LARC	L1	5.534	24	512	768

11.3.2 1X (100%) DAAC/SIPS Data Traffic for MODIS based on ECS F&PR Appendix C (Source 1) and ESDIS Level 2 Volume 0, Appendix E (Source 1) with no reprocessing

(MODIS Products Transfer Rates for TERRA Mission)

TERRA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
MODIS	GES DAAC @GSFC	MODAPS @GSFC	L1	356.84	24	33040	49560
MODIS	MODAPS @GSFC	GES DAAC @GSFC	L2 +	230	24	21296	31944
MODIS	MODAPS @GSFC	LP DAAC @EDC	L2 +	330	24	30556	45833
MODIS	MODAPS @GSFC	NSIDC DAAC	L2 +	40	24	3704	5556

(MODIS Products Transfer Rates for AQUA Mission)

AQUA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
MODIS	GES DAAC @GSFC	MODAPS @GSFC	L1	356.84	24	33040	49560
MODIS	MODAPS @GSFC	GES DAAC @GSFC	L2 +	230	24	21296	31944
MODIS	MODAPS @GSFC	LP DAAC @EDC	L2 +	330	24	30556	45833
MODIS	MODAPS @GSFC	NSIDC DAAC	L2 +	40	24	3704	5556

11.3.3 1X (100%) DAAC/SIPS Data Traffic for ICESat GLAS Products Based on ICD Between ECS and ICESat SIPS, Volume 11 (Source 4) with no reprocessing

ICESAT Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
GLAS	EDOS @GSFC	ICESat SIPS @GSFC (B22)	L0	5.80	2.50	5156	7734
GLAS	EDOS @GSFC	NSIDC DAAC	L0	5.80	5.00	2578	3867
GLAS	ICESat SIPS @GSFC (B22)	NSIDC DAAC	L1	16.64	8.00	4622	6933
GLAS	ICESat SIPS @GSFC (B22)	NSIDC DAAC	L2 +	8.384	8.00	2329	3494
GLAS	ICESat SIPS @GSFC (B22)	ISF @GSFC (B22)	L0 / L1	5.00	2.50	4444	6666
GLAS	GES DAAC @GSFC	ICESat SIPS @GSFC (B22)	NCEP	0.084	2.00	93	140

11.3.4 1X (100%) DAAC/SIPS Data Traffic for ACRIM III Based on ECS-ACRIM III SIPS ICD, Volume 1 (Source 4) with no reprocessing

ACRIM Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
ACRIM III	ACRIM SIPS @Coronado, CA	ASDC DAAC @LARC	L0	0.0012	24	0.11	0.17
ACRIM III	ACRIM SIPS @Coronado, CA	ASDC DAAC @LARC	L2+	0.000135	24	0.0125	0.019

11.3.5 1X (100%) DAAC/SIPS Data Traffic for MOPITT Based on ECS-MOPITT SIPS ICD, Volume 5 (Source 4) with no reprocessing

TERRA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
MOPITT	GES DAAC @GSFC	ASDC DAAC @LARC	MODIS	0.285	24	26	39
MOPITT	ASDC DAAC @LARC	MOPITT SIPS @NCAR	L0	0.285	24	26	39
MOPITT	ASDC DAAC @LARC	MOPITT SIPS @NCAR	Others	0.977	24	90	135
MOPITT	GES DAAC @GSFC	MOPITT SIPS @NCAR	DAO	0.280	24	26	39
MOPITT	MOPITT SIPS @NCAR	ASDC DAAC @LARC	L1	0.154	24	14	21
MOPITT	MOPITT SIPS @NCAR	ASDC DAAC @LARC	L2+	0.119	24	11	17

11.3.6 1X (100%) DAAC/SIPS Data Traffic for AMSR-E based on ICD Between ECS-and AMSR-E SIPS, Volume 7 (Source 4) with no reprocessing

AQUA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
AMSR-E	NASDA EOC	PO.DAAC @JPL	L1A	1.109	4.80	513	770
AMSR-E	PO.DAAC @JPL	NSIDC DAAC	L1A	1.109	4.80	513	770
AMSR-E	PO.DAAC @JPL	SIPS @RSS	L1A	1.109	4.80	513	770
AMSR-E	SIPS @ RSS	SIPS @GHCC	L2A	2.489	4.66	1187	1781
AMSR-E	SIPS @ GHCC	NSIDC DAAC	L2/L3	3.600	4.80	1667	2500

11.3.7 1X (100%) DAAC/SIPS Data Traffic for AIRS Based on ECS-AIRS Science Processing System (ASPS) ICD (Source 4 and Volume 0) with no reprocessing

AQUA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
AIRS	EDOS @GSFC	ASPS/GES DAAC @GSFC	L0	14.04	24	1300	1950

11.3.8 1X (100%) DAAC/SIPS Data Traffic for MLS Based on ICD Between ECS and MLS SIPS, Volume 8 (Source 4) with no reprocessing

AURA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
MLS	GES DAAC @GSFC	MLS SIPS @JPL	L0 +	1.098	6	407	610
MLS	GES DAAC @GSFC	MLS SIPS @JPL	Attitude/ GBAD	0.024	6	9	14
MLS	GES DAAC @GSFC	MLS SIPS @JPL	DPREP/ Meteoro	0.307	2	341	511
MLS	MLS SIPS @JPL	GES DAAC @GSFC	L1	3.881	6	1437	2156
MLS	MLS SIPS @JPL	GES DAAC @GSFC	L2 +	0.0839	1.2	155	232
MLS	MLS SIPS @JPL	GES DAAC @GSFC	Product History	0.0002	0.25	2	3

11.3.9 1X (100%) DAAC/SIPS Data Traffic for OMI Based on ICD Between ECS and OMI SIPS, Volume 13 (Source 4) with no reprocessing

AURA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
OMI	GES DAAC @GSFC	OMI SIPS @GSFC	L0	6.108	24	566	849
OMI	GES DAAC @GSFC	OMI SIPS @GSFC	Exp L0	6.036	24	559	838
OMI	GES DAAC @GSFC	OMI SIPS @GSFC	DPREP	0.01236	0.80	34	51
OMI	GES DAAC @GSFC	OMI SIPS @GSFC	DAS	0.2336	1	519	778
OMI	GES DAAC @GSFC	OMI SIPS @GSFC	NCEP	0.088	4	49	98
OMI	GES DAAC @GSFC	ODPS @Netherlands	L1 (Daily)	15.41	24	1427	2140
OMI	GES DAAC @GSFC	ODPS @Netherlands	L1 (1day/MO)	16.06	24	1487	2230
OMI	GES DAAC @GSFC	ODPS @Netherlands	L2+ (Daily)	0.205	24	19	28
OMI	GES DAAC @GSFC	ODPS @Netherlands	L2+ (1day/MO)	0.205	24	19	28
OMI	OMI SIPS @GSFC	GES DAAC @GSFC	L1 (Daily)	16.575	24	1535	2302
OMI	OMI SIPS @GSFC	GES DAAC @GSFC	L1 (1day/MO)	16.053	24	1486	2229
OMI	OMI SIPS @GSFC	GES DAAC @GSFC	L2 +	4.554	24	422	633
OMI	ODPS @Netherlands	GES DAAC @GSFC	L2+ (Daily)	0.432	24	40	60
OMI	ODPS @Netherlands	GES DAAC @GSFC	L2+ (1day/MO)	0.432	24	40	60

11.3.10 1X (100%) DAAC/SIPS Data Traffic for TES Based on ICD Between ECS and TES SIPS, Volume 10 (Source 4) with no reprocessing

AURA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
TES	ASDC DAAC @LARC	TES SIPS @JPL	L0	22.172	3	16424	24636
TES	ASDC DAAC @LARC	TES SIPS @JPL	Exp L0	0.4434	0.25	3942	5913
TES	GES DAAC @GSFC	TES SIPS @JPL	Orbit/Att	0.0056	0.50	25	38
TES	TES SIPS @JPL	ASDC DAAC @LARC	L1	19.506	3	14449	21674
TES	TES SIPS @JPL	ASDC DAAC @LARC	L2 +	0.007	1.0	16	24

11.3.11 1X (100%) DAAC/SIPS Data Traffic for HIDRLS Based on ICD Between ECS and HIRDLS SIPS, Volume 12 (Source 4) with no reprocessing

AURA Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
HIRDLS	GES DAAC @GSFC	HIDRLS SIPS @UCB	L0	0.7884	6.0	292	438
HIRDLS	GES DAAC @GSFC	HIDRLS SIPS @ UCB	Orbit/Att	0.0056	0.50	25	38
HIRDLS	HIDRLS SIPS @ UCB	GES DAAC @GSFC	L1	0.732	2.0	813	1220
HIRDLS	HIDRLS SIPS @ UCB	GES DAAC @GSFC	L2 +	0.172	2.0	191	287

11.3.12 1X (100%) DAAC/SIPS Data Traffic for ADEOS II Based on ECS F&PR Appendix C (Source 1) and ESDIS Level 2 Volume 0, Appendix E (Source 1) with no reprocessing

ADEOS II Instrument	Source	Destination	Data Type	Products Daily Volume (GB/Day)	Products Raw Data Delivery Time (Hours)	Products Raw Data Transfer Rate (Kbps)	Network Data Rate with ESDIS OH (Raw Data Rate X 1.50) (Kbps)
AMSR	JPL PO.DAAC	NSIDC DAAC	L1+	1.30	24	120	180

Section 12 – DAAC/SIPS-to-SCFs Data Traffic Requirements

This section provides the official network data traffic requirements between ECS DAACs and Instrument SIPS and QA SCFs based on documents in process or already approved by ICWG/CCB and/or EOS networks Manager.

12.1 Data Traffic Requirements Sources

1. ESDIS Level 2 Requirements, Volume 0, Appendix F, Table F-2 (DAAC/SIPS-to-SCF Science Data Traffic in GB/day)
2. SPSO Revised Science Data Traffic spreadsheets from Yun-Chi Lu (July 1999) for changes to Feb 96 technical baseline and subsequent SPSO Budget Models (DAAC-to-SCF Data Traffic Table)
3. Email Memos dated July 98 and Dec 22, 99 from G. Bothwell (JPL) to Ramapriyan for MISR SCFs
4. ICDs between ECS and SIPS for each instrument for Terra, Aqua, Aura and ICESat missions.

12.2 Data Traffic Ramp-ups Assumptions & Guidelines

- DAACs to SCFs data traffic estimates for QA are provided to SPSO by the various instrument teams leaders. In absence of such estimates from instrument team leaders, the SCF data traffic is assumed to be 10 % of higher level (L1-L4) data products volume.
- **Ramp-up factors for DAAC/SIPS-to-SCFs data traffic apply only to level 2 and higher data products. They are not applied to Level 1 data products. Level 1 volume is always 100%.**
- DAAC/SIPS to SCFs Ramped-up data traffic volume and schedule are provided in the next section.

12.3 Data Traffic Ramp-ups Schedule

Note: Following DAAC-to-SCFs data traffic ramp-up schedules may be adjusted based on specific mission's real launch date, if there is significant difference.

DAAC/SIPS-to-SCFs Data Traffic Ramp-Up Schedule for TERRA based on December 1999 Launch (Launch – 6 Months to End of Mission + 1 Year)

TERRA	6/99 – 12/00	1/01 – 12/01	1/02 – 12/02	1/03 - EOM	EOM + 1 Year
DAAC to SCFs	50% of 1X	75% of 1X	100% of 1X	100% of 1X	None

DAAC/SIPS-to-SCFs Data Traffic Ramp-Up Schedule for AQUA based May 2002 Launch (Launch – 6 Months to End of Mission + 1 Year)

AQUA	11/01 – 4/03	5/03 – 4/04	5/04 – 4/05	5/05 - EOM	EOM + 1 Year
DAAC to SCFs	50% of 1X	75% of 1X	100% of 1X	100% of 1X	None

DAAC/SIPS-to-SCFs Data Traffic Ramp-Up Schedule for AQUA based June 2004 Launch (Launch – 6 Months to End of Mission + 1 Year)

AURA	12/03 – 6/05	7/05 – 6/06	7/06 – 6/07	7/07 - EOM	EOM + 1 Year
DAAC to SCFs	50% of 1X	75% of 1X	100% of 1X	100% of 1X	None

I-SIPS-to-SCFs Data Traffic Ramp-Up Schedule for ICESAT based on January 2003 Launch (Launch – 6 Months to End of Mission + 1 Year)

ICESAT	7/02 – 12/03	1/04 – 12/04	1/05 - 12/05	1/06 - EOM	EOM + 1 Year
I-SIPs to SCFs	50% of 1X	75% of 1X	100% of 1X	100% of 1X	None

12.4 QA SCFs 1X (100%) Traffic Requirements

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
LP DAAC @EDC	GSFC B32/ LDOPE	MODIS	Terra/Aqua	L2+	5.6	24	519	778
LP DAAC @EDC	Boston U., MA	MODIS	Terra/Aqua	L2+	7.3	24	676	1014
LP DAAC @EDC	U. Arizona (Tucson)	MODIS	Terra/Aqua	L2+	1.76	24	163	244
LP DAAC @EDC	U. Montana	MODIS	Terra/Aqua	L2+	2.07	24	192	288
LP DAAC @EDC	U. Maryland	MODIS	Terra/Aqua	L2+	0.4	24	37	56
LP DAAC @EDC	U. Virginia	MODIS	Terra/Aqua	L2+	2	24	185	278
LP DAAC @EDC	UCSB, CA	MODIS	Terra/Aqua	L2+	4.064	24	376.3	564
GES DAAC @GSFC	GSFC B33 (King)	MODIS	Terra/Aqua	L2+	17.14	24	1587	2381
GES DAAC @GSFC	GSFC TLCF (Fisher)	MODIS	Terra/Aqua	L2+	23.2	24	2148	3222
GES DAAC @GSFC	GSFC TLCF (Masuoka)	MODIS	Terra/Aqua	L2+	219.91	24	20362	30543
GES DAAC @GSFC	GSFC B32/LDOPE	MODIS	Terra/Aqua	L2+	73.7	24	6824	10236
GES DAAC @GSFC	GSFC B33/ MCST	MODIS	Terra/Aqua	L2+	18.28	24	1693	2539
GES DAAC @GSFC	U. Miami	MODIS	Terra/Aqua	L2+	52.77	24	4886	7329
GES DAAC @GSFC	U. Wisconsin	MODIS	Terra/Aqua	L2+	41.6	24	3852	5778
GES DAAC @GSFC	UCSB, CA	MODIS	Terra/Aqua	L2+	6.41	24	594	890
GES DAAC @GSFC	U. Virginia	MODIS	Terra/Aqua	L2+	0.7	24	65	97
GES DAAC @GSFC	Oregon State U.	MODIS	Terra/Aqua	L2+	0.713	24	66	99
ASDC DAAC @LARC	Oregon State U.	MODIS	Terra/Aqua	L2+	0.036	24	3	5
ASDC DAAC @LARC	U. Wisconsin	MODIS	Terra/Aqua	L2+	1.58	24	146	219
NSIDC DAAC	GSFC B33	MODIS	Terra/Aqua	L2+	3.4	24	315	472
NSIDC DAAC	GSFC B32/ LDOPE	MODIS	Terra/Aqua	L2+	0.7	24	65	97
NSIDC DAAC	UCSB, CA	MODIS	Terra/Aqua	L2+	0.37	24	34	51

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
LaTIS @LaRC	CSU, Fort Collins	CERES	Terra/Aqua	L2+	2.676	24	248	372
LaTIS @LaRC	GSFC TLCF	CERES	Terra/Aqua	L2+	2.592	24	240	360
LaTIS @LaRC	LARC	CERES	Terra/Aqua	L2+	92.692	24	8583	12874
LaTIS @LaRC	NOAA/ERL, Boulder	CERES	Terra/Aqua	L2+	0.041	24	3.8	5.7

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
LaTIS @LaRC	NOAA/NWS	CERES	Terra/Aqua	L2+	0.017	24	1.57	2.36
LaTIS @LaRC	Oregon State U.	CERES	Terra/Aqua	L2+	17.583	24	1628	2442
LaTIS @LaRC	Palaiseau, France	CERES	Terra/Aqua	L2+	0.018	24	1.67	2.5
LaTIS @LaRC	SIO, San Diego	CERES	Terra/Aqua	L2+	0.21	24	19	29
LaTIS @LaRC	U. Wisconsin	CERES	Terra/Aqua	L2+	18.967	24	1756	2634
LaTIS @LaRC	GHCC, Alabama	CERES	Terra/Aqua	L2+	68.253	24	6320	9480
LaTIS @LaRC	SUNY-SB	CERES	Terra/Aqua	L2+	0.21	24	19	29

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
LaTIS @LaRC	CSU, Fort Collins	CERES	TRMM	L2+	2.676	24	248	372
LaTIS @LaRC	LARC	CERES	TRMM	L2+	24.8	24	2296	3444
LaTIS @LaRC	NOAA/ERL, Boulder	CERES	TRMM	L2+	0.041	24	3.8	5.7
LaTIS @LaRC	NOAA/NWS	CERES	TRMM	L2+	0.017	24	1.57	2.36
LaTIS @LaRC	Oregon State U.	CERES	TRMM	L2+	2.077	24	192	288
LaTIS @LaRC	Palaiseau, France	CERES	TRMM	L2+	0.018	24	1.67	2.5
LaTIS @LaRC	SIO, San Diego	CERES	TRMM	L2+	0.21	24	19	29
LaTIS @LaRC	U. Wisconsin	CERES	TRMM	L2+	2.077	24	192	288
LaTIS @LaRC	GHCC, Alabama	CERES	TRMM	L2+	8.309	24	769	1154
LaTIS @LaRC	SUNY-SB	CERES	TRMM	L2+	0.21	24	19	29

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
ASDC DAAC @LARC	JPL	MISR	Terra	L2+	70	24	6481	9722
ASDC DAAC @LARC	Ispra, Italy	MISR	Terra	L2+	2	24	185	278
ASDC DAAC @LARC	LANL, Santa Fe (NM)	MISR	Terra	L2+	4	24	370	556
ASDC DAAC @LARC	UCL (London)	MISR	Terra	L2+	4	24	370	556
ASDC DAAC @LARC	Penn State U.	MISR	Terra	L2+	5	24	463	694
ASDC DAAC @LARC	U. Arizona	MISR	Terra	L2+	17	24	1574	2361
ASDC DAAC @LARC	U. Miami	MISR	Terra	L2+	5	24	463	694
ASDC DAAC @LARC	Boston U	MISR	Terra	L2+	5	24	463	694
ASDC DAAC @LARC	U. Colorado	MISR	Terra	L2+	5	24	463	694
ASDC DAAC @LARC	U. Illinois (UIUC)	MISR	Terra	L2+	4	24	370	556
ASDC DAAC @LARC	Pacific NW Lab (PNL)	MISR	Terra	L2+	5	24	463	694

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
NCAR	U. Toronto	MOPITT	Terra	L2+	0.431	24	40	60
LP DAAC @EDC	NCAR, CO	MOPITT	Terra	L2+	0.034	24	3	5
GES DAAC @GSFC	NCAR, CO	MOPITT	Terra	L2+	0.280	24	26	39
ASDC DAAC @LARC	NCAR, CO	MOPITT	Terra	L2+	1.262	24	117	176
LP DAAC @EDC	JPL	ASTER	Terra	L2+	3.931	24	364	546
GES DAAC @GSFC	AIRS TLSCF @JPL	AIRS	Aqua	L0+ *	14.20	12	2630	3945
GES DAAC @GSFC	AIRS TLSCF @JPL	AIRS	Aqua	10%	1.87	12	346	519
GES DAAC @GSFC	AIRS TLSCF @JPL	AIRS	Aqua	L1	3.029	12	561	842
GES DAAC @GSFC	AIRS TLSCF @JPL	AIRS	Aqua	L2	0.900	12	167	251
GES DAAC @GSFC	AIRS TLSCF @JPL	AIRS	Aqua	Other	0.145	12	27	41
GES DAAC @GSFC	AIRS TLSCF @ JPL	AIRS	Aqua	L2+	4.097	12	759	1139
AMSR-E TLSCF at GHCC	AMSR-E SIPS @GHCC	AMSR-E	Aqua	L2+	0.096	0.4	533	800
AMSR-E SIPS @GHCC	AMSR-E Science Team at Texas A&M, CSU, JPL, NOAA, and MSFC	AMSR-E	Aqua	L2+	0.534	1.5	791	1187
AMSR-E Science Team at Texas A&M, CSU, JPL, NOAA, MSFC, and GSFC	AMSR-E TLSCF at GHCC	AMSR-E	Aqua	Algorithm	0.096	0.4	533	800
NSIDC DAAC	AMSR-E Science Team at Texas A&M, CSU, JPL, NOAA, and GSFC	AMSR-E	Aqua	L2+	0.125	24.0	12	18
HIRDLS SIPS @UCB	NCAR, CO	HIRDLS	Aura	L2+	0.09	12	17	25
HIRDLS SIPS @UCB	UCB, CO	HIRDLS	Aura	L2+	0.09	12	17	25
HIRDLS SIPS @UCB	U. Washington	HIRDLS	Aura	L2+	0.09	12	17	25
HIRDLS SIPS @UCB	BADC, UK	HIRDLS	Aura	L2+	0.09	12	17	25
GES DAAC @GSFC	MLS TLCF @JPL	MLS	Aura	Exo. L0	0.022	6	8	12
MLS SIPS @JPL	QA SCFs at JPL	MLS	Aura	L2+	0.574	12	106	159
OMI SIPS @GSFC	OMI TLCF @Seabrook	OMI	Aura	L1	21.77	24		
OMI SIPS @GSFC	OMI TLCF @Seabrook	OMI	Aura	L2+	68.28	24		
TES SIPS @JPL	QA SCFs @JPL	TES	Aura	L2+	4.575	24	424	635

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
ICESat SIPS @GSFC	ICESat SCF @GSFC	GLAS	ICESat	L1	16.64	8	4,622	6,933
ICESat SIPS @GSFC	ICESat SCF @GSFC	GLAS	ICESat	L2 +	25.10	8	6.972	10.458
ICESat SIPS @GSFC	SCF at CSR (U. Texas)	GLAS	ICESat	Other	5.32	4	2,956	4,433
ICESat SIPS @GSFC	WFF	GLAS	ICESat	QA/Perf.	3.224	2.67	2687	4030
ICESat SCF @GSFC	ICESat SIPS @ GSFC	GLAS	ICESat	QA/L3	7.074	1.50	10,480	15,720
ICESat SCF @GSFC	Alt. SCF at Ohio State U.	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF at Ohio State U.	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Alt. SCF CSR (U. Texas)	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF CSR (U. Texas)	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Alt. SCF at U. Wash.	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF at U. Wash.	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Alt. SCF at Scripps/UCSD	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF at Scripps/UCSD	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Alt. SCF at GSFC	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF at GSFC	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Alt. SCF at MIT	GLAS	ICESat	Alt L1	2.788	2	3,098	4,647
ICESat SCF @GSFC	Alt. SCF at MIT	GLAS	ICESat	Alt L2+	0.756	2	840	1,260
ICESat SCF @GSFC	Atm. SCF at U. Wash.	GLAS	ICESat	Atm L1	5.782	6	2,141	3,212
ICESat SCF @GSFC	Atm. SCF at U. Wash.	GLAS	ICESat	Atm L2+	0.408	6	151	227
ICESat SCF @GSFC	Atm. SCF @GSFC	GLAS	ICESat	Atm L1	5.782	6	2,141	3,212
ICESat SCF @GSFC	Atm. SCF @GSFC	GLAS	ICESat	Atm L2+	0.408	6	151	227
Alt SCF at OSU	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Alt SCF at CSR (Texas)	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Alt SCF at U. Wash.	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Alt SCF at UCSD	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Alt SCF at GSFC	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Alt SCF at MIT	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Atm SCF at U. Wash.	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113
Atm SCF at GSFC	ICESat SCF @GSFC	GLAS	ICESat	QA/Special	0.467	0.5	2,076	3,113

Source	Destination	Instrument	Misssion	Data Type	Raw Data Volume (GB/Day)	Raw Data Delivery Time (Hours)	Raw Avg. Data Rate (Kbps)	Network Bandwidth Avg X 1.5 OH (Kbps)
ASDC DAAC @LARC	QA SCF at JPL	ACRIM III	ACRIMSAT	L2+	0.007	24	0.65	0.97

Section 13 – ISTs Site Locations and Data Traffic Requirements

13.1 TRMM IST Sites Locations

- 1 TRMM IST at LaRC
- 1 TRMM IST at MSFC

13.2 Terra (AM) IST Sites Locations

- 6 CERES ISTs at LaRC
- 3 MISR ISTs at JPL
- 3 MODIS ISTs at GSFC
- 1 MOPITT IST at NCAR (Boulder)
- 1 MOPITT IST at U. of Toronto (Canada)
- 1 ASTER IST at JPL
- 1 ASTER IST at MITI, ERSDAC (Japan)

13.3 Aqua (PM) IST Sites Locations

- 2 MODIS ISTs at GSFC (1 UNIX + 1 NT)
- 4 CERES ISTs at LaRC (2 UNIX + 2 NT)
- 2 AIRS ISTs at JPL (1 UNIX + 1 NT)
- 2 AMSU ISTs at JPL (1 UNIX + 1 NT)
- 2 HSB ISTs at JPL (1 UNIX + 1 NT)
- 2 HSB ISTs at INPE, Brazil (1 UNIX + 1 NT)
- 4 AMSR-E ISTs at NASDA, Japan (2 UNIX + 2 NT)

13.4 Aura (Chem) IST Sites Locations

- 1 TES IST at JPL
- 1 MLS IST at JPL
- 1 HIRDLS IST at NCAR, Boulder, Colorado
- 1 HIRDLS IST at Oxford University, England
- 1 OMI IST at KNMI in De Bilt, Netherlands
- 1 OMI IST at Dutch Space facility in Leiden, Netherlands

13.5 ISTs Data Traffic Requirements

If an IST's data traffic requirements are not specifically provided in any CCB-approved document, it should be assumed as follows:

1. **EOC to IST:** 311 Kbps *
2. IST to EOC: 128 Kbps

* The EOC-to-IST data traffic requirement of 311 Kbps is computed based on transfer of 7 Mega bytes of raw data within 3 minutes with no overhead.

Note: Since most of the ISTs are connected locally or via internet, there is no need to add the contingency and network overheads to the above network bandwidth requirements.

Section 14 – ECS DAAC-to-Users Data Distribution Traffic (DAAC Outflows)

Effective access to EOSDIS elements depends on network connectivity between end-users and data sources. The existing and evolving network capabilities in U.S. and abroad (including the commercially available Internet) will be used to satisfy the network connectivity needs of users.

14.1 Assumptions and Guidelines

- **Use the following sources for Data Products Volumes for Each instrument and DAAC:**

  1. ESDIS Level 2 Requirements, Volume 0, Appendix E, Table E-3 (EOS Data Volume by Instrument) and Table E-4 (EOS Data Volume by Archival DAAC), Revision C
  2. ECS F&PR Specification (423-41-02), Table C-2 (User Distribution Rates via Network and via physical Media) and Table C-3 (DAACs products Archive Capacity by Missions and 6 month time periods from Launch)
  3. Revised Science Data Products Volume and Data Traffic requirements spreadsheets as a Budget Model Baseline dated July 7, 1999 from Yun-Chi Lu (SPSO) for changes to February 1996 technical baseline

- Use the following assumptions for DAACs-to-Users Data Distribution media (Source: ECS F&PR Specification (423-41-02):

  LandSat Products Distribution: 80% via network and 20% via Physical Media with no ramp-ups

  EOS Missions Products Distribution: 50% via network and 50% via Physical Media with ramp-ups for Level 2 and higher products for EOS and ICESat Missions.

  Other Non-EOS Missions: 50% via network and 50% via Physical Media without any ramp-ups

- Use the following Ramp-Up or product multiplier Factors for Terra, Aqua, ICESat, and Aura Missions Science Data Distribution based on percent of data volume to be distributed via networks:

Products	Launch – 6 Mos.	Launch + 1 Yr	Launch + 2 Yr	Launch + 3 Yr To EOM
L0 and L1 Products	1.00	1.00	1.00	1.00
L2 – L4 Products	0.50	0.75	1.00	1.00

- Compute DAAC outflow traffic to each of the NISN hubs from each DAAC site based on number of users connectivity through each hub (all basic users data traffic are included in 50% of 1X network outflows)
- Assume each basic user's connectivity bandwidth as @100 kbps per user
- Allocate the number of interdisciplinary (ID) users to each DAAC site as their data products source based on percent of DAAC outflow or archive volume for each DAAC with connectivity @100 kbps per user.
- Add QA SCF data flows to 50 % of 1X standard products outflows for each DAAC

14.2 Current DAACs Outflow Traffic Requirements

- Current Users Data Distribution (DAACs Outflow) requirements appearing in BAH's ETRD have been derived based on the following and they need to be replaced with the official DAACs-to-Users Data Distribution requirements via Networks:
  - Data Outflows for each DAAC is computed for each calendar year based on the following methodology or computation formulae documented by Andy Germain in 1997-98

    Each DAAC's Outflow Volume = 50% of [RDAF x (Sum of (Each DAAC Products Archive Volumes including QA x 0.625 - QA) + Non-EOS Flows] + QA Data

ECS DAACs	RDAF Factor	1999 (GB/Day)	2000 (GB/Day)	2001 (GB/Day)	2002 to EOM (GB/Day)
GSFC	0.59	179	304	338	341
EDC	0.10	87	101	104	104
LaRC	0.20	155	309	359	364
NSIDC	0.02	10	20	23	23
TOTAL		**465**	**831**	**922**	**918**
JPL	0.04	18	29	31	31
ASF	0.05	54	63	65	66
G. TOTAL	**1.00**	**537**	**923**	**1005**	**1005**

14.3 New Guidelines for Estimating the DAACs Outflows

Recommend using the following tables in near future to compute the outflow volumes of EOS products for distribution to users via networks. These tables provide the Estimated Users Data Distribution/ECS DAACs Outflow Volumes for each DAAC based on CCB-approved ECS F&PR Specification, Rev D, 2002 (Table C-2) as a budget baseline for ESDIS project. They include LandSat-7, Terra (AM), Meteor 3, ACRIM, ADEOS II, Jason-1, Aqua (PM), ICESat, and Aura (Chem) Missions Product. The yearly outflow volume will be the summation of the products generated for the various missions during their operational period starting from the launch date of each mission.

14.3.1 EOS Missions Products Outflows with Ramp-Ups

MISSION	DAAC	Instrument	Level 0 (GB/Day)	Level 1 (GB/Day)	Level 2 > (GB/Day)	L - 6 Mo 50% of (L0+L1 + 0.5*L2>)	L + 1 Yr 50% of (L0+L1 + 0.75*L2>)	L + 2 Yr 50% of (L0+L1 + 1.0*L2>)
TERRA	LP DAAC @EDC	ASTER	135.88	0	57.31	82.27	89.43	96.60
TERRA	LP DAAC @EDC	MODIS	0	0	330	82.50	123.75	165.00
TERRA	GES DAAC @GSFC	MODIS	73.948	356.84	230	272.89	296.64	330.39
TERRA	LaRC (LaTIS)	CERES	0.183	1.6	33.6	9.29	13.49	17.69
TERRA	ASDC DAAC @LARC	MISR	41.04	158.22	13.38	102.98	104.64	106.32
TERRA	ASDC DAAC @LARC	MOPITT	0.27	0.08	0.09	0.20	0.21	0.22
TERRA	NSIDC DAAC	MODIS	0	0	40	10.0	15.0	20.0

MISSION	DAAC	Instrument	Level 0 (GB/Day)	Level 1 (GB/Day)	Level 2 > (GB/Day)	L - 6 Mo 50% of (L0+L1 + 0.5*L2>)	L + 1 Yr 50% of (L0+L1 + 0.75*L2>)	L + 2 Yr 50% of (L0+L1 + 1.0*L2>)
AQUA	LP DAAC @EDC	MODIS	0	0	330	82.50	123.75	165.00
AQUA	GES DAAC @GSFC	AIRS	14	56	10	37.50	38.75	40.00
AQUA	GES DAAC @GSFC	AMSU	0.018	0.28	0	0.15	0.15	0.15
AQUA	GES DAAC @GSFC	HSB	0.045	0.8	0	0.43	0.43	0.43
AQUA	GES DAAC @GSFC	MODIS	73.948	356.84	230	272.89	296.64	330.39
AQUA	LaRC (LaTIS)	CERES	0.183	1.60	34.8	9.59	13.94	18.29
AQUA	NSIDC DAAC	MODIS	0	0	40	10.0	15.0	20.0
AQUA	NSIDC DAAC	AMSR-E	0.944	1.1	3.51	1.897	2.34	2.77
AURA	GES DAAC @GSFC	HIRDLS	0.79	0.73	0.17	0.80	0.82	0.85
AURA	GES DAAC @GSFC	MLS	1.097	3.881	0.139	2.52	2.54	2.56
AURA	GES DAAC @GSFC	OMI	8.21	21.77	68.28	32.06	40.59	49.13
AURA	ASDC DAAC @LARC	TES	32.97	30	0.5	31.67	31.67	31.73
ICESAT	NSIDC DAAC	GLAS	5.8	16.6	6.4	12.80	13.60	14.40

14.3.2 Other Missions Products Outflows with No Ramp-Ups

MISSION	DAAC	Instrument	Level 0 (GB/Day)	Level 1 (GB/Day)	Level 2 > (GB/Day)	L - 6 Mo 50% of (L0+L1 + 0.5*L2>)	L + 1 Yr 50% of (L0+L1 + 0.75*L2>)	L + 2 Yr 50% of (L0+L1 + 1.0*L2>)
ACRIMSAT	ASDC DAAC @LARC	ACRIM	0.01	0.05	0	0.03	0.03	0.03
ADEOS II	NSIDC DAAC	AMSR	0	1.3	0	0.65	0.65	0.65
METEOR 3	ASDC DAAC @LARC	SAGE III	0.12	0.002	0	0.06	0.06	0.06
SORCE	GES DAAC @GSFC	Combined	0.12	0.01	0	0.07	0.07	0.07

14.3.3 LandSat 7 Products Outflows with No Ramp-Ups

MISSION	DAAC	Instrument	Level 0 (GB/Day)	Level 1 (GB/Day)	Level 2 > (GB/Day)	L - 6 Mo 80% of (L0+L1 + 0.5*L2>)	L + 1 Yr 80% of (L0+L1 + 0.75*L2>)	L + 2 Yr 80% of (L0+L1 + 1.0*L2>)
LANDSAT 7	LP DAAC @EDC	ETM+	58	0	0	46.40	46.40	46.40

14.4 List of Investigators and Team Leaders

Use the following sources for the updated list of EOS Investigators Team and Members:

1. **EOS Instrument Science Teams and Investigators List:**
   http://eospso.gsfc.nasa.gov/directory/instrument/instrument.html

2. **EOS Interdisciplinary Science (IDS) Investigators List (PIs and Team Members):**
   http://eospso.gsfc.nasa.gov/directory/ids/teams.html

14.5 DAACs to Users Data Distribution Allocations

Note: *Use following table to compute the DAAC outflow traffic to NISN hubs based on the percent of users connected via each of the hubs. The updates to this table will provided by Andy when needed.*

NISN Hubs	Number of Users	Percent of US Users	Percent of NISN Users	Percent of Total Users
ARC	20	2%	5%	**2%**
EDC	13	1%	3%	**1%**
GSFC	210	21%	55%	**16%**
JPL	78	8%	20%	**6%**
JSC	1	0%	0%	**0%**
KSC	1	0%	0%	**0%**
LARC	38	4%	10%	**3%**
MSFC	24	2%	6%	**2%**
NISN Total	**385**	**38%**	**100%**	**30%**
Abilene	**459**	**45%**	**--**	**35%**
ESNet	**21**	**2%**	**--**	**2%**
DC FedNet	**51**	**5%**	**--**	**4%**
Internet	**83**	**8%**	**--**	**6%**
vBNS	**14**	**1%**	**--**	**1%**
US Total	**1013**	**100%**	**--**	**78%**
International	**292**	**--**	**--**	**22%**
Grand Total	**1305**	**--**	**--**	**100%**

14.6 DAACs-to-HUBs Connectivity

HUB	EDC ECS DAAC	JPL PO.DAAC	NSIDC ECS DAAC
NASA Centers	vBNS+, Chicago, NISN	NISN	NISN
EDC	LAN	CALREN2, Abilene , Chicago, vBNS+	FRG, Abilene, Chicago, vBNS+
Abilene	vBNS+, Chicago Abilene	CALREN2, Abilene	FRG, Abilene
ESNet	vBNS+, Chicago Abilene	CALREN2	FRG, Abilene
DC FedNet	vBNS+	NISN	FRG, Abilene
Internet	EDC ISP	JPL ISP	CU ISP
vBNS	vBNS+	CALREN2, Abilene	FRG, Abilene
International	vBNS+, Chicago Abilene	CALREN2, Abilene	FRG, Abilene

HUB	GSFC ECS DAAC	GSFC (Other)
NASA Centers	NISN	NISN
EDC	Direct Fiber to MAX	NISN
Abilene	Direct Fiber to MAX, Abilene	NISN
ESNet	Direct Fiber to MAX	NISN
DC FedNet	Direct Fiber to MAX	NISN
Internet	NISN	NISN
vBNS	Direct Fiber to MAX	NISN
International	Abilene, Direct Fiber to MAX	NISN

HUB	LaRC ECS DAAC	LaRC/LaTIS
NASA Centers	NISN	NISN
EDC	NISN	LaRC ISP
Abilene	NISN	NISN
ESNet	NISN	LaRC ISP
DC FedNet	NISN	LaRC ISP
Internet	NISN	LaRC ISP
vBNS	NISN	NISN
International	**NISN**	LaRC ISP

14.7 List of EOS User Sites with Number of Users per Site

Note: Following table will be updated by Andy Germain twice a year in June and December based on changes to EOS Users connectivity.

EOS Site	Number of Users	NISN POP	STATE	TYPE	Teams
U of Alaska - Fairbanks	7	Abilene	AK	U	DAAC
University of Alabama - Huntsville	4	Abilene	AL	U	
Arizona State University	1	Abilene	AZ	U	ASTER
University of Arizona	22	Abilene	AZ	U	MISR (QA), MODIS, SAGE III, SeaWiFS, Int
Cal. Tech	4	Abilene	CA	U	
San Diego State University	0	Abilene	CA	U	SeaWiFs
San Jose State University	0	Abilene	CA	U	
Stanford University	9	Abilene	CA	U	Int
U California, San Diego (include. Scripps Inst.)	14	Abilene	CA	U	CERES (QA), GLAS, NSCAT, SeaWiFS, Int
University of California, Berkeley	3	Abilene	CA	U	Int
University of California, Davis	3	Abilene	CA	U	Int
University of California, Irvine	2	Abilene	CA	U	Int
University of California, Los Angeles	4	Abilene	CA	U	
University of California, Santa Barbara	17	Abilene	CA	U	MODIS (QA), SeaWiFS, Int
University of Southern California	0	Abilene	CA	U	SeaWiFs, Int
Colorado State University	12	Abilene	CO	U	CERES (QA), Int
National Center for Atmospheric Research	43	Abilene	CO	I	MOPITT (IST, QA), CERES, HIRDLS, NSCAT, SOLSTICE, Int
NOAA ERL, Boulder	17	Abilene	CO	F	SAGE III, Int
University of Colorado - Boulder	39	Abilene	CO	U	SOLSTICE II, Int
University of Connecticut	1	Abilene	CT	U	
Yale University	4	Abilene	CT	U	Int
George Washington University	1	Abilene	DC	U	
Florida State University	4	Abilene	FL	U	SeaWiFs, NSCAT
University of Central Florida	1	Abilene	FL	U	
University of Florida	1	Abilene	FL	U	Int
University of Miami	6	Abilene	FL	U	MISR (QA), MODIS (QA), NSCAT, SeaWiFS
University of South Florida - Tampa	3	Abilene	FL	U	SeaWiFS
Georgia Institute of Technology	6	Abilene	GA	U	SAGE III, Int
University of Georgia	1	Abilene	GA	U	
University of Hawaii	10	Abilene	HI	U	ACRIM, SeaWiFS, Int
University of Chicago	1	Abilene	IL	U	TOMS
University of Illinois Urbana-Champaign	3	Abilene	IL	U	
Purdue University	2	Abilene	IN	U	
University of Kansas	1	Abilene	KS		
Boston University	7	Abilene	MA	U	MODIS, MISR, Int

EOS Site	Number of Users	NISN POP	STATE	TYPE	Teams
Harvard University	5	Abilene	MA	U	SAGE III, TES
Massachusetts Institute of Technology	11	Abilene	MA	U	AIRS, GLAS, Int
University of Maryland - Baltimore	3	Abilene	MD	U	AIRS
University of Maryland - College Park	19	Abilene	MD	U	MODIS, AIRS, Int
Michigan State University	6	Abilene	MI	U	Key
Michigan Technological University	1	Abilene	MI	U	TOMS
University of Michigan	3	Abilene	MI	U	
University of Minnesota	2	Abilene	MN	U	
University of Misouri, Columbia	1	Abilene	MO	U	
University of Montana	1	Abilene	MT	U	MODIS (QA)
Duke University	3	Abilene	NC	U	
North Carolina State University	2	Abilene	NC	U	MOPITT, SAGE III, SeaWiFS
University of North Carolina, Chapel Hill	2	Abilene	NC	U	
University of North Carolina, Charlotte	1	Abilene	NC	U	
University of North Dakota	1	Abilene	ND	U	Int
University of Nebraska at Lincoln	3	Abilene	NE	U	Int
Dartmouth College	1	Abilene	NH	U	
University of New Hampshire	5	Abilene	NH	U	MODIS, Int
Rutgers University	4	Abilene	NJ	U	
Columbia University, Lamont-Doherty Geo. Obs	5	Abilene	NY	U	NSCAT
Cornell University	7	Abilene	NY	U	Int
Rochester Institute of Technology	1	Abilene	NY	U	
State University of New York - Stony Brook	5	Abilene	NY	U	CERES (QA), Int
Ohio State University	4	Abilene	OH	U	Int
University of Cincinnati	1	Abilene	OH	U	
University of Oklahoma	1	Abilene	OK	U	
Oregon Institute of Technology	1	Abilene	OR	U	
Oregon State University	12	Abilene	OR	U	CERES (QA), MODIS (QA), NSCAT, SeaWiFS, Int
Pennsylvania State University	16	Abilene	PA	U	MISR (QA), Int
University of Rhode Island	2	Abilene	RI	U	NSCAT, SeaWiFS
University of South Carolina	4	Abilene	SC	U	
University of Tennessee	0	Abilene	TN	U	SeaWiFs
Texas A&M University	4	Abilene	TX	U	AMSR, SeaWiFS, Int
University of Texas at Austin	7	Abilene	TX	U	JASON, Int
Brigham Young University	2	Abilene	UT	U	NSCAT
University of Utah	3	Abilene	UT	U	
Utah State University	1	Abilene	UT	U	
George Mason University	1	Abilene	VA	U	
Old Dominion University	1	Abilene	VA	U	SeaWiFS
University of Virginia	7	Abilene	VA	U	Key
University of Vermont	1	Abilene	VT	U	
NOAA PMEL	3	Abilene	WA	F	
University of Washington	24	Abilene	WA	U	ASTER, HIRDLS, NSCAT, SAGE III, SeaWinds, Int

EOS Site	Number of Users	NISN POP	STATE	TYPE	Teams
Washington State University	1	Abilene	WA	U	
University of Wisconsin	16	Abilene	WI	U	AIRS, GLAS, MODIS (QA), Int
University of Wyoming	2	Abilene	WY	U	SAGE III, Int
ABILENE TOTAL	**459**	**ABILENE**			
AMES Research Center	16	ARC	CA	N	SAGE-III
Monterey Bay Aquarium Research Institute	-	ARC	CA	I	Int
Naval Postgraduate School	2	ARC	CA	F	SAGE III
Remote Sensing Systems	2	ARC	CA	C	NSCAT
Sets Technology	-	ARC	HI	C	Int
ARC TOTAL	**20**	**ARC**			
EROS Data Center	**13**	EDC	SD	F	DAAC
Lawrence Berkeley National Laboratory	4	ESnet	CA	F	Int
Lawrence Livermore National Laboratory	2	ESnet	CA	F	
Argonne National Laboratory	1	ESnet	IL	F	
Los Alamos National Lab	2	ESnet	NM	F	MISR (QA)
Brookhaven National Laboratory	3	ESnet	NY	F	SeaWiFs
Oak Ridge National Laboratory	5	ESnet	TN	F	DAAC, Int
Pacific Northwest National Lab	4	ESnet	WA	F	
ESnet TOTAL	**21**	**ESNET**			
Naval Research Lab	5	DC FedNet	DC	F	MODIS, SAGE III
NOAA	2	DC FedNet	DC	F	
NOAA NESDIS Camp Springs	17	DC FedNet	MD	F	AIRS, CERES (QA), SeaWiFS
NOAA NWS NCEP	14	DC FedNet	MD	F	Int
U.S. Department of Agriculture - MD	6	DC FedNet	MD	F	ASTER, Int
U.S. Geological Survey - VA	2	DC FedNet	VA	F	ASTER
Other Fednet Users	5	DC FedNet			
DC FEDNET TOTAL	**51**	**DC FEDNET**			
NASA Headquarters	13	GSFC	DC	N	GLAS, SeaWiFS
Atmospheric & Environmental Research Inc.	5	GSFC	MA	I	NSCAT I, TES, Int
GSFC	164	GSFC	MD	N	DAAC, EOC, SMC, AMSR, MISR (QA), SeaWiFs, CERES, GLAS, MODIS (IST, QA), NSCAT, TOMS, JASON, Int
Bigelow Lab. Boothbay Harbor, Me		GSFC	ME	I	SeaWiFs
Goddard Institute for Space Studies	20	GSFC	NY	I	EOSP, Int
Institute of Marine and Atmospheric Science		GSFC	NY	I	NSCAT
Niagara University	1	GSFC	NY	U	Key, LIS

EOS Site	Number of Users	NISN POP	STATE	TYPE	Teams
GSFC/Wallops	6	GSFC	VA	N	SeaWiFs, MODIS, JASON
Simpson Weather Associates	1	GSFC	VA	C	Key
GSFC TOTAL	**210**	**GSFC**			
Auburn University	1	Internet	AL	U	Int
U.S. Department of Agriculture - AZ		Internet	AZ	F	Int
U.S. Geological Survey - AZ	1	Internet	AZ	F	ASTER
Naval Research Lab	1	Internet	CA	F	
Santa Barbara Research Center	1	Internet	CA	I	EOSP
SPAWAR Systems Center San Diego	1	Internet	CA	F	
TRW Corp		Internet	CA	C	
Hughes Aircraft Company	1	Internet	CO		
National Park Service	1	Internet	CO	F	Int
National Renewable Energy Laboratory	1	Internet	CO		
University of Denver	6	Internet	CO	U	TES
US Coast Guard	1	Internet	CT		
Wesleyan University	1	Internet	CT		
The Globe Program	1	Internet	DC		
Universities Space Research Assn	1	Internet	DC		
WPI	1	Internet	DC		
NOAA	2	Internet	FL	F	
Terra Systems Inc	1	Internet	HI		
Idaho Department of Water Resources	1	Internet	ID		
Indiana State University	1	Internet	IN		
Valparaiso University	1	Internet	IN		
Aerodyne Research Inc	1	Internet	MA		
Clark University	1	Internet	MA		
Marine Biological Laboratory	2	Internet	MA	I	Int
Smithsonian Astrophysical Observatory	1	Internet	MA		
TASC	1	Internet	MA		
University of Massachusetts Amherst	1	Internet	MA		
Woods Hole Oceanographic Institute	10	Internet	MA	I	NSCAT I, SeaWiFS, Int
Hofstra University		Internet	NY	U	NSCAT
State University of New York - Albany		Internet	NY	U	SAGE III
U.S. Department of Agriculture - OK		Internet	OK	F	Int
Hampton University	2	Internet	VA	U	SAGE III
Science and Technology Corporation		Internet	VA	C	SAGE III
Other Internet Users	39	Internet			
INTERNET TOTAL	**83**	**INTERNET**			

EOS Site	Number of Users	NISN POP	STATE	TYPE	Teams
JPL	78	JPL	CA	N	DAAC, ACRIM, AIRS, ASTER (IST, QA), MISR (IST, QA), MLS, AMSR, NSCAT, SeaWiFS, SeaWinds, TES, JASON, Int
Columbia University (Affiliation - Altadena CA)		JPL	CA	U	ACRIM
JPL TOTAL	**78**	**JPL**			
Johnson Space Center	1	JSC	TX	N	MISR
JSC TOTAL	**1**	**JSC**			
Kennedy Space Center	1	KSC	FL	N	NSCAT
KSC TOTAL	**1**	**KSC**			
LaRC	38	LaRC	VA	N	DAAC, CERES (IST, QA) , MOPITT, SAGE III, TES, Int
LARC TOTAL	**38**	**LaRC**			
MSFC	8	MSFC	AL	N	AMSR, LIS, Int
NSSTC - Huntsville	16	MSFC	AL	I	CERES (QA), LIS, Int
MSFC TOTAL	**24**	**MSFC**			
University of Iowa	1	vBNS	IA		
Johns Hopkins University	3	vBNS	MD	U	ASTER
Princeton University	10	vBNS	NJ	U	SAGE III, Int
vBNS TOTAL	**14**	**vBNS**			
TOTAL U.S. USERS	**1013**	**U.S.Users**			

INTERNATIONAL SITES	Number of Users	NISN POP	STATE	TYPE	Teams
AUSTRALIA	31				
BELGIUM	6				
BRAZIL	13				
CANADA	54				
DENMARK	1				
FINLAND	2				
FRANCE	30				
GERMANY	7				
ITALY	5				
JAPAN	65				
NEW ZEALAND	4				
NORWAY	2				
PEOPLE'S REPUBLIC OF CHINA	5				
RUSSIA	4				
SAUDI ARABIA	1				
SOUTH AFRICA	1				
SWEDEN	2				
SWITZERLAND	1				
THE NETHERLANDS	7				
UNITED KINGDOM	51				
TOTAL INTERNATIONAL USERS	**292**				
GRAND TOTAL	**1305**				

Section 15 – List of EOS Networks-Related IRDs and ICDs

Here is the list of old EOS Networks-Related IRDs and ICDs

Document Title	Document #
EBnet Interface Requirements Document (IRD)	540-022
IRD between EDOS and EBnet	560-EDOS-0211
ICD between EDOS and EBnet	510-ICD-EDOS/EBnet
ICD between EDOS and ASTER GDS	540-037
ICD between EBnet and DAACs	540-032
ICD between EBnet and EOC	540-031
ICD between EBnet and SMC	540-036
ICD between EBnet and ETS	540-098
ICD between EBnet and FDS	540-034
ICD between EBnet and FSTB	540-094
ICD between EBnet and GSE	540-093
ICD between EBnet and LPS	540-097
ICD between EBnet and SAS	540-095
ICD between EBnet and SCS	540-091
ICD between EBnet and SDF	540-096
ICD between EBnet and SSIM	540-092
ICD between EBnet and TSDIS	540-047
IRD between EOSDIS and NSI for ECS Elements	505-41-17
IRD between EOSDIS and NSI for Non-ECS Elements	505-42-01
ICD between ECS and NSI	505-41-317

Old EBnet ICDs have been consolidated and replaced with the following 5 new **EMSn ICDs** to minimize the number of documents.

1. **ICD Between EMSn and ECS Elements (423-35-01)** [Sponsor: Dan Duffy]
   EBnet / DAACs ICD (540-032)
   EBnet / EOC ICD (540-031)
   EBnet / SMC ICD (540-036)

2. **ICD Between EMSn and Non-ECS Elements (423-35-02)** [Sponsor: Dan Duffy]
   EBNet / ASTER GDS ICD (540-037EBnet)
   EBnet / LPS ICD (540-097)
   EBnet / TSDIS ICD (540-047)

3. **ICD Between EMSn and EOS Test Systems (423-35-04)** [Sponsor: Dan Duffy]
   EBnet / ETS ICD (540-098)
   EBnet / FSTB ICD(540-094)
   EBnet / SSIM ICD (540-092)

4. **ICD Between EMSn and Institutional Support Systems (423-35-03)**
   [Sponsor: Dan Duffy]
   EBnet / FDS ICD (540-034)

Since NSI does not exist any more, the existing NSI IRD and ICDs have been replaced with following two new **ESSn ICDs**:

1. **ICD Between ESSn and ECS Elements (423-35-06)** [Sponsor**:** Jeff Smith]
   [To replace EOSDIS / NSI ICD (505-41-17) and ECS / NSI ICD (505-41-31)]
2. **ICD Between ESSn and Non-ECS Elements (423-35-07)** [Sponsor**:** Jeff Smith]
   [To replace ESDIS / NSI IRD for Non-ECS EOSDIS Elements (505-42-01)]

In addition, following 5 new baseline ICDs have been developed between EOS Networks and Instrument SIPS on a mission-by-mission basis:

1. **ICD Between EOS Networks and ICESat Elements** (Sponsor**:** Clayton Sigman)
   (As an update to the existing EMSn/ICESat SIPS ICD (423-36-01) to include the SIPS interfaces to ESSn]
2. **ICD Between EOS Networks and SIPS for Terra Instruments (423-35-08)**
   [Sponsor**:** Jeff Smith]
3. **ICD Between EOS Networks and SIPS for Aqua Instruments (423-35-09)**
   [Sponsor**:** Jeff Smith]
4. **ICD Between EOS Networks and SIPS for Aura Instruments (423-35-10)**
   [Sponsor**:** Jeff Smith]
5. **ICD Between EOS Networks and SIPS for ACRIMSAT Instruments (423-35-11)**
   [Sponsor**:** Jeff Smith]

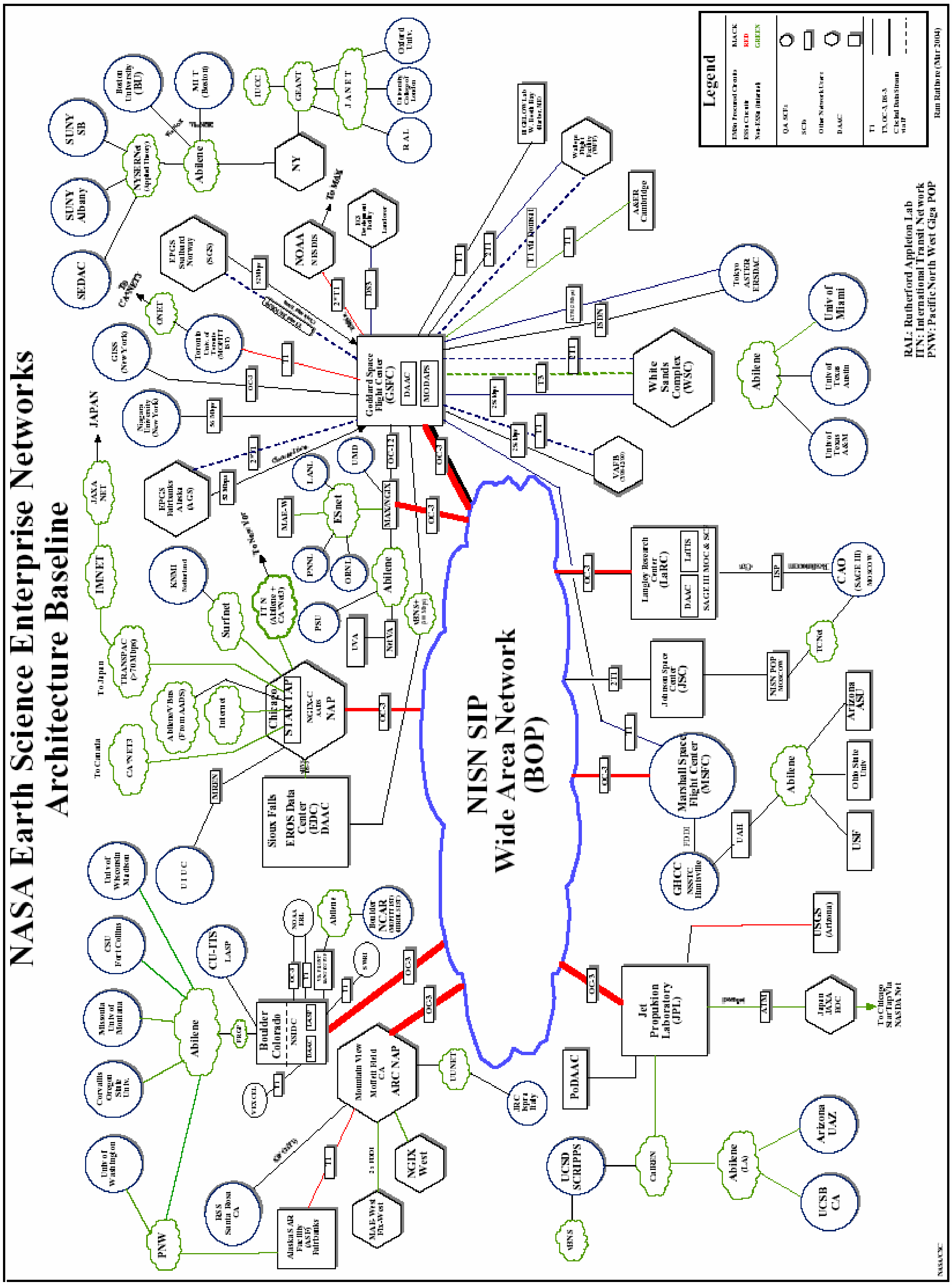
Section 16 – EOS Networks Architecture

16.1 EOS Networks Characteristics

- EOS Network is comprised of EOS Mission Support network (EMSn) and EOS Science Support network (ESSn)
- EMSn (known as Open and Closed EBNet) provides local-area and wide-area communication circuits and facilities between and among various EOS Ground system elements to support EOS missions operations and to transport mission data between EOSDIS elements.
- EMSn also serves as the interface to other external systems and networks such as DAACs, EOS Ground stations, EOS Science Support network (ESSn) and NASA centers campus LANs
- Open side of EBnet LAN and WAN allows appropriate science data to be transmitted via the Internet to various end-users.
- Closed side of EBnet is protected by firewalls and transports mission critical data to various EOSDIS subsystems and ground stations via a secure network (including the high-rate circuit links).
- ESSn is a globally connected science data communication network comprised of several segments of shared IP-based NASA internal and other external physical networks such as Abilene and vBNS+.

16.2 EOS Networks Baseline Architecture

See Figure on Next Page


NASA Earth Science Enterprise Networks
Architecture Baseline
NISN SIP
Wide Area Network
(BOP)
Goddard Space Flight Center (GSFC)
DAAC
MODAPS
Jet Propulsion Laboratory (JPL)
Marshall Space Flight Center (MSFC)
Johnson Space Center (JSC)
Langley Research Center (LaRC)
SAGE III MOC & SCF
White Sands Complex (WSC)
Sioux Falls EROS Data Center (EDC) DAAC
Boulder Colorado NSIDC
Mountain View Moffett Field CA ARC NAP
Chicago STAR TAP NGIX-C NAP
PoDAAC
Legend
RAL: Rutherford Appleton Lab
ITN: International Transit Network
PNW: Pacific North West Giga POP
Ran Rathore (Mar 2004)

Section 17 – EOS Networks Web Sites

Following URL provides the collection of menu-driven EOS networks related Web pages and links for detailed information relevant to and about the EOSDIS networks:

http://netwoks.eos.nasa.gov

To know more about the EOSDIS networks, click one of the following menu items displayed on the above mentioned EOS Missions Networks home page:

- **Design and Implementation**
  - Plans
  - Briefings and Reviews
  - Diagrams
- **Documents**
  - ESDIS Document Resources
  - EOS Networks ICDs
  - EBNet Documents
- **Operations**
  - Contact List
  - Trouble Reporting
  - Management View
  - Network Performance Tracking
- **Organization**
- **Requirements**
  - Process
  - Handbook
  - Traffic Reports and Reviews
  - Other Documents
  - Search Network Requirements Database
- **Schedules and Status**
- **Related Sites**
  - Earth Science Enterprise (**http://www.earth.nasa.gov**)
  - EOS (**http://eospso.gsfc.nasa.gov**)
  - ESDIS (**http://romulus.gsfc.nasa.gov/eosinfo/ESDIS_Site/index.html**)
  - EOSDIS (**http://romulus.gsfc.nasa.gov/eosinfo/EOSDIS_Site/index.html**)
  - GSFC (**http://www.gsfc.nasa.gov**)
  - NASA (**http://www.nasa.gov**)
  - IETF/ISOC Internet Documents (**http://www.ietf.org**)
  - ESDIS Acronym List (**http://romulus.gsfc.nasa.gov/acronyms/acroFrameset.html**)
  - EMSn (**http://bernoulli.gsfc.nasa.gov/emsn**)
  - ESSn (**http://bernoulli.gsfc.nasa.gov/essn**)
  - CNE (**http://cne.gsfc.nasa.gov**)
  - VBNS+ (**http://www.vbns.net**)
  - NISN (**http://www.nisn.gasa.gov**)
  - Abilene NOC (**http://www.abilene.iu.edu**)

NREN (**http://www.nren.nasa.gov**)

- NGI (**http://www.ngi.gov**)
- Internet 2 (**http://www.internet2.edu**)

ACRONYMS

AGS	Alaska Ground Station
AIRS	Atmospheric Infrared Sounder
AMSR	Advanced Microwave Scanning Radiometer
AMSR-E	Advanced Microwave Scanning Radiometer - EOS
AMSU	Advanced Microwave Sounding Unit
ASDC	Atmospheric Science Data Center
ASTER	Advanced Spaceborne Thermal Emission and Reflection
ATM	Asynchronous Transmission Mode
CCB	Configuration Control Board
CCSDS	Consultative Committee for Space Data Systems
CERES	Clouds and the Earth's Radiant Energy System
CM	Configuration Management
CSOC	Consolidated Space Operations Contract
DAAC	Distributed Active Archive Center
EBnet	EOS Backbone network
ECS	EOSDIS Core System
EDC	EROS Data Center
EDOS	EOS Data and Operations System
EGS	EOS Ground System
EMSn	EOS Missions Support network
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESSn	EOS Science Support network
FDDI	Fiber Distributed Data Interface
FE	Fast Ethernet

FTP	File Transfer Protocol
GB	Giga Bytes
GDS	Ground Data System
GE	Gigabit Ethernet
GES	Goddard Earth Sciences
GHCC	Global Hydrology and Climate Center
GSFC	Goddard Space Flight Center
GSRD	Ground System Requirement Document
HSB	Humidity Sounder for Brazil
ICD	Interdisciplinaryerface Control Document
ICESAT	Ice, Cloud and Land Elevation Satellite
II	Interdisciplinaryerdisciplinary Investigator
IONET	IP Operational Network
IP	International Partner
IP	Internet Protocol
IPNOC	IP Network Operating Center
IRD	Interdisciplinaryerface Requirement Document
ISAR	Instrument Support Activity Request
ISF	Instrument Support Facility
IST	Instrument Support Terminal
JAXA	Japan Aerospace Exploration Agency
JPL	Jet Propulsion Laboratory
Kbps	Kilobits Per Second
LAN	Local Area Network
LANDSAT	Land Remote Sensing Satellite
LaRC	Langley Research Center
LaTIS	LaRC TRMM Information System
LPDAAC	Land Processes DAAC

MB	MegaByte (10^6)
Mbps	Megabits per second
MISR	Multi-angle Imaging Spectro-Radiometer
MLS	Microwave Limb Sounder
MOC	Mission Operations Center
MODAPS	MODIS Adaptive Processing System
MODIS	Moderate-Resolution Imaging Spectrometer
MOPITT	Measurements of Pollution in the Troposphere
MORD	Mission Operations Requirement Document
MOU	Memorandum of Understanding
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service (NOAA)
NISN	NASA Integrated Services Network
NOAA	National Oceanic and Atmospheric Administration
NREN	National Research and Education Network
NSF	National Science Foundation
NSI	NASA Science Interdisciplinaryernet
NSIDC	National Snow and Ice Data Center
PI	Principal Investigator
PIP	Premium Internet Protocol
PI/TL	Principal Investigator/Team Leader
PO.DAAC	Physical Oceanography DAAC
RB	Rate Buferred
RSS	Remote Sensing System
RT	Real Time
QA	Quality Assurance
SAGE III	Stratospheric Aerosol and Gas Experiment III

SB	Santa Barbara (CA)
SCF	Science Computing Facility
SD	San Diego (CA)
SeaWiFS	Sea-viewing Wide Field of View Sensor
SGS	Svalbard Ground Station
SIO	Scripps Institutional of Oceanography
SIP	Standard Internet Protocol
SIPS	Science Investigator-led Processing System
SMC	System Management Center
SN	Space Network
SPS	Science Processing System
SUNY	State University of New York
TBD	To Be Determined
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TES	Tropospheric Emission Spectrometer
TL	Team Leader
TLSCF	Team Leader SCF
TM	Team Member
TOMS	Total Ozone Mapping Spectrometer
TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rainfall Measuring Mission
UCB	University of Colorado at Boulder
UCSB	University of California, Santa Barbara
UCSD	University of California, San Diego
UK	United Kingdom
vBNS	Very High Speed Basndwidth Network Service
VIS	Visible

UK	United Kingdom
WAN	Wide Area Network
WFF	Wallops Flight Facility
WGS	Wallops Ground Station
WSC	White Sands Complex
WSGT	White Sands Ground Terminal