

EOS Production Sites Network Performance Report: March 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 3.63 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 “**Almost Adequate**” from EDOS or GES DISC
- **Bottlenecks:**
 - **GSFC:** EBnet: 10 Gig upgrade “mostly” complete.
 - **MODIS moved to ESDIS router on 25 February**
 - But still using a single 1 gig connection
 - Since MODIS was dominating the old 1 gig circuit, there was not much improvement seen by MODIS
 - **But performance from the other sources which were competing with MODIS on the old gigE did improve!**
 - e.g., OMISIPS, GSFC-PTH
 - Average user flow: approx 1000 mbps
 - Was only 700 mbps when EBnet backbone was 1 gbps
 - Upgrade EBnet backbone to 10 Gig - history
 - 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
 - ESDIS and ESMO routers connected to 10 gig backbone in December – 10 gig connections
 - PPS connected to ESDIS router
 - MODIS moved to ESDIS router on 25 February '10
 - Other systems to be upgraded individually
- Significant improvements are noted in Green, Network problems in Red, System problems and Requirements issues in Gold, other comments in Blue.

Ratings Changes:

Upgrades: ↑ GSFC → NSIDC: Adequate → **Good**

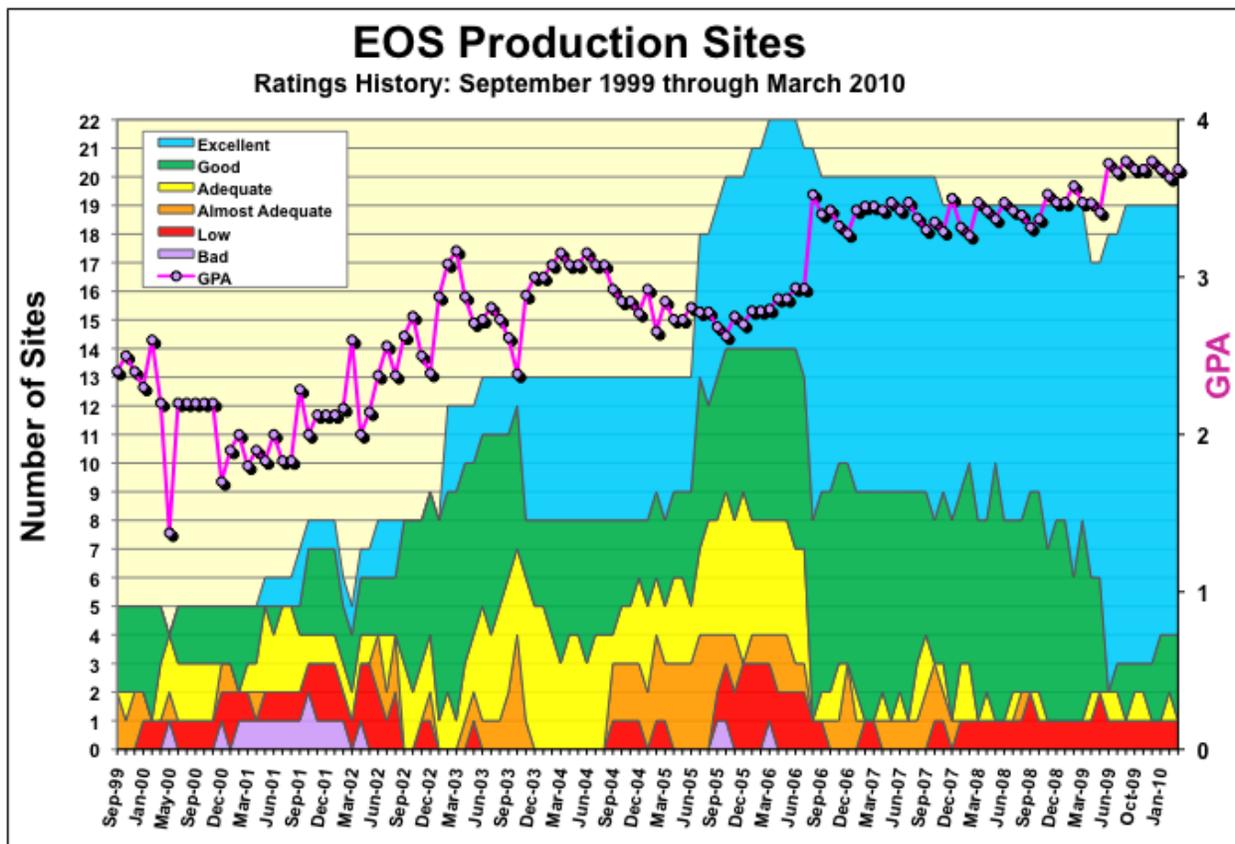
Downgrades: ↓ None

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.

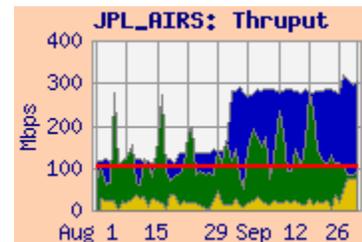
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated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

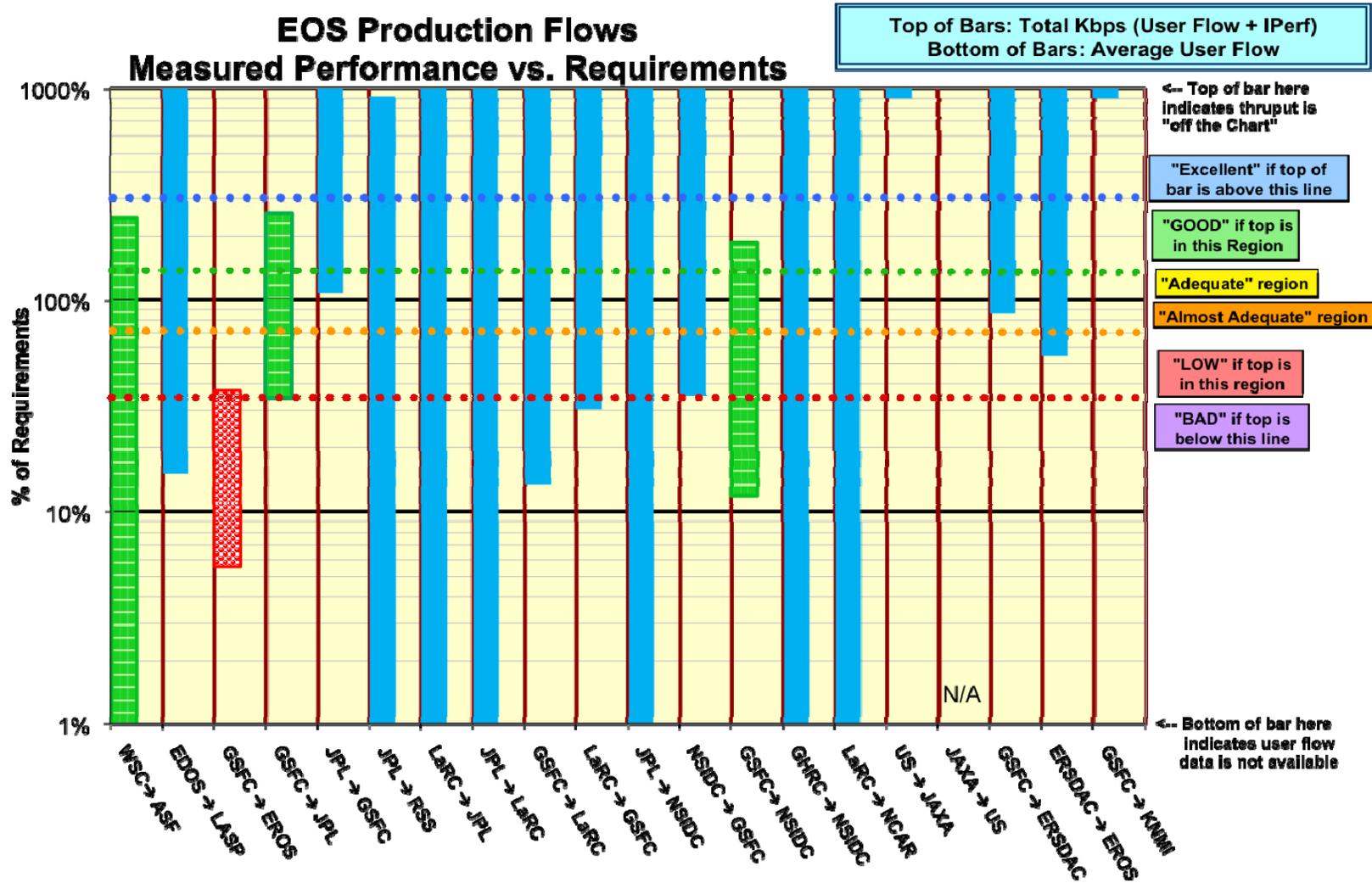
Integrated Charts:

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 – “behind” the green area – representing adjusted iperf measurements from a second source node at the same facility.



Network Requirements vs. Measured Performance

March 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 Mar 10 Requirements		Ratings re Oct 2010 Reqmnts	
		Mar 2010		Oct 2010					This Month	Last Month		
WSC → ASF	ALOS	96.0	n/a	96.0	WSC → ASF-DAAC TEST		234.1		GOOD	G	GOOD	
EDOS → LASP	ICESat, QuikScat	0.4	0.4	0.4	GSFC-EDOS → LASP (blue)	0.06	34.0		Excellent	E	Excellent	
GSFC → EROS	MODIS, LandSat	342.9	345.9	342.9	MODAPS-PDR → EROS LPDAAC	19.1	117.7	127.7	LOW	L	LOW	
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	101.7	GES DISC → JPL-AIRS	35.2	256.6	260.5	GOOD	G	GOOD	
JPL → GSFC	MLS	0.6	7.4	0.6	JPL-PTH → GSFC-PTH	0.60	84.2		Excellent	E	Excellent	
JPL → RSS	AMSR-E	0.5	2.5	0.5	JPL-PODAAC → RSS		4.4		Excellent	E	Excellent	
LaRC → JPL	TES, MISR	23.0	43.7	23.0	LARC-DAAC → JPL-TES		281.9		Excellent	E	Excellent	
JPL → LaRC	TES	1.5	4.4	1.5	JPL-PTH → LARC-PTH		83.4		Excellent	E	Excellent	
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	31.3	GSFC-EDOS → LDAAC	4.2	341.4	341.4	Excellent	E	Excellent	
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	0.4	LDAAC → GES DISC	0.11	445.4	445.4	Excellent	E	Excellent	
JPL → NSIDC	AMSR-E	0.2	1.3	0.2	JPL-PODAAC → NSIDC		41.3		Excellent	E	Excellent	
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	0.6	NSIDC DAAC → GES DISC	0.20	201.3	201.3	Excellent	E	Excellent	
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	27.6	MODAPS-PDR → NSIDC-DAAC	3.3	51.2	51.5	GOOD	A	GOOD	
GHRC → NSIDC	AMSR-E	0.5	7.5	0.5	GHRC → NSIDC DAAC		11.6		Excellent	E	Excellent	
LaRC → NCAR	MOPITT	0.1	5.4	0.1	LDAAC → NCAR		171.8		Excellent	E	Excellent	
US → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	0.1	GSFC-EDOS → JAXA DDS	1.5	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	4.6	75.0	76.2	Excellent	E	Excellent	
ERSDAC → EROS	ASTER	8.3	26.8	8.3	ERSDAC → EROS PTH	4.5	85.1	85.2	Excellent	E	Excellent	
GSFC → KNMI	OMI	0.03	3.3	0.03	GSFC-OMISIPS → ODPS	2.4	217.7	217.7	Excellent	E	Excellent	
significant change from version 1.42 (May 2009) to 1.43												
							Ratings Summary			Oct-2010		
										Mar-2010 Req		Req
										Score	Prev	Score
*Criteria:	Excellent	Total Kbps > Requirement * 3					Excellent			15	15	15
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3					GOOD			3	2	3
	Adequate	Requirement < Total Kbps < Requirement * 1.3					Adequate			0	1	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	3.63	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	209.9	117.7	38.4	19.1	127.7
GSFC-EDOS → EROS LPDAAC	377.2	335.1	79.4		
GES DISC → EROS LPDAAC	396.4	263.4	136.2		
ERSDAC → EROS LPDAAC	86.2	85.1	82.4	4.5	85.2
NSIDC SIDADS → EROS LPDAAC	110.6	88.5	60.9		
GSFC-EBnet-PTH → EROS PTH	415.6	304.0	160.3		
GSFC-ENPL → EROS PTH	422.2	372.3	296.7		
GSFC-NISN → EROS PTH	474.0	449.9	346.9		
LaRC PTH → EROS PTH	141.0	120.4	42.9		

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 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 was typical of the last few months, and remains far below the nominal requirement (the requirement includes a high level of MODIS reprocessing).

MODAPS was moved to the 10 gbps EBnet backbone last month (but with a 1 gig connection). Since MODIS flows were dominating the previous gigE EBnet circuit, performance from MODAPS improved only slightly (Median was 109 mbps last month). Performance from MODAPS is still limited by congestion on this GigE circuit, as indicated by the 5.5:1 best:worst ratio. Thruput remains more than 30% below the requirement so the rating remains "**Low**".

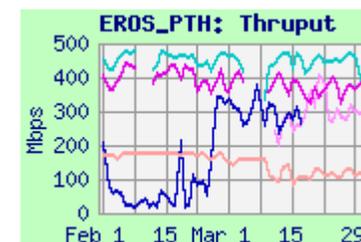
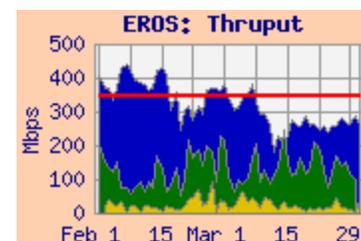
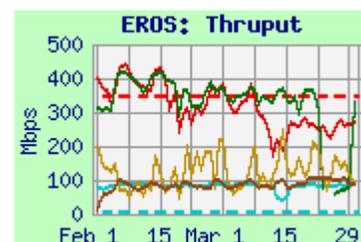
However, from GSFC-EBnet-PTH, still on the 1 Gig EBnet backbone, and no longer competing with MODAPS flows, thruput improved dramatically – from a median of 55 mbps to 304 mbps!

Likewise, GES-DISC and EDOS, on the 10 Gig EBnet get much better performance than MODAPS! While the median daily best thruput from GES DISC is about double that from MODAPS, its median daily worst thruput is almost 4 times higher! It would be rated "**Almost Adequate**". Likewise, the GSFC-NISN host uses the same NISN route as above, but is connected past the congested MODAPS Gig-E, so its performance is also much higher, and would be rated "**Good**". The ENPL host has a direct connection to the MAX, also bypassing the congestion. 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.

ERSDAC → EROS: See section 8 (ERSDAC) for further discussion.

NSIDC → EROS: Thruput was steady this month, via UCB, FRGP, Internet2 from SLC to Chicago.

LaRC → EROS: The thruput 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 → 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	175.9	159.5	104.9	
EROS PTH → GSFC-EBnet PTH	403.6	342.7	282.4	
JPL-PTH → GSFC-EBnet PTH	87.2	84.2	55.6	0.60
LDAAC → GES DISC	535.7	445.4	236.8	0.11
LARC-ANGe → GSFC-EBnet PTH	323.8	266.2	204.4	
NSIDC DAAC → GES DISC	297.5	201.3	82.7	0.20
NSIDC DAAC → GSFC-ISIPS	83.0	65.6	25.6	

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

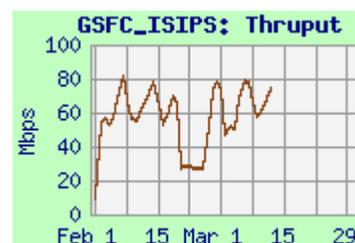
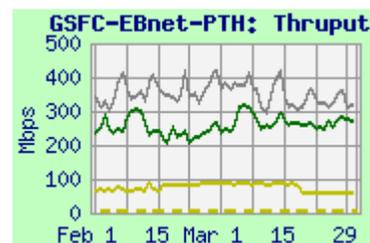
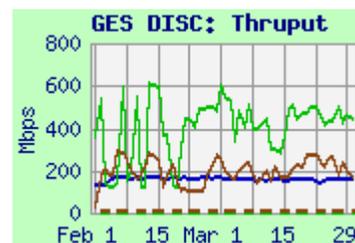
Comments:

EROS, EROS-PTH → GSFC: The thrupt for tests from EROS 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 '09), 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 was reduced to a 2.3:1 best : worst ratio (compared with last month's 3.2:1 ratio). LaRC ANGe had a lower best, but about the same worst, and only a 1.6:1 ratio, so the congestion appears isolated to just ASDC. The user flow this month was way below both the typical flow and the requirement.

NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) improved in December '09, with NSIDC's switch from NISN to Internet2. With the low requirement (reduced from 13.3 mbps in May), the rating remains "Excellent".

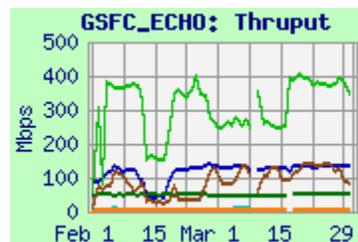


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

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

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	142.7	132.5	97.3
EROS LPDAAC ftp	8.7	7.1	5.9
GES DISC	n/a	n/a	n/a
GES DISC ftp	n/a	n/a	n/a
LaRC ASDC DAAC	451.4	348.1	214.3
LaRC ASDC DAAC ftp	46.2	45.3	18.2
NSIDC DAAC	144.4	111.3	50.1
NSIDC DAAC ftp	8.0	7.6	2.6



Comments:

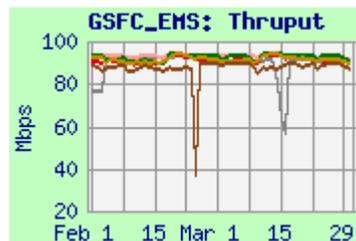
GSFC-ECHO was upgraded to a Gig E interface in January, with improved results. Testing is performed to GSFC-ECHO from the above nodes, both iperf and ftp.. The Fast-E is no longer a performance limitation, but TCP window size remains – especially on ftp with long RTT.

2.3 GSFC-EMS: EOS Metrics System

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

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS-PTH	91.6	91.0	84.4
GES DISC	92.9	92.2	66.7
GSFC-PTH	92.9	91.6	86.8
LARC-PTH	93.7	93.4	58.1
MODAPS-PDR	93.7	93.4	90.5
NSIDC-PTH	93.1	91.3	83.7



Comments:

Testing is performed to GSFC-EMS from the above nodes, iperf only. Results are 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	288.3	256.6	144.3	35.2	260.5
GSFC-NISN → JPL-AIRS	255.1	238.8	201.3		
GSFC-EBnet-PTH → JPL-AIRS	365.9	232.4	101.0		
GSFC-NISN → JPL-PODAAC	177.5	146.6	80.6		
GSFC-EBnet-PTH → JPL-PODAAC	251.1	168.2	82.5		
GSFC-EBnet-PTH → JPL-QSCAT	91.3	91.2	74.7		
GSFC-EBnet-PTH → JPL-MLS	199.4	138.1	70.4		
GSFC-NISN → JPL-MLS	351.4	187.6	99.7		

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

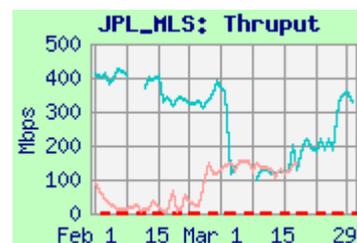
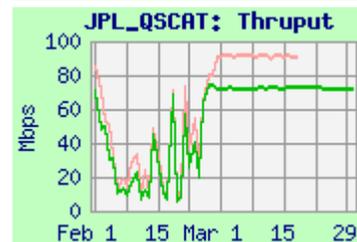
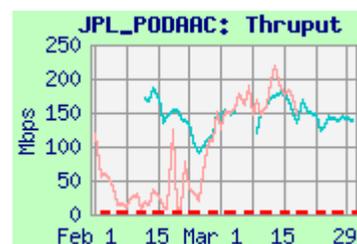
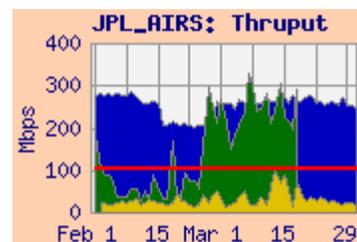
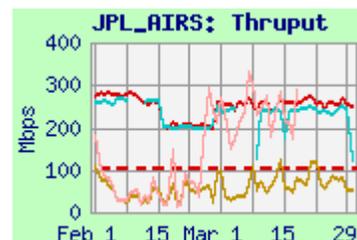
Comments: The user flow from GSFC/EOS increased this month (was 26 mbps last month).

AIRS, Overall: Thruput from GES DISC was well above the AIRS requirement, but by 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 thruput is also below 3x this requirement, so the overall rating remains "Good".

PODAAC: The EBnet GigE congestion at GSFC was eliminated as the bottleneck for the flows from GSFC-EBnet-PTH with the MODIS move to the 10 Gig EBnet core, so performance was better and more stable than previously, and similar to performance from GSFC-NISN. The GSFC-PODAAC requirement (for MODIS data) is only 1.5 mbps, rating "Excellent".

QSCAT: Thuput from GSFC-EBnet-PTH improved and stabilized with the reduced GigE congestion, now limited only by the Fast-E connection at QSCAT. The thruput 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 also stabilized with the reduced GigE congestion, and is now much closer to results from GSFC-NISN. The rating remains "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	355.0	281.9	118.3
LaRC PTH → JPL-TES	177.3	136.6	97.1
LaRC PTH → JPL-TES sftp	13.0	12.5	10.5
LaRC PTH → JPL-PTH	62.7	45.9	26.9
LaRC PTH → JPL-PTH sftp	31.3	31.3	31.1
LaRC DAAC → JPL-MISR	49.1	36.7	11.9
LaRC PTH → JPL-MISR	44.1	22.7	11.8
JPL-PTH → LaRC PTH	85.4	83.4	54.4

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

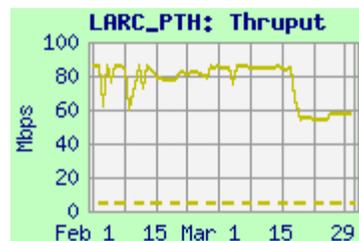
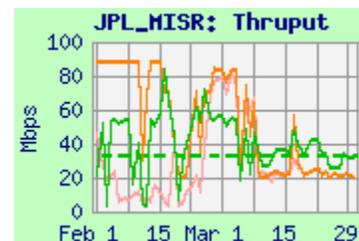
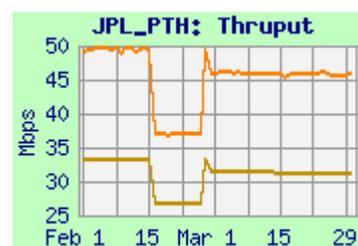
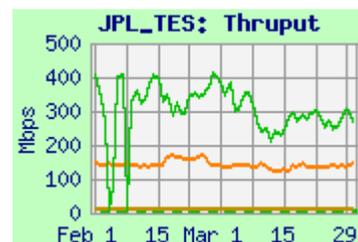
Comments: LDAAC was moved to campus address space in March '07. User flow data is no longer available from LaRC (has been requested but not implemented). Thus no integrated graphs are available from LaRC.

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**". There were fewer periods of congestion observed from ASDC DAAC (none are 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): the median thruput is above the requirement, now by a bit less than 30%, apparently due to congestion at JPL, so the rating drops to "**Adequate**". Thruput is similar from LaRC-PTH.

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 dropped to its lower bimodal state (thruput often switches between 60 and 85 mbps). The rating remains "**Excellent**".



4) Boulder CO:

4.1) NSIDC:

Ratings: GSFC → NSIDC: ↑ Adequate → **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 '09 – 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	97.5	51.2	13.0	3.3	51.5
GES-DISC → NSIDC	188.7	145.9	40.2		
GSFC-ISIPS → NSIDC (iperf)	103.4	76.2	36.6		
GSFC-ISIPS → NSIDC (ftp)	20.0	15.3	6.2		
JPL PODAAC → NSIDC	46.1	41.3	18.8		
GHRC → NSIDC DAAC (iperf)	26.2	11.6	2.9		
GHRC → NSIDC DAAC (ftp pull)	17.1	11.9	2.0		

Requirements:

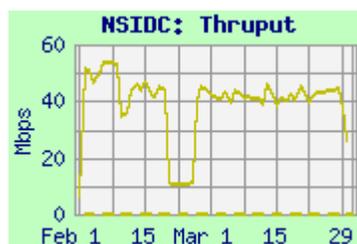
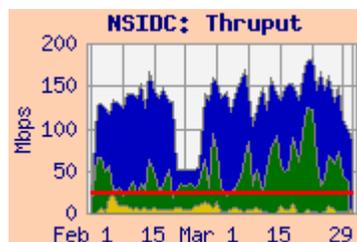
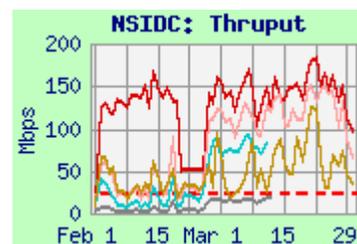
Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '10	27.6	Good
JPL → NSIDC	CY '07 – '10	0.2	Excellent
GHRC → NSIDC	CY '07 – '10	0.5	Excellent

Comments: GSFC → NSIDC S4PA: This rating is based on testing from the MODAPS PDR server to the NSIDC DAAC, via Internet2, since this is the primary production flow. The requirement was reduced in May '09 from 34.5 mbps (was 64 mbps in April '08). Although MODIS was moved last month to the 10Gig EBnet core, its 1 Gig connection is still congested (although somewhat less so), so the throughput values remain noisy. The Integrated throughput from MODAPS is above this lower requirement, now by more than 30%, so the rating improves to "Good" (would be "Excellent" from GES DISC). Note that the user flow remains much lower, even than the reduced requirement (which includes MODIS reprocessing).

GSFC-ISIPS → NSIDC: The MODIS move also reduced the congestion from ISIPS as well, with big improvement in throughput.

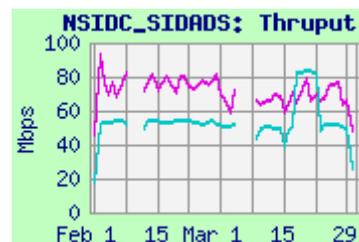
JPL PODAAC → NSIDC S4PA: The requirement was reduced from 1.34 mbps in May '09. Throughput from PODAAC to NSIDC has been mostly stable since testing was moved to use Internet2 in September '09; the rating remains "Excellent".

GHRC → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E 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 '09), so the rating remains "Excellent". The ftp performance is limited by the TCP window size and RTT.



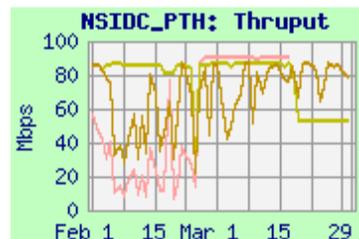
Test Results: NSIDC SIDADS, PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC_SIDADS	90.9	66.4	40.8
GSFC-NISN → NSIDC_SIDADS	52.2	50.7	39.3
GSFC-EBnet-PTH → NSIDC-PTH	90.5	90.2	79.9
MODIS-PDR → NSIDC-PTH	88.4	81.6	39.4
JPL PTH → NSIDC-PTH	86.6	85.0	81.4



GSFC → NSIDC-SIDADS: Thruput via Internet2 to SIDADS from ENPL and GSFC-NISN was pretty stable and well above the requirement.

NSIDC-PTH: Testing to NSIDC-PTH is via NISN-PIP, **which no longer supports any NSIDC user flows.** Thruput from GSFC-EBnet-PTH stabilized due to reduced EBnet congestion at GSFC with the MODIS move, while MODIS itself still experienced congestion. From JPL-PTH performance was very steady.



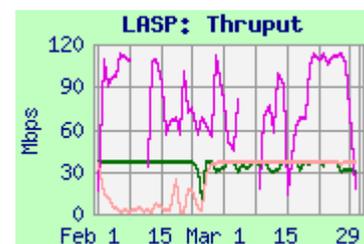
4.2) LASP:

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

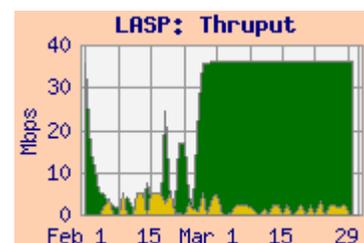
Web Page: <http://ensight.eos.nasa.gov/Organizations/production/LASP.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP (blue)	37.2	34.0	0.6
GSFC EBnet-PTH → LASP (iperf)	36.4	36.1	22.3
GSFC ENPL → LASP (green)	114.8	76.4	19.2



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. Likewise, thruput from GSFC-EBnet-PTH, stabilized due to reduced EBnet congestion at GSFC with the MODIS move. 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. The average user flow this month was lower than typical at 60 kbps. Sftp thruput testing was suspended in November '09 due to account issues.

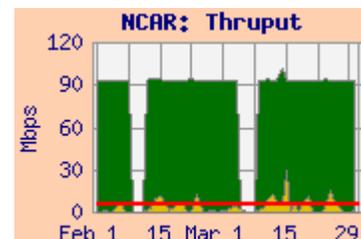
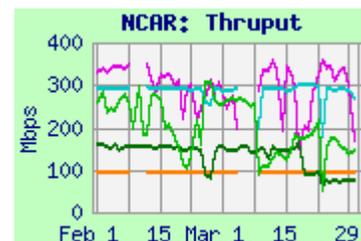


4.3) NCAR:Ratings: LaRC → NCAR: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
LaRC ASDC	268.3	171.8	79.9	0.1	
LaRC PTH	169.4	142.8	50.1		
GSFC-ENPL-GE	392.4	297.3	88.4	n/a	
GSFC-ENPL-FE	93.1	93.0	92.8		
GSFC-NISN	293.1	290.4	164.8		

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 less noisy this month, similar to 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 even higher. 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 5.2 mbps, consistent with to the old 5.1 mbps requirement.

**5) 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	235.4	234.1	104.3	96	Good
GSFC	182.4	71.9	24.9		
GSFC-SCP	17.9	17.8	17.6		

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 policing was installed at the WSC source at 250 mbps. This steadied the thruput significantly. The median is again above the requirement by more than 30%, so the rating remains **“Good”**.



An additional test was added this month, CP from GSFC. Thruput was very steady. Although the systems are set up to allow and use large windows, the window size used during transfers never gets large enough to improve the performance beyond the values above.

6) 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	290.7	260.6	193.4	5.3	262.39
GSFC-EDOS → LaRC ASDC	446.8	341.4	123.9		
GSFC-EBnet-PTH → LaRC-ANGe	425.3	404.9	329.1		
GSFC-NISN → LaTIS	392.8	370.6	328.7		

Requirements:

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

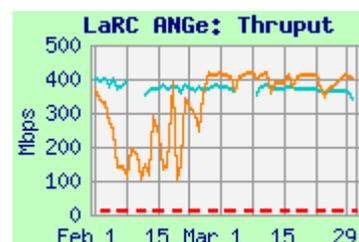
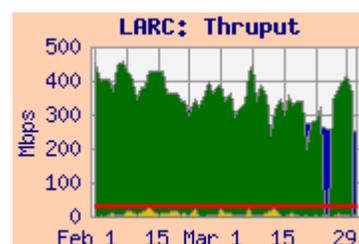
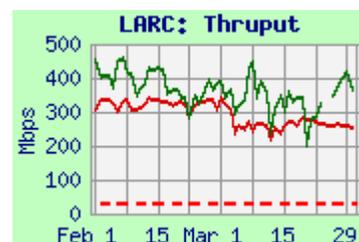
Comments:

GSFC → LaRC ASDC: The rating is based on the GES DISC to LaRC ASDC DAAC thrupt, compared to 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.

As seen on the Integrated graph, the 5.3 mbps average user flow (typical for recent months) remains much lower than the requirement.

ANGe (LaTIS): The EBnet congestion at GSFC was reduced with the MODIS move at the end of February, in creasing the thrupt and stability from GSFC-EBnet-PTH to ANGe via PIP. **was again noisy due to EBnet congestion at GSFC.** Testing to LaTIS from GSFC-NISN was similar, also with consistent results.



7) 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	5.66	4.42	2.03	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 thrupt 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.



8) 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	82.0	75.0	27.3	4.6	76.2
GES DISC → ERSDAC	30.1	25.3	16.6		
GSFC ENPL (FE) → ERSDAC	89.1	89.0	88.6		
ERSDAC → EROS	86.2	85.1	82.4	4.5	
ERSDAC → JPL-ASTER IST	89.7	89.6	89.3		

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

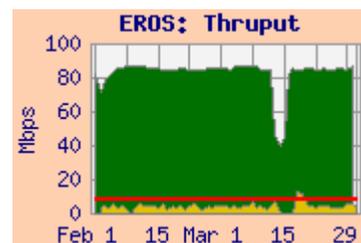
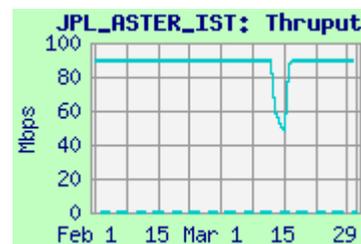
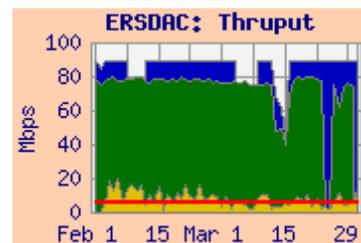
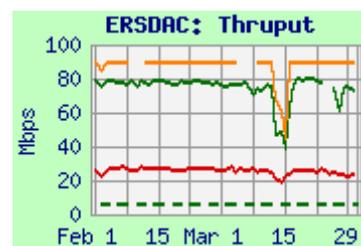
Comments:

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 4.6 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). 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 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 4.5 mbps (especially when contingency is added) . The median thrupt is more than 3 x the reduced requirement, so the rating remains "Excellent".



9) 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 '09.

However, the user flow to JAXA continues to be measured. This month the average user flow was 1.5 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

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	243.5	217.7	164.7	0.03
GSFC-ENPL → KNMI-ODPS	115.3	106.5	85.1	

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**". This performance improved dramatically at the end of February with MODIS' move off of the congested EBnet GigE. The best to worst ratio is now only 1.5:1 (was 12:1 last month). Congestion is also not present from the steady results from GSFC-ENPL. The user flow averaged 2.4 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).

