

EOS Production Sites Network Performance Report: November 2009

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** (same as last month)
- Requirements updated to Handbook 1.4.3 in May (was 1.4.2 previously)
 - Many Requirements dropped significantly
 - Some of these changes are under review
 - GSFC-JPL requirement increased
 - See below for more details on requirements changes
- **Only 1 flow below “Adequate”:**
 - **GSFC MODAPS-PDR to EROS (“Low”)**
 - Due to EBnet 1G congestion at GSFC
 - Would be rated “Adequate” from EDOS or GES DISC
- **Bottlenecks:**
 - **GSFC: EBnet to Doors Gig-E**
 - Average user flow: approx 700 mbps
 - Sustained (5 minute) peaks very close to 1 gbps
 - Upgrade to 10 Gig backbone is in progress
 - Door routers upgraded to 10 Gig in April
 - EBnet routers upgraded to 10 Gig on 28 May
 - GES DISC moved to 10 Gig EBnet on June 3
 - 1 gig connection
 - GES DISC performance improved at that time!
 - **Closed EBnet moved to 10 Gig EBnet on October 30**
 - 1 gig connection
 - **EDOS performance improved at that time!**
 - 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: ↑ None

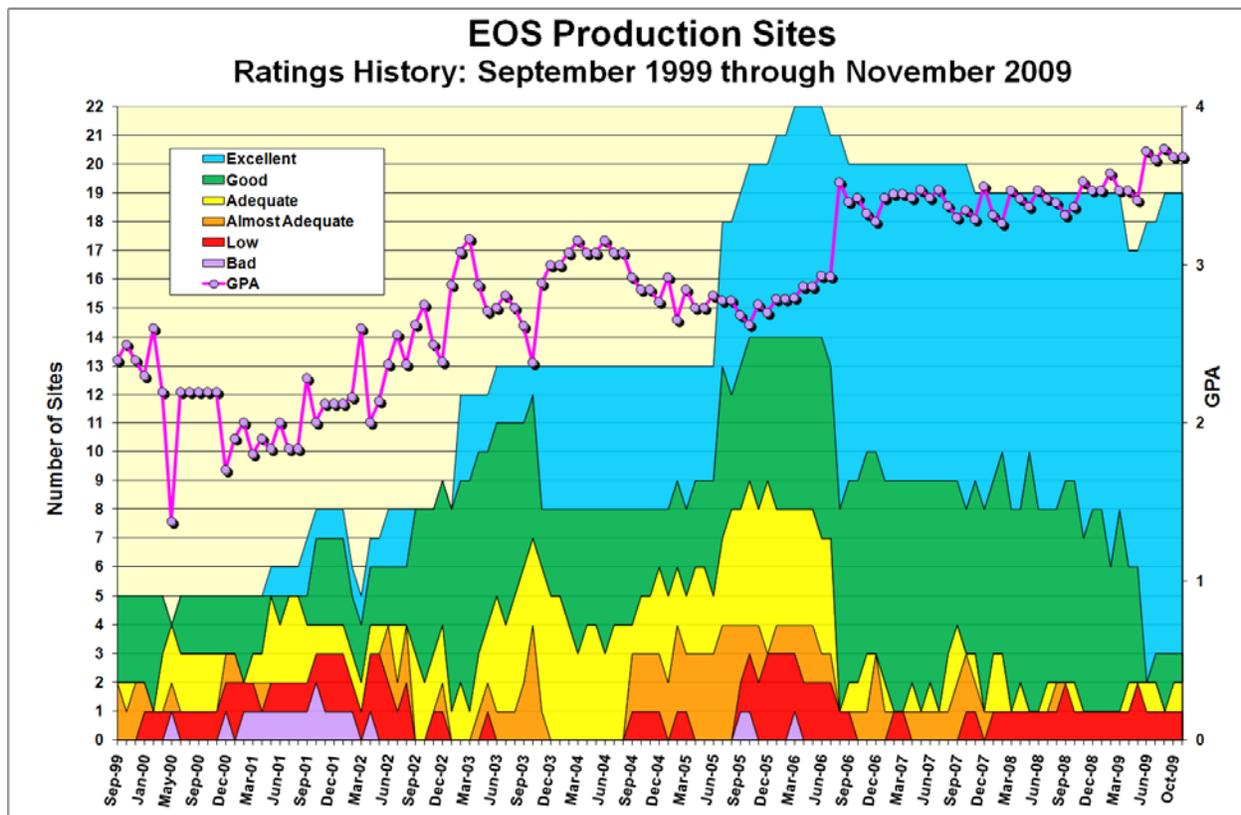
Downgrades: ↓ None

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 this month 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.

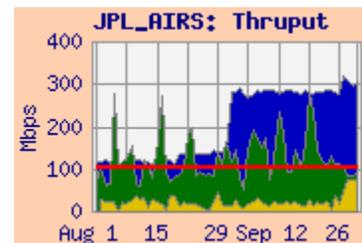
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated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

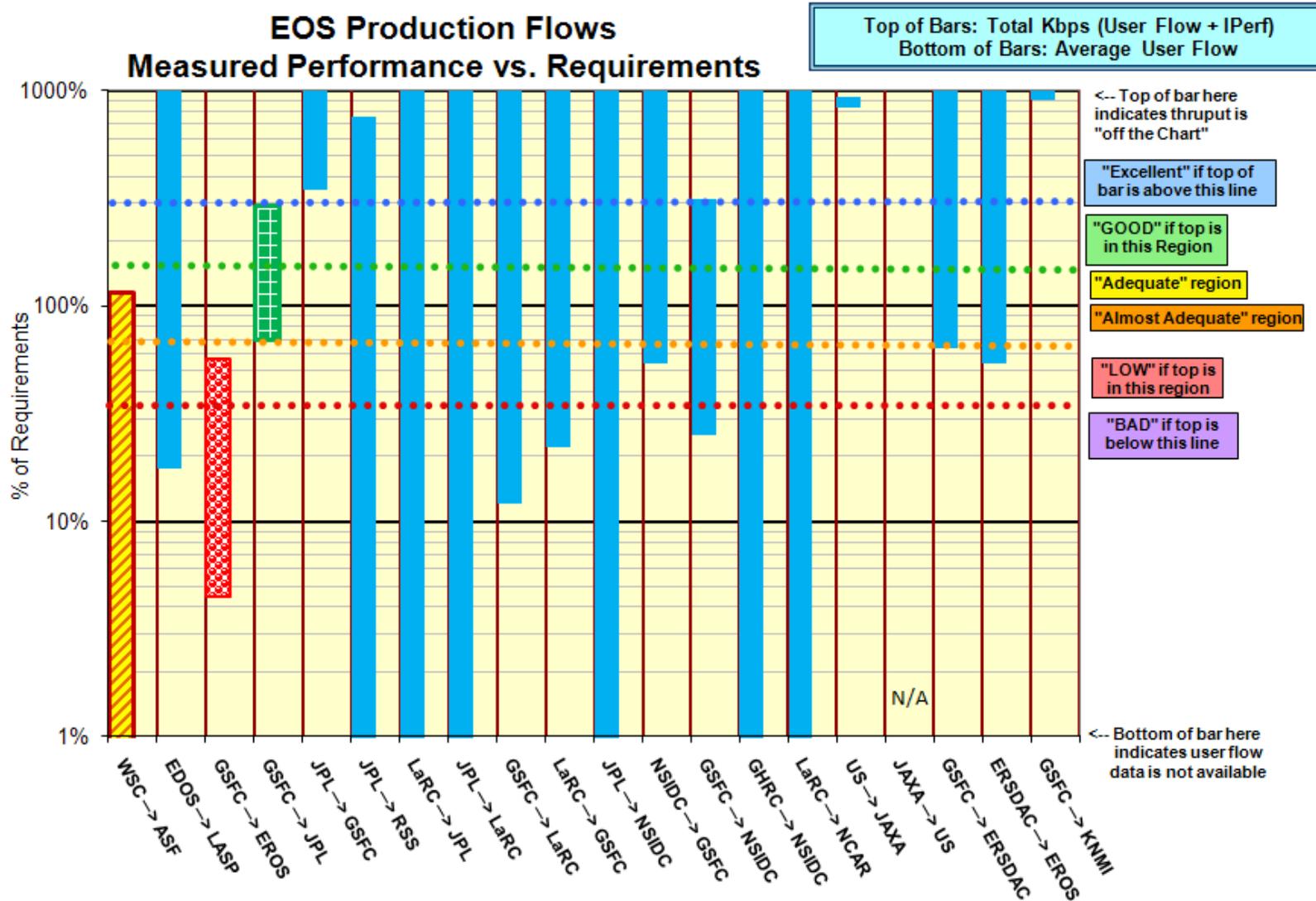
Integrated charts are included with site details, where available. These charts are “Area” charts, with a “salmon” background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to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

November 2009		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 Nov 09 Requirements		Ratings re Oct 2010 Reqmnts	
		Nov 2009		Oct 2010					This Month	Last Month		
WSC → ASF	ALOS	96.0	n/a	96.0	WSC → ASF-DAAC TEST		111.8		Adequate	A	Adequate	
EDOS → LASP	ICESat, QuikScat	0.4	0.4	0.4	GSFC-EDOS → LASP	0.07	37.8		Excellent	E	Excellent	
GSFC → EROS	MODIS, LandSat	342.9	345.9	342.9	MODAPS-PDR → EROS LPDAAC	15.3	191.5	194.1	LOW	L	LOW	
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	101.7	GES DISC → JPL-AIRS	71.8	286.0	299.9	GOOD	G	GOOD	
JPL → GSFC	MLS	0.6	7.4	0.6	JPL-PTH → GSFC-PTH	1.95	64.1		Excellent	E	Excellent	
JPL → RSS	AMSR-E	0.5	2.5	0.5	JPL-PODAAC → RSS		3.7		Excellent	E	Excellent	
LaRC → JPL	TES, MISR	23.0	43.7	23.0	LARC-DAAC → JPL-TES		345.9		Excellent	E	Excellent	
JPL → LaRC	TES	1.5	4.4	1.5	JPL-PTH → LARC-PTH		62.5		Excellent	E	Excellent	
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	31.3	GSFC-EDOS → LDAAC	3.8	405.1	405.3	Excellent	E	Excellent	
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	0.4	LDAAC → GES DISC	0.08	548.9	548.9	Excellent	E	Excellent	
JPL → NSIDC	AMSR-E	0.2	1.3	0.2	JPL-PTH → NSIDC SIDADS		84.1		Excellent	E	Excellent	
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	0.6	NSIDC DAAC → GES DISC	0.31	126.3	126.3	Excellent	E	Excellent	
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	27.6	MODAPS-PDR → NSIDC-DAAC	7.0	85.9	86.6	Excellent	E	Excellent	
GHRC → NSIDC	AMSR-E	0.5	7.5	0.5	GHRC → NSIDC DAAC		37.0		Excellent	E	Excellent	
LaRC → NCAR	MOPITT	0.1	5.4	0.1	LDAAC → NCAR		265.2		Excellent	E	Excellent	
US → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	0.1	GSFC-EDOS → JAXA DDS	1.1	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	3.4	77.4	77.9	Excellent	E	Excellent	
ERSDAC → EROS	ASTER	8.3	26.8	8.3	ERSDAC → EROS PTH	4.5	86.8	86.8	Excellent	E	Excellent	
GSFC → KNMI	OMI	0.03	3.3	0.03	GSFC-OMISIPS → ODPS	1.4	115.0	115.0	Excellent	E	Excellent	
significant change from May 2009 version												Oct-2010
							Ratings Summary					
										Nov-2009 Req		Req
										Score	Prev	Score
*Criteria:	Excellent	Total Kbps > Requirement * 3				Excellent			16	16	16	
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3				GOOD			1	1	1	
	Adequate	Requirement < Total Kbps < Requirement * 1.3				Adequate			1	1	1	
	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	3.68	3.68	

This graph shows a bar for each source-destination pair – relating the measurements vs 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	291.2	191.5	74.7	15.3	194.1
GSFC-EDOS → EROS LPDAAC	424.2	402.7	219.2		
GES DISC → EROS LPDAAC	429.6	352.0	182.9		
ERSDAC → EROS LPDAAC	87.5	86.8	26.2	4.5	86.8
GSFC-EBnet-PTH → EROS PTH	342.7	146.1	31.4		
GSFC-ENPL → EROS PTH	478.7	468.0	352.3		
GSFC-NISN → EROS PTH	483.2	476.3	409.5		
NSIDC → EROS	110.5	105.2	76.3		
LaRC → EROS	93.0	93.0	93.0		

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.

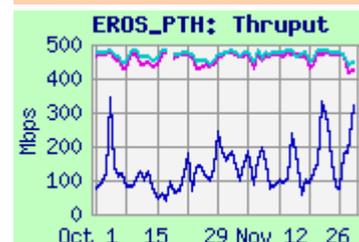
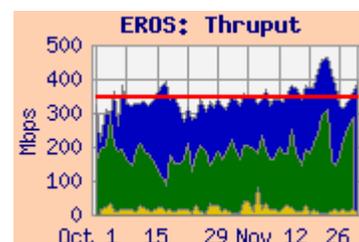
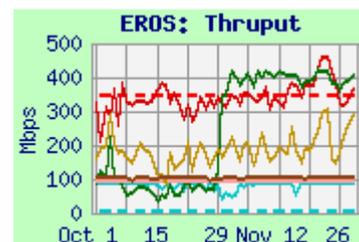
Performance from the hosts on the 1 Gig EBnet (MODAPS, and GSFC-EBnet-PTH) is predominantly limited by congestion on the EBnet GigE circuit at GSFC, as indicated by their large best:worst ratios (e.g., 3.9:1 from MODAPS). Performance from these hosts was somewhat higher than recent months, due to reduced congestion from EDOS and GES DISC, since they are no longer competing for this bandwidth. Thruput from MODAPS remains more than 30% below the requirement so the rating remains "Low".

EDOS was moved to the new 10 Gig EBnet on October 30, and the GES-DISC was moved in June, with much better performance! While the median daily best thruput from EDOS is about 50% higher than from MODAPS, its median daily worst thruput is 3 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 was stable this month.

LaRC → EROS: The thruput from LaRC-PTH to EROS-PTH was again very stable this month via NISN to the Chicago CIEF. Thruput is limited to 100 mbps by the Fast-E connection at LaRC-PTH.



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	209.9	163.2	108.3	
EROS PTH → GSFC-EBnet PTH	384.7	327.7	258.5	
JPL-PTH → GSFC-EBnet PTH	64.5	64.1	29.8	1.95
LDAAC → GES DISC	604.2	548.9	384.7	0.08
LARC-ANGe → GSFC-EBnet PTH	275.7	205.4	163.0	
NSIDC DAAC → GES DISC	126.5	126.3	123.9	0.31
NSIDC DAAC → GSFC-ISIPS	79.7	78.3	60.6	

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

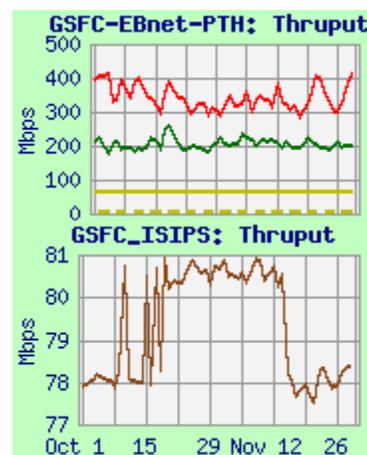
Comments:

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 ECS firewall.

JPL → GSFC: Thrupt was very 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”. The user flow this month was way below the typical flow, and the requirement.

NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) was again very steady this month. With the low requirement (reduced from 13.3 mbps in May), the rating remains “Excellent”. Most of the user flow between these nodes was re-routed onto Internet2, so the NISN user flow remains greatly reduced from the 1.2 mbps in May.

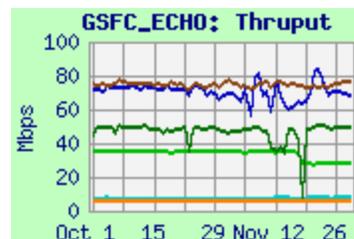


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

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

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	79.9	69.1	49.6
EROS LPDAAC ftp	9.3	7.6	6.2
GES DISC	n/a	n/a	n/a
GES DISC ftp	n/a	n/a	n/a
LaRC ASDC DAAC	36.0	34.7	29.0
LaRC ASDC DAAC ftp	50.4	48.2	13.6
NSIDC DAAC	82.2	74.7	56.3
NSIDC DAAC ftp	5.7	5.5	2.5



Comments:

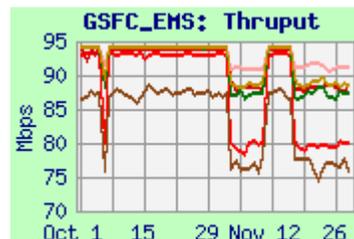
Testing is performed to GSFC-ECHO from the above nodes, both iperf and ftp. Results are generally steady. Performance limitations are from the 100 mbps Fast-E and TCP window size – especially on ftp.

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	83.5	80.0	74.1
GES DISC	90.2	88.2	83.7
GSFC-PTH	91.9	91.2	89.9
LARC-PTH	88.7	87.4	54.8
MODAPS-PDR	90.9	88.8	84.8
NSIDC-PTH	83.7	77.4	60.7



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	323.1	286.0	189.1	71.8	299.9
GSFC-NISN → JPL-AIRS	277.0	264.8	233.1		
GSFC-EBnet-PTH → JPL-AIRS	162.6	91.6	36.0		
GSFC-EBnet-PTH → JPL-PODAAC	178.3	78.8	18.8		
GSFC-EBnet-PTH → JPL-QSCAT	91.5	78.7	17.5		
GSFC-EBnet-PTH → JPL-MLS	36.1	18.2	11.0		
GSFC-NISN → JPL-MLS	386.0	361.1	257.3		

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL Combined	FY '08-'09	101.7	Good
GSFC → JPL AIRS	FY '08-'09	98	Excellent
GSFC → JPL PODAAC	FY '08-'11	1.5	Excellent
GSFC → JPL QSCAT	FY '08-'11		n/a
GSFC → JPL MLS	FY '08-'09	2.1	Excellent

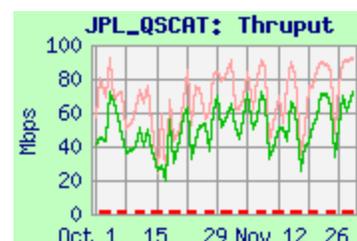
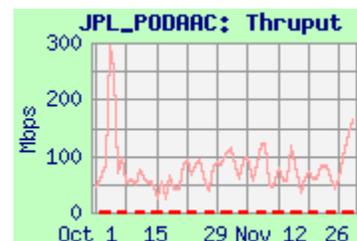
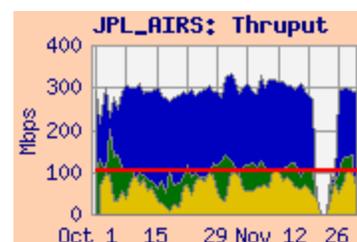
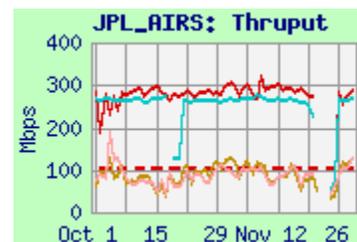
Comments: The EBnet to Doors congestion at GSFC was the bottleneck for the flows from GSFC-EBnet-PTH, and from GES DISC until the GES DISC was moved to the 10 Gig EBnet in early June. The user flow from GSFC/EOS increased at the end of September, apparently due to increased MODIS flows.

AIRS, Overall: The median thrupt from GES DISC improved in early September, due to retuning of the testing. Thrupt was above the AIRS requirement, by slightly more than 3x, so the AIRS rating improves to "Excellent". The JPL overall rating is based on this test compared with the sum of all the GSFC to JPL requirements – the overall rating is slightly below 3x the requirement, so it remains "Good"

PODAAC: Daily thrupt peaks from EBnet-PTH averaged nearly 180 mbps, while the median thrupt is less than 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. The QSCAT requirement was only 1.3 mbps, but does not appear in the 1.4.3 handbook (the rating would remain "Excellent", based on the old requirement). Performance to a second QScat node (ketch) (green line), is similar to the primary node.

MLS: The GSFC-MLS requirement is for MLS and GEOS flow, and was reduced again (was 5.9 mbps since April '08). Thrupt from GSFC-PTH was very noisy, but a bit higher than last month. Testing from GSFC-NISN avoids the EBnet congestion seen from GSFC-EBnet-PTH, with much higher and more stable results.



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	393.2	345.9	129.4
LaRC PTH → JPL-TES	91.1	91.0	90.9
LaRC PTH → JPL-TES sftp	13.7	13.5	12.2
LaRC PTH → JPL-PTH	78.5	63.2	34.2
LaRC PTH → JPL-PTH sftp	33.2	33.2	33.0
LaRC DAAC → JPL-MISR	36.7	31.3	16.8
LaRC PTH → JPL-MISR	87.9	87.5	27.4
JPL-PTH → LaRC PTH	77.0	62.5	58.8

Requirements:

Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	FY '07 – '09	7.0	Excellent
LaRC DAAC → JPL-MISR	FY '07 – '09	32.9	Adequate
LaRC → JPL-Combined	FY '07 – '09	39.9	Excellent
JPL PTH → LaRC PTH	FY '07 – '09	1.5	Excellent

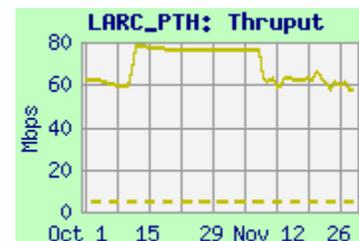
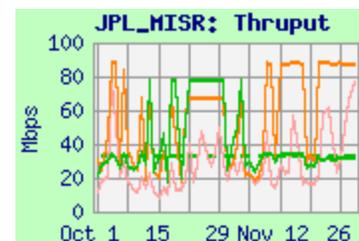
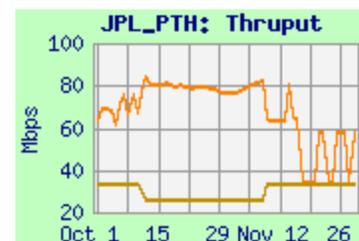
Comments: LDAAC was moved to campus address space in March '07. User flow data is no longer available from LaRC (has been requested but not implemented). Thus no integrated graphs are available from LaRC.

LaRC → JPL (Overall, TES): Median performance from LDAAC to JPL-TES remains well over 3 x the TES and combined requirements, so the TES and Overall ratings remain "Excellent". The TES requirement was reduced from 29.8 mbps in May.

The TES system was upgraded in February '08; the sftp window size and sftp performance increased with that upgrade. Sftp results are even better from LaRC-PTH to JPL-PTH which uses an even larger window size.

LaRC → JPL (MISR): Median thrupt was mostly steady but lower this month, with a best:worst ratio from the ASDC DAAC of 2.2:1. The median thrupt from the ASDC DAAC is about at this requirement, but thrupt is much higher from LaRC-PTH, so the MISR rating remains "Adequate". Will retune this testing next month.

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 (and had been reduced in April '08 from 52.6 mbps). Thrupt this month was bimodal between 60 and 85 mbps, as has often been the case. The rating remains "Excellent".



4) Boulder CO:

4.1) GSFC → NSIDC:

Ratings: GSFC → NSIDC: Continued **Excellent**

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

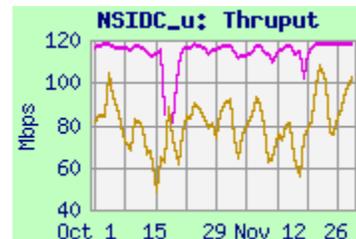
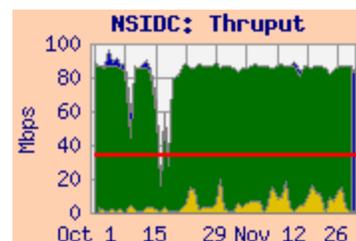
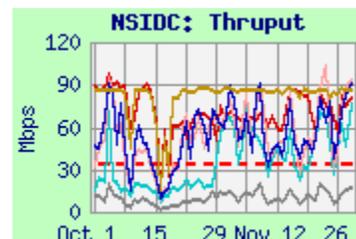
Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODIS-PDR → NSIDC-DAAC	88.8	85.9	48.3	7.0	86.6
GES-DISC → NSIDC-DAAC	91.9	68.9	45.8		
GSFC-ISIPS → NSIDC (iperf)	83.6	46.4	12.9		
GSFC-ISIPS → NSIDC (ftp)	19.4	10.6	2.7		
GSFC-ENPL → NSIDC_SIDADS_u	117.9	116.5	93.3		
MODIS-PDR → NSIDC-DAAC_u	109.3	79.8	32.4		

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '09	27.6	Excellent

Comments: GSFC → NSIDC: This rating is based on testing from the MODAPS PDR server to the NSIDC DAAC via NISN PIP, since this is the primary production flow (but will change soon to be via the Internet2 route). The thrupt values remain noisy, due to EBnet congestion at GSFC, but were otherwise mostly stable this month. Thrupt was more stable from GES DISC, which is now on the 10 gig backbone. The requirement was reduced in May from 34.5 mbps (was 64 mbps in April '08). The Integrated thrupt is above this lower requirement, by slightly more than 3 x, so the rating remains "Excellent. Note that the user flow remains MUCH lower, even than the reduced requirement, but increased late in October.



GSFC → NSIDC u via Internet2: Results via Internet2 are also shown here, since most production flows have been switched from PIP to Internet2. Thrupt on this path to SIDADS from ENPL was steady and well above the requirement. Performance via Internet2 from MODAPS to n4ftl01 improved in late September, but still is affected by 1G EBnet congestion. The return path from NSIDC to MODAPS remains via NISN – but has been switched to NISN SIP.

GSFC-ISIPS ↔ NSIDC: The EBnet congestion at GSFC is affecting ISIPS as well, with a 6.5:1 best to worst ratio.

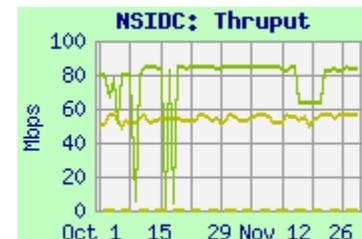
4.2) JPL → NSIDC:

Ratings: JPL → NSIDC: Continued **Excellent**

Test Results:

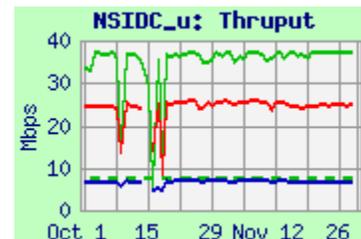
Source → Dest	Medians of daily tests (mbps)			Requirement
	Best	Median	Worst	
JPL PTH → NSIDC-PTH	85.2	84.1	62.9	0.2
JPL PODAAC → NSIDC	56.8	55.1	39.2	

Comments: The test from JPL-PTH to NSIDC-PTH has higher thrupt than from PODAAC, and more fully assesses the true network capability. Thrupt from JPL-PTH has been stable since February, not bistable, as is often the case. Testing from PODAAC to NSIDC-SIDADS was switched to Internet2 at the end of September, 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; the rating remains "Excellent".



4.3) GHRC → NSIDC: Ratings: GHRC → NSIDC: Continued **Excellent**Web Pages: http://ensight.eos.nasa.gov/Missions/aqua/NSIDC_u.shtml**Test Results:**

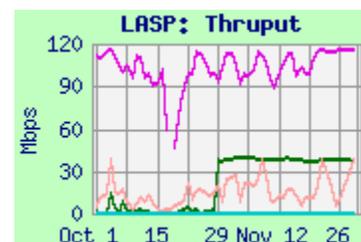
Source → Dest	Medians of daily tests (mbps)			Req.
	Best	Median	Worst	
GHRC → NSIDC DAAC (iperf)	37.8	37.0	21.5	0.5
GHRC → NSIDC DAAC (ftp pull)	25.2	24.8	12.4	
GHRC → NSIDC SIDADS (ftp pull)	6.9	6.8	4.4	



Comments: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E L2/L3 data to NSIDC via Internet2, with the return route via NISN SIP. The median thrupt 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. The user flow is no longer measurable due to reconfiguration.

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

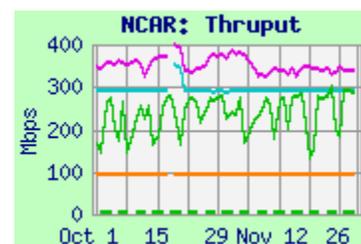
Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP (blue)	38.5	37.8	0.7
GSFC EBnet-PTH → LASP (iperf)	38.8	18.2	2.2
GSFC EBnet-PTH → LASP (sftp)	0.47	0.46	0.44
GSFC ENPL → LASP (green)	115.2	109.4	54.2



Comments: GSFC → LASP: Thrupt from EDOS to the LASP blue network via NISN PIP improved and got much steadier with EDOS' move to the 10 gig backbone, late in October. But thrupt remained noisy GSFC-PTH, attributed mostly to 1G EBnet congestion at GSFC. The median thrupt from EDOS is now well over 3x the 0.4 mbps requirement, so the rating remains “Excellent”. Sftp thrupt is MUCH lower than iperf, due to TCP window size limitations. 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 back to the typical 80 kbps.

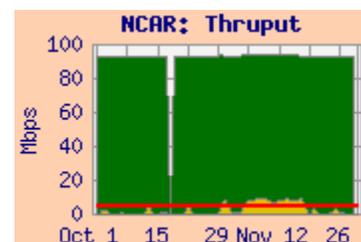
4.5) NCAR:Ratings: LaRC → NCAR: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml>**Test Results:**

Source	Medians of daily tests (mbps)			Requirement
	Best	Median	Worst	
LaRC	288.7	265.2	96.7	0.1
GSFC-ENPL-GE	382.5	341.2	279.3	n/a
GSFC-ENPL-FE	93.1	93.0	92.9	
GSFC-NISN	294.3	292.8	268.1	



Comments: NCAR (Boulder, CO) has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements. Thrupt from LaRC was again noisy this month, but the median remains well above 3 x the reduced requirement (the requirement was 5.4 mbps in May), so the rating remains “Excellent”.

From GSFC-ENPL-GE, with a Gig-E connection to MAX, the median thrupt is less noisy. The previous 5.1 mbps requirement is not present in the new handbook version. 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 about 4.4 mbps, near the old 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

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GES DISC → LDAAC	355.2	309.5	206.9	3.1	309.5
GSFC-EDOS → LDAAC	491.7	405.1	217.8		
GSFC-EBnet-PTH → LaRC-ANGe	410.4	349.3	168.8		
GSFC-NISN → LaTIS	403.3	379.5	346.7		

Requirements:

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

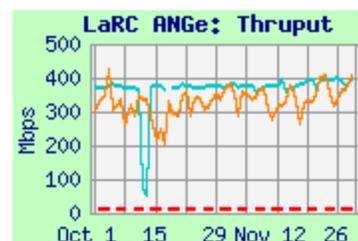
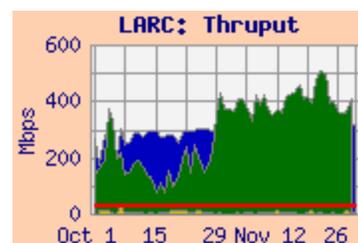
Comments:

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 when the GES DISC moved to the 10 Gig EBnet LAN, as did results from EDOS with its move to the 10 Gig at the end of October – thrupt from EDOS is now higher than from GES DISC. 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 3.1 mbps average user flow (typical for recent months) remains much lower than the [even the reduced] 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 (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 1.1 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	83.0	77.4	18.7	3.4	77.9
GES DISC → ERSDAC	29.9	24.9	13.1		
GSFC ENPL (FE) → ERSDAC	89.1	89.0	23.9		
ERSDAC → JPL-ASTER IST	90.0	89.6	44.7		
ERSDAC → EROS	87.5	86.8	26.2		

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

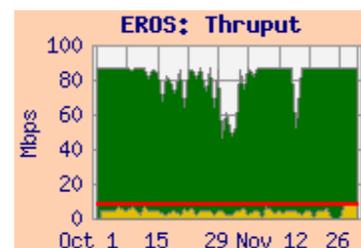
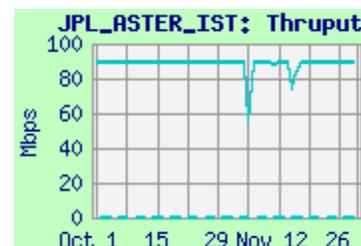
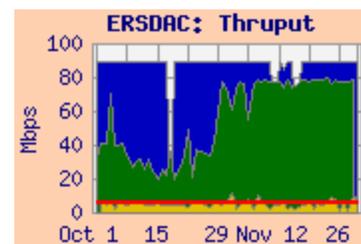
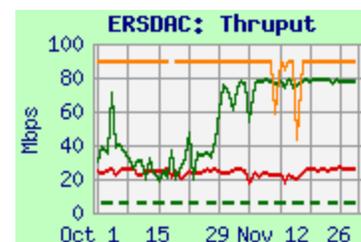
Comments:

GSFC → ERSDAC: The median thrupt from EDOS improved at the end of October 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 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.

ERSDAC → JPL-ASTER-IST: The median thrupt 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. The median thrupt is more than 3 x the reduced requirement, so the rating remains "Excellent".



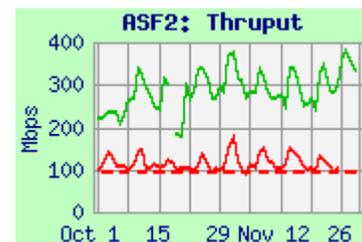
8) ASF

Ratings: IOnet: X Discontinued
WSC → ASF: Continued **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	391.6	111.8	71.3	96	Adequate
GSFC	428.7	292.1	157.0		



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). There is a strong diurnal cycle from both sources, indicating congestion at UAF. The median thrupt remained above the requirement, by less than 30%, so the rating remains "Adequate".

9) Other SIPS Sites:

Web Pages <http://ensight.eos.nasa.gov/Missions/aqua/RSS.shtml>
http://ensight.eos.nasa.gov/Missions/aura/KNMI_OMIPDR.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			Reqmt	Rating
	Best	Median	Worst		
JPL → RSS	5.62	3.68	1.56	0.5	Continued Excellent
OMISIPS → KNMI-ODPS	179.5	115.0	27.9	0.03	Continued Excellent
GSFC-ENPL → KNMI-ODPS	123.2	109.1	88.2		

Comments:

9.1 RSS: Remote Sensing Systems (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 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.

9.2 KNMI: 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 6.4:1 best to worst ratio is attributed to EBnet congestion, not present from GSFC-ENPL. The user flow averaged 1.4 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 is under review).

