

EOS Production Sites Network Performance Report: November 2010

This is a monthly summary of EOS network performance testing between production sites -- comparing the measured performance against the requirements. Significant improvements are noted in Green, Network problems in Red, System problems and Requirements issues in Gold, Issues in Orange, and other comments in Blue

Highlights:

- **Mostly stable flows with reduced congestion at GSFC**
 - **GPA 3.68** (was 3.65 last month)
- **Requirements:** updated to Handbook 1.4.3 in May '09 (was 1.4.2 previously)
 - Many Requirements dropped significantly (under review)
- **Only 1 flow below "Adequate":**
 - **GSFC MODAPS-PDR to EROS** ("Almost Adequate")
 - Upgrade from "Low" last month
 - Meets requirement without contingency
 - High user flow this month
- **Bottlenecks:**
 - **GSFC:** EBnet: 10 Gig upgrade substantially complete.
 - User outflow now averages 1.3 gbps
 - was only 700 mbps before upgrade
 - Legacy MODIS systems moved to 10 G backbone
 - Remaining systems to upgraded individually

Ratings Changes:

Upgrades: ↑ GSFC → EROS: Low → Almost Adequate

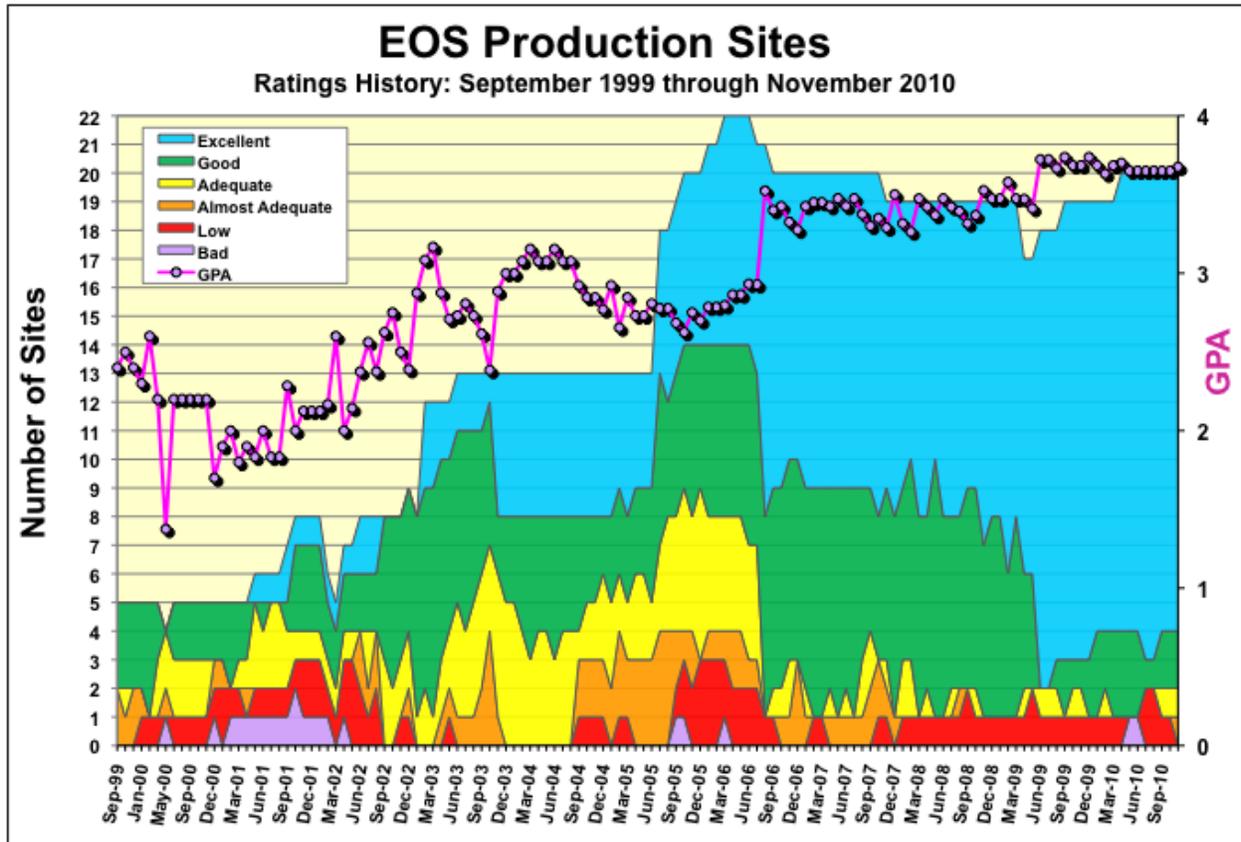
Downgrades: ↓ None

Ratings Categories:

Rating	Value	Criteria
Excellent:	4	Total Kbps > Requirement * 3
Good:	3	1.3 * Requirement <= Total Kbps < Requirement * 3
Adequate:	2	Requirement < Total Kbps < Requirement * 1.3
Almost Adequate:	1.5	Requirement / 1.3 < Total Kbps < Requirement
Low:	1	Requirement / 3 < Total Kbps < Requirement / 1.3
Bad:	0	Total Kbps < Requirement / 3

Where Total Kbps = Integrated Kbps (where available), otherwise just iperf

Ratings History:



The chart above shows the number of sites in each classification since EOS Production Site testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements.

Requirements Basis:

While the long term plan is to use the requirements from the EOSDIS network requirements database, the database does not appear ready to be used for that purpose at this time. Some mission flows have not been included yet (e.g., TRMM), and the network requirements based on rapid reprocessing (e.g., MODIS 27X, AIRS 20X) have not been resolved.

Thus the requirements are based on the EOS Networks Requirements Handbook, Version 1.4.3 (from which the database requirements were derived). Previously, the requirements were derived from version 1.4.2.

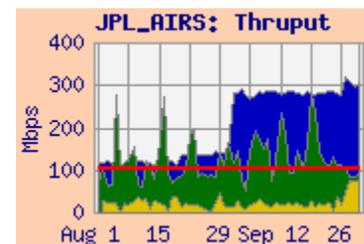
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated either between the per-orbit flows, or within the built-in contingency. Previously, these flows were added in linearly to the requirements, making the requirements unrealistically high.

Additionally, the contingency for reprocessing flows greater than 2X reprocessing was reduced. These flows WERE a major component of the contingency, so adding additional contingency on top of these flows was considered excessive.

However, it seems likely that there are some flows which have been omitted. For example, the GES DISC to KNMI requirement for Level 1+ data (without contingency) was 1.4 mbps in version 1.4.2, but only 22 kbps in version 1.4.3. The user flow has been averaging about 1.4 mbps, suggesting that version 1.4.2 was correct, and that version 1.4.3 has omitted something.

Integrated Charts:

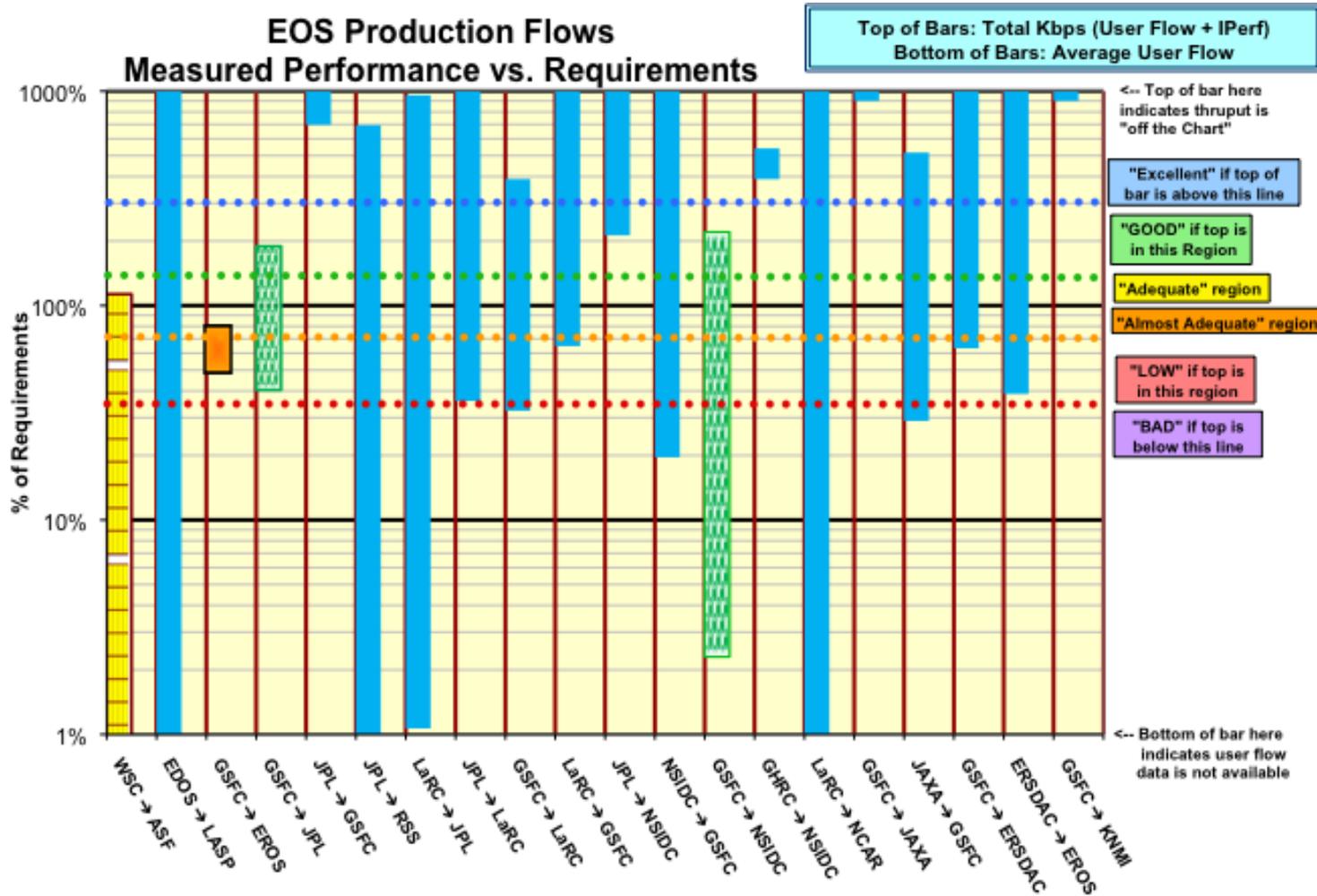
Integrated charts are included with site details, where available. These charts are “Area” charts, with a “salmon” background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to the destination facility (JPL, in this example) obtained from routers via “netflow”. The green area is stacked on top of the user flow, and represents the “adjusted” daily average iperf thrupt between the source-destination pair most closely corresponding to the requirement. This iperf measurement essentially shows the circuit capacity remaining with the user flows active. Adjustments are made to compensate for various systematic effects, and are best considered as an approximation. The red line is the requirement for the flow from the source to destination facilities. On some charts a blue area is also present – usually “behind” the green area – representing adjusted iperf measurements from a second source node at the same facility.



Network Requirements vs. Measured Performance

November 2010		Requirements (mbps)		Testing				Ratings		
Source → Destination	Instrument (s)	Current	Old	Source → Dest Nodes	Average User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re HB 1.4.3 Requirements		
		HB 1.4.3	HB 1.4.2					This Month	Last Month	
WSC → ASF	ALOS	96.0	n/a	WSC → ASF		108.4		Adequate	A	
EDOS → LASP	ICESat, QuikScat	0.4	0.4	GSFC-EDOS → LASP (blue)	0.00008	20.3		Excellent	E	
GSFC → EROS	MODIS, LandSat	342.9	345.9	MODAPS-PDR → EROS LPDAAC	166.1	186.6	268.4	AA	L	
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	GES DISC → JPL-AIRS	41.1	186.0	192.1	Good	G	
JPL → GSFC	MLS	0.6	7.4	JPL-PTH → GSFC-ESDIS-PTH	3.9	88.9	89.0	Excellent	E	
JPL → RSS	AMSR-E	0.5	2.5	JPL-PODAAC → RSS		3.4		Excellent	E	
LaRC → JPL	TES, MISR	23.0	43.7	LARC-DAAC → JPL-TES	0.25	220.2		Excellent	E	
JPL → LaRC	TES	1.5	4.4	JPL-PTH → LARC-PTH	0.53	75.7		Excellent	E	
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	GSFC-EDOS → LDAAC	10.1	117.6	121.9	Excellent	E	
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	LDAAC → GES DISC	0.23	506.3	506.3	Excellent	E	
JPL → NSIDC	AMSR-E	0.2	1.3	JPL-PODAAC → NSIDC	0.34	17.2		Excellent	E	
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	NSIDC DAAC → GES DISC	0.11	231.2	231.2	Excellent	E	
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	MODAPS-PDR → NSIDC-DAAC	0.6	60.6	60.6	Good	G	
GHRC → NSIDC	AMSR-E	0.5	7.5	GHRC → NSIDC DAAC (ftp)	1.84	1.72	2.56	Excellent	E	
LaRC → NCAR	MOPITT	0.1	5.4	LDAAC → NCAR		324.4		Excellent	E	
GSFC → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	GSFC → JAXA	3.85	Testing discontinued: 31 March 2009		Excellent	E	
JAXA → GSFC	AMSR-E	0.5	1.3	JAXA → GSFC	2.5			Excellent	E	
GSFC → ERSDAC	ASTER	5.4	12.5	GSFC-EDOS → ERSDAC	3.4	78.8	78.9	Excellent	E	
ERSDAC → EROS	ASTER	8.3	26.8	ERSDAC → EROS PTH	3.2	83.9	84.0	Excellent	E	
GSFC → KNMI	OMI	0.03	3.3	GSFC-OMISIPS → KNMI ODPS	2.1	179.8	179.8	Excellent	E	
				Significant change from v 1.4.2 (5/09) to v 1.4.3				Ratings Summary		
				Value used for ratings				HB 1.4.3 Req		
								Score	Prev	
*Criteria:	Excellent	Total Kbps > Requirement * 3			Excellent		16	16		
	Good	1.3 * Requirement <= Total Kbps < Requirement * 3			Good		2	2		
	Adequate	Requirement < Total Kbps < Requirement * 1.3			Adequate		1	1		
	Almost Adequate	Requirement / 1.3 < Total Kbps < Requirement			Almost Adequate		1	0		
	Low	Requirement / 3 < Total Kbps < Requirement / 1.3			Low		0	1		
	Bad	Total Kbps < Requirement / 3			Bad		0	0		
								Total Sites	20	
Notes:		Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS							GPA	3.68
									3.65	

This graph shows a bar for each source-destination pair – relating the measurements to the requirements for that pair. The bottom of each bar represents the average measured user flow from the source site to the destination site (as a percent of the requirement). Thus the bottom of each bar indicates the relationship between the requirements and actual flows. Note that the requirements generally include a 50% contingency factor above what was specified by the projects, so a value of 66% (dotted orange line) would indicate that the project is flowing as much data as requested. The top of each bar similarly represents the integrated measurement, combining the user flow with Iperf measurements – this value is used to determine the ratings.



1) EROS:

Ratings: GSFC→ EROS: ↑ **Low** → **Almost Adequate**
 ERSDAC→ EROS: Continued **Excellent**

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/EROS.shtml>

http://ensight.eos.nasa.gov/Organizations/production/EROS_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODAPS-PDR → EROS LPDAAC	356.6	186.6	85.3	166.1	268.4
GSFC-EDOS → EROS LPDAAC	361.6	186.4	74.2		
GES DISC → EROS LPDAAC	192.5	145.7	63.8		
ERSDAC → EROS LPDAAC	88.0	83.9	35.2		
NSIDC SIDADS → EROS PTH	43.7	20.8	7.7	3.2	84.0
GSFC-ENPL → EROS PTH	382.7	295.1	156.1		
GSFC-NISN → EROS PTH	404.4	291.5	191.2		
LaRC PTH → EROS PTH	149.1	139.2	74.3		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → EROS	CY '08-11	343	Almost Adequate
ERSDAC → EROS	FY '06 - '10	8.3	Excellent

Comments:

1.1 GSFC → EROS: The rating is based on the MODAPS-PDR Server to EROS LP DAAC measurement, since that is the primary flow. The route is via the Doors to NISN SIP, via the NISN 10 gbps backbone to the NISN Chicago CIEF, then via GigE to the StarLight gigapop, peering with the EROS OC-12 (622 mbps).

The user flow this month increased to more than double the typical level, reportedly based on a science user at EROS acquiring MODIS data. It is still only about half of the nominal requirement (which includes MODIS reprocessing).

In May 2010, the EROS LPDAAC Portus proxy firewall removed – the EROS campus Juniper firewall is used instead. At that time, incoming packet retransmission to the EROS LPDAAC increased, and throughput dropped from all sources. This problem appears to have cleared up in late October – iperf increased, as well as user flow!

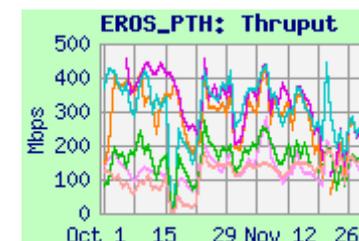
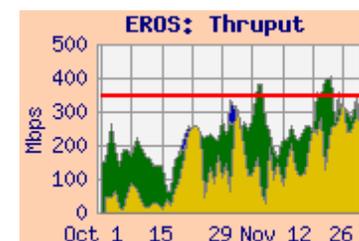
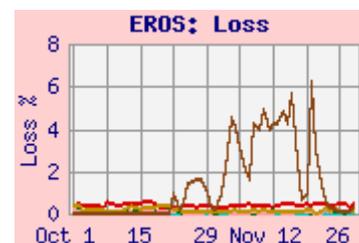
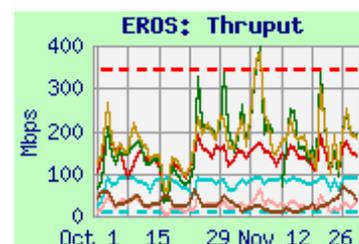
Performance from GSFC-NISN to EROS-PTH would be rated "**Adequate**".

The GSFC-ENPL host has a direct connection to the MAX; its route is via MAX to Internet2 to StarLight in Chicago. Performance is similar to the GSFC-NISN source. Both are mainly limited by the OC-12 to EROS.

1.2 ERSDAC → EROS: **Excellent**. See section 9 (ERSDAC) for further discussion.

1.3 NSIDC → EROS: Throughput dropped (and packet loss increased) in September due returning students causing network congestion in Boulder.

1.4 LaRC → EROS: The throughput from LaRC-PTH to EROS-PTH was stable. The route is via NISN to the Chicago CIEF.



2) to GSFC

Ratings: NSIDC → GES DISC: Continued **Excellent**
 LDAAC → GES DISC: Continued **Excellent**
 JPL → GSFC: Continued **Excellent**

Web Pages:

<http://ensight.eos.nasa.gov/Organizations/production/GDAAC.shtml>

http://ensight.eos.nasa.gov/Organizations/production/GSFC_PTH.shtml

http://ensight.eos.nasa.gov/Missions/icesat/GSFC_ISIPS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
EROS LPDAAC → GES DISC	217.9	152.6	68.8	
EROS PTH → GSFC-ESDIS PTH	365.7	265.7	123.6	
JPL-PTH → GSFC-ESDIS PTH	91.7	88.9	84.2	3.9
LDAAC → GES DISC	577.7	506.3	315.0	0.23
LARC-ANGe → GSFC-ESDIS PTH	522.3	415.1	353.0	
NSIDC DAAC → GES DISC	364.0	231.2	144.0	0.11
NSIDC DAAC → GSFC-ISIPS	131.9	104.0	67.7	

Requirements:

Source → Dest	Date	Mbps	Rating
NSIDC → GSFC	CY '06 – '10	0.6	Excellent
LDAAC → GES DISC	FY '07 – '10	0.4	Excellent
JPL → GSFC combined	CY '06 - 10	3.2	Excellent

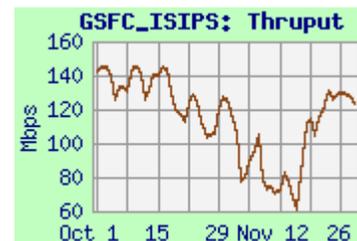
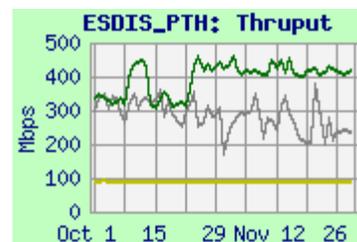
Comments:

EROS, EROS-PTH → GSFC: The thrupt for tests from EROS PTH to ESDIS-PTH were stable this month. Testing from EROS LPDAAC to GES DISC improved in June with the removal of the EROS proxy firewall.

JPL → GSFC: Thrupt was again very stable this month. With the modest requirement (reduced from 7.4 mbps in May '09), the rating remains "**Excellent**". The actual user flow is above but fairly consistent with the reduced requirement.

LaRC → GSFC: Performance from LDAAC → GES DISC and LaRC ANGe to ESDIS-PTH remained way above 3 x the modest requirement, so the rating continues as "**Excellent**". The user flow this month was typical and consistent with the requirement.

NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) improved at the beginning of July, when FRGP's connection to Internet2 was switched from SLC to KC, reducing RTT to the East. The user flow was below the low requirement (reduced from 13.3 mbps in May '09); the rating remains "**Excellent**".

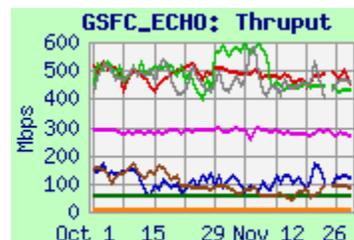


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

Web Page: http://ensight.eos.nasa.gov/Organizations/gsf/GSFC_ECHO.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	152.7	104.0	49.9
EROS LPDAAC ftp	7.7	7.4	4.0
GES DISC	521.0	482.5	336.1
GES DISC ftp	297.4	281.9	141.6
LaRC ASDC DAAC	505.0	445.7	385.3
LaRC ASDC DAAC ftp	58.3	57.1	13.4
MODIS-LADSWEB	526.5	450.8	385.3
NSIDC DAAC	95.8	71.1	42.5
NSIDC DAAC ftp	9.5	8.6	3.7



Comments:

Testing was stable from all sources, with improvement from LaRC. Performance is mostly limited by TCP window size – especially on ftp with long RTT.

2.3 GSFC-EMS: EOS Metrics System

Web Page: http://ensight.eos.nasa.gov/Organizations/gsf/GSFC_EMS.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS-PTH	80.3	60.6	28.6
ESDIS-PTH	94.2	93.7	42.7
GES DISC	93.8	93.7	49.0
LARC-PTH	94.0	94.0	48.1
MODAPS-PDR	94.1	94.1	48.7
NSIDC-SIDADS	91.8	89.4	35.9



Comments:

Testing is performed to GSFC-EMS from the above nodes, iperf only. Results are mostly very steady. Performance limitation is from the 100 mbps fast-E connection.

3) JPL:

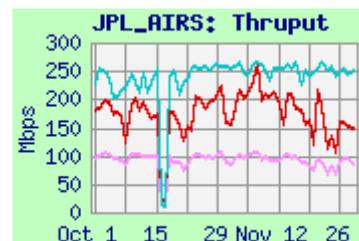
3.1) GSFC → JPL:

Ratings: GSFC → JPL: Continued **Good**

Web Pages: http://ensight.eos.nasa.gov/Missions/aqua/JPL_AIRS.shtml
http://ensight.eos.nasa.gov/Missions/aura/JPL_MLS.shtml
http://ensight.eos.nasa.gov/Organizations/production/JPL_QSCAT.shtml
http://ensight.eos.nasa.gov/Organizations/production/JPL_PODAAC.shtml

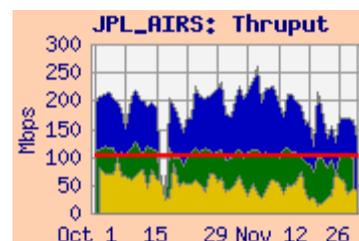
Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-GES DISC → JPL-AIRS	239.3	186.0	92.3	41.1	192.1
GSFC-NISN → JPL-AIRS	274.9	252.8	196.5		
ESDIS-PTH → JPL-AIRS	111.2	92.4	61.0		
GSFC-NISN → JPL-PODAAC	167.2	127.1	82.6		
ESDIS-PTH → JPL-PODAAC	80.4	53.6	35.2		
GSFC-NISN → JPL-QSCAT	88.7	87.6	79.3		
ESDIS-PTH → JPL-QSCAT	60.3	52.6	34.5		
GSFC-NISN → JPL-MLS	368.2	302.6	234.5		
ESDIS-PTH → JPL-MLS	150.1	81.2	34.2		



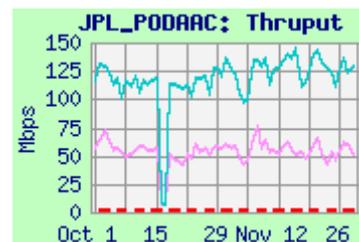
Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL Combined	FY '08-'10	101.7	Good
GSFC → JPL AIRS	FY '08-'10	98	Good
GSFC → JPL PODAAC	FY '08-'11	1.5	Excellent
GSFC → JPL QSCAT	FY '08-'11	0.6	Excellent
GSFC → JPL MLS	FY '08-'10	2.1	Excellent

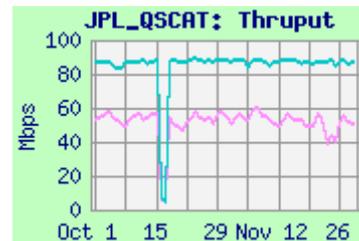


Comments: The user flow from GSFC/EOS to JPL decreased this month (was 55 mbps last month).

AIRS, Overall: Thruput from **GES DISC** was almost 2 x the AIRS requirement, so the AIRS rating remains "**Good**". The **JPL overall rating** is based on this test compared with the sum of all the GSFC to JPL requirements – the thrupt is also below 3x this requirement, so the overall rating remains "**Good**".

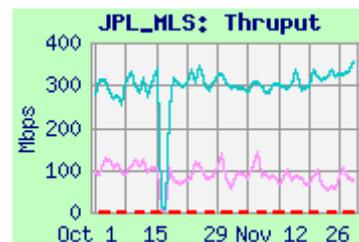


PODAAC: **ESDIS-PTH** (connected at 1 gig to the 10 gig EBnet backbone) replaced EBnet-PTH as a test source in April 2010. Performance is lower than previously from EBnet-PTH, but still way above the 1.5 mbps PODAAC requirement, rating "**Excellent**".



QSCAT: Thuput from **ESDIS-PTH** to QSCAT was also lower than from EBnet-PTH, but is also well above the modest requirement, rating "**Excellent**". Testing from **GSFC-NISN** has even higher thrupt. User flow from GSFC to QSCAT averaged only about 1.2 kbps this month.

MLS: Thruput from **ESDIS-PTH** was mostly stable, but thrupt was even better from **GSFC-NISN**. The rating remains "**Excellent**".



3.2) LaRC → JPL

Rating: Continued **Excellent**

Web Pages:

- http://ensight.eos.nasa.gov/Organizations/production/JPL_TES.shtml
- http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml
- http://ensight.eos.nasa.gov/Organizations/production/JPL_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
LaRC DAAC → JPL-TES	299.2	220.2	77.5	0.25	220.2
LaRC PTH → JPL-TES	158.0	119.5	77.2		
LaRC PTH → JPL-TES sftp	13.1	12.5	7.6		
LaRC ANGE → JPL-PTH	77.6	74.6	71.2	3.8	74.7
LaRC PTH → JPL-PTH	65.6	46.6	27.3		
LaRC PTH → JPL-PTH sftp	31.8	31.8	31.7		
LaRC DAAC → JPL-MISR	74.4	59.0	37.4	1.7	59.0
LaRC PTH → JPL-MISR	84.2	79.6	52.9		

Requirements:

Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	FY '07 – '10	7.0	Excellent
LaRC DAAC → JPL-MISR	FY '07 – '10	32.9	Good
LaRC → JPL-Combined	FY '07 – '10	39.9	Excellent

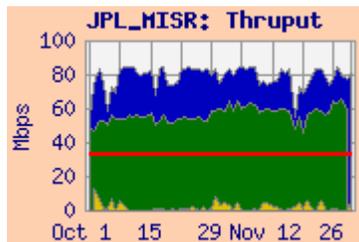
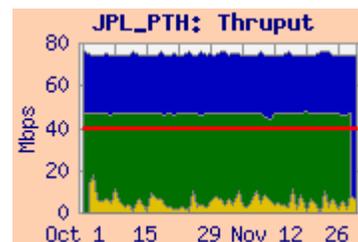
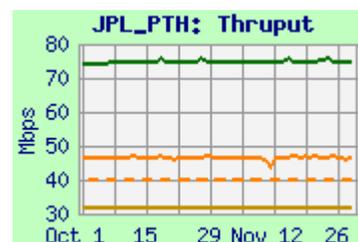
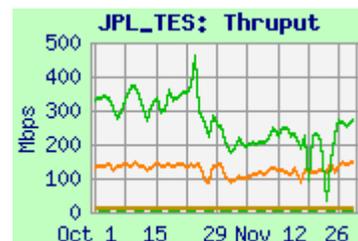
Note: About 45% of the LaRC to JPL flow this month is for MISR.

LaRC → JPL (Overall, TES): Median performance from LaRC ASDC DAAC to JPL-TES remains well over 3 x the TES and combined requirements, so the TES and Overall ratings remain "Excellent". User flow to TES is very low.

Sftp performance from LaRC-PTH to JPL-TES is quite low, limited by the Sftp application on the TES node. Sftp results are better from LaRC-PTH to JPL-PTH (than to TES) because JPL-PTH uses a larger TCP window size.

The JPL-PTH integrated graph shows the overall LaRC to JPL user flow (vs. the overall requirement).

LaRC → JPL (MISR): the median thrupt is above the requirement, by more than 30%, so the MISR rating remains "Good". The user flow to MISR is only about 5% of the requirement.



3.3) JPL → LaRC

Rating: Continued **Excellent**

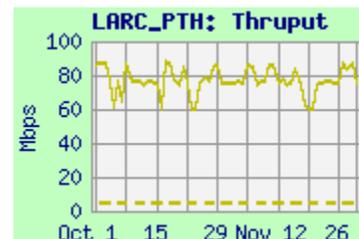
Web Page: http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
JPL-PTH → LaRC PTH	88.7	75.7	59.5	0.53	75.7

Requirements:

Source → Dest	Date	Mbps	Rating
JPL-PTH → LaRC PTH	FY '07 – '10	1.5	Excellent



Comment: This requirement is primarily for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving; it was reduced from 4.4 mbps in May '09 (and had been reduced in April '08 from 52.6 mbps). This month the thrupt frequently switched between its two common states -- 60 and 85 mbps. The rating remains "**Excellent**". The user flow is now measured (at JPL); it was small but consistent with the requirement.

4) GSFC → LaRC:

Rating: Continued **Excellent**

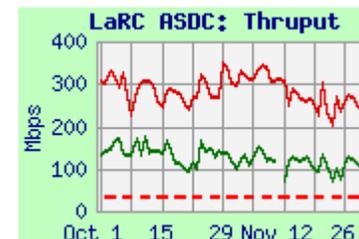
Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/LARC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/LARC_ANGe.shtml
http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GES DISC → LaRC ASDC	361.2	276.0	193.2	8.9	278.3
GSFC-EDOS → LaRC ASDC	152.0	117.6	65.4		
ESDIS-PTH → LaRC-ANGe	402.3	344.5	247.4		
GSFC-NISN → LaTIS	414.4	394.9	344.5		

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → LARC (Combined)	CY '09 – '11	31.3	Excellent



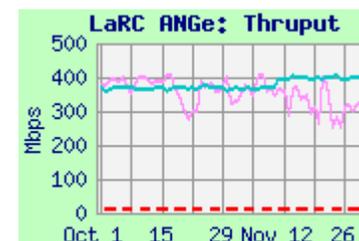
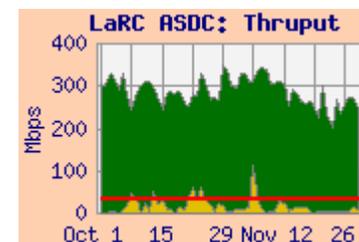
Comments:

GSFC → LaRC ASDC: The rating is based on the GES DISC to LaRC ASDC DAAC thrupt, compared to the combined requirement. The integrated thrupt remains well above 3 x this requirement, so the rating remains "**Excellent**".

The GES DISC results improved in June '09 when the GES DISC moved to the 10 Gig EBnet LAN, as did results from EDOS with its move to the 10 Gig in October '09.

As seen on the Integrated graph, the user flow is often lower than the requirement, except for frequent bursts.

ANGe (LaTIS): Testing to ANGe from ESDIS-PTH gets very steady performance. Testing to LaTIS (Darrin) from GSFC-NISN was similar, also with consistent results.



5) Boulder CO sites:

5.1) NSIDC:

Ratings: GSFC → NSIDC: Continued **Good**
 JPL → NSIDC: Continued **Excellent**
 GHRC → NSIDC: Continued **Excellent**

Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/NSIDC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_SIDADS.shtml
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_PTH.shtml

The ECS proxy firewall was removed from NSIDC on 25 August. Thruput was generally unaffected, but reverse iperf testing with GHRC remains blocked (fixed in December).

The NSIDC DAAC was disconnected from NISN PIP in December '09 – all flows now go via the UCB campus, usually via FRGP to Internet2.

At the beginning of July 2010, FRGP changed its connection to Internet2 to be at Kansas City (KC) instead of Salt Lake City (SLC). This reduced RTT between sites in the East, and increased it from the West. This resulted in performance changes in some cases.

Test Results: NSIDC S4PA

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODIS-PDR → NSIDC DAAC	154.9	60.6	19.1	0.62	60.6
GES-DISC → NSIDC DAAC	189.2	76.3	26.5		
GSFC-EDOS → NSIDC DAAC	107.7	45.4	11.2		
GSFC-ISIPS → NSIDC (iperf)	119.5	55.7	12.2		
JPL PODAAC → NSIDC DAAC	36.6	17.2	3.4		

Requirements:

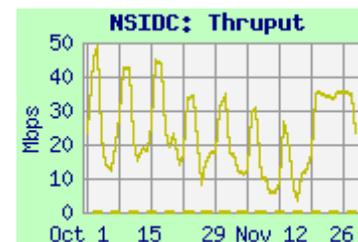
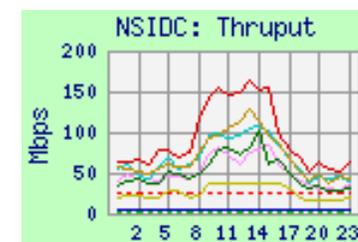
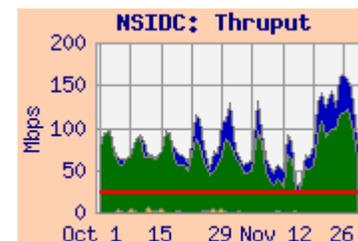
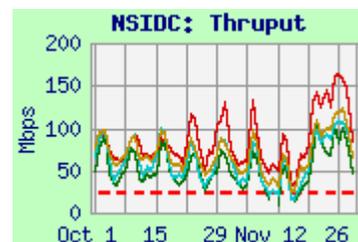
Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '10	27.6	Good
JPL → NSIDC	CY '07 – '10	0.2	Excellent
GHRC → NSIDC	CY '07 – '10	0.5	Excellent

Comments: GSFC → NSIDC S4PA: This rating is based on testing from the MODIS-PDR server to the NSIDC DAAC, since this is the primary production flow. The requirement was reduced in May '09 from 34.5 mbps (and was 64 mbps in April '08). MODIS performance increased at the beginning of July, when MODIS was moved to a 10 gig switch, with separate 1 gig connections for most subsystems.

In late August, probably due to students returning, thruput to NSIDC had a strong diurnal cycle – for example, the ratio of the median daily max to median daily min from MODIS was 8.4:1 (was only 3.1:1 in August).

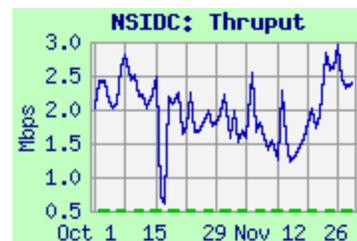
The integrated thruput from MODIS remains above the requirement, by less than 3x, so the rating remains "Good". The user flow was lower this month, substantially below the reduced requirement. Testing from other GSFC sources, including GES DISC, EDOS, and ISIPS similar to MODIS.

JPL PODAAC → NSIDC S4PA: The requirement was reduced from 1.34 mbps in May '09. Thruput from PODAAC to NSIDC has been mostly stable with a similar diurnal cycle since testing was moved to use Internet2 in September '09; the rating remains "Excellent".



5.1 NSIDC: (Continued): Test Results: GHRC to NSIDC

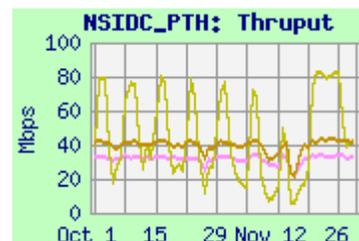
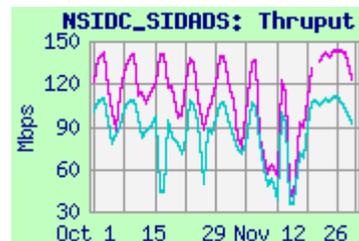
Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GHRC → NSIDC DAAC (iperf)	n/a	n/a	n/a
GHRC → NSIDC DAAC (ftp pull)	4.08	1.72	1.14



GHRC, GHRC-ftp → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E data to NSIDC via Internet2. Iperf testing from GHRC was previously performed by reverse testing initiated by NSIDC. With the new NSIDC firewall configuration in August, this testing remains blocked (testing resumed in December by switching to nuttcp). So the rating is based only on the reverse ftp testing. The median ftp thrupt is more than 3x the 0.5 mbps requirement, so the rating remains **Excellent**. The ftp performance is limited by the TCP window size and RTT. User flow averaged about 1.8 mbps this month (above the requirement).

Test Results: NSIDC SIDADS, PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC-SIDADS	143.7	108.4	31.4
GSFC-NISN → NSIDC-SIDADS	111.0	90.3	30.4
ESDIS-PTH → NSIDC-PTH	36.5	31.8	9.3
MODIS-PDR → NSIDC-PTH	46.5	40.0	14.1
JPL PTH → NSIDC-PTH	82.5	31.2	5.1



GSFC → NSIDC-SIDADS: Thruput via Internet2 to SIDADS from ENPL and GSFC-NISN showed similar diurnal variation but was otherwise steady.

NSIDC-PTH: Testing to NSIDC-PTH (now on the UCB network -- had been removed from NISN in mid May). The average thrupt is lower than previously, due to the diurnal variation.

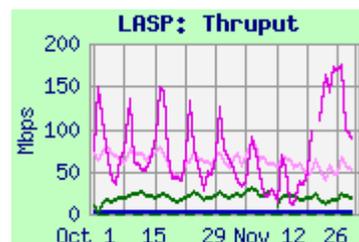
5.2 LASP:

Ratings: GSFC → LASP: Continued **Excellent**

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/LASP.shtml>

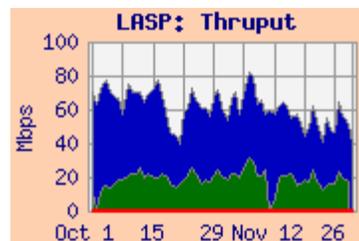
Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP blue	33.4	20.3	7.4
ESDIS-PTH → LASP blue (iperf)	83.2	57.4	35.8
ESDIS-PTH → LASP blue (scp)	3.1	3.0	2.6
GSFC ENPL → LASP green	175.1	52.2	5.7



Requirement:

Source → Dest	Date	Mbps	Rating
GSFC-EDOS → LASP (blue)	CY '07 – '10	0.4	Excellent



Comments: Thruput from EDOS stabilized in October -- the median thrupt remains well over 3x the requirement, so the rating remains **Excellent**. The average user flow again this month was below typical at only 1 kbps.

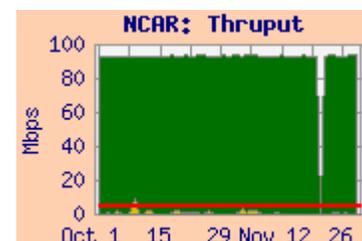
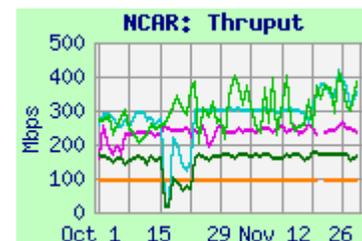
ESDIS-PTH also tests to the test node on LASP's blue network with steady thrupt. SCP performance from ESDIS-PTH to LASP was also very steady

Performance from GSFC-ENPL to a node on LASP's green network via Internet2 improved in July with the reduced RTT, but is also subject to severe diurnal variation.

Note: In December, LASP's connection to NISN PIP was rerouted: previously was 100 mbps from CU-ITS via NSIDC; changed to 10 mbps direct from CU-ITS. This is temporary until the connection to the NISN POP in Denver is made, expected in January.

5.3) NCAR:Ratings: LaRC → NCAR: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement
	Best	Median	Worst	
LaRC ASDC	428.2	324.4	128.9	0.1
LaRC PTH	186.5	169.0	132.7	
GSFC-ENPL-GE	309.0	243.4	179.6	n/a
GSFC-ENPL-FE	93.6	93.5	93.4	
GSFC-NISN	310.2	302.8	265.7	



Comments: NCAR (Boulder, CO) has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements.

Thruput from all of the East coast nodes to NCAR improved at the beginning of July, when FRGP changed its connection to Internet2 to KC instead of SLC, reducing RTT. Thruput from LaRC ASDC was somewhat noisy, but the median remained well above 3 x the reduced requirement, so the rating remains "**Excellent**".

From GSFC-ENPL-GE, with a Gig-E connection to MAX, the median thruput also improved in July. From GSFC-NISN, the route is via NISN to the MAX (similar to the route from LaRC). Performance from all sources is noisy but mostly stable. The average user flow from GSFC this month was a below normal 0.7 mbps (after a large burst at the end of September).

6) ASFRatings: IOnet: **X** Discontinued
WSC → ASF: Continued **Adequate**Web Page: <http://ensight.eos.nasa.gov/Organizations/production/ASF2.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
WSC	122.0	108.4	66.7	96	Adequate
WSC-SFTP	68.8	61.4	36.2		
GSFC ENPL	165.5	92.5	38.3		
GSFC-SCP	17.2	17.0	15.9		

Comments: IOnet: The ASF IOnet host and firewall was reconfigured in October '07, and all IOnet testing stopped at that time.

Testing to ASF is for the ALOS mission. The route from WSC is via NISN SIP, peering with Internet2 at one of several possible peering points (usually StarLight in Chicago). Internet2 connects to the "Pacific Northwest Gigapop" (PNW) in Seattle. From there the University of Alaska – Fairbanks (UAF) has a dedicated OC-12 circuit to campus, then via campus LAN to the Alaska Satellite Facility (ASF). In February 2010, policing was installed at the WSC source at 250 mbps. That steadied the thruput significantly.



A new ASF iperf server was provided in late September (the old one had gone down in June). The median iperf thruput from WSC is now above requirement, but by less than 30%, so the rating remains "**Adequate**".

From GSFC, SCP thruput is lower, even though the RTT is also lower. This is under investigation.

7) Remote Sensing Systems (RSS):Web Page <http://ensight.eos.nasa.gov/Missions/aqua/RSS.shtml>Rating: Continued **Excellent****Test Results:**

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
JPL → RSS	5.56	3.35	1.14	0.5

Comments: RSS (Santa Rosa, CA) is a SIPS for AMSR-E (Aqua), receiving L1 data from JAXA via JPL, and sending its processed L2 results to GHRC (aka NSSTC) (UAH, Huntsville, AL). This month the thruput from JPL was noisy, as usual -- periods of low performance are believed to be attributable to correspondingly high user flow (User flow data remains unavailable on this circuit). The requirement was reduced with handbook 1.4.3 (was 2.5 mbps previously). The median iperf was more than 3 x the reduced requirement, so the rating remains "Excellent".



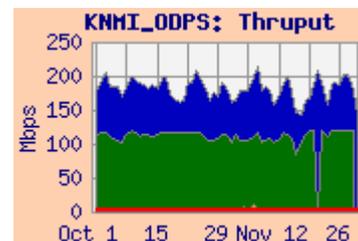
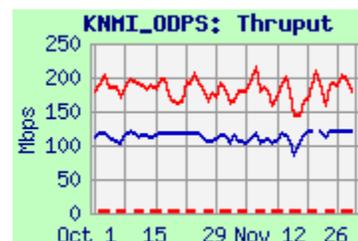
RSS currently is connected to NISN SIP via 4 x T1s to NASA ARC (total 6 mbps). Planning is underway to switch to a higher speed circuit from a commercial ISP in the area.

Note that with the present configuration (passive servers at both RSS and GHRC), the RSS to GHRC performance cannot be tested.

8) KNMI:Web Pages http://ensight.eos.nasa.gov/Missions/aura/KNMI_ODPS.shtmlRating: Continued **Excellent****Test Results:**

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
OMISIPS → KNMI-ODPS	226.1	179.8	109.4	0.03
GSFC-ENPL → KNMI-ODPS	122.7	113.5	69.9	

Comments: KNMI (DeBilt, Netherlands) is a SIPS and QA site for OMI (Aura). The route from GSFC is via MAX to Internet2, peering in DC with Géant's 10 gbps circuit to Frankfurt, then via Surfnets through Amsterdam. The rating is based on the results from OMISIPS at GSFC to the ODPS primary server, and remains "Excellent". This performance improved dramatically at the end of February with OMI move off of the congested EBnet GigE. The best to worst ratio is now only 2.1:1 (was 12:1 in February). The user flow averaged 2.1 mbps this month, (hard to see on the integrated graph). This is more consistent with the previous 3.3 mbps requirement than the current 0.03 mbps requirement (This new requirement remains under review).



9) ERSDAC:

Ratings: **GSFC → ERSDAC:** Continued **Excellent**
ERSDAC → EROS: Continued **Excellent**
ERSDAC → JPL-ASTER-IST: Continued **Excellent**

Web Page : <http://ensight.eos.nasa.gov/Organizations/production/ERSDAC.shtml>

US ↔ ERSDAC Test Results

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-EDOS → ERSDAC	81.7	78.8	58.1	3.4	78.9
GES DISC → ERSDAC	22.2	18.3	12.6		
GSFC ENPL (FE) → ERSDAC	89.5	89.3	89.2		
ERSDAC → EROS	88.0	83.9	35.2	3.2	
ERSDAC → JPL-ASTER IST	89.9	89.7	89.5		

Requirements:

Source → Dest	FY	Mbps	Rating
GSFC → ERSDAC	'05 - '09	5.4	Excellent
ERSDAC → JPL-ASTER IST	'07- '09	0.31	Excellent
ERSDAC → EROS	'07- '09	8.3	Excellent

Comments:

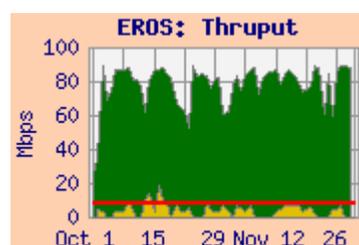
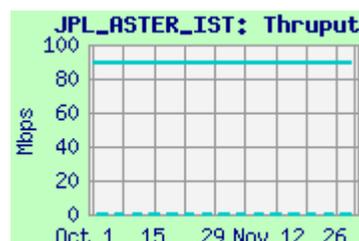
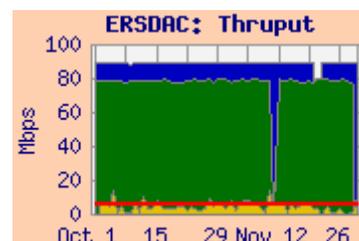
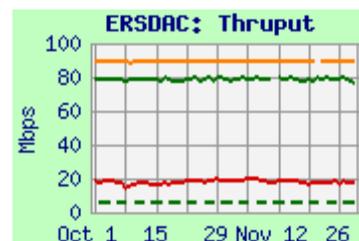
GSFC → ERSDAC: The median thrupt from EDOS improved in late September. It remains well above 3 x the reduced requirement; the rating remains “**Excellent**”. The integrated chart shows that the user flow is stable, and consistent with the new requirement.

Thruput from GES DISC to ERSDAC is limited by packet loss at the GigE to FastE switch at Tokyo-XP. The GES DISC GigE source does not see any bottlenecks until this switch (The Internet2 and APAN backbones are 10

Gbps). It thus exceeds the capacity of the switch’s FastE output circuit, causing packet loss. But the FastE connected ENPL node is limited to 100 mbps by its own interface, so does not suffer performance degrading packet loss – and the performance is much higher. EDOS uses QoS (HTB) to limit its burst rate, and thus gets much better thrupt that GES DISC – thrupt similar to ENPL-FE.

ERSDAC → JPL-ASTER-IST: The median thrupt is very stable, and remains well above the [unstated] requirement (IST requirements are generally 311 kbps), so the rating remains “**Excellent**”.

ERSDAC → EROS: The thrupt is mostly stable and remains well above the reduced requirement (was 26.8 mbps previously). The new 8.3 mbps requirement is much closer to the actual flow (especially when contingency is added). The median thrupt is more than 3 x the reduced requirement, so the rating remains “**Excellent**”.



10) US ↔ JAXA

Ratings: US → JAXA: Continued Excellent
JAXA → US: Continued Excellent

The JAXA test hosts at EOC Hatoyama were retired on March 31, 2009 (the end of the Japanese government's fiscal year). No additional testing is planned for AMSR or TRMM. All testing to JAXA-TKSC for ALOS was terminated at the end of June '09.

However, the user flow between GSFC and JAXA continues to be measured. As shown below, the average user flow this month was 3.85 mbps from GSFC to JAXA (with frequent peaks above 10 mbps), and 143 kbps from JAXA to GSFC (with regular peaks to 2.5 mbps). Comparing these values to the new requirement of 0.1 mbps produces a rating of "Excellent" in both directions. Note that the user flow to JAXA is much more consistent with the old 2.0 mbps GSFC → JAXA requirement.

