

EOS Production Sites

Network Performance Report: January 2010

This is a monthly summary of EOS network performance testing between production sites -- comparing the measured performance against the requirements.

Highlights:

- **Mostly stable flows with continued congestion at GSFC**
 - **GPA 3.68** (was 3.74 last month)
- **Requirements:** updated to Handbook 1.4.3 in May '09 (was 1.4.2 previously)
 - Many Requirements dropped significantly
 - Some of these changes are under review
- **Only 1 flow below "Good":**
 - **GSFC MODAPS-PDR to EROS ("Low")**
 - Due to EBnet 1G congestion at GSFC
 - Would be rated "**Adequate**" from EDOS or GES DISC
- **NSIDC:** Disconnected from NISN PIP in December
 - All NSIDC flows are now via UCB campus
 - UCB disconnected from SIP in January
 - Most flows use Internet2
- **Bottlenecks:**
 - **GSFC:** EBnet Internal Gig-E
 - Congestion affects MODIS, others
 - Average user flow: approx 700 mbps
 - Sustained (5 minute) peaks very close to 1 gbps
 - Upgrade to 10 Gig backbone is partially complete
 - Doors, EBnet routers upgraded to 10 Gig in April, May '09
 - GES DISC, Closed EBnet moved to 10 Gig EBnet in June, October '09
 - 1 gig connections
 - performance improved at that time!
 - ESDIS and ESMO routers connected to 10 gig backbone in December – 10 gig connections
 - PPS connected to ESDIS router
 - Other systems to be upgraded individually
 - MODIS planned for February '10
 - **LaRC ASDC:**
 - High user outflow congests GigE
 - No problem seen from ANGe or LaRC-PTH
- Significant improvements are noted in Green, Network problems in Red, System problems and Requirements issues in Gold, other comments in Blue.

Ratings Changes:

Upgrades: ↑ None

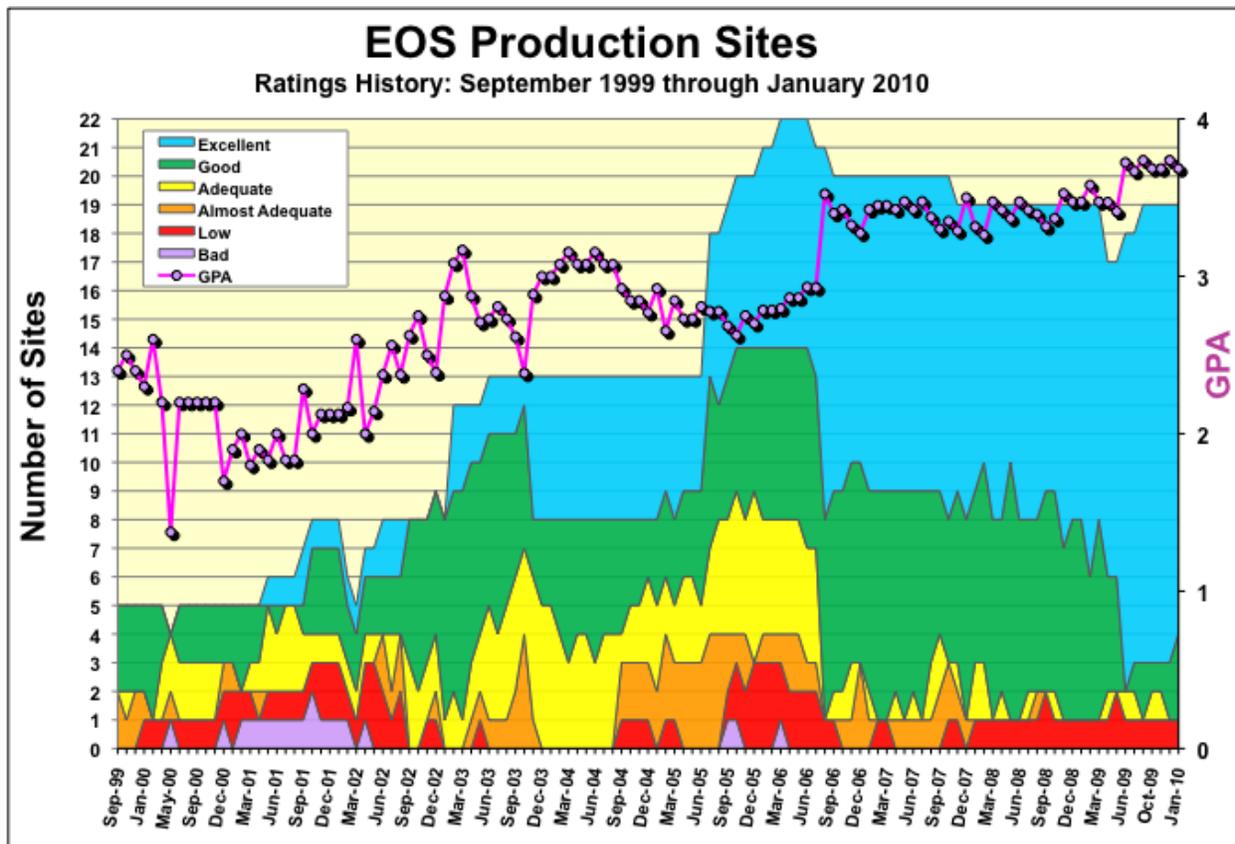
Downgrades: ↓ GSFC MODAPS → NSIDC: Excellent → **GOOD**

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.

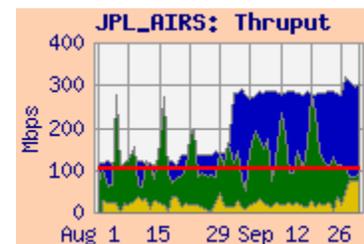
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated 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:

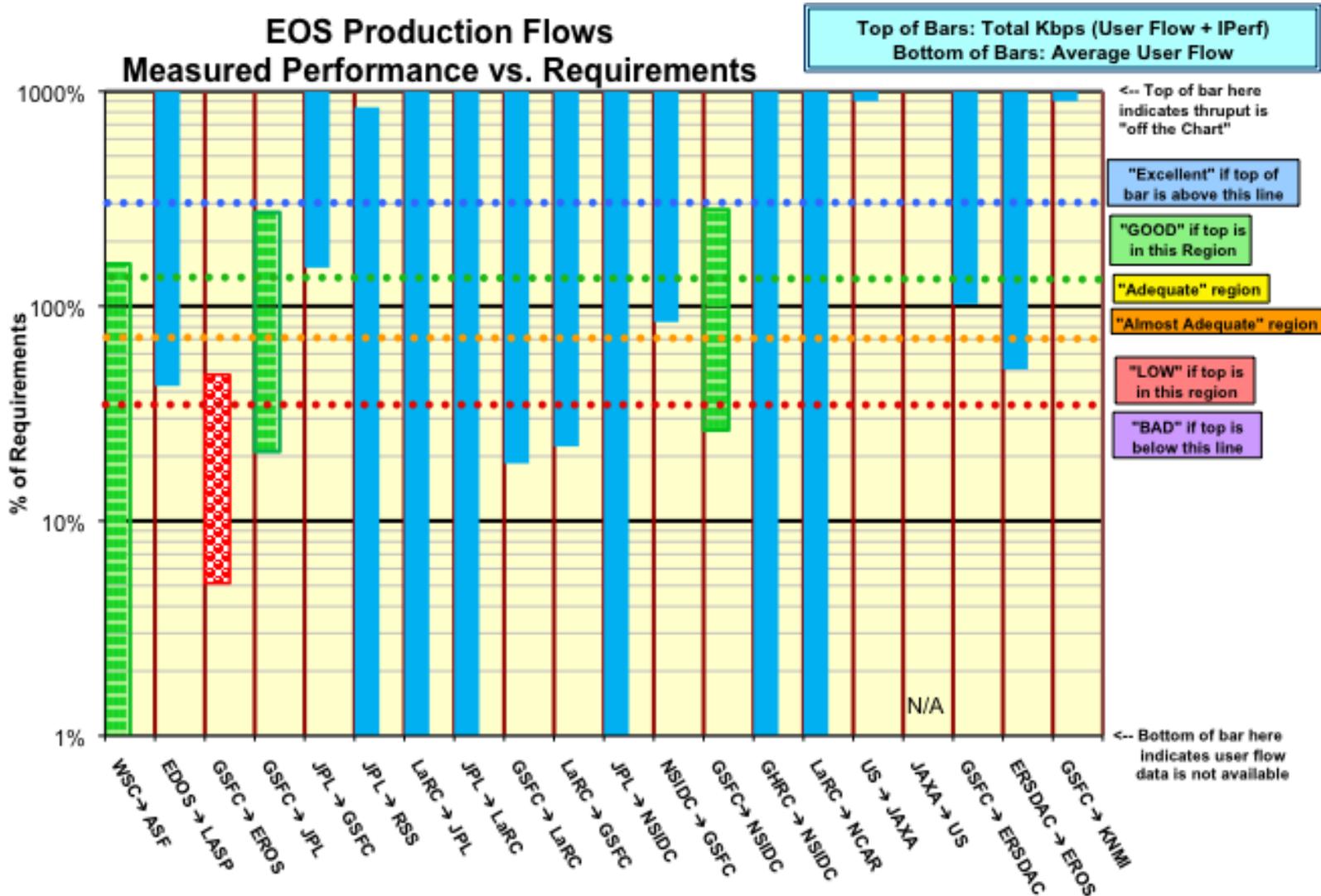
Integrated charts are included with site details, where available. These charts are “Area” charts, with a “salmon” background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to 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 – “behind” the green area – representing adjusted iperf measurements from a second source node at the same facility.



Network Requirements vs. Measured Performance

January 2010		Requirements (mbps) from Handbook 1.4.3			Testing				Ratings		
Source → Destination	Instrument (s)	Current	Old Version (1.4.2)	Future	Source → Dest Nodes	Avg User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re Jan 10 Requirements		Ratings re Oct 2010 Reqmnts
		Jan 2010		Oct 2010					This Month	Last Month	
WSC → ASF	ALOS	96.0	n/a	96.0	WSC → ASF-DAAC TEST		150.8		GOOD	G	GOOD
EDOS → LASP	ICESat, QuikScat	0.4	0.4	0.4	GSFC-EDOS → LASP (blue)	0.17	36.5		Excellent	E	Excellent
GSFC → EROS	MODIS, LandSat	342.9	345.9	342.9	MODAPS-PDR → EROS LPDAAC	17.6	163.0	164.2	LOW	L	LOW
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	101.7	GES DISC → JPL-AIRS	21.4	275.8	277.7	GOOD	G	GOOD
JPL → GSFC	MLS	0.6	7.4	0.6	JPL-PTH → GSFC-PTH	0.85	66.8		Excellent	E	Excellent
JPL → RSS	AMSR-E	0.5	2.5	0.5	JPL-PODAAC → RSS		4.1		Excellent	E	Excellent
LaRC → JPL	TES, MISR	23.0	43.7	23.0	LARC-DAAC → JPL-TES		304.1		Excellent	E	Excellent
JPL → LaRC	TES	1.5	4.4	1.5	JPL-PTH → LARC-PTH		85.7		Excellent	E	Excellent
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	31.3	GSFC-EDOS → LDAAC	5.8	419.7	419.9	Excellent	E	Excellent
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	0.4	LDAAC → GES DISC	0.08	508.8	508.8	Excellent	E	Excellent
JPL → NSIDC	AMSR-E	0.2	1.3	0.2	JPL-PODAAC → NSIDC		53.1		Excellent	E	Excellent
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	0.6	NSIDC DAAC → GES DISC	0.48	295.3	295.3	Excellent	E	Excellent
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	27.6	MODAPS-PDR → NSIDC-DAAC	7.3	75.5	77.5	GOOD	E	GOOD
GHRC → NSIDC	AMSR-E	0.5	7.5	0.5	GHRC → NSIDC DAAC		25.5		Excellent	E	Excellent
LaRC → NCAR	MOPITT	0.1	5.4	0.1	LDAAC → NCAR		163.4		Excellent	E	Excellent
US → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	0.1	GSFC-EDOS → JAXA DDS	1.3	Testing discontinued: 31 March 2009		Excellent	E	Excellent
JAXA → US	AMSR-E	0.5	1.3	0.5	JAXA DDS → JPL-QSCAT				n/a	n/a	n/a
GSFC → ERSDAC	ASTER	5.4	12.5	5.4	GSFC-EDOS → ERSDAC	5.5	77.6	78.2	Excellent	E	Excellent
ERSDAC → EROS	ASTER	8.3	26.8	8.3	ERSDAC → EROS PTH	4.2	82.3	82.3	Excellent	E	Excellent
GSFC → KNMI	OMI	0.03	3.3	0.03	GSFC-OMISIPS → ODPS	1.5	114.5	114.5	Excellent	E	Excellent
significant change from version 1.42 (May 2009) to 1.43									Ratings Summary		Oct-2010
									Jan-2010 Req	Prev	Req
									Score		Score
*Criteria:	Excellent	Total Kbps > Requirement * 3				Excellent		15	16	15	
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3				GOOD		3	2	3	
	Adequate	Requirement < Total Kbps < Requirement * 1.3				Adequate		0	0	0	
	Almost Adequate	Requirement / 1.3 < Total Kbps < Requirement				Almost Adequate		0	0	0	
	LOW	Requirement / 3 < Total Kbps < Requirement / 1.3				LOW		1	1	1	
	BAD	Total Kbps < Requirement / 3				BAD		0	0	0	
							Total Sites		19	19	19
Notes:	Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS						GPA		3.68	3.74	3.68

This graph shows a bar for each source-destination pair – relating the measurements to the requirements for that pair. The bottom of each bar is the average measured user flow to a site. 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 represents the integrated measurement, combining the user flow with Iperf measurements – this value is used to determine the ratings.



1) EROS:

Ratings: GSFC → EROS: Continued **Low**
 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	228.0	163.0	74.5	17.6	164.2
GSFC-EDOS → EROS LPDAAC	316.1	310.1	95.8		
GES DISC → EROS LPDAAC	433.3	358.5	176.4		
ERSDAC → EROS LPDAAC	83.0	82.3	80.4	4.2	82.3
GSFC-EBnet-PTH → EROS PTH	347.6	104.7	31.4		
GSFC-ENPL → EROS PTH	459.0	442.5	334.9		
GSFC-NISN → EROS PTH	480.0	466.9	384.2		
NSIDC SIDADS → EROS LPDAAC	87.5	82.7	65.3		
LaRC PTH → EROS PTH	170.1	169.4	107.2		

Requirements:

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

Comments:

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 OC-48 (2.5 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 was typical of the last few months, and remains far below the nominal requirement, which includes a high level of MODIS reprocessing.

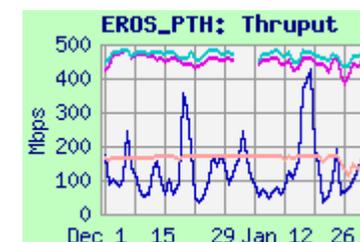
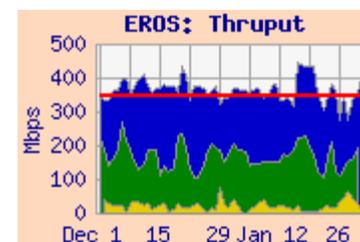
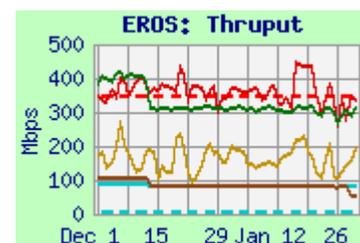
Performance from the hosts on the 1 Gig EBnet (MODAPS, and GSFC-EBnet-PTH) is predominantly limited by congestion on the EBnet GigE circuit at GSFC, as indicated by their large best:worst ratios (e.g., 3.1:1 from MODAPS). Thruput from MODAPS remains more than 30% below the requirement so the rating remains "**Low**".

GES-DISC was moved to the new 10 Gig EBnet in June '09, and EDOS was moved in October, with much better performance! While the median daily best thrupt from GES DISC is about 90% higher than from MODAPS, its median daily worst thrupt is 2.4 times higher! It would be rated "**Adequate**". Likewise, the GSFC-NISN host uses the same NISN route as above, but is connected outside the congested EBnet to Doors Gig-E circuit, so its performance is also much higher. The ENPL host has a direct connection to the MAX, also bypassing the congested EBnet Gig-E circuit. Its route is via MAX to Internet2 to StarLight in Chicago. Performance is similar to the GSFC-NISN source. Both are predominantly limited by the OC-12 to EROS, and would be rated "**Good**".

ERSDAC → EROS: See section 7 (ERSDAC) for further discussion of this performance.

NSIDC → EROS: Performance dropped a bit with NSIDC's switch to from NISN to Internet2 in December, with a longer RTT.

LaRC → EROS: The thrupt from LaRC-PTH to EROS-PTH was stable after last month's upgrade of LaRC-PTH to a GigE interface (with policing at 200 mbps). The route is via NISN to the Chicago CIEF.



2) to GSFC

Ratings: NSIDC → GES DISC: Continued **Excellent**
 LDAAC → GES DISC: Continued **Excellent**
 JPL → GES DISC: 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	141.5	129.4	112.1	
EROS PTH → GSFC-EBnet PTH	395.0	347.6	235.1	
JPL-PTH → GSFC-EBnet PTH	87.6	66.8	44.3	0.86
LDAAC → GES DISC	616.6	508.8	136.3	0.08
LARC-ANGe → GSFC-EBnet PTH	333.4	269.4	193.8	
NSIDC DAAC → GES DISC	341.3	295.3	179.8	0.48
NSIDC DAAC → GSFC-ISIPS	86.0	82.8	57.6	

Requirements:

Source → Dest	Date	Mbps	Rating
NSIDC → GSFC	CY '06 – '09	0.6	Excellent
LDAAC → GES DISC	FY '07 – '09	0.4	Excellent
JPL → GSFC combined	CY '06-09	3.2	Excellent

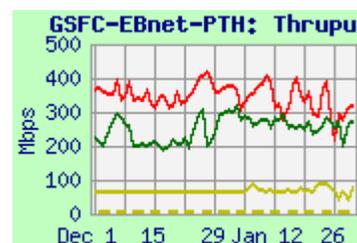
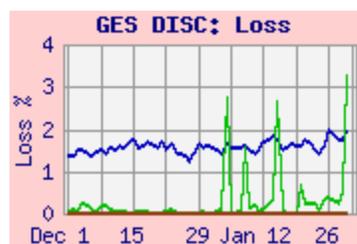
Comments:

EROS → GSFC: The thrupt for tests from EROS LPDAAC to GES DISC and EROS PTH to EBnet-PTH were stable this month, but note that the DAAC to DAAC flow still cannot use most of the WAN capability (compared to the EROS-PTH to GSFC-EBnet-PTH results), due to packet loss between the LPDAAC and the EROS ECS firewall.

JPL → GSFC: Thrupt was stable this month. With the modest requirement (reduced from 7.4 mbps in May), the rating remains “Excellent”. The actual user flow remains lower than even this reduced requirement.

LaRC → GSFC: Performance from LDAAC → GES DISC remained way above 3 x the modest requirement, so the rating continues as “Excellent”. Congestion at LaRC ASDC caused a higher than normal 4.5:1 Best:worst ratio (LaRC ANGe had a lower best, but a higher worst, and only 1.7:1 ratio, so the problem is isolated to just ASDC). The user flow this month was way below the typical flow, and the requirement.

NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) improved last month, with NSIDC’s switch from NISN to Internet2. With the low requirement (reduced from 13.3 mbps in May), the rating remains “Excellent”. The user flow remains greatly reduced from the 1.2 mbps in May.

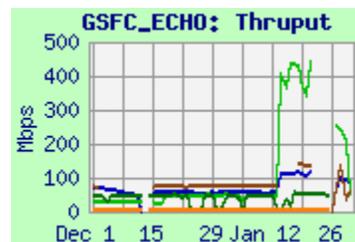


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

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

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	109.7	62.8	44.6
EROS LPDAAC ftp	8.4	7.1	6.0
GES DISC	n/a	n/a	n/a
GES DISC ftp	n/a	n/a	n/a
LaRC ASDC DAAC	171.7	50.0	42.4
LaRC ASDC DAAC ftp	55.3	49.4	9.9
NSIDC DAAC	84.6	76.2	41.5
NSIDC DAAC ftp	8.2	8.0	2.9



Comments:

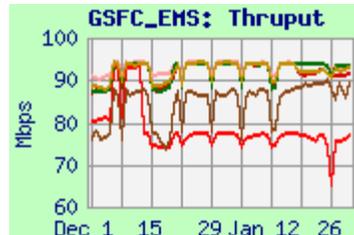
GSFC-ECHO was upgraded to a Gig E interface in mid January, with improved results (note that the values above are a weighted average of the two configurations). Testing is performed to GSFC-ECHO from the above nodes, both iperf and ftp.. The Fast-E is no longer a performance limitation, but TCP window size remains – especially on ftp with long RTT.

2.3 GSFC-EMS: EOS Metrics System

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

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS-PTH	77.7	76.8	62.8
GES DISC	93.8	92.3	87.0
GSFC-PTH	94.1	93.7	59.1
LARC-PTH	94.0	93.8	85.6
MODAPS-PDR	94.1	92.7	86.0
NSIDC-PTH	89.8	87.5	69.6



Comments:

Testing is performed to GSFC-EMS from the above nodes, iperf only. Results are quite steady (note the expanded scale on the graph). 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	309.4	275.8	185.2	21.4	277.7
GSFC-NISN → JPL-AIRS	274.0	261.8	236.5		
GSFC-EBnet-PTH → JPL-AIRS	279.8	124.7	53.9		
GSFC-EBnet-PTH → JPL-PODAAC	178.1	90.5	29.0		
GSFC-EBnet-PTH → JPL-QSCAT	91.5	84.8	29.9		
GSFC-EBnet-PTH → JPL-MLS	48.3	20.4	13.6		
GSFC-NISN → JPL-MLS	441.0	408.2	284.2		

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL Combined	FY '08-'09	101.7	Good
GSFC → JPL AIRS	FY '08-'09	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-'09	2.1	Excellent

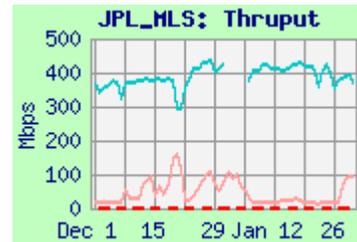
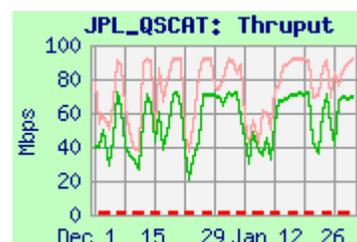
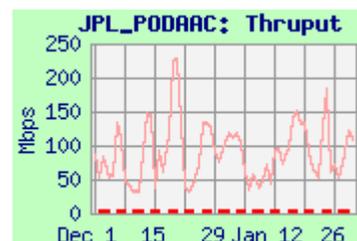
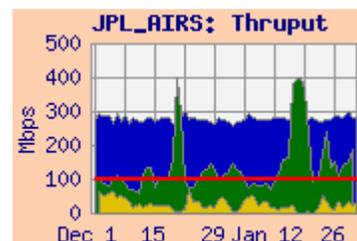
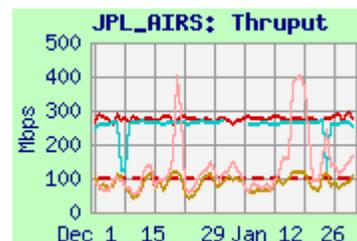
Comments: The EBnet to Doors congestion at GSFC was the bottleneck for the flows from GSFC-EBnet-PTH, and from GES DISC until the GES DISC was moved to the 10 Gig EBnet in June '09. The user flow from GSFC/EOS remained near normal this month, after increasing at the end of September, apparently due to increased MODIS flows.

AIRS, Overall: Thruput was well above the AIRS requirement, but by slightly less than 3x, 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 slightly below 3x this requirement, so the overall rating remains "Good".

PODAAC: Daily thrupt peaks from EBnet-PTH averaged 180 mbps, while the median thrupt is about half of that, due to congestion at GSFC. The GSFC-PODAAC requirement (for MODIS data) is only 1.5 mbps, rating "Excellent".

QSCAT: The thrupt from GSFC-EBnet-PTH peaks close to 100 mbps – limited by a Fast-E connection at QSCAT, and congestion at GSFC. Even with a 3:1 best:worst ratio, the thrupt is well above the modest requirement, rating "Excellent". Performance to a second QScat node (ketch) (green line), is similar to the primary node.

MLS: Thruput from GSFC-EBnet-PTH was very noisy, with a 3.6:1 best:worst ratio, due to congestion at GSFC. Testing from GSFC-NISN avoids this congestion, with much higher and more stable results, . rating "Excellent"



3.2) LaRC ↔ JPL

Ratings: LaRC → JPL: Continued **Excellent**
 JPL → LaRC: Continued **Excellent**

Web Pages:

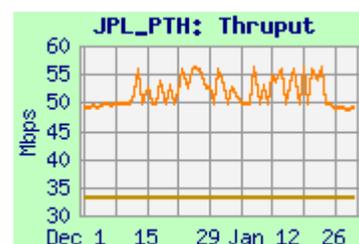
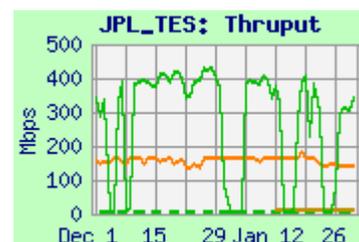
http://ensight.eos.nasa.gov/Organizations/production/JPL_TES.shtml

http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml

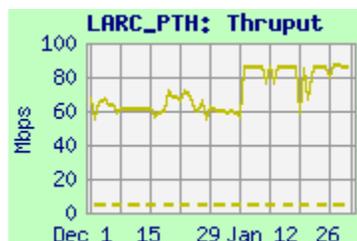
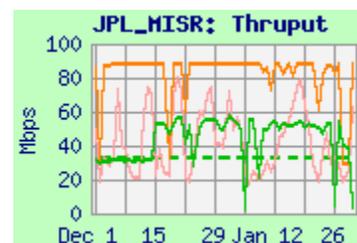
http://ensight.eos.nasa.gov/Organizations/production/JPL_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
LaRC DAAC → JPL-TES	425.3	304.1	6.5
LaRC PTH → JPL-TES	181.9	163.7	123.0
LaRC PTH → JPL-TES sftp	13.8	13.5	12.9
LaRC PTH → JPL-PTH	78.3	49.8	47.0
LaRC PTH → JPL-PTH sftp	33.2	33.2	33.1
LaRC DAAC → JPL-MISR	64.1	51.7	6.2
LaRC PTH → JPL-MISR	88.0	87.8	45.3
JPL-PTH → LaRC PTH	85.9	85.7	55.3

**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	Adequate
LaRC → JPL-Combined	FY '07 – '10	39.9	Excellent
JPL PTH → LaRC PTH	FY '07 – '10	1.5	Excellent



Comments: LDAAC was moved to campus address space in March '07. User flow data is no longer available from LaRC (has been requested but not implemented). Thus no integrated graphs are available from LaRC.

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**". However, there were many periods of extreme congestion observed from ASDC DAAC (not seen from ANGe or LaRC-PTH).

Sftp testing from LaRC-PTH to JPL-TES resumed in January, with similar results to previous tests. Sftp results are better from LaRC-PTH to JPL-PTH which uses a larger TCP window size.

LaRC → JPL (MISR): Testing from LaRC ASDC DAAC was retuned in December, with improved thruput; the median thruput is above the requirement, but by slightly less than 30%, so the rating remains "**Adequate**". Thruput is much higher from LaRC-PTH, would be rated "**Good**".

JPL → LaRC: 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). Thruput this month was mostly steady, after increasing from its lower bimodal state in early January (thruput often switches between 60 and 85 mbps). The rating remains "**Excellent**".

4) Boulder CO:

4.1) NSIDC:

Ratings: GSFC → NSIDC: ↓ Excellent → **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 NSIDC DAAC was disconnected from NISN PIP in December – all flows now go via the UCB campus, usually via FRGP to Internet2. Note that NSIDC-PTH is still connected to and using NISN PIP (It is planned to switch its connection to UCB). Also, UCB dropped its peering with NISN SIP in January, so that route is no longer used.

Test Results: NSIDC S4PA

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODIS-PDR → NSIDC	111.3	75.5	37.5	7.3	77.5
GES-DISC → NSIDC	191.1	162.2	74.2		
GSFC-ISIPS → NSIDC (iperf)	73.4	35.4	13.4		
GSFC-ISIPS → NSIDC (ftp)	20.8	10.1	3.0		
JPL PODAAC → NSIDC	56.7	53.1	35.7		
GHRC → NSIDC DAAC (iperf)	29.0	25.5	14.9		
GHRC → NSIDC DAAC (ftp pull)	16.9	16.7	8.3		

Requirements:

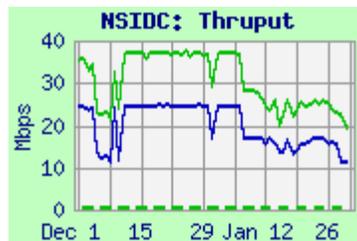
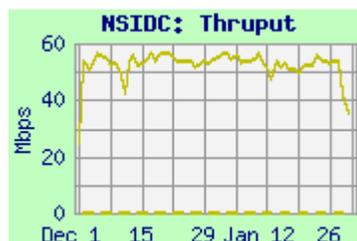
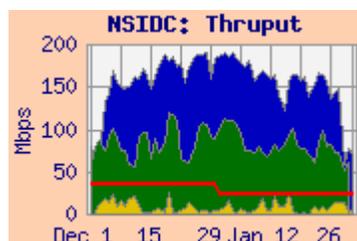
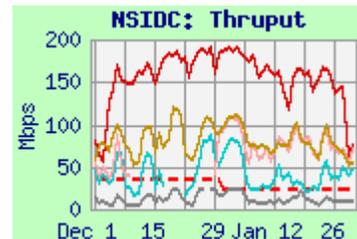
Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '10	27.6	Good
JPL → NSIDC	CY '07 – '10	0.2	Excellent
GHRC → NSIDC	CY '07 – '10	0.5	Excellent

Comments: GSFC → NSIDC S4PA: This rating is based on testing from the MODAPS PDR server to the NSIDC DAAC, now via Internet2, since this is the primary production flow. The throughput values improved with the route change, but remain noisy, due to 1G EBnet congestion at GSFC. Throughput improved even more from GES DISC, which is on the 10 gig backbone. The requirement was reduced in May '09 from 34.5 mbps (was 64 mbps in April '08). The Integrated throughput from MODAPS is above this lower requirement, but by slightly less than 3 x, so the rating drops to "Good" (would be "Excellent" from GES DISC). Note that the user flow remains MUCH lower, even than the reduced requirement.

GSFC-ISIPS → NSIDC: The EBnet congestion at GSFC is affecting ISIPS as well, with a 5.5:1 best to worst ratio.

JPL PODAAC → NSIDC S4PA: Testing from PODAAC to NSIDC was switched to Internet2 in September '09, with significant performance improvement at that time (the user data flows had already been switched). The requirement was reduced from 1.34 mbps in May '09; the rating remains "Excellent".

GHRC → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E L2/L3 data to NSIDC via Internet2, with the return route now via Internet2 peering with NISN SIP – reducing performance due to its longer RTT. The median throughput is more than 3x the requirement (reduced from 7.5 mbps in May), so the rating remains "Excellent". The ftp performance is limited by the TCP window size and RTT.

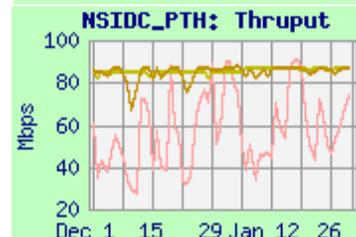
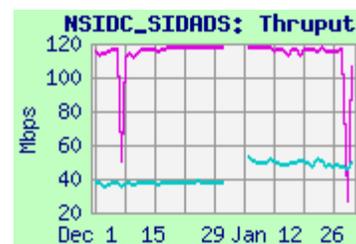


Test Results: NSIDC SIDADS, PTH

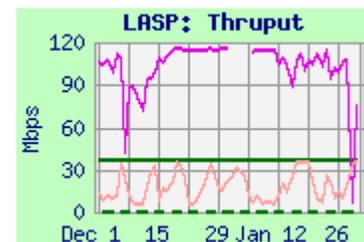
Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC_SIDADS	117.9	116.2	94.5
GSFC-NISN → NSIDC_SIDADS	55.0	49.0	31.9
GSFC-EBnet-PTH → NSIDC-PTH	90.3	58.6	18.9
MODIS-PDR → NSIDC-PTH	88.5	86.5	65.5
JPL PTH → NSIDC-PTH	86.6	86.5	83.3

GSFC → NSIDC-SIDADS: Thruput via Internet2 to SIDADS from ENPL was steady and well above the requirement. Testing from GSFC-NISN was returned in January, with somewhat improved performance.

NSIDC-PTH: Testing to NSIDC-PTH is via NISN-PIP, which no longer supports any user flows. Thruput from GSFC was noisy due to EBnet congestion at GSFC, and from JPL-PTH was very steady.

**4.2) LASP:**Ratings: GSFC → LASP: Continued **Excellent**Web Page: <http://ensight.eos.nasa.gov/Organizations/production/LASP.shtml>**Test Results:**

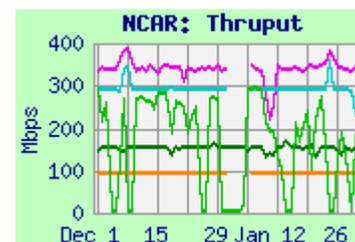
Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP (blue)	36.7	36.5	0.5
GSFC EBnet-PTH → LASP (iperf)	35.9	19.3	2.9
GSFC ENPL → LASP (green)	115.1	105.5	68.0



Comments: GSFC → LASP: Thruput from EDOS to the LASP blue network via NISN PIP improved and got much steadier with EDOS' move to the 10 gig backbone, in October '09. But thruput remained noisy from GSFC-EBnet-PTH, attributed mostly to 1G EBnet congestion at GSFC. The median thruput from EDOS remains well over 3x the 0.4 mbps requirement, so the rating remains "Excellent". Performance is much higher from GSFC-ENPL to a node on LASP's green network via Internet2, which avoids the EBnet congestion at GSFC. The average user flow this month was a bit higher than typical at 170 kbps. Sftp thruput testing was suspended in November '09 due to account issues.

4.3) 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	289.3	163.4	3.4	0.1
LaRC PTH	176.0	154.5	113.7	
GSFC-ENPL-GE	376.7	343.6	274.1	n/a
GSFC-ENPL-FE	93.1	93.0	92.9	
GSFC-NISN	294.3	293.9	258.0	



Comments: NCAR (Boulder, CO) has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements. Thruput from LaRC ASDC was very noisy this month, due to LAN congestion at LaRC, but note the much steadier performance from LaRC-PTH. The median remains 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 is quite steady. From GSFC-NISN, the route is via NISN to the MAX (similar to the route from LaRC). Performance is very stable. The average user flow from GSFC this month was only 2.0 mbps, compared to the old 5.1 mbps requirement.

5) 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 → LDAAC	357.4	305.4	205.3	4.5	305.4
GSFC-EDOS → LDAAC	522.7	419.7	168.0		
GSFC-EBnet-PTH → LaRC-ANGe	414.6	364.4	232.7		
GSFC-NISN → LaTIS	402.3	388.0	347.2		

Requirements:

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

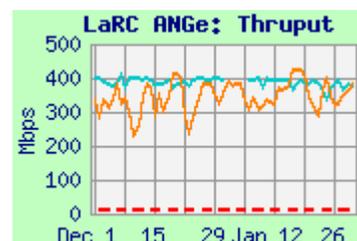
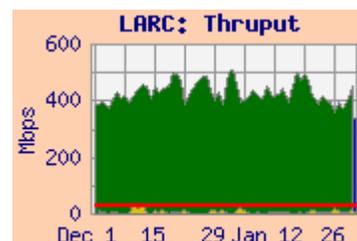
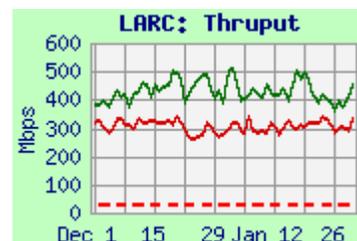
Comments:

GSFC → LaRC: The requirement was reduced from 60.5 mbps (after being reduced effective January '08 from 86.9 mbps due to decreased GEOS flows). The rating is based on the GES DISC to LaRC ASDC DAAC thrupt, compared to this 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. The difference between the daily best, median, and average values from GSFC-EBnet-PTH is attributed to congestion on the 1 gig part of EBnet at GSFC.

As seen on the Integrated graph, the 4.5 mbps average user flow (typical for recent months) remains much lower than the requirement.

ANGe (LaTIS): The thrupt from GSFC-EBnet-PTH to ANGe via PIP was again noisy due to EBnet congestion at GSFC. Testing to LaTIS from GSFC-NISN avoids this congestion, with much more consistent results.

**6) US ↔ JAXA**Ratings: US → JAXA: Continued **Excellent**JAXA → US: **X Testing Discontinued**

Web Pages http://ensight.eos.nasa.gov/Organizations/production/JAXA_EOC.shtml
http://ensight.eos.nasa.gov/Organizations/production/JAXA_HEOC.shtml
http://ensight.eos.nasa.gov/Missions/ALOS/JAXA_TKSC.shtml

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.

However, the user flow to JAXA continues to be measured. This month the average user flow was 1.3 mbps. Comparing this value to the new requirement of 0.1 mbps produces a rating of "**Excellent**". Note that the user flow is much more consistent with the old 2.0 mbps requirement

7) ERSDAC ↔ US:

Ratings: **GSFC → ERSDAC: Continued Excellent**
ERSDAC → EROS: 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	82.9	77.6	28.4	5.5	78.2
GES DISC → ERSDAC	30.5	26.2	21.4		
GSFC ENPL (FE) → ERSDAC	89.1	89.0	88.6		
ERSDAC → EROS	83.0	82.3	80.4	4.2	
ERSDAC → JPL-ASTER IST	90.0	89.6	89.4		

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

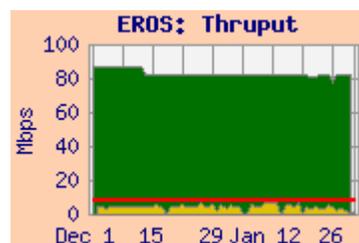
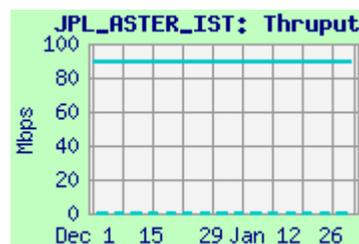
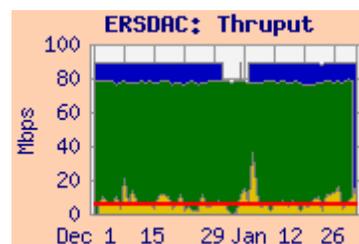
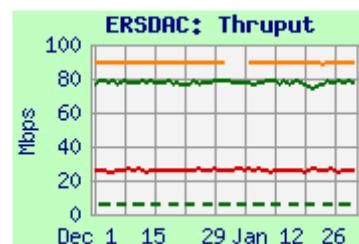
Comments:

GSFC → ERSDAC: The median thrupt from EDOS improved in October '09 with EDOS' move to the 10 Gig EBnet, avoiding the congestion on the 1 gig EBnet. It remains well above 3 x the reduced requirement, so the rating remains "Excellent". The integrated chart shows that the 5.5 mbps 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), and 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 median thrupt remains well above the reduced requirement (was 26.8 mbps previously). The new 8.3 mbps requirement is much closer to the actual flow of 4.2 mbps. The median thrupt is more than 3 x the reduced requirement, so the rating remains "Excellent".



8) ASF

Ratings: IOnet: **X** Discontinued
 WSC → ASF: Continued **Good**

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	344.6	150.8	78.2	96	Good
GSFC	434.1	326.8	175.4		



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 (expected to be 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). Last month's diurnal cycle from both sources is no longer observed. The median is again above the requirement by more than 30%, so the rating remains **Good**.

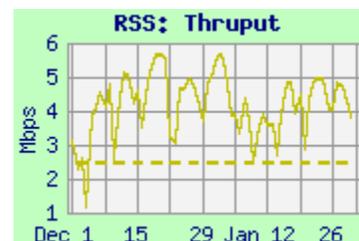
9) Remote Sensing Systems (RSS):

Rating: Continued **Excellent**

Web Page <http://ensight.eos.nasa.gov/Missions/aqua/RSS.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
JPL → RSS	5.68	4.08	1.77	0.5



Comments: RSS (Santa Rosa, CA) is a SIPS for AMSR-E (Aqua), receiving data from JPL, and sending its processed results to GHRC (aka NSSTC) (UAH, Huntsville, AL). This month the thruput from JPL remained 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**.

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

10) KNMI: Rating: Continued **Excellent**

Web Pages http://ensight.eos.nasa.gov/Missions/aura/KNMI_OMIPDR.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
OMISIPS → KNMI-ODPS	158.0	114.5	32.1	0.03
GSFC-ENPL → KNMI-ODPS	125.7	113.1	91.3	

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 Surfnet through Amsterdam. The rating is based on the results from OMISIPS at GSFC to the ODPS primary server, protected by a firewall, and remains "Excellent". **The 5:1 best to worst ratio is attributed to EBnet congestion, not present from GSFC-ENPL.** The user flow averaged 1.5 mbps this month, as shown on the integrated graph. **This is much closer to the previous 3.3 mbps requirement (without contingency), than the current 0.03 mbps requirement (This new requirement remains under review).**

