EOS Production Sites
Network Performance Report: May 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 3.65** (was 3.70 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** ("Bad")
    - Drop was related to removal of Portis Firewall at EROS
    - Under investigation
- GSFC-ISIPS test node restored 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 – so 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

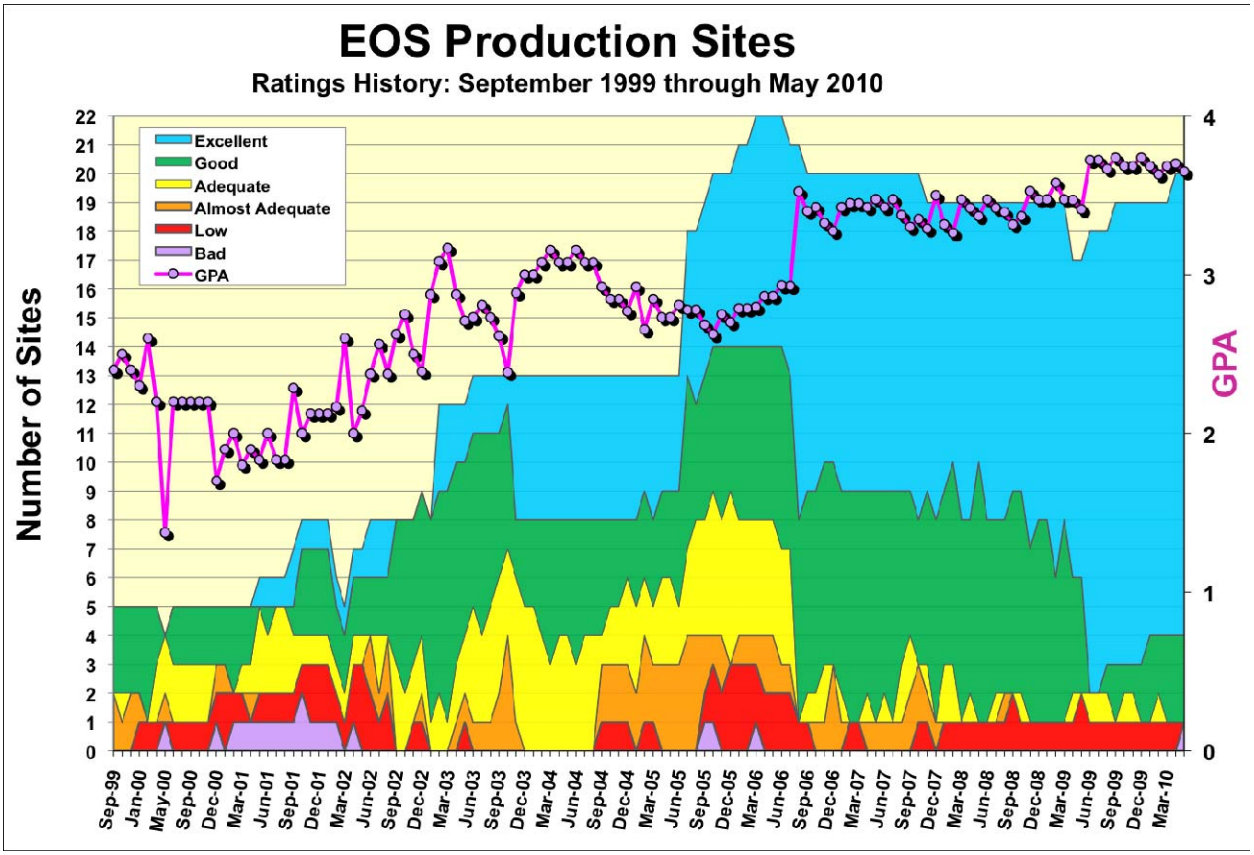
  Downgrades: ↓ GSFC-MODIS → EROS LPDAAC: Low → Bad

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.

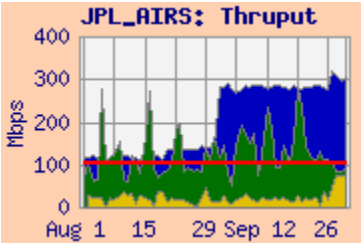
Thus the requirements are based on the EOS Networks Requirements Handbook, Version 1.4.3 (from which the database requirements were derived). Previously, the requirements were derived from version 1.4.2.

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 thruput 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.

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Network Requirements vs. Measured Performance

May 2010		Requirements (mbps) from Handbook 1.4.3			Testing				Ratings		
Source → Destination	Instrument (s)	Current May 2010	Old Version (1.4.2)	Future Oct 2010	Source → Dest Nodes	Avg User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re May 10 Requirements: This Month	Ratings re May 10 Requirements: Last Month	Ratings re Oct 2010 Reqmnts
WSC→ ASF	ALOS	96.0	n/a	96.0	WSC → ASF-DAAC TEST		233.6		Good	G	Good
EDOS → LASP	ICESat, QuikScat	0.4	0.4	0.4	GSFC-EDOS → LASP (blue)	0.09	34.0		Excellent	E	Excellent
GSFC → EROS	MODIS, LandSat	342.9	345.9	342.9	MODAPS-PDR → EROS LPDAAC	18.5	107.0	111.2	Bad	L	Bad
GSFC → JPL	AIRS, MLS, ISTs	101.7	43.6	101.7	GES DISC → JPL-AIRS	25.8	239.7	243.7	Good	G	Good
JPL → GSFC	MLS	0.6	7.4	0.6	JPL-PTH → GSFC-ESDIS-PTH	4.31	86.8	86.9	Excellent	E	Excellent
JPL → RSS	AMSR-E	0.5	2.5	0.5	JPL-PODAAC → RSS		3.3		Excellent	E	Excellent
LaRC → JPL	TES, MISR	23.0	43.7	23.0	LARC-DAAC → JPL-TES	4.3	387.9		Excellent	E	Excellent
JPL → LaRC	TES	1.5	4.4	1.5	JPL-PTH → LARC-PTH	0.14	85.6		Excellent	E	Excellent
GSFC → LaRC	CERES, MISR, MOPITT	31.3	60.5	31.3	GSFC-EDOS → LDAAC	8.9	367.5	367.5	Excellent	E	Excellent
LaRC → GSFC	CERES, MODIS, TES	0.4	0.2	0.4	LDAAC → GES DISC	0.25	466.6	466.6	Excellent	E	Excellent
JPL → NSIDC	AMSR-E	0.2	1.3	0.2	JPL-PODAAC → NSIDC		43.5		Excellent	E	Excellent
NSIDC → GSFC	MODIS, ICESAT, QuikScat	0.6	0.5	0.6	NSIDC DAAC → GES DISC	0.97	239.8	239.8	Excellent	E	Excellent
GSFC→ NSIDC	MODIS, ICESAT, QuikScat	27.6	34.5	27.6	MODAPS-PDR → NSIDC-DAAC	16.3	66.4	72.2	Good	G	Good
GHRC → NSIDC	AMSR-E	0.5	7.5	0.5	GHRC → NSIDC DAAC	0.35	10.7		Excellent	E	Excellent
LaRC → NCAR	MOPITT	0.1	5.4	0.1	LDAAC → NCAR		55.4		Excellent	E	Excellent
GSFC → JAXA	QuikScat, TRMM, AMSR	0.1	2.0	0.1	GSFC-EDOS → JAXA DDS	5.6	Testing discontinued: 31 March 2009		Excellent	E	Excellent
JAXA → US	AMSR-E	0.5	1.3	0.5	JAXA DDS → JPL-QSCAT	2.5			Excellent	E	Excellent
GSFC → ERSDAC	ASTER	5.4	12.5	5.4	GSFC-EDOS → ERSDAC	4.5	79.5	79.8	Excellent	E	Excellent
ERSDAC → EROS	ASTER	8.3	26.8	8.3	ERSDAC → EROS PTH	3.9	84.3	84.3	Excellent	E	Excellent
GSFC → KNMI	OMI	0.03	3.3	0.03	GSFC-OMISIPS → ODPS	3.0	231.9	233.1	Excellent	E	Excellent

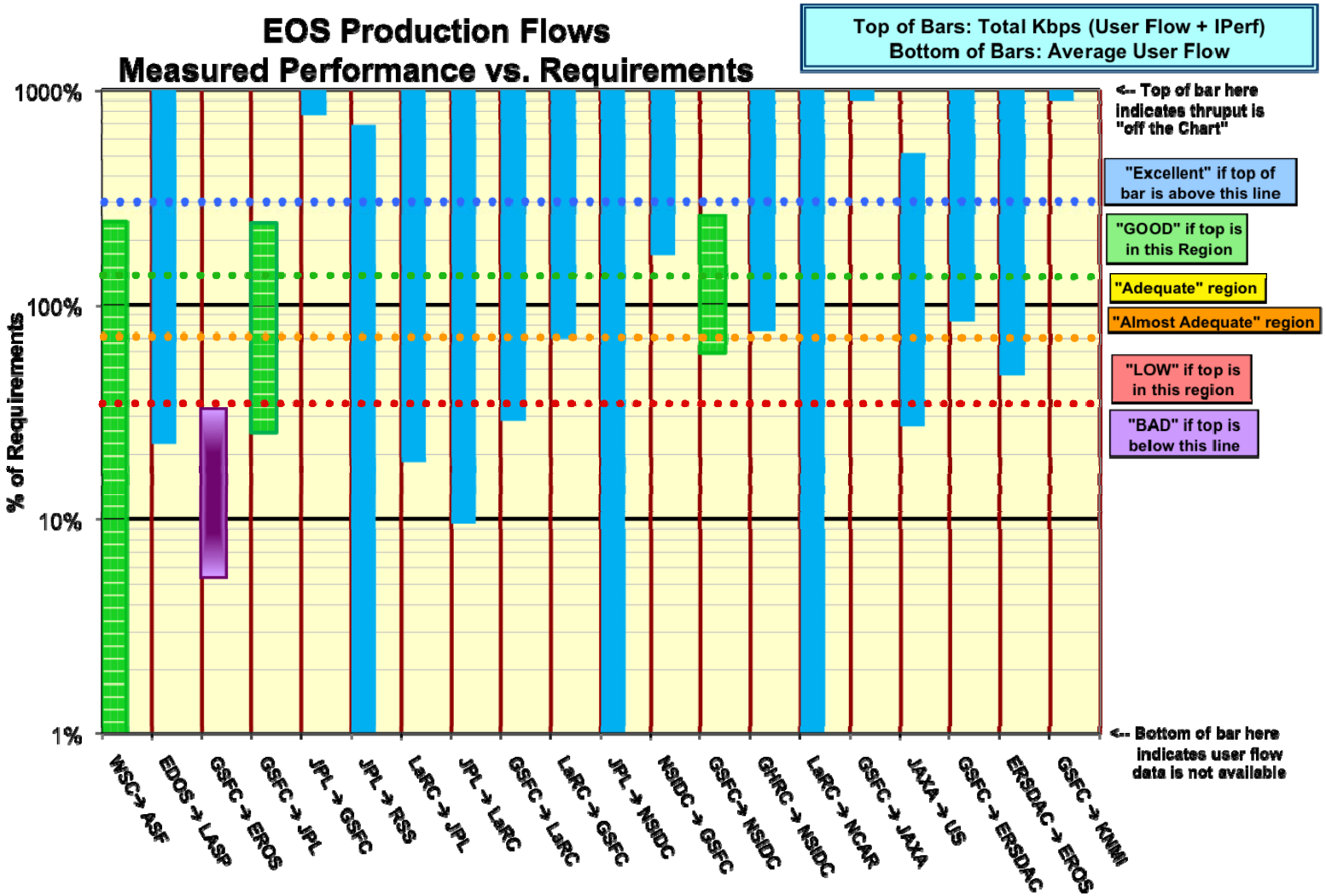
significant change from version 1.42 (May 2009) to 1.43

*Criteria:		
	Excellent	**Total Kbps** > Requirement * 3
	Good	1.3 * Requirement <= **Total Kbps** < Requirement * 3
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3
	Almost Adequate	Requirement / 1.3 < **Total Kbps** < Requirement
	Low	Requirement / 3 < **Total Kbps** < Requirement / 1.3
	Bad	**Total Kbps** < Requirement / 3

Ratings Summary	May-2010 Req Score	May-2010 Req Prev	Oct-2010 Req Score
Excellent	16	16	16
Good	3	3	3
Adequate	0	0	0
Almost Adequate	0	0	0
Low	0	1	0
Bad	1	0	1
Total Sites	20	20	20
GPA	3.65	3.70	3.65

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.



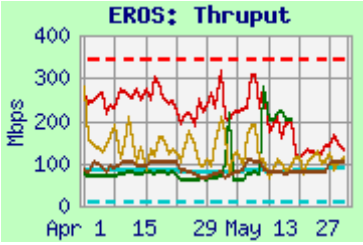
1) EROS:

Ratings: GSFC → EROS: ↓ **Low** → **Bad**
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

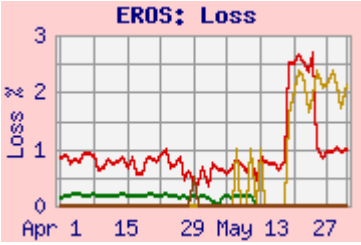
Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**User Flow**	**Integrated**
MODAPS-PDR→ EROS LPDAAC	160.8	107.0	49.2	18.5	111.2
GSFC-EDOS → EROS LPDAAC	228.3	88.9	42.6		
GES DISC → EROS LPDAAC	319.5	189.8	75.9		
ERSDAC→ EROS LPDAAC	84.7	84.3	77.3	3.9	84.3
NSIDC SIDADS→ EROS LPDAAC	86.4	80.6	67.4		
GSFC-ESDIS-PTH → EROS PTH	391.1	264.0	156.1		
GSFC-ENPL → EROS PTH	409.9	357.9	283.0		
GSFC-NISN → EROS PTH	459.4	428.4	305.3		
LaRC PTH→ EROS PTH	140.2	105.4	32.0		



Requirements:

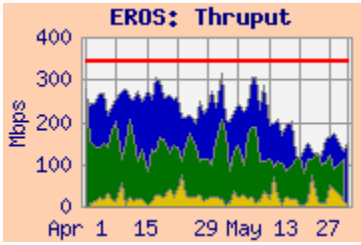
Source → Dest	Date	mbps	Rating
GSFC → EROS	CY '08-11	343	**Bad**
ERSDAC → EROS	FY '06 - '10	8.3	**Excellent**



Comments:

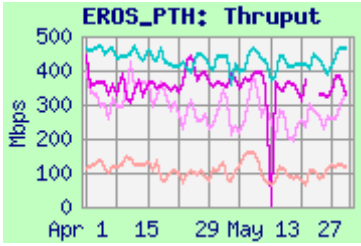
1.1 GSFC → EROS: The rating is based on the MODAPS-PDR Server to EROS LP DAAC measurement, since that is the primary flow. The route is via the Doors to NISN SIP, via the NISN 10 gbps backbone to the NISN Chicago CIEF, then via GigE to the StarLight gigapop, peering with the EROS OC-12 (622 mbps).

The user flow this month was typical of the last few months, and remains far below the nominal requirement (which includes MODIS reprocessing).



On May 18, the EROS LPDAAC Portus proxy firewall was replaced with a Juniper firewall. At that time, incoming packet retransmission to the EROS LPDAAC increased, and thruput dropped from all sources, apparently due to the LPDAAC not using "selective acks". Performance to EROS-PTH, outside this firewall, was unchanged, indicating that there was no change to the networks.

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 thruput remains more than 30% below the requirement so the rating remains "Low". MODIS is planned to be upgraded to 10 gig (but with each subsystem having a I gig connection) in the near future.



However, GES-DISC and ESDIS-PTH are connected to the 10 gig EBnet backbone (with 1 Gig connections), and do not compete with MODAPS flows. So their thruput is higher than from MODAPS; ESDIS-PTH to EROS-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 to EROS-PTH 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 – EDOS testing resumed in June and was retuned, with improved performance.

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

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

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

1.4 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**

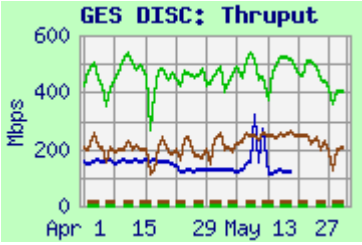
Web Pages:
http://ensight.eos.nasa.gov/Organizations/production/GDAAC.shtml
http://ensight.eos.nasa.gov/Organizations/production/GSFC_PTH.shtml
http://ensight.eos.nasa.gov/Missions/icesat/GSFC_ISIPS.shtml

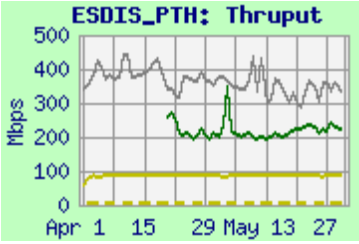
Test Results:

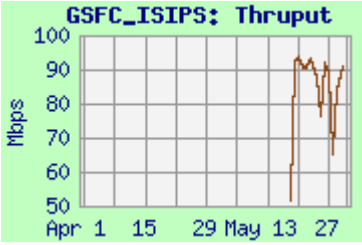
Source → Dest	Medians of daily tests (mbps)			
	Best	**Median**	**Worst**	**User Flow**
EROS LPDAAC → GES DISC	158.8	124.8	81.3	
EROS PTH→ GSFC-ESDIS PTH	434.8	347.0	284.9	
JPL-PTH→ GSFC-ESDIS PTH	89.5	86.8	77.2	4.3
LDAAC → GES DISC	539.5	466.6	269.0	0.25
LARC-ANGe → GSFC-ESDIS PTH	266.6	214.2	161.9	
NSIDC DAAC → GES DISC	306.7	239.8	112.7	0.97
NSIDC DAAC → GSFC-ISIPS	95.8	90.5	41.7	

Requirements:

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







Comments:

EROS, EROS-PTH → GSFC: The thruput for tests from EROS PTH to ESDIS-PTH were stable this month. Testing from EROS LPDAAC to GES DISC went down with the removal of the EROS proxy firewall on May 18 (but resumed in June with improved performance).

JPL → GSFC: Thruput 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 and LaRC ANGe to ESDIS-PTH remained way above 3 x the modest requirement, so the rating continues as "**Excellent**". The user flow this month was way below both the typical flow and the requirement.

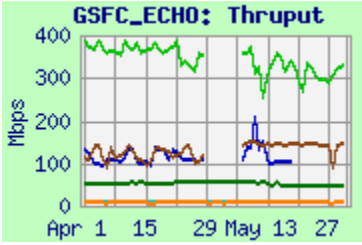
NSIDC → GSFC: Performance from NSIDC to GSFC (DAAC and ISIPS) improved in December '09, with NSIDC's switch from NISN to Internet2. With the low requirement (reduced from 13.3 mbps in May '09), the rating remains "**Excellent**". The ISIPS test node was replaced last month, and testing resumed this month, with thruput better than previously.

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	131.3	104.6	86.4
EROS LPDAAC ftp	8.4	8.3	6.5
GES DISC	n/a	n/a	n/a
GES DISC ftp	n/a	n/a	n/a
LaRC ASDC DAAC	379.8	321.8	201.0
LaRC ASDC DAAC ftp	55.6	48.2	28.9
NSIDC DAAC	149.6	145.5	102.0
NSIDC DAAC ftp	8.1	7.7	4.3



Comments:

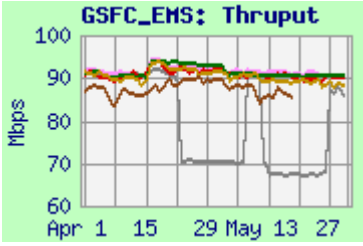
Performance is mostly limited by TCP window size – especially on ftp with long RTT. Testing stopped from EROS when its proxy firewall was removed on May 18. Testing from LPDAAC resumed in June with improved thruput. Testing from GSFC also resumed in June.

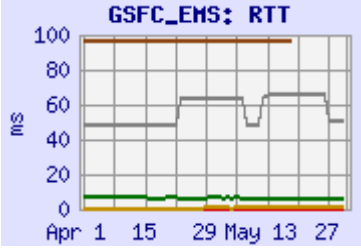
2.3 GSFC-EMS: EOS Metrics System

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	70.8	70.2	65.2
ESDIS-PTH	92.1	91.3	55.5
GES DISC	92.4	90.3	85.5
LARC-PTH	90.8	90.5	89.0
MODAPS-PDR	91.9	89.4	84.4
NSIDC-PTH	90.4	87.5	79.1





Comments:

Testing is performed to GSFC-EMS from the above nodes, iperf only. Results are mostly very steady. Performance limitation is from the 100 mbps fast-E connection. The thruput drops from EROS correspond to increased RTT, which has been corrected.

3) JPL:

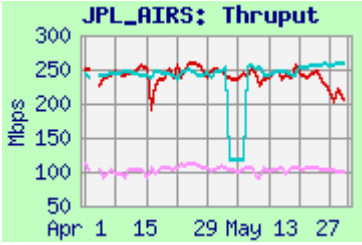
3.1) GSFC → JPL:

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

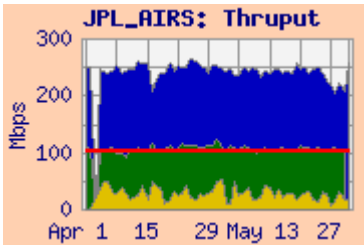
Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**User Flow**	**Integrated**
GSFC-GES DISC→ JPL-AIRS	265.0	239.7	144.9	25.8	243.7
GSFC-NISN → JPL-AIRS	258.5	251.5	212.4		
ESDIS-PTH → JPL-AIRS	114.4	104.1	81.2		
GSFC-NISN → JPL-PODAAC	186.3	145.4	102.2		
ESDIS-PTH → JPL-PODAAC	163.9	88.9	56.8		
GSFC-NISN → JPL-QSCAT	87.9	87.6	85.2		
ESDIS-PTH → JPL-QSCAT	62.2	59.8	50.4		
GSFC-NISN → JPL-MLS	414.3	385.1	316.7		
ESDIS-PTH → JPL-MLS	207.9	173.6	116.6		



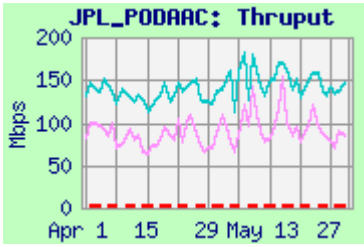
Requirements:

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**

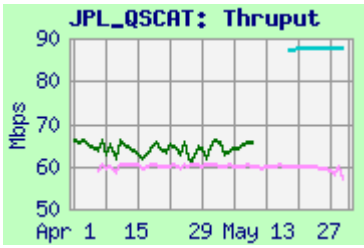


Comments: The user flow from GSFC/EOS was steady this month.

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**".

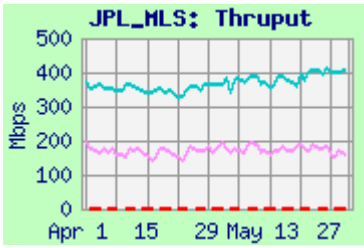


PODAAC: ESDIS-PTH (connected at 1 gig to the 10 gig EBnet backbone) replaced EBnet-PTH as a test source last month. Performance is lower than previously from EBnet-PTH, but still way above the 1.5 mbps PODAAC requirement (possibly related to tuning), rating "**Excellent**".



QSCAT: Thuput from ESDIS-PTH to QSCAT was also lower than from EBnet-PTH, but is also well above the modest requirement, rating "**Excellent**". Testing was started this month from GSFC-NISN with even higher thruput.

MLS: Thruput 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 thruput was even better from GSFC-NISN. The rating remains "**Excellent**".



3.2) LaRC → JPL

Rating: Continued **Excellent**

Web Pages:

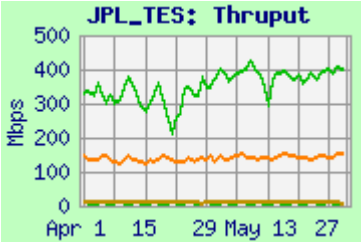
http://ensight.eos.nasa.gov/Organizations/production/JPL_TES.shtml
http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml
http://ensight.eos.nasa.gov/Organizations/production/JPL_PTH.shtml

Test Results:

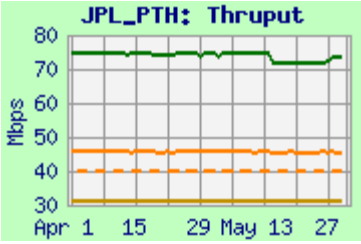
Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	Integrated
LaRC DAAC → JPL-TES	430.4	387.9	183.0	0.3	387.9
LaRC PTH → JPL-TES	181.7	141.8	115.6		
LaRC PTH → JPL-TES sftp	12.9	12.7	11.0		
LaRC ANGE → JPL-PTH	73.6	73.5	66.9	3.8	74.3
LaRC PTH → JPL-PTH	59.4	45.6	27.5		
LaRC PTH → JPL-PTH sftp	31.4	31.4	31.2		
LaRC DAAC → JPL-MISR	66.1	55.6	38.5	2.8	49.7
LaRC PTH → JPL-MISR	83.0	82.7	61.7		

Requirements:

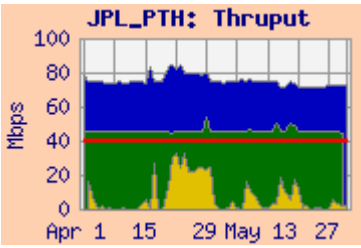
Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	FY '07 – '10	7.0	**Excellent**
LaRC DAAC → JPL-MISR	FY '07 – '10	32.9	**Good**
LaRC → JPL-Combined	FY '07 – '10	39.9	**Excellent**



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.

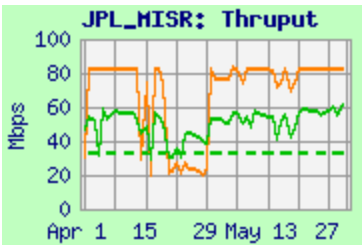


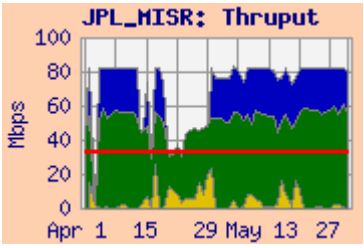
LaRC→ JPL (Overall, TES): Median performance from LaRC ASDC DAAC to JPL-TES remains well over 3 x the TES and combined requirements, so the TES and Overall ratings remain "**Excellent**". There were fewer periods of congestion observed from ASDC DAAC (none are seen from ANGe or LaRC-PTH). Sftp performance from LaRC-PTH to JPL-TES is quite low, limited by the Sftp application on the TES node. User flow to TES is very low.



LaRC→ JPL-PTH: Sftp results are better from LaRC-PTH to JPL-PTH which uses a larger TCP window size. The JPL-PTH integrated graph shows the overall LaRC to JPL user flow (vs. the overall requirement). The user flow in May was mostly for MISR.

LARC → JPL (MISR): the median thruput is above the requirement, by more than 30%, so the MISR rating remains "**Good**". Thruput is even better from LaRC-PTH, and both sources get better iperf thruput when user flow is low.





3.3) JPL → LaRC

Rating: Continued **Excellent**

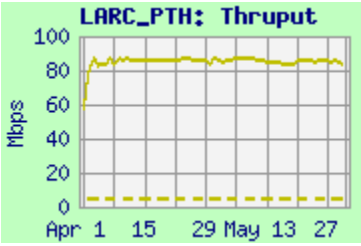
Web Page: http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**User Flow**	**Integrated**
JPL-PTH → LaRC PTH	86.9	85.6	83.7	0.14	85.6

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). Thruput this month was steady at its higher bimodal state (thruput often switches between 60 and 85 mbps). The rating remains "**Excellent**". The user flow is now measured, but is very small.

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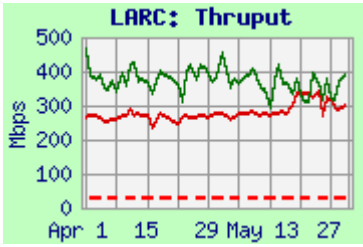
4) GSFC → LaRC:

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)				
	Best	**Median**	**Worst**	**User Flow**	**Integrated**
GES DISC → LaRC ASDC	305.6	277.4	177.9	7.3	279.2
GSFC-EDOS → LaRC ASDC	471.7	367.5	93.3		
ESDIS-PTH → LaRC-ANGe	435.6	411.6	338.5		
GSFC-NISN → LaTIS	402.2	392.5	347.1		

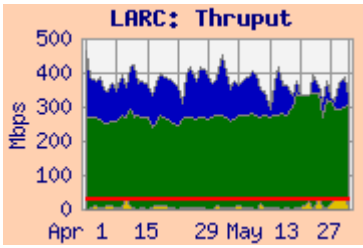


Requirements:

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

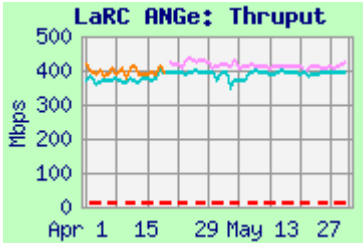
Comments:

GSFC → LaRC ASDC: The rating is based on the GES DISC to LaRC ASDC DAAC thruput, compared to this combined requirement. The integrated thruput 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 average user flow (higher than average for recent months) remains much lower than the requirement.



ANGe (LaTIS): Testing to ANGe was moved from EBnet-PTH to ESDIS-PTH last 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

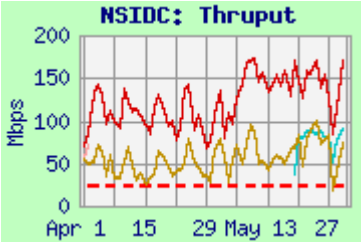
The NSIDC DAAC was disconnected from NISN PIP in December '09 – all flows now go via the UCB campus, usually via FRGP to Internet2. Note that NSIDC-PTH was still connected to and using NISN PIP until mid May, when it was removed in preparation to switch its connection to UCB. Also, UCB dropped its peering with NISN SIP in January, so that route is no longer used.

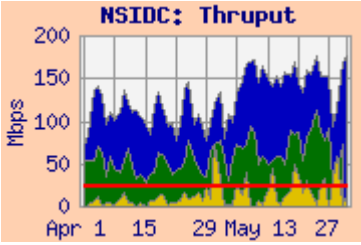
Test Results: NSIDC S4PA

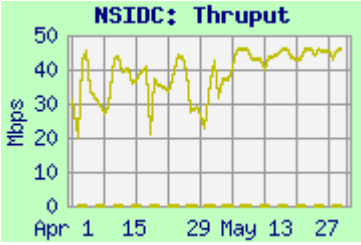
Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	Integrated
MODIS-PDR → NSIDC	100.7	66.4	21.9	16.3	72.2
GES-DISC → NSIDC	187.4	143.7	44.5		
GSFC-ISIPS → NSIDC (iperf)	92.7	80.9	48.1		
GSFC-ISIPS → NSIDC (ftp)	n/a	n/a	n/a		
JPL PODAAC → NSIDC	46.2	43.5	20.5		
GHRC → NSIDC DAAC (iperf)	23.0	10.5	3.1		
GHRC → NSIDC DAAC (ftp pull)	16.9	10.7	2.8		

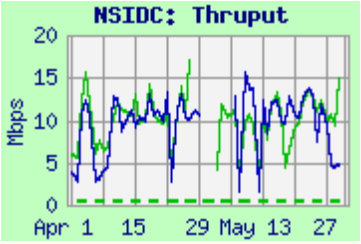
Requirements:

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 thruput values remain noisy, The integrated thruput from MODAPS is above this lower requirement, by more than 30%, so the rating remains "**Good**" (would be "**Excellent**" from GES DISC). The user flow increased this month, and was consistent with this reduced requirement (without contingency).

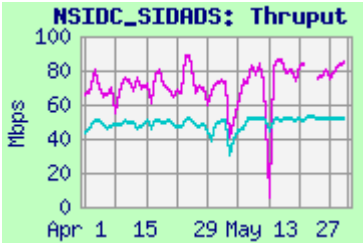
GSFC-ISIPS → NSIDC: The ISIPS node was replaced in March, and iperf testing resumed this month (ftp testing is no longer supported). Thruput is very similar to MODIS.

JPL PODAAC → NSIDC S4PA: The requirement was reduced from 1.34 mbps in May '09. Thruput from PODAAC to NSIDC has been mostly stable 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 thruput 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 500 kbps this month (very consistent with the requirement).

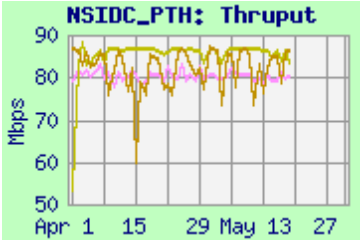
Test Results: NSIDC SIDADS, PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	**Median**	**Worst**
GSFC-ENPL → NSIDC_SIDADS	91.7	76.2	44.4
GSFC-NISN → NSIDC_SIDADS	52.3	51.3	37.9
ESDIS-PTH → NSIDC-PTH	87.2	80.2	71.3
MODIS-PDR → NSIDC-PTH	88.6	85.2	54.0
JPL PTH → NSIDC-PTH	86.6	86.5	83.2



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 was via NISN-PIP, **which no longer supports any NSIDC user flows.** Testing was stopped in mid May when the test node was removed in preparation to switch its connection to UCB.



Thruput from ESDIS-PTH (replacing EBnet-PTH) was steady, but slightly lower that EBnet-PTH previously. MODIS-PDR still experienced some congestion. From JPL-PTH performance was very steady, in its higher bimodal state.

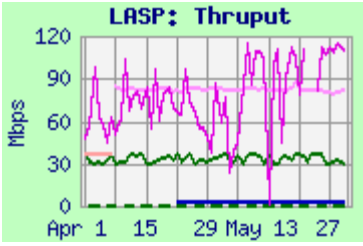
5.2) LASP:

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

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

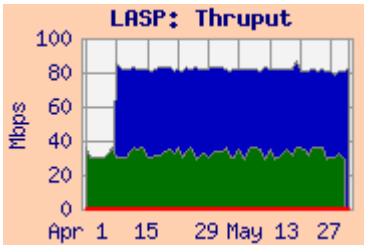
Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	**Median**	**Worst**
GSFC EDOS → LASP (blue)	37.1	34.0	11.1
ESDIS-PTH → LASP (iperf)	86.4	82.2	69.5
ESDIS-PTH → LASP (scp)	3.1	3.1	2.9
GSFC ENPL → LASP (green)	114.7	102.5	39.8



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 typical at 89 kbps

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

SCP testing was restored in April 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.

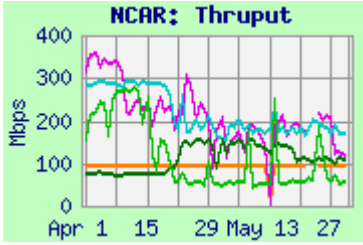
5.3) NCAR:

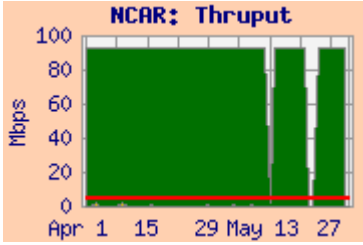
Ratings: LaRC → NCAR: Continued **Excellent**

Web Pages http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml

Test Results:

Source	Medians of daily tests (mbps)			
	Best	Median	Worst	Requirement
LaRC ASDC	275.3	55.4	35.3	0.1
LaRC PTH	178.4	124.3	55.6	
GSFC-ENPL-GE	274.7	176.1	58.2	n/a
GSFC-ENPL-FE	93.1	93.0	92.8	
GSFC-NISN	292.8	180.1	122.5	





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 thruput is even higher. From GSFC-NISN, the route is via NISN to the MAX (similar to the route from LaRC). Performance from all sources is noisy but mostly stable. The average user flow from GSFC this month was only 180 kbps, vs. 5.2 mbps in March (which was consistent with the old 5.1 mbps requirement).

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6) ASF

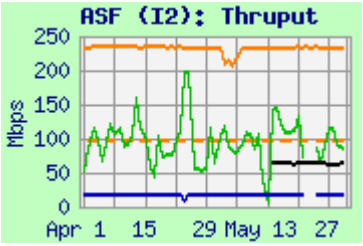
Ratings: IOnet: X Discontinued
WSC → ASF: Continued **Good**

Web Page: http://ensight.eos.nasa.gov/Organizations/production/ASF2.shtml

Test Results:

Source	Medians of daily tests (mbps)				
	Best	Median	Worst	Requirement	Rating
WSC	235.0	233.6	105.1	96	Good
WSC-SFTP	66.4	64.7	47.9		
GSFC	198.6	103.5	29.1		
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%, but less than 3x, so the rating remains "Good".

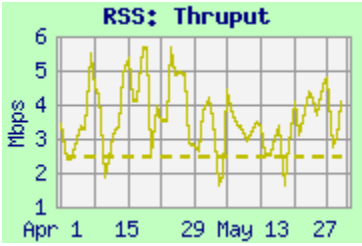
An additional test was added last month, SFTP from WSC. Thruput was lower than iperf, due to TCP window size limitations, but was very steady.

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

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)			
	Best	**Median**	**Worst**	**Reqmt**
JPL → RSS	5.19	3.34	1.39	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.

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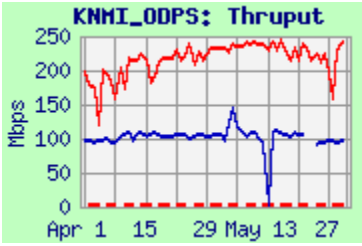
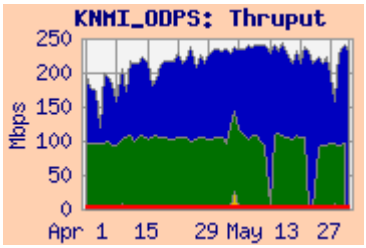
8) KNMI:

Rating: Continued **Excellent**

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





Test Results:

Source → Dest	Medians of daily tests (mbps)			
	Best	**Median**	**Worst**	**Reqmt**
OMISIPS → KNMI-ODPS	250.4	231.9	176.2	0.03
GSFC-ENPL → KNMI-ODPS	113.8	104.7	80.6	

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 1.4:1 (was 12:1 in February). Congestion is also not present from the steady results from GSFC-ENPL. The user flow averaged 3.0 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**

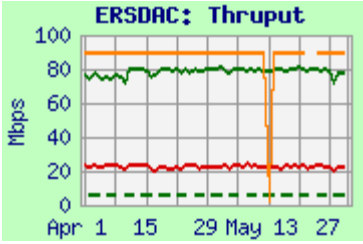
Web Page :http://ensight.eos.nasa.gov/Organizations/production/ERSDAC.shtml

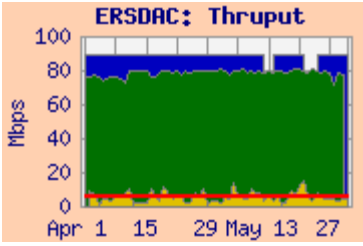
US ←→ ERSDAC Test Results

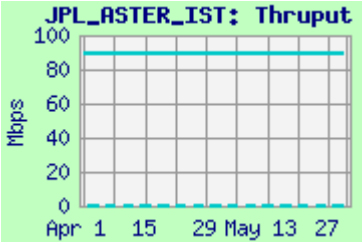
Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	Integrated
GSFC-EDOS → ERSDAC	84.2	79.5	38.9	4.5	79.8
GES DISC → ERSDAC	27.4	22.8	14.9		
GSFC ENPL (FE) → ERSDAC	89.2	89.0	88.9		
ERSDAC → EROS	84.7	84.3	77.3	3.9	
ERSDAC → JPL-ASTER IST	89.7	89.6	89.3		

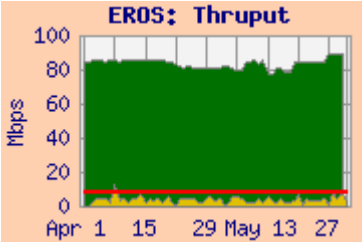
Requirements:

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 thruput 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 4.5 mbps user flow is stable, and consistent with the new requirement.

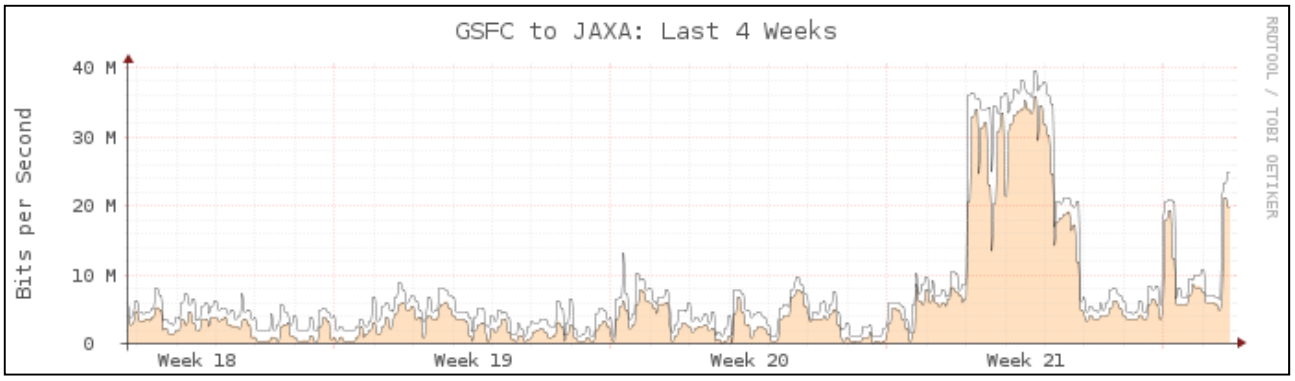
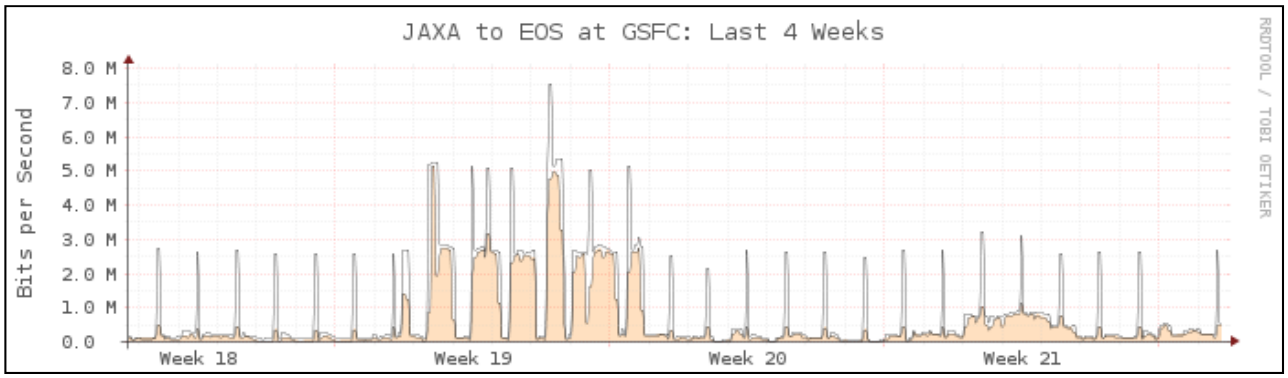
Thruput from GES DISC to ERSDAC is limited by packet loss at the GigE to FastE switch at Tokyo-XP. The GES DISC GigE source does not see any bottlenecks until this switch (The Internet2 and APAN backbones are 10 Gbps). It thus exceeds the capacity of the switch's FastE output circuit, causing packet 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 thruput that GES DISC – thruput similar to ENPL-FE.

ERSDAC → JPL-ASTER-IST: The median thruput 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 thruput remains well above the reduced requirement (was 26.8 mbps previously). The new 8.3 mbps requirement is much closer to the actual 3.9 mbps flow (especially when contingency is added) . The median thruput 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 5.6 mbps from GSFC to JAXA (peaking over 30 mbps), and 540 kbps from JAXA to GSFC (with regular peaks to 2.5 mbps, others to 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.