

EOS Production Sites Network Performance Report: April 2010

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

Highlights:

- **Mostly stable flows with reduced congestion at GSFC**
 - **GPA 3.70** (was 3.68 last month)
- **Requirements:** updated to Handbook 1.4.3 in May '09 (was 1.4.2 previously)
 - Many Requirements dropped significantly (under review)
- **Only 1 flow below "Good":**
 - **GSFC MODAPS-PDR to EROS ("Low")**
 - Due to EBnet 1G congestion at GSFC
 - Would be rated "**Adequate**" from GSFC-NISN
 - Next Step: MODIS 10 Gig upgrade
- **LaRC ← → JPL:** began receiving user flow data from NISN-JPL
 - Integrated graphs now available on this path
- GSFC-EBnet-PTH replaced with GSFC-ESDIS-PTH (Test nodes)
- GSFC-ISIPS test node down this month
- **Bottlenecks:**
 - **GSFC:** EBnet: 10 Gig upgrade "mostly" complete.
 - **MAX:** 10 Gig upgrade in process - Problem with IDS taps
 - 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 '09 – 10 gig connections
 - PPS, MODIS moved to ESDIS router in February '10
 - 1 gig connections
 - MODIS had been dominating the old 1 gig circuit -- not much improvement for MODIS
 - But performance from the other sources which were competing with MODIS on the old GigE did improve!
 - e.g., OMISIPS, ISIPS
 - Other systems to be upgraded individually

- **Ratings Changes:**

Upgrades: ↑ None

Downgrades: ↓ None

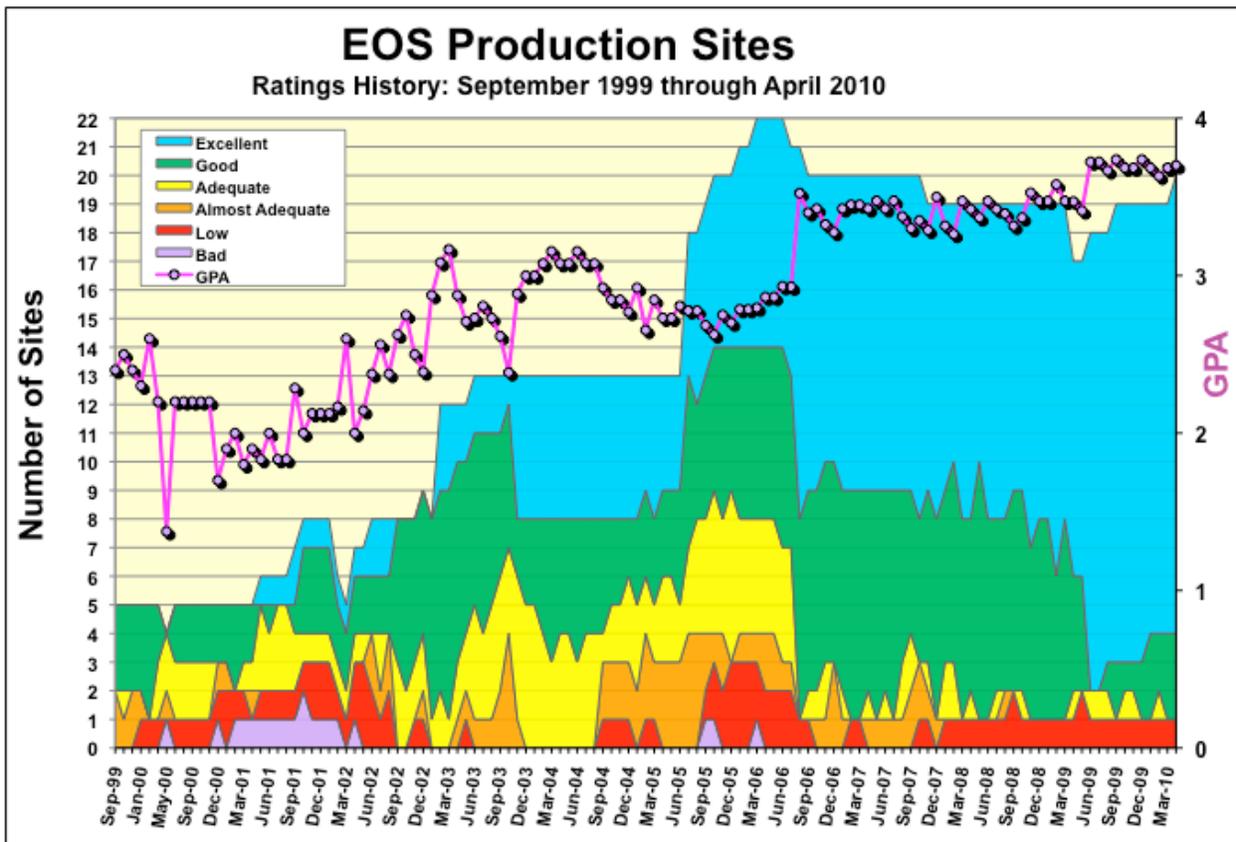
Addition: JAXA → US: **Excellent** (based on user flow only)

Ratings Categories:

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

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

Ratings History:



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

Requirements Basis:

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

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

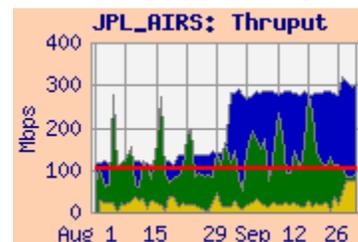
One main difference between Handbooks 1.4.2 and 1.4.3 is that most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated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

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

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

Integrated Charts:

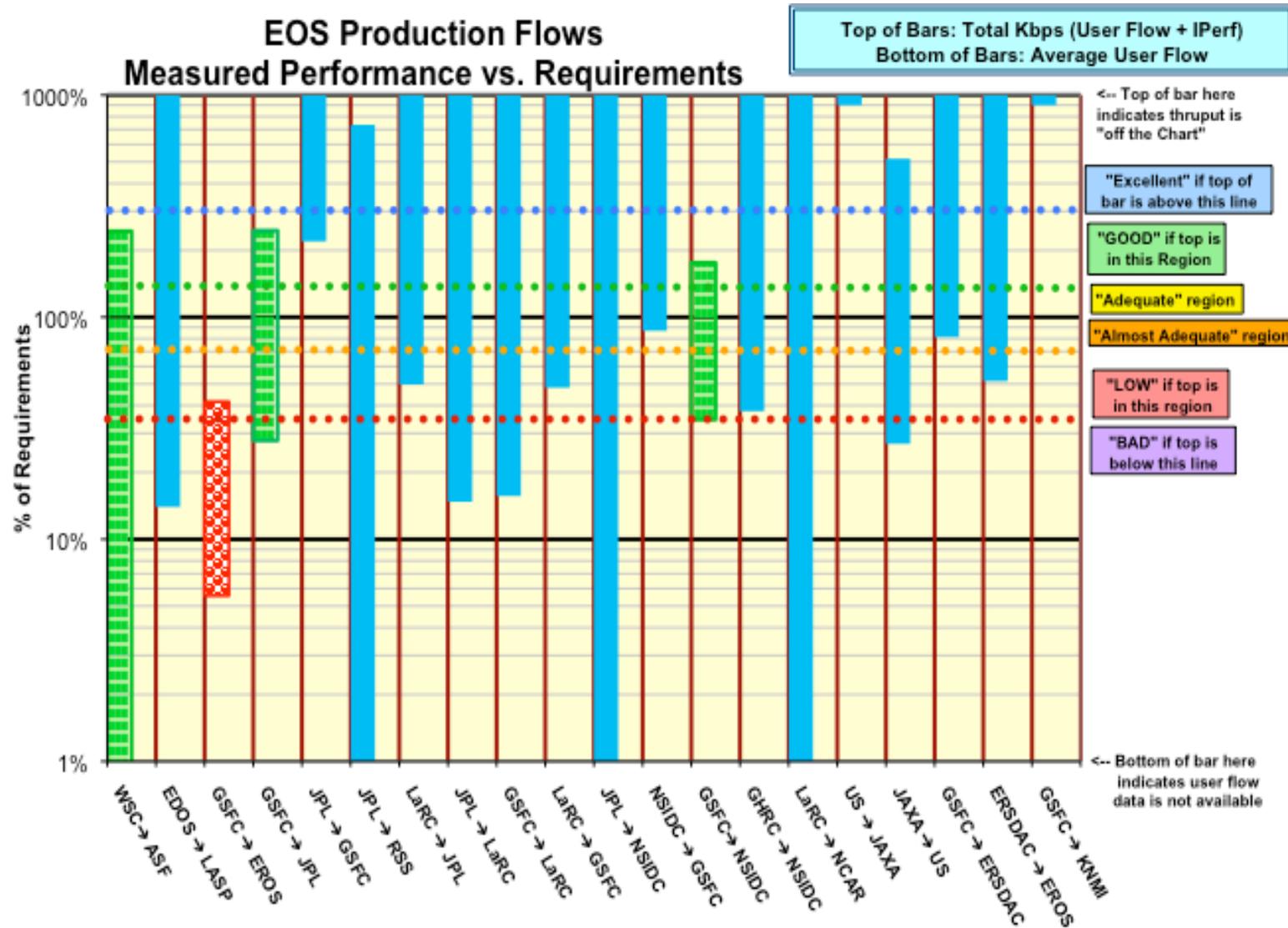
Integrated charts are included with site details, where available. These charts are “Area” charts, with a “salmon” background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to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



Network Requirements vs. Measured Performance

April 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 Apr 10 Requirements		Ratings re Oct 2010 Reqmnts																																								
		Apr 2010		Oct 2010					This Month	Last Month																																									
WSC → ASF	ALOS	96.0	n/a	96.0	WSC → ASF-DAAC TEST		233.9		GOOD	G	GOOD																																								
EDOS → LASP	ICESat, QuikScat	0.4	0.4	0.4	GSFC-EDOS → LASP (blue)	0.06	32.1		Excellent	E	Excellent																																								
GSFC → EROS	MODIS, LandSat	342.9	345.9	342.9	MODAPS-PDR → EROS LPDAAC	19.1	136.4	142.8	LOW	L	LOW																																								
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	101.7	GES DISC → JPL-AIRS	28.3	245.6	249.2	GOOD	G	GOOD																																								
JPL → GSFC	MLS	0.6	7.4	0.6	JPL-PTH → GSFC-ESDIS-PTH	1.23	87.0		Excellent	E	Excellent																																								
JPL → RSS	AMSR-E	0.5	2.5	0.5	JPL-PODAAC → RSS		3.5		Excellent	E	Excellent																																								
LaRC → JPL	TES, MISR	23.0	43.7	23.0	LARC-DAAC → JPL-TES	11.5	325.4		Excellent	E	Excellent																																								
JPL → LaRC	TES	1.5	4.4	1.5	JPL-PTH → LARC-PTH	0.2	86.0		Excellent	E	Excellent																																								
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	31.3	GSFC-EDOS → LDAAC	4.9	376.9	376.9	Excellent	E	Excellent																																								
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	0.4	LDAAC → GES DISC	0.17	460.5	460.5	Excellent	E	Excellent																																								
JPL → NSIDC	AMSR-E	0.2	1.3	0.2	JPL-PODAAC → NSIDC		35.8		Excellent	E	Excellent																																								
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	0.6	NSIDC DAAC → GES DISC	0.49	198.5	198.5	Excellent	E	Excellent																																								
GSFC → NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	27.6	MODAPS-PDR → NSIDC-DAAC	9.5	45.5	48.5	GOOD	G	GOOD																																								
GHRC → NSIDC	AMSR-E	0.5	7.5	0.5	GHRC → NSIDC DAAC	0.18	10.7		Excellent	E	Excellent																																								
LaRC → NCAR	MOPITT	0.1	5.4	0.1	LDAAC → NCAR		156.1		Excellent	E	Excellent																																								
US → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	0.1	GSFC-EDOS → JAXA DDS	3.4	Testing discontinued:		Excellent	E	Excellent																																								
JAXA → US	AMSR-E	0.5	1.3	0.5	JAXA DDS → JPL-QSCAT	2.5	31 March 2009		Excellent	n/a	Excellent																																								
GSFC → ERSDAC	ASTER	5.4	12.5	5.4	GSFC-EDOS → ERSDAC	4.4	78.6	79.0	Excellent	E	Excellent																																								
ERSDAC → EROS	ASTER	8.3	26.8	8.3	ERSDAC → EROS PTH	4.3	85.2	85.3	Excellent	E	Excellent																																								
GSFC → KNMI	OMI	0.03	3.3	0.03	GSFC-OMISIPS → ODPS	2.9	214.5	214.5	Excellent	E	Excellent																																								
significant change from version 1.42 (May 2009) to 1.43									Ratings Summary																																										
Blue Text = new from last month									<table border="1"> <thead> <tr> <th></th> <th colspan="2">Apr-2010 Req</th> <th>Oct-2010 Req</th> </tr> <tr> <th></th> <th>Score</th> <th>Prev</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>Excellent</td> <td>16</td> <td>15</td> <td>16</td> </tr> <tr> <td>GOOD</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>Adequate</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Almost Adequate</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>LOW</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>BAD</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total Sites</td> <td>20</td> <td>19</td> <td>20</td> </tr> <tr> <td>GPA</td> <td>3.70</td> <td>3.68</td> <td>3.70</td> </tr> </tbody> </table>				Apr-2010 Req		Oct-2010 Req		Score	Prev	Score	Excellent	16	15	16	GOOD	3	3	3	Adequate	0	0	0	Almost Adequate	0	0	0	LOW	1	1	1	BAD	0	0	0	Total Sites	20	19	20	GPA	3.70	3.68	3.70
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Notes:	Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS																																																		

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



1) EROS:

Ratings: GSFC → EROS: 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	217.8	136.4	53.1	19.1	142.8
GSFC-EDOS → EROS LPDAAC	96.3	71.3	51.1		
GES DISC → EROS LPDAAC	378.1	248.9	104.6		
ERSDAC → EROS LPDAAC	86.2	85.2	78.3	4.3	85.3
NSIDC SIDADS → EROS LPDAAC	109.9	93.4	52.3		
	435.8	304.5	196.2		
GSFC-ENPL → EROS PTH	412.0	361.5	271.1		
GSFC-NISN → EROS PTH	475.6	439.3	330.6		
LaRC PTH → EROS PTH	139.6	112.2	38.2		

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 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 (which includes MODIS reprocessing).

MODAPS was moved to the 10 gbps EBnet backbone in February (but with a 1 gig connection). Since MODIS flows were dominating the previous gigE EBnet circuit, performance from MODAPS improved only slightly.

Performance from MODAPS is still limited by congestion on this GigE circuit, as indicated by the 4.1:1 best:worst ratio. Median thrupt remains more than 30% below the requirement so the rating remains "**Low**".

MODIS is planned to be upgraded to 10 gig in the near future.

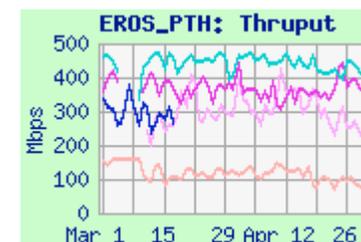
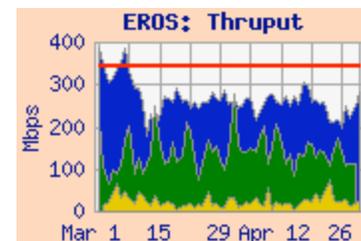
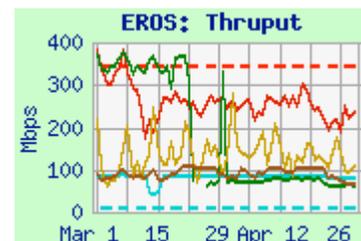
However, GES-DISC and ESDIS-PTH (replacing GSFC-EBnet-PTH) are connected to the 10 gig EBnet backbone (but with 1 Gig connections), and do not compete with MODAPS flows. So their thrupt is much higher than from MODAPS; ESDIS-PTH would be rated "**Almost Adequate**". Likewise, the GSFC-NISN host uses the same NISN route as above, but is connected outside of EBnet, so its performance is also much higher than MODAPS, and would be rated "**Adequate**". EDOS is also on the 10 Gig EBnet backbone, but its performance dropped substantially in late March – this is under investigation.

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: Thrupt was steady this month, via UCB, FRGP, Internet2 from SLC to Chicago.

LaRC → EROS: The thrupt 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	171.5	153.4	106.3	
EROS PTH → GSFC-ESDIS PTH	421.8	377.5	328.0	
JPL-PTH → GSFC-ESDIS PTH	89.5	87.0	79.8	1.23
LDAAC → GES DISC	539.1	460.5	254.9	0.17
LARC-ANGe → GSFC-ESDIS PTH	262.2	209.8	161.0	
NSIDC DAAC → GES DISC	298.7	198.5	77.0	0.49
NSIDC DAAC → GSFC-ISIPS	n/a	n/a	n/a	

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

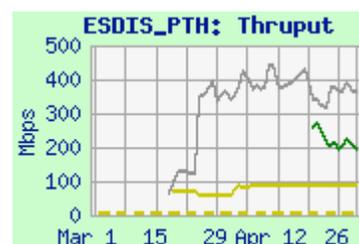
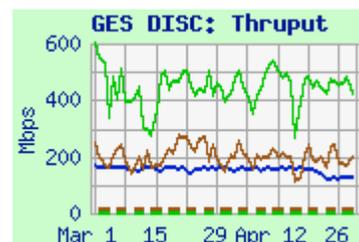
Comments:

EROS, EROS-PTH → GSFC: The thrupt for tests from EROS LPDAAC to GES DISC and EROS PTH to ESDIS-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 ESDIS-PTH results), due to packet loss between the LPDAAC and the EROS ECS firewall.

JPL → GSFC: Thrupt was very 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**". 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**". The ISIPS test node was replaced this month, but the new node has not been fully configured, so testing is down to this node.

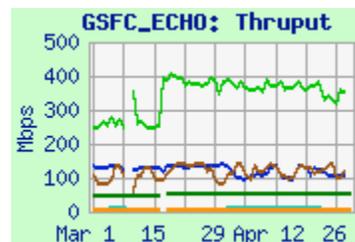


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

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

Test Results:

	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	140.0	107.7	84.6
EROS LPDAAC ftp	10.9	10.7	7.8
GES DISC	n/a	n/a	n/a
GES DISC ftp	n/a	n/a	n/a
LaRC ASDC DAAC	420.2	366.7	266.8
LaRC ASDC DAAC ftp	54.9	53.9	21.9
NSIDC DAAC	148.9	117.1	50.8
NSIDC DAAC ftp	8.0	7.5	3.3



Comments:

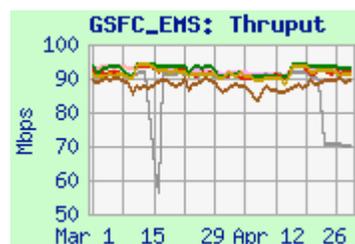
GSFC-ECHO was upgraded to a Gig E interface in January '10, with improved results. Testing is performed to GSFC-ECHO from the above nodes, both iperf and ftp.. The Fast-E is no longer a performance limitation, but TCP window size remains limiting – especially on ftp with long RTT.

2.3 GSFC-EMS: EOS Metrics System

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

Test Results:

	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS-PTH	91.3	90.8	80.4
ESDIS-PTH	92.9	91.9	61.6
GES DISC	92.8	91.3	86.0
LARC-PTH	93.4	92.1	90.1
MODAPS-PDR	92.7	91.0	85.2
NSIDC-PTH	90.5	87.7	76.7



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	282.7	245.6	142.2	28.3	249.2
GSFC-NISN → JPL-AIRS	254.8	243.7	210.3		
	117.1	102.6	77.5		
GSFC-NISN → JPL-PODAAC	170.3	132.5	92.1		
ESDIS-PTH → JPL-PODAAC	137.4	81.9	54.7		
ESDIS-PTH → JPL-QSCAT	62.6	60.1	52.2		
ESDIS-PTH → JPL-MLS	202.3	166.6	114.5		
GSFC-NISN → JPL-MLS	393.4	352.6	287.2		

Requirements:

	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

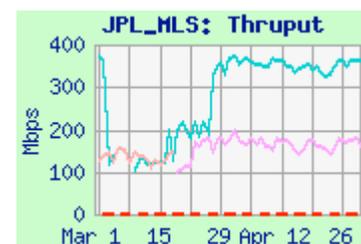
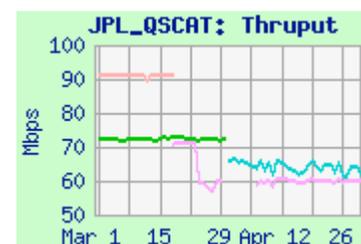
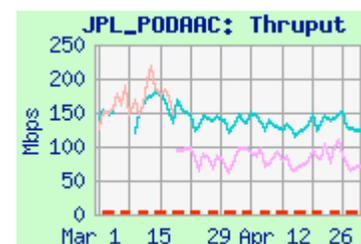
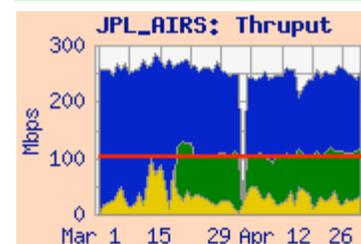
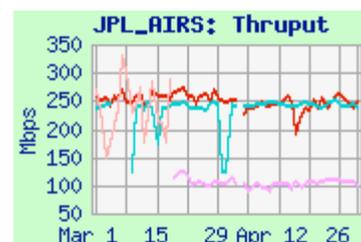
Comments: The user flow from GSFC/EOS decreased this month (was 35 mbps last month).

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 thrupt is also below 3x this requirement, so the overall rating remains "Good".

PODAAC: ESDIS-PTH (connected at 1 gig to the 10 gig EBnet backbone) replaces EBnet-PTH as a test source this month. Performance is lower than previously from EBnet-PTH, but still way above the 1.5 mbps PODAAC requirement (possibly related to tuning), rating "Excellent".

QSCAT: Thuput from ESDIS-PTH to QSCAT was also lower than from EBnet-PTH, but is also well above the modest requirement, rating "Excellent". Performance to a second QScat node (ketch) (cyan), is similar to the primary node.

MLS: Thrupt from ESDIS-PTH was stable, and a bit HIGHER than previously from EBnet-PTH (performance from ESDIS-PTH to other JPL destinations was confusingly lower than from EBnet-PTH!), but was even better from GSFC-NISN. The rating remains "Excellent".



3.2) LaRC → JPL

Rating: Continued **Excellent**

Web Pages:

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

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
LaRC DAAC → JPL-TES	396.0	325.4	181.6	0.1	325.4
LaRC PTH → JPL-TES	173.4	134.5	104.1		
LaRC PTH → JPL-TES sftp	12.9	12.5	9.5		
LaRC ANGE → JPL-PTH	76.6	74.6	72.0	11.5	74.9
LaRC PTH → JPL-PTH	61.5	45.7	27.5		
LaRC PTH → JPL-PTH sftp	31.3	31.3	31.2		
LaRC DAAC → JPL-MISR	63.8	49.7	25.9	3.3	49.7
LaRC PTH → JPL-MISR	82.8	77.9	22.2		

Requirements:

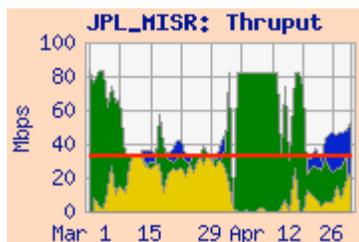
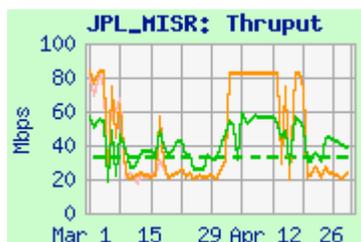
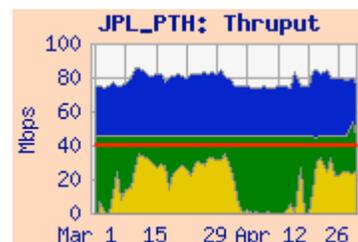
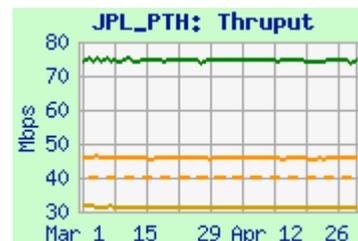
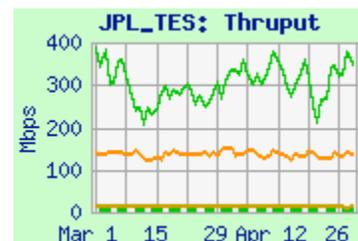
Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	FY '07 – '10	7.0	Excellent
LaRC DAAC → JPL-MISR	FY '07 – '10	32.9	Good
LaRC → JPL-Combined	FY '07 – '10	39.9	Excellent

Note: User flow data between LaRC and JPL data is now obtained from the NISN router at JPL. Thus integrated graphs are again available for this path.

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 performance from LaRC-PTH to JPL-TES is quite low, limited by the Sftp application on the TES node.

LaRC → JPL-PTH: Sftp results are better from LaRC-PTH to JPL-PTH which uses a larger TCP window size. The new JPL-PTH integrated graph shows the overall LaRC to JPL user flow (vs. the overall requirement). The flow is mostly for MISR in March, but other components are present in April.

LaRC → JPL (MISR): the median thrupt is above the requirement, now by a bit more than 30%, so the MISR rating improves to "Good". Thrupt is similar from LaRC-PTH, and both sources get better iperf thrupt when user flow is low.



3.3) JPL → LaRC

Rating: Continued **Excellent**

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

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
JPL-PTH → LaRC PTH	86.8	86.0	65.0	0.2	86.0

Requirements:

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



Comment: This requirement is primarily for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving; it was reduced from 4.4 mbps in May '09 (and had been reduced in April '08 from 52.6 mbps). Thrupt this month was steady at its higher bimodal state (thrupt often switches between 60 and 85 mbps). The rating remains "**Excellent**". The user flow is now measured, but is very small.

4) GSFC → LaRC:

Rating: Continued **Excellent**

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

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GES DISC → LaRC ASDC	297.1	267.1	172.2	4.2	269.0
GSFC-EDOS → LaRC ASDC	480.1	376.9	126.8		
ESDIS-PTH → LaRC-ANGe	436.4	423.6	340.0		
GSFC-NISN → LaTIS	400.3	375.6	336.3		

Requirements:

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

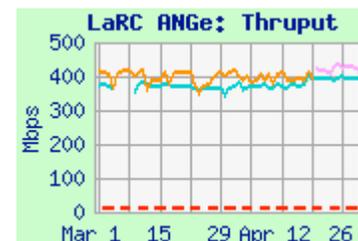
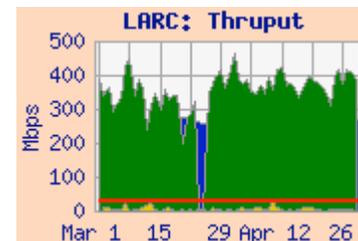
Comments:

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 4.2 mbps average user flow (typical for recent months) remains much lower than the requirement.

ANGe (LaTIS): Testing to ANGe was moved from EBnet-PTH to ESDIS-PTH this month, with similar steady performance. Testing to LaTIS from GSFC-NISN was similar, also with consistent results.



5) Boulder CO sites:

5.1) 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	89.9	45.5	12.7	9.5	48.5
GES-DISC → NSIDC	181.4	102.3	29.7		
	n/a	n/a	n/a		
GSFC-ISIPS → NSIDC (ftp)	n/a	n/a	n/a		
JPL PODAAC → NSIDC	46.1	35.8	8.0		
GHRC → NSIDC DAAC (iperf)	23.2	10.7	3.6		
GHRC → NSIDC DAAC (ftp pull)	16.0	10.4	1.9		

Requirements:

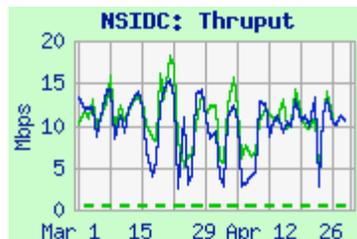
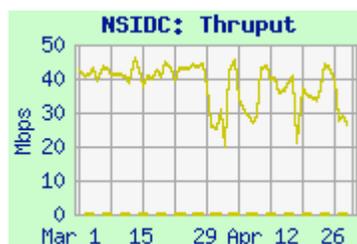
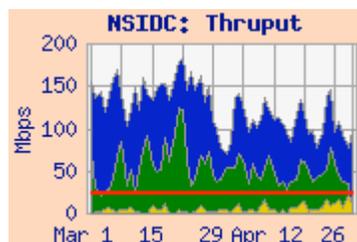
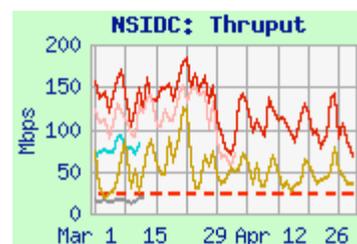
Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	CY '07 – '10	27.6	Good
JPL → NSIDC	CY '07 – '10	0.2	Excellent
GHRC → NSIDC	CY '07 – '10	0.5	Excellent

Comments: GSFC → NSIDC S4PA: This rating is based on testing from the MODIS-PDR server to the NSIDC DAAC, 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 thrupt values remain noisy, The integrated thrupt from MODAPS is above this lower requirement, by more than 30%, so the rating remains "Good" (would be "Excellent" from GES DISC). Although the user flow increased this month (was a more typical 3.3 mbps last month), it remains much lower, even than the reduced requirement (which includes MODIS reprocessing).

GSFC-ISIPS → NSIDC: The ISIPS node was replaced in March, and the new node has not yet been configured to support this testing.

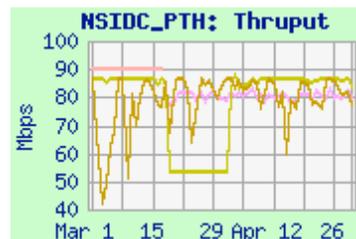
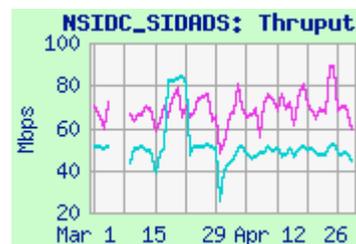
JPL PODAAC → NSIDC S4PA: The requirement was reduced from 1.34 mbps in May '09. Thrupt from PODAAC to NSIDC has been mostly stable since testing was moved to use Internet2 in September '09; the rating remains "Excellent".

GHRC, GHRC-ftp → 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 thrupt 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. User flow is now measured between these nodes – it averaged 225 kbps this month (reasonably consistent with the requirement).



Test Results: NSIDC SIDADS, PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC_SIDADS	90.7	68.9	41.6
GSFC-NISN → NSIDC_SIDADS	52.0	48.2	29.6
ESDIS-PTH → NSIDC-PTH	86.9	80.5	71.2
MODIS-PDR → NSIDC-PTH	88.4	82.8	48.0
JPL PTH → NSIDC-PTH	86.6	86.5	83.3



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 ESDIS-PTH (replacing EBnet-PTH) was steady, but slightly lower than EBnet-PTH previously.

MODIS still experienced some congestion. From JPL-PTH performance was very steady, in its higher bimodal state.

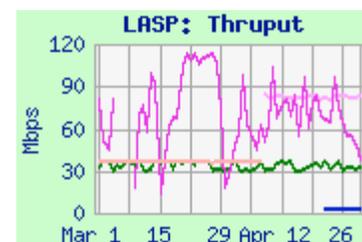
5.2) LASP:

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

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

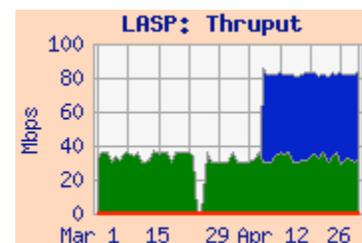
Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC EDOS → LASP (blue)	37.1	32.1	9.5
ESDIS-PTH → LASP (iperf)	86.4	82.6	71.7
ESDIS-PTH → LASP (scp)	3.1	3.1	3.0
GSFC ENPL → LASP (green)	114.7	65.1	13.5



Requirement:

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



Comments: 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. The median thruput from EDOS remains well over 3x the requirement, so the rating remains "**Excellent**". The average user flow this month was lower than typical at 55 kbps

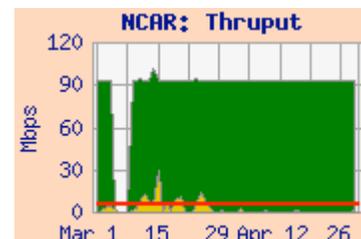
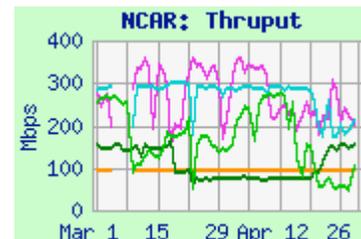
ESDIS-PTH also tests to the test node on LASP's blue network (replacing EBnet-PTH), with improved thruput.

SCP testing was restored (from ESDIS-PTH) to the upgraded LASP test node. When SCP testing was discontinued to the old LASP node in November '09, thruput was very steady at 0.45 mbps, so the current performance is approximately a 7X improvement.

Performance is also higher from GSFC-ENPL to a node on LASP's green network via Internet2.

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

Source	Medians of daily tests (mbps)			Requirement
	Best	Median	Worst	
LaRC ASDC	281.0	156.1	65.3	0.1
LaRC PTH	103.0	76.7	51.3	
GSFC-ENPL-GE	326.4	241.4	95.3	n/a
GSFC-ENPL-FE	93.1	93.0	92.9	
GSFC-NISN	293.0	284.5	114.7	



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

Thruput from LaRC ASDC was similar to last month, as was LaRC-PTH. The median remains well above 3 x the reduced requirement, so the rating remains "**Excellent**".

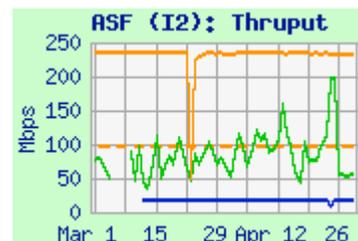
From GSFC-ENPL-GE, with a Gig-E connection to MAX, the median thrupt is even higher. From GSFC-NISN, the route is via NISN to the MAX (similar to the route from LaRC). Performance is mostly stable. The average user flow from GSFC this month was only 334 mbps, vs. 5.2 mbps last month (which was consistent with to the old 5.1 mbps requirement).

6) ASFRatings: 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	235.5	233.9	121.3	96	Good
GSFC	198.9	94.4	25.3		
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.

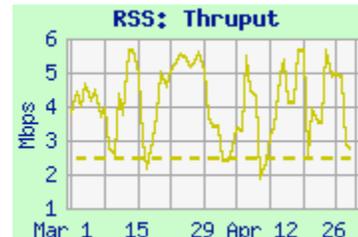
Testing to ASF is for the ALOS mission. The route from WSC is via NISN SIP, peering with Internet2 at one of several possible peering points (usually StarLight in Chicago). Internet2 connects to the "Pacific Northwest Gigapop" (PNW) in Seattle. From there the University of Alaska – Fairbanks (UAF) has 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 thrupt significantly. The median is again above the requirement by more than 30%, but less than 3x, so the rating remains "**Good**".



An additional test was added last month, SCP 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.

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

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
JPL → RSS	5.65	3.54	1.42	0.5

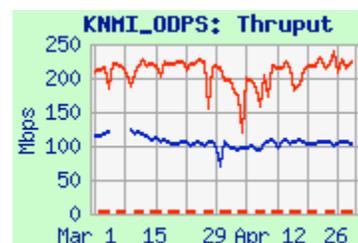


Comments: RSS (Santa Rosa, CA) is a SIPS for AMSR-E (Aqua), receiving L1 data from JAXA via JPL, and sending its processed L2 results to GHRC (aka NSSTC) (UAH, Huntsville, AL). This month the thruput from JPL was noisy, as usual -- periods of low performance are believed to be attributable to correspondingly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

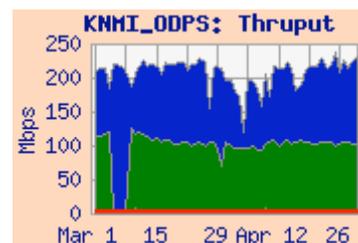
Note that with the present configuration (passive servers at both RSS and GHRC), the RSS to GHRC performance cannot be tested.

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

Source → Dest	Medians of daily tests (mbps)			Reqmt
	Best	Median	Worst	
OMISIPS → KNMI-ODPS	239.2	214.5	151.1	0.03
GSFC-ENPL → KNMI-ODPS	112.9	103.4	82.6	



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, 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 1.6:1 (was 12:1 in February). Congestion is also not present from the steady results from GSFC-ENPL. The user flow averaged 2.9 mbps this month, as shown (but hard to see) 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).



9) ERSDAC ↔ US:

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

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

US ↔ ERSDAC Test Results

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-EDOS → ERSDAC	84.4	78.6	32.6	4.4	79.0
GES DISC → ERSDAC	28.1	22.8	14.3		
GSFC ENPL (FE) → ERSDAC	89.2	89.0	88.9		
ERSDAC → EROS	86.2	85.2	78.3	4.3	
ERSDAC → JPL-ASTER IST	89.8	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

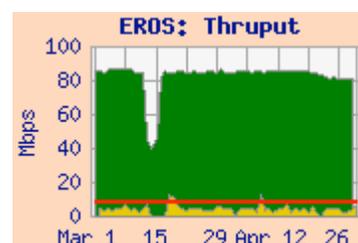
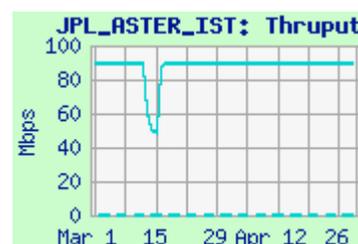
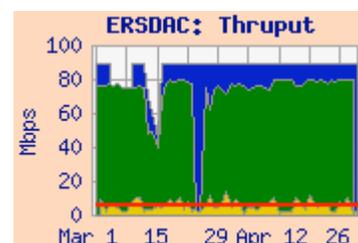
Comments:

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 4.4 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 4.5 mbps flow (especially when contingency is added). The median thrupt is more than 3 x the reduced requirement, so the rating remains "Excellent".



10) US ↔ JAXA

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

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

However, the user flow between GSFC and JAXA continues to be measured. As shown below, the average user flow this month was 3.4 mbps from GSFC to JAXA (peaking to 8 mbps), and 131 kbps from JAXA to GSFC (with regular peaks to 2.5 mbps). Comparing these value to the new requirement of 0.1 mbps produces a rating of "Excellent" in both directions. Note that the user flow is much more consistent with the old 2.0 mbps GSFC → JAXA requirement.

