

EOS Production Sites Network Performance Report: November 2014

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:

- **Very stable flows**
 - **GPA: 3.56 ↓** (was 3.73 last month)
- **Requirements:** using the Network Requirements Database for 2014
 - Including GPM, OCO2, and SMAP missions
 - AMSR Reprocessing requirements began last month (GHRC --> NSIDC)
- **Only 2 flows below Good**
 - **GSFC → EROS: Low**
 - **NOAA → GSFC-NPP-SD3E: Low**

Ratings Changes:

Upgrade: ↑ GSFC-EDOS → JPL-SMAP: Low → Adequate

Downgrades: ↓

LaRC → JPL: Excellent → Good

NOAA → GSFC-NPP-SD3E: Good → Low

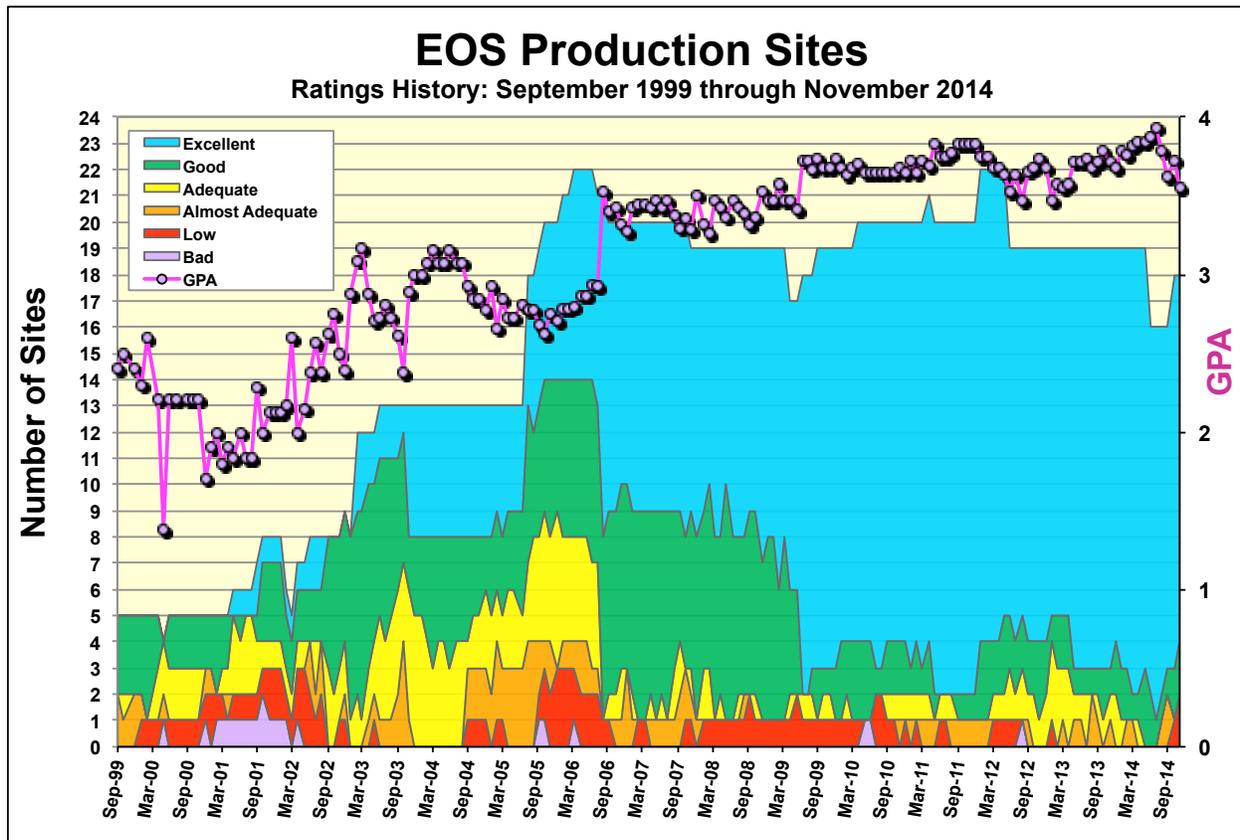
- Probably just a problem with the NOAA test node

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 / 1.5 < Total Kbps < Requirement
Low:	1	Requirement / 3 < Total Kbps < Requirement / 1.5
Bad:	0	Total Kbps < Requirement / 3

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

Note that “**Almost Adequate**” implies meeting the requirement excluding the usual 50% contingency factor.

Ratings History:

The chart above shows the number of sites in each rating category 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.

Additions and deletions:

- 2011 April: Added RSS to GHRC
- 2011 May: Deleted WSC to ASF for ALOS
- 2012 January: Added NOAA → GSFC-SD3E
Added GSFC-SD3E → Wisconsin
- 2012 June: Deleted GSFC → LASP
Deleted GSFC ← → JAXA
- 2014 June: AMSR-E no longer producing data
Deleted JPL to RSS and RSS to GHRC
Deleted JPL to NSIDC
- 2014 October: Added JPL to NSIDC requirement for SMAP
Added GSFC to GHRC requirement for LANCE

Requirements Basis:

In June 2014, the requirements were updated to the latest values in the database!

- Added flows for GPM, OCO2, and SMAP (effective FY '15) missions
- Removed AMSR-E, ICESAT flows (AMSR-E reprocessing remains included)
- MODIS reprocessing incorporated month-by-month
 - Reprocessing requirement began 2014 August

In June 2012, the requirements were switched, to use the EOSDIS network requirements database.

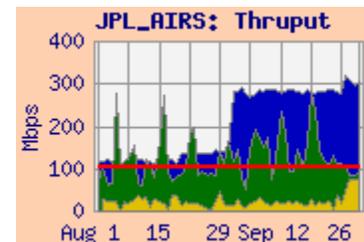
Previously, the requirements were based on the EOS Networks Requirements Handbook, Version 1.4.3 (from which the original database requirements were derived). Prior to that, the requirements were derived from version 1.4.2.

One main difference between Handbooks 1.4.2 and 1.4.3 is that in 1.4.3 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.

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”.

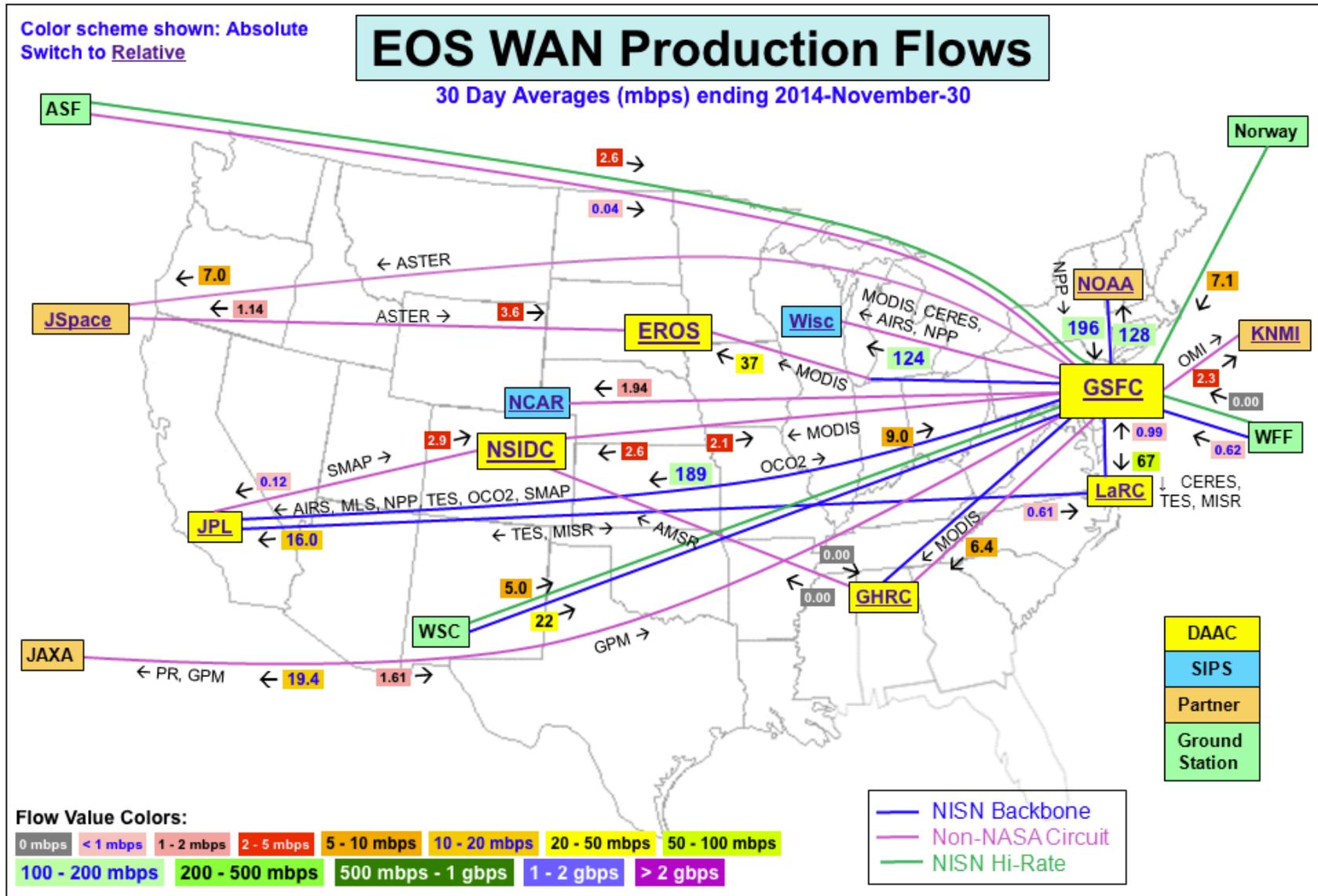


The green area is stacked on top of the user flow, and represents the “adjusted” daily average iperf throughput between the source-destination pair most closely corresponding to the requirement. This iperf measurement essentially shows the circuit capacity remaining with the user flows active. Adjustments 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 – usually “behind” the green area – representing adjusted iperf measurements from a second source node at the same facility.

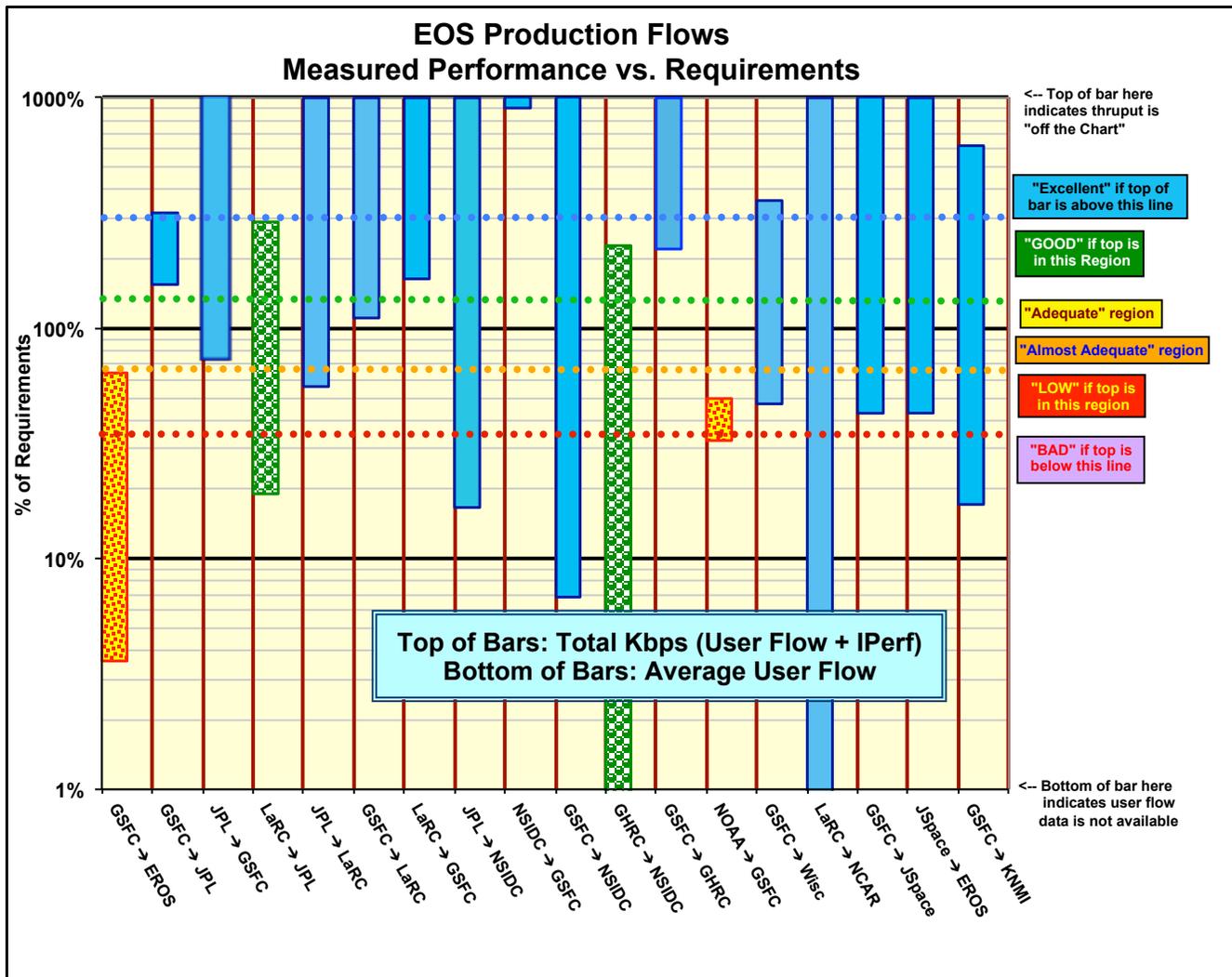
Network Requirements vs. Measured Performance

November 2014		Requirements (mbps)		Testing				Ratings	
Source → Destination	Instrument (s)	Current	Old	Source → Dest Nodes	Average User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re FY '15 Requirements	
		FY '15	FY '12					This Month	Last Month
GSFC → EROS	MODIS, LandSat	1016.2	548.4	MODAPS-PDR → EROS LPDAAC	36.6	649.6	651.4	Low	Low
GSFC → JPL	AIRS, MLS, NPP, TES, OCO2, SMAP	121	63.0	NPP SD3E OPS1 → JPL-AIRS	188.6	313.7	385.0	Excellent	Ex
JPL → GSFC	MLS, OCO2	11.9	0.57	JPL-PODAAC → GSFC GES DISC	9.0	240.7	240.8	Excellent	Ex
LaRC → JPL	TES, MISR	83.5	83.5	LARC-ANGe → JPL-TES	16.0	242.0		Good	Ex
JPL → LaRC	TES	1.1	1.1	JPL-TES → LARC-PTH	0.61	380.5	380.5	Excellent	Ex
GSFC → LaRC	CERES, MISR, MOPITT, TES, MODIS	60.7	52.2	GSFC EDOS → LaRC ASDC	67.3	815.4	826.5	Excellent	Ex
LaRC → GSFC	MISR	0.6	0.6	LARC-ASDC → GES DISC	0.99	934.1	934.1	Excellent	Ex
JPL → NSIDC	AMSR-E, SMAP	17.1	0.16	JPL-SMAP → NSIDC	2.9	357.5		Excellent	Ex
NSIDC → GSFC	AMSR-E, MODIS, ICESAT	0.009	0.017	NSIDC DAAC → GES DISC	2.12	755.0	755.0	Excellent	Ex
GSFC → NSIDC	AMSR-E, MODIS, ICESAT, GBAD	38.5	8.4	MODAPS PDR → NSIDC-DAAC	2.6	579.9	580.4	Excellent	Ex
GHRC → NSIDC	AMSR-E	5.14	2.08	GHRC → NSIDC DAAC	0.003	11.7	11.7	Good	Good
GSFC → GHRC	AMSR-E, MODIS	2.9	0.00	GSFC EDOS → GHRC via NISN	6.41	256.4	256.4	Excellent	Ex
NOAA → GSFC	NPP	601.3	522.3	NOAA-PTH → GSFC NPP-SD3E OPS1	196.2	223.6	298.3	Low	Good
GSFC → Wisc	NPP, MODIS, CERES, AIRS	264.2	259.1	GSFC NPP-SD3E OPS1 → WISC	124.3	902.0	947.3	Excellent	Ex
LaRC → NCAR	MOPITT	0.044	0.044	LaRC-PTH → NCAR		181.3		Excellent	Ex
GSFC → JAXA	TRMM, AMSR-E, MODIS, GPM	15.4	3.5	GSFC-EBnet → JAXA	19.4	n/a		n/a	n/a
JAXA → GSFC	AMSR-E, GPM	3.3	0.16	JAXA → GSFC-EBnet	1.61	n/a		n/a	n/a
GSFC → JSpace	ASTER	16.4	6.8	GSFC-EDOS → JSpace-ERSD	6.99	220.7	222.0	Excellent	Ex
JSpace → EROS	ASTER	8.3	8.3	JSpace-ERSD → EROS PTH	3.57	295.6	295.8	Excellent	Ex
GSFC → KNMI	OMI	13.4	13.4	GSFC-OMISIPS → KNMI ODPS	2.30	82.7	82.8	Excellent	Ex
		Significant change from FY '12 to FY '14						Ratings Summary	
		Changed in 2014		Value used for ratings				FY '15 Req	
								Score	Prev
*Criteria:	Excellent	Total Kbps > Requirement * 3		Excellent				14	15
	Good	1.3 * Requirement <= Total Kbps < Requirement * 3		Good				2	2
	Adequate	Requirement < Total Kbps < Requirement * 1.3		Adequate				0	0
	Almost Adequate	Requirement / 1.5 < Total Kbps < Requirement		Almost Adequate				0	0
	Low	Requirement / 3 < Total Kbps < Requirement / 1.5		Low				2	1
	Bad	Total Kbps < Requirement / 3		Bad				0	0
								Total Sites	18
								GPA	3.56
Notes:	Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS, NPP, GPM, SMAP, OCO2							18	18
								3.56	3.72



This chart shows the averages for the main EOS production flows for the current month. Up to date flow information can be found at http://ensight.eos.nasa.gov/Weather/web/hourly/Production_Flows-A.shtml

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) – it 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 67% (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 (when available) is used to determine the ratings.



1) EROS:

Ratings: GSFC → EROS: Continued **Low**
 JSpace → EROS: Continued **Excellent**

1.1 GSFC → EROS:

Web Pages: <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	739.9	649.6	455.9	36.6	651.4
GSFC-EDOS → EROS LPDAAC	457.1	442.9	291.5		
GES DISC → EROS LPDAAC	724.5	602.3	462.5		
GSFC-ENPL → EROS LPDAAC	1122.0	1108.5	948.5		
GSFC-ENPL → EROS PTH	2325.2	2274.2	2000.8		
GSFC-ENPL → EROS PTH (IPv6)	n/a	n/a	n/a		
GSFC-NISN → EROS PTH	806.0	710.5	325.0		
ESDIS-PS → EROS PTH	832.8	700.7	455.6		

Requirements:

Source → Dest	Date	mbps	prev	Rating
GSFC → EROS	8/14	1016.1	49.8	Low

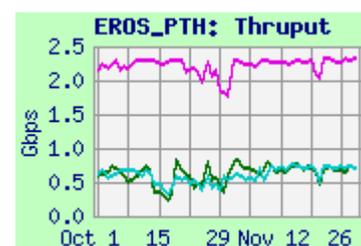
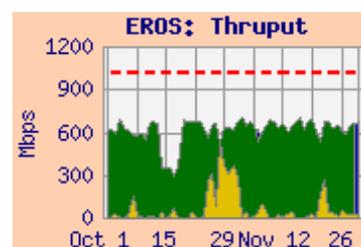
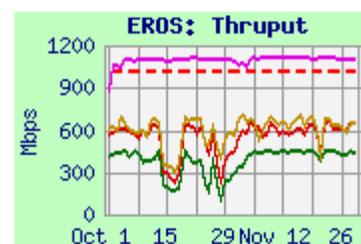
Comments: The rating is based on the MODAPS-PDR Server to EROS LP DAAC measurement, since that is the primary flow.

The reprocessing flow requirement began in August, so the requirement increased to 1016.1 mbps (was only 49.8 mbps previously). Note from the integrated graph that the flow actually increased in late October – the peaks were about 40% of the requirement (including reprocessing). But the user flow this month averaged only 36.6 mbps – much lower than last month's 96 mbps, and only about 3.6% of the requirement.

Thruput from all sources was slightly higher this month, probably related to the reduced user flow. The median integrated thrupt from MODAPS-PDR to LPDAAC remained slightly below 2/3 of the new requirement (which includes reprocessing), so the rating remains **Low**.

The median thrupt from GSFC-EDOS and GES DISC (also on EBnet) was also slightly higher than last month, with improved daily minimums.

The route from EBnet sources is via the Doors, to the NISN 10 gbps backbone, to the NISN Chicago CIEF, then via a NISN GigE, peering at the StarLight Gigapop with the EROS OC-48 (2.5 gbps) tail circuit.



1) **EROS:** (continued)

Iperf testing for comparison is performed from **GSFC-ENPL** to both LPDAAC (the “FTL” node, outside the EROS firewall) and to EROS-PTH (both 10 gig hosts). The route from **GSFC-ENPL** to EROS is from GSFC via a direct 10 gig connection to the MAX, to Internet2, to StarLight in Chicago, then via the EROS OC-48 tail circuit. **GSFC-ENPL** (IPv4) to EROS-PTH now typically gets over 2 gbps. This shows that the capacity of this network is well in excess of the requirement (including reprocessing) – it would be rated **Good**. **GSFC-ENPL IPv6** tests have been failing since February.

Additional Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
JSpace-ERSD → EROS LPDAAC	312.0	295.6	226.2	3.6	295.8
JSpace → EROS PTH	256.2	178.2	94.3		
NSIDC SIDADS → EROS PTH	922.3	920.0	854.1		
LaRC PTH → EROS PTH	189.3	188.8	172.7		

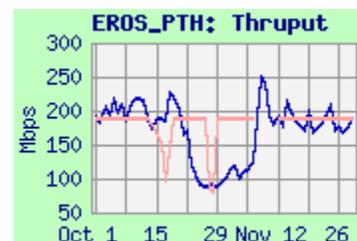
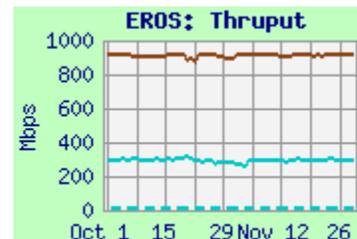
Requirements:

Source → Dest	Date	mbps	prev	Rating
ERSDAC → EROS	FY '06 –	8.3	8.3	Excellent

1.2 JSpace-ERSD → EROS: **Excellent**. See section 9 (ERSD) for further discussion.

1.3 NSIDC → EROS-PTH: Performance was stable and excellent this month.

1.4 LaRC → EROS-PTH: Testing from **LaRC-PTH** to EROS-PTH was restored in June (had been failing since April). The route is via NISN SIP to the Chicago CIEF to StarLight – similar to EBnet sources. Performance improved and stabilized this month, similarly to the other NISN sources. Note that **LaRC-PTH** has a 200 mbps outflow limitation.



2) to GSFC

2.1) to NPP, GES DISC, etc.

Ratings: NOAA → NPP SD3E: ↓ **Good** → **Low**

NSIDC → GES DISC: Continued **Excellent**

LDAAC → GES DISC: Continued **Excellent**

JPL → GSFC: Continued **Excellent**

Web Pages:

http://ensight.eos.nasa.gov/Missions/NPP/GSFC_SD3E.shtml

<http://ensight.eos.nasa.gov/Organizations/production/GDAAC.shtml>

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

http://ensight.eos.nasa.gov/Missions/icesat/GSFC_ISIPS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NOAA-PTH → NPP-SD3E-OPS1	231.4	223.6	216.1	196.2	298.3
EROS LPDAAC → GES DISC	262.8	232.3	148.4		
EROS PTH → GSFC-ESDIS PTH	926.5	588.0	139.5		
JPL-PODAAC → GES DISC	796.3	240.7	57.8	9.0	
JPL-PTH → GSFC-NISN	695.1	504.2	152.3		
LaRC ASDC → GES DISC	936.2	934.1	844.4	0.99	
LARC-ANGe → GSFC-ESDIS PTH	936.2	917.8	858.4		
NSIDC DAAC → GES DISC	837.7	755.0	629.7	2.12	
NSIDC DAAC → GSFC-ISIPS (scp)	32.0	31.5	28.9		

Requirements:

Source → Dest	Date	FY '14	FY '12	Rating
NOAA → NPP SD3E	FY '14 –	601.3	522.3	↓ Low
JPL → GSFC combined	FY '14 –	11.9	0.57	Excellent
NSIDC → GSFC	FY '14 –	0.009	0.017	Excellent
LaRC ASDC → GES DISC	CY '12 –	0.6	0.6	Excellent

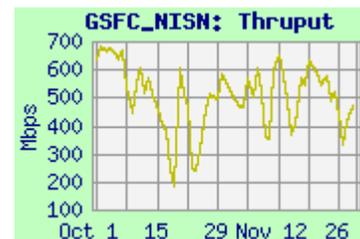
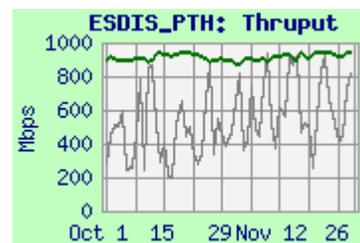
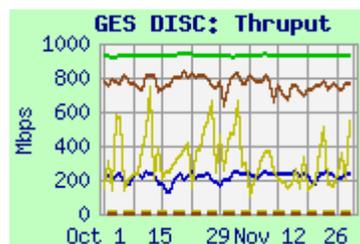
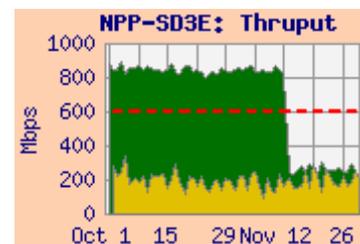
Comments:

2.1.1 NOAA → NPP-SD3E: Performance from NOAA-PTH to GSFC NPP-SD3E-OPS1 dropped dramatically in early November. The user flow was close to usual, at about 50% of the requirement (with contingency), and appeared unaffected, leading to the inference that the problem was with the test node, not the network.

2.1.2 EROS LPDAAC, EROS-PTH → GSFC: The thrupt for tests from EROS LPDAAC to GES DISC and from EROS-PTH to ESDIS-PTH were again noisy, with the PTH's getting better results than the DAACs.

2.1.3 JPL → GSFC: Thrupt from JPL-PODAAC to GES DISC is noisy, but improved last month, with a switch to a different node at JPL. Note that JPL campus nodes → EBnet flows take Internet2 instead of NISN, based on JPL routing policies. Thrupt was well above 3 x the requirement, so the rating remains **Excellent**. The 9 mbps average user flow was similar to the 10.1 mbps last month, presumably due to OCO2 flows. It is now close to the new requirement (with contingency).

Testing from JPL-PTH to GSFC-NISN is routed via NISN PIP, and became less noisy this month. Its higher performance than from JPL-PODAAC indicates congestion on the JPL campus.

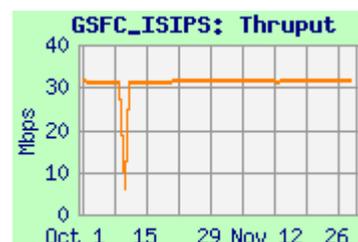


2.1) to NPP, GES DISC continued.

2.1.4 LaRC → GSFC: Performance from both **LaRC ASDC** to GES DISC and **LaRC ANGe** to ESDIS-PTH was very stable this month. Both results remained way above 3 x the modest requirement, so the rating continues as **Excellent**. The user flow this month was above the requirement.

2.1.5 NSIDC → GSFC: Performance from **NSIDC** to GES DISC remained way above the tiny requirement, so the rating remains **Excellent**. The user flow was again well above both the old and lower new requirement.

Thruput to **GSFC-ISIPS** using SCP remains well above the requirement.

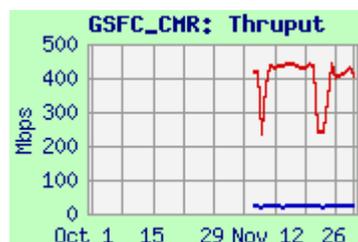
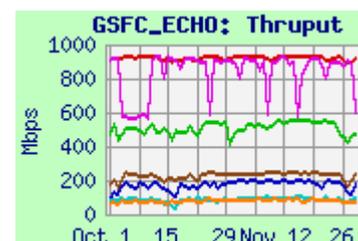


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

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	203.2	193.3	141.6
EROS LPDAAC ftp	128.4	93.0	37.1
GES DISC	937.8	927.5	899.4
GES DISC ftp	941.2	893.9	538.7
LaRC ASDC DAAC	560.0	528.3	370.3
NSIDC DAAC	254.5	237.1	213.2
NSIDC DAAC ftp	110.3	83.0	39.7
EROS LPDAAC → CMR	45.2	21.7	14.8
GES DISC → CMR	444.3	428.8	363.5



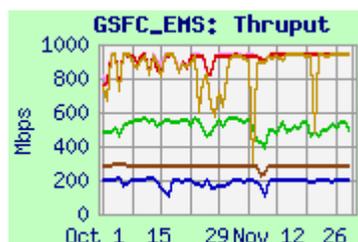
Comments: Performance was mostly stable from all sources. FTP performance is mostly limited by TCP window size – especially from sites with long RTT. Testing to the “Common Metadata Repository” (CMR), which will replace ECHO, was started in November. Performance is lower than to ECHO, but needs retuning.

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 LPDAAC	206.1	200.0	138.7
ESDIS-PTH	939.0	937.7	911.7
GES DISC	938.0	936.7	912.9
LARC ASDC	567.6	502.6	346.6
MODAPS-PDR	938.6	935.0	365.8
NSIDC-SIDADS	287.1	285.5	276.2



Comments: Testing is performed to GSFC-EMS from the above nodes, iperf only.. Performance was stable from all sources.

3) JPL:

3.1) GSFC → JPL:

Ratings: GSFC → JPL: Continued **Excellent**

Test Results: (additional results on next page)

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NPP-SD3E-OPS1 → JPL-AIRS	630.8	313.7	162.9	188.6	385.0
GSFC-GES DISC → JPL-AIRS	432.5	370.1	191.6		
ESDIS-PTH → JPL-AIRS	514.8	263.9	128.1		
GSFC-NISN → JPL-AIRS	287.3	115.5	38.9		
ESDIS-PTH → JPL-NISN-PTH	214.9	130.0	47.0		
NPP-SD3E-OPS1 → JPL-Sounder	637.9	333.4	163.8		
GSFC-NISN → JPL-Sounder	319.1	142.0	53.1		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → JPL Combined	FY '15	121.0	63	Excellent
GSFC → JPL AIRS	FY '15	11.4	40	Excellent
GSFC NPP → JPL Sounder	FY '15	15.9	15	Excellent
GSFC → JPL SMAP	FY '15	49.1	-	Low
GSFC → JPL OCO2	FY '15	36.6	-	Excellent
GSFC → JPL Other	FY '15	8.0	1.0	

Comments: 3.1.1 AIRS , Overall:

http://ensight.eos.nasa.gov/Missions/aqua/JPL_AIRS.shtml

OCO2 requirements were added in September, and SMAP requirements added last month. User flow increased significantly this month – the 188.6 mbps average flow (for all EBnet to JPL flows) is more than 50% ABOVE the requirement, including contingency. This user flow caused a reduction in performance of most iperf tests, except around Thanksgiving.

Most GSFC → JPL thrupt tests again experienced significant diurnal variation this month, believed to be due to congestion on the 1 gbps connection between NISN PIP and the JPL campus. The OCO2 “hourly” graph at the right is an example -- it shows a 4:1 typical ratio between the daily best and worst hours.

The median integrated thrupt from NPP-SD3E-OPS1 remains above 3 x the AIRS requirement, so the AIRS rating remains **Excellent**.

3.1.2 The JPL overall rating is also based on the NPP-SD3E-OPS1 to JPL AIRS thrupt, compared with the sum of all the GSFC to JPL requirements. The median thrupt remained [slightly] above 3 x this requirement, so the overall rating remains **Excellent**.

3.1.3 ESDIS-PTH to JPL-NISN-PTH:

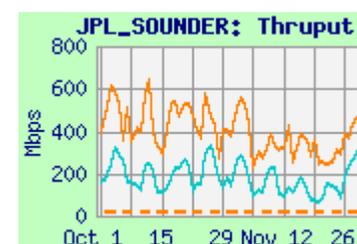
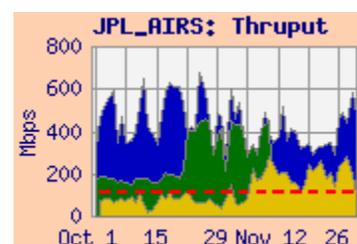
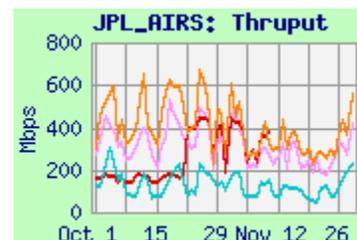
http://ensight.eos.nasa.gov/Organizations/daac/JPL_NISN_PTH.shtml

The thrupt from ESDIS-PTH to JPL-NISN-PTH is stable, and does not exhibit diurnal variation, providing further evidence that the that the congestion is between NISN and the JPL campus.

3.1.4 NPP to JPL Sounder:

http://ensight.eos.nasa.gov/Missions/NPP/JPL_SOUNDER.shtml

Performance from NPP-SD3E-OPS1 and GSFC-NISN again had significant diurnal variation this month, but was mostly stable and well above the requirement rating **Excellent**.



3.1) GSFC → JPL: continued

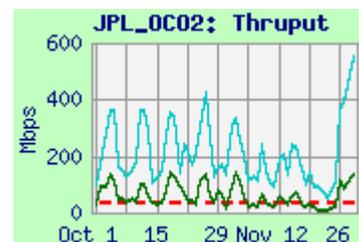
Test Results: continued

Source → Dest	Medians of daily tests (mbps)			Requirement (mbps)	Rating
	Best	Median	Worst		
GSFC-EDOS → JPL-OCO2	1 stream	191.1	31.3	36.6	↓ Almost Adequate
	6 streams	498.3	152.8		Excellent
GSFC-EDOS → JPL-SMAP	1 stream	94.3	8.7	49	Bad
	6 streams	269.6	63.2		↑ Adequate
ESDIS-PTH → JPL-MLS		437.2	298.5		
GSFC-NISN → JPL-MLS		438.4	257.9		
ESDIS-PTH → JPL-PODAAC		468.3	268.0		
GSFC-NISN → JPL-PODAAC		577.4	305.9		
ESDIS-PS → JPL-QSCAT		92.9	90.9		
GSFC-NISN → JPL-QSCAT		73.1	64.0		

3.1.5 OCO2:

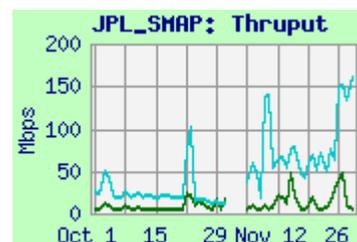
http://ensight.eos.nasa.gov/Organizations/daac/JPL_OCO2.shtml

OCO-2 was launched July 2! Testing from EDOS to OCO2 is done using both a **single stream** and **6 streams**. Thruput exhibited significant diurnal variation, and degradation due to increased user flow, like GSFC to other JPL sites. Performance from EDOS (using 6 streams) is rated **Excellent**. Single stream performance would drop to **Almost Adequate**.

**3.1.6 SMAP:**

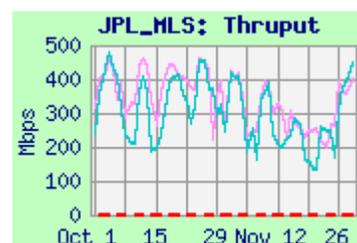
http://ensight.eos.nasa.gov/Organizations/daac/JPL_SMAP.shtml

The 49 mbps requirement from GSFC to JPL SMAP began last month, before the planned SMAP launch in January. Testing from EDOS to SMAP is done using both a **single stream** and **6 streams**. Performance was very noisy this month, and exhibited significant diurnal variation. The rating improves to **Adequate** with 6 streams, but remains **Bad** with a single stream.



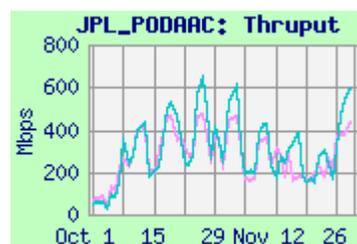
3.1.7 MLS: http://ensight.eos.nasa.gov/Missions/aura/JPL_MLS.shtml

Thruput from both **ESDIS-PTH** and **GSFC-NISN** also exhibited significant diurnal variation this month but were way above the modest 1.2 mbps requirement, so the rating remains **Excellent**.

**3.1.8 PODAAC:**

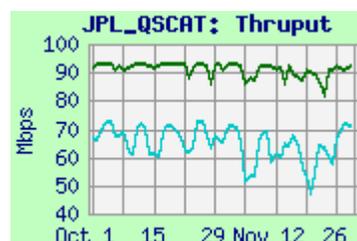
http://ensight.eos.nasa.gov/Organizations/production/JPL_PODAAC.shtml

There is no longer a requirement from GSFC to JPL PODAAC in the database. Performance exhibited diurnal variation, but was long term stable this month, with an upgrade to the PODAAC test host last month. Thruput was way above the previous 1.5 mbps PODAAC requirement.

**3.1.9 QSCAT:**

http://ensight.eos.nasa.gov/Organizations/daac/JPL_QSCAT.shtml

There is no longer a requirement from GSFC to JPL QSCAT in the database. Thruput from **ESDIS-PS** to QSCAT was stable, but exhibited diurnal variation from **GSFC-NISN**. Thruput from both remained well above the modest previous 0.6 mbps requirement.



3.2) LaRC → JPLRating:  **Excellent** → **Good**

Web Pages:

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

Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
LaRC ANGE → JPL-TES	359.7	242.0	69.2	
LaRC ASDC → JPL-TES	136.3	34.1	6.0	
LaRC ANGE → JPL-PTH	304.5	245.5	31.9	16.0

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
LaRC → JPL-Combined	CY '12 –	83.5	69.3	 Good
LaRC ASDC → JPL-MISR	CY '12 –	78.1	62.3	Bad
LaRC ASDC → JPL-TES	CY '12 –	5.5	7.0	Excellent

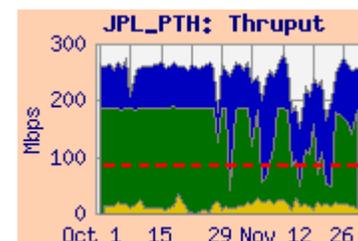
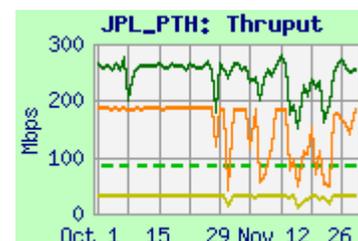
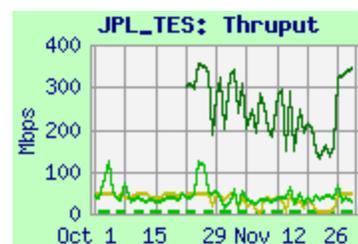
3.2.1 LaRC → JPL (Overall, TES): Performance from LaRC ASDC to JPL dropped dramatically in mid August, and continued to have significant diurnal variation this month (similar to GSFC to JPL performance). LaRC ASDC to JPL-TES had improved dramatically in early January 2014 with the ASDC node upgrade!

Testing from LaRC ANGe to JPL-TES had been discontinued in July, since results had been similar to those from LaRC ASDC. But with the drop from LaRC ASDC, testing from LaRC ANGe was restarted in October. Results were similar to previous results, and much better than from LaRC ASDC currently. This implies congestion at LaRC ASDC, as well as NISN PIP to JPL.

The LaRC to JPL Overall rating is now based on the performance from LaRC ANGe to JPL-TES, since it more accurately shows the network capability. The median thruput was slightly below 3 x the combined requirements, so the overall rating drops to **Good**. Total LaRC to JPL user flow is about 19% of the requirement (without contingency).

The median thruput from LaRC ASDC to JPL-TES remained well over 3 x the TES requirement, so the TES rating remains **Excellent**. User flow to TES is very low.

Performance from LaRC ANGe to JPL-PTH was much more stable than LaRC ASDC to JPL-TES – no large degradation is apparent. JPL-PTH is directly connected to the NISN router, so it is not affected by the congestion between NISN and the JPL campus.



3.2) LaRC → JPL (continued)

3.2.2 LaRC → JPL-MISR: http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
LaRC ASDC → JPL-MISR	36.0	24.1	3.0	
LaRC PTH → JPL-MISR	45.9	19.6	1.0	5.0

Requirements:

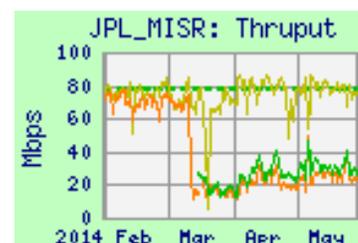
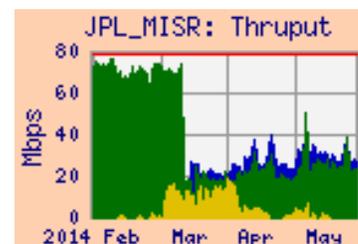
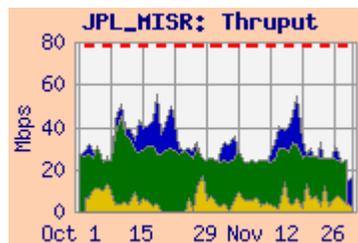
Source → Dest	Date	Mbps	Prev	Rating
LaRC ASDC → JPL-MISR	CY '12 –	78.1	62.3	↓ Bad

Performance from **LaRC ASDC** to JPL-MISR is similar to that from **LaRC PTH**, limited by the Fast-E connection to the MISR node. Thruput to MISR from both sources dropped severely in March 2014, after improving in December 2013.

The median integrated thruput from **LaRC ASDC** dropped to slightly below 1/3 the MISR requirement, so the MISR rating drops to **Bad**. User flow was about the same as last month, and averaged only about 9.5% of the requirement, without contingency.

Note that there was a user flow peak, beginning in late February, BEFORE the measured thruput dropped in March, suggesting that the user flow is not the cause of the thruput drop.

The LaRC → JPL Overall rating is not based on this result, however, since it not indicative of the capability of the network.



4) LaRC

4.1) 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
	Best	Median	Worst	
JPL-PTH → LaRC PTH	507.6	461.2	129.0	0.61
JPL-TES → LaRC PTH	799.4	380.5	41.6	

Requirements:

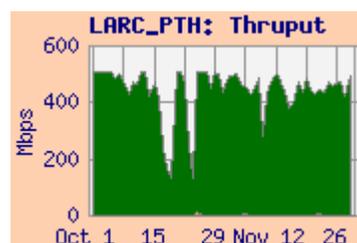
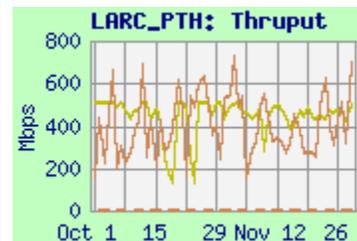
Source → Dest	Date	Mbps	Prev	Rating
JPL → LaRC	CY '12 –	1.1	1.5	Excellent

Comment: This requirement is primarily for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving. The route from JPL to LaRC is via NISN PIP. This month the thrupt from JPL-TES was noisy, but remained much higher than the requirement; the rating remains **Excellent**.

Thruput from JPL-NISN-PTH to LaRC-PTH increased at the beginning of June, when JPL-NISN-PTH was connected to a Gig-E port on a NISN switch – previously it was limited to 100 mbps due to its connection to a Fast-E port. The thrupt is now similar to, but less noisy than from JPL-TES – implying congestion on the JPL campus LAN.

Thruput from both JPL sources to LaRC-PTH increased again in September, when LaRC-PTH was upgraded.

The JPL to LaRC integrated graph shows the 0.6 mbps user flow from JPL to LaRC this month. This is the entire NISN flow from JPL to LaRC – it may not all be EOS related. But it is consistent with the EOS requirement.



4.2) 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	935.4	894.9	621.3	67.3	899.7
GSFC-EDOS → LaRC ASDC	922.2	815.4	512.9		
ESDIS-PTH → LaRC-ANGe	904.3	808.8	574.2		
GSFC-NISN → LaRC-ANGe	902.1	862.4	633.4		
GES DISC → LaRC-PTH	929.9	792.0	596.0		
GSFC-NISN → LaRC-PTH	928.7	835.7	686.4		
NPP-SD3E → LaRC-PTH	906.0	755.2	583.1		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → LARC (Combined)	CY '12 –	60.7	52.2	Excellent

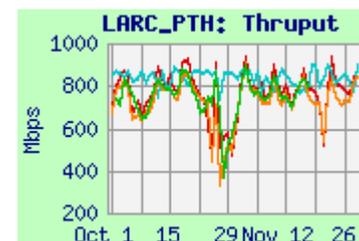
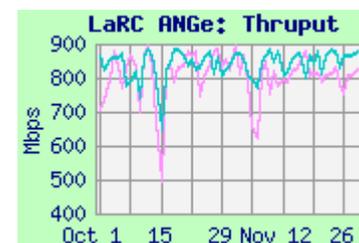
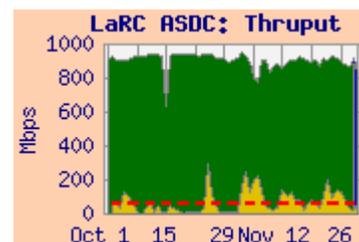
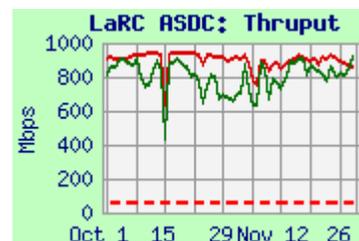
Comments:

GSFC → LaRC ASDC: Thruput from **GES DISC** to LaRC ASDC DAAC remained well above 3 x the increased combined requirement, close to the circuit limitation, so the rating remains **Excellent**. Thruput to ASDC from **GSFC-EDOS** was slightly lower and noisier, but improved a bit in mid March '14 along with other tests from EDOS.

As seen on the integrated graph, the 67 mbps average user flow this month was above both typical and the requirement.

GSFC → ANGe (LaTIS): Testing to ANGe (“Bob”) from both **ESDIS-PTH** and **GSFC-NISN** was stable, close to the circuit limitation. (Note the expanded scale on the graph).

GSFC → LaRC-PTH: Testing to LaRC-PTH from **GES DISC**, **NPP-SD3E**, and **GSFC-NISN** improved from all sources in late September when the LaRC-PTH node was upgraded. (Note the expanded scale on the graph). Performance is now similar to ASDC and ANGe.



5) Boulder CO sites:

5.1) NSIDC:

Ratings: GSFC → NSIDC: Continued **Excellent**GHRC → NSIDC: Continued **Good**JPL → NSIDC: **Excellent**Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/NSIDC.shtml>http://ensight.eos.nasa.gov/Organizations/production/NSIDC_SIDADS.shtmlhttp://ensight.eos.nasa.gov/Organizations/production/NSIDC_PTH.shtml

Test Results: NSIDC S4PA

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODAPS-PDR → NSIDC DAAC	769.2	579.9	328.5	2.6	580.4
GES-DISC → NSIDC DAAC	886.6	831.5	611.8		
GSFC-EDOS → NSIDC DAAC	848.0	800.9	462.3		
ESDIS-PTH → NSIDC DAAC	839.4	801.2	627.1		
GSFC-ISIPS → NSIDC (iperf)	631.4	628.4	543.8		
JPL SMAP → NSIDC DAAC	768.0	357.5	102.5	2.9	
GHRC → NSIDC DAAC (nuttcp)	44.5	11.7	3.7	0.003	
GHRC → NSIDC DAAC (ftp pull)	9.8	8.1	1.8		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → NSIDC	8/14 –	38.5	16.8	Excellent
JPL → NSIDC	FY '15 –	17.1	0.16	Excellent
GHRC → NSIDC	FY '15 –	5.14	2.08	Good

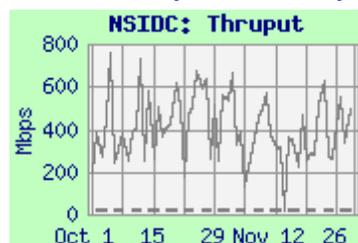
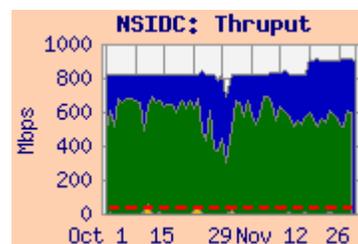
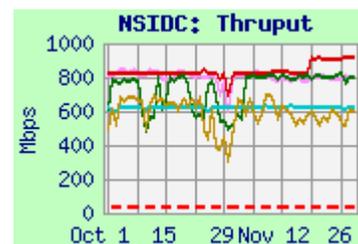
Comments: The requirements were updated in June to use the FY '14 database. AMSR-E flows from EDOS and JPL have been removed. **The MODIS reprocessing flow requirement is now effective, although the actual flow has not begun.**

5.1.1 GSFC → NSIDC S4PA: The rating is based on testing from the **MODAPS-PDR** server to the NSIDC DAAC, since that is the primary flow. The median thruput from **MODAPS-PDR** remained well above 3 x the increased requirement, so the rating remains **Excellent**. The 2.6 mbps average user flow was well below the requirement – without MODIS reprocessing or contingency.

Performance from **GES-DISC**, **GSFC-EDOS**, and **GSFC-ISIPS** was less noisy and mostly stable.

5.1.2 JPL SMAP → NSIDC S4PA: There is no longer a JPL to NSIDC requirement for AMSR-E. A new 17.1 mbps flow for SMAP began last month.

Testing to NSIDC from **JPL-SMAP** was well in excess of the SMAP requirement, rating **Excellent**. The user flow is now measured – the 2.9 mbps average is pre-launch testing, below the requirement.



5) Boulder CO sites (Continued):

5.1.3 GHRC, GHRC-ftp → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends reprocessed AMSR-E data to NSIDC via Internet2. This requirement increased to 5.14 mbps this month (was 2.08 mbps previously) – when the next reprocessing campaign begins.

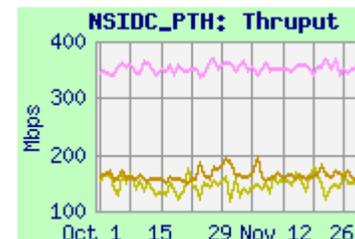
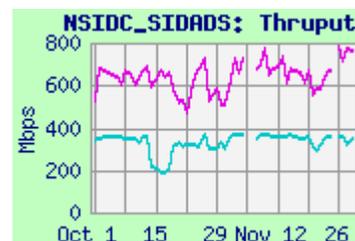
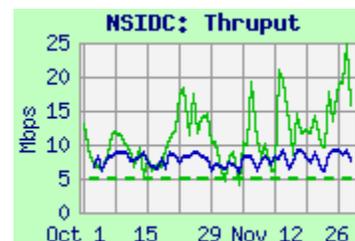
The median integrated thruput was again above the increased requirement, but no longer by 3 x, so the rating remains **Good**

Test Results: NSIDC-SIDADS, NSIDC-PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC-SIDADS	790.0	675.0	490.0
GSFC-NISN → NSIDC-SIDADS	365.0	359.8	292.9
ESDIS-PTH → NSIDC-PTH	399.0	350.7	253.6
MODAPS-PDR → NSIDC-PTH	217.8	161.4	139.3
JPL-NISN-PTH → NSIDC-PTH	222.7	148.0	72.3

5.1.4 GSFC → NSIDC-SIDADS: Performance from GSFC-ENPL was returned in June (using 30 streams, to compensate for the small window size on SIDADS) with increased thruput. Testing from GSFC-NISN was similarly returned in September.

5.1.5 NSIDC-PTH: Thruput from GSFC sources to NSIDC-PTH was stable. JPL-NISN-PTH was limited by its Fast-E connection until it was upgraded and testing returned in June. The NSIDC-PTH machine is scheduled for replacement and upgrade next month.



5.2) LASP:

Ratings: LASP → GSFC: 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
ESDIS-PTH → LASP blue (scp)	3.75	3.71	3.25
ESDIS-PTH → LASP blue (iperf)	9.39	9.38	8.27
GES DISC → LASP blue (iperf)	4.22	4.22	4.09
LASP → GES DISC	9.31	9.29	8.63

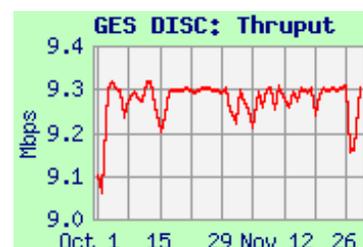
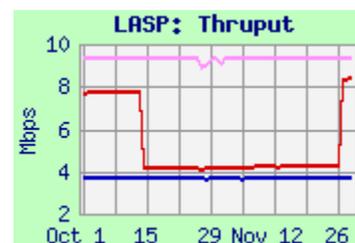
Requirement:

Source → Dest	Date	Mbps	Rating
LASP → GES DISC	CY '10 -	0.016	Excellent

Comments: In January '11, LASP's connection to NISN PIP was rerouted to a 10 mbps connection to the NISN POP in Denver; previously it was 100 mbps from CU-ITS via NSIDC.

Thruput recovered in late November with retuning, after dropping in mid-October. Previously, iperf testing from GES DISC had been very stable since February 2013, when it improved with the GES DISC firewall upgrade.

Iperf and SCP testing from ESDIS-PTH was very stable, and consistent with the circuit limitation, as was return testing from LASP to GES DISC, rating **Excellent**.



5.3) UCB: <http://ensight.eos.nasa.gov/Organizations/daac/UCB.shtml>

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL	6451.0	5459.6	2766.0
GSFC-ESTO	856.0	842.3	743.5



Comments: Thruput from both **GSFC-ENPL** and **GSFC-ESTO** improved in early October, by switching back to the 10 gig connected test node at UCB (it had began failing consistently in mid-May 2013, so testing had been switched to a 1 gig test node in mid-June '13). The route is via Internet2 to FRGP, similar to NCAR.

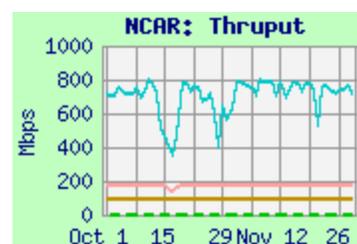
5.4) NCAR:

Ratings: LaRC → NCAR: Continued **Excellent**
 GSFC → 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
LaRC PTH	181.8	181.3	166.9
GSFC-ENPL-10G	5303.9	4358.0	1795.2
GSFC-ENPL-FE	95.6	95.4	95.0
GSFC-NISN	839.5	762.6	392.7



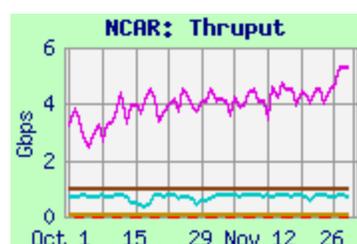
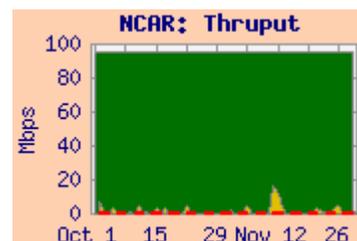
Requirement:

Source	Date	Mbps	Prev	Rating
LaRC	CY '12 -	0.044	0.1	Excellent
GSFC	CY '12 -	0.111	5.0	Excellent

Comments: NCAR has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements. Testing is to NCAR's 10 gigabit capable PerfSonar node since March '12.

From LaRC: Thruput from **LaRC-PTH** was very steady, and improved a bit with the **LaRC-PTH** upgrade in September. It remains limited to 200 mbps by agreement with CSO / NISN. The median remained well above 3 x the tiny requirement, so the rating remains **Excellent**.

From GSFC: From **GSFC-NISN**, the route is via NISN to the MAX (similar route as from **LaRC-PTH**). Thruput was mostly stable this month. The median was well above 3 x the tiny requirement, so the rating remains **Excellent**. The user flow from **GSFC-EBnet** averaged about 1.8 mbps this month. This is well above the revised requirement, but closer to the previous requirement.



From **GSFC-ENPL-10G**, with a 10 Gig-E interface, and a 10 gig connection to MAX, performance to NCAR's 10 Gig PerfSonar node is also noisy, but averages over 4 gbps, and gets over 5 gbps on peaks.

6) Wisconsin:Rating: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/NPP/WISC.shtml>**Test Results:**

Source Node	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NPP-SD3E	1904.2	902.0	6.4	124.2	947.3
GES DISC	850.2	833.1	629.7		
GSFC ENPL	6451.0	5459.6	2766.0		
GSFC-ENPL-v6	5889.6	5826.5	3949.7		
LaRC ANGe	503.1	448.1	310.1		

Requirements:

Source Node	Date	mbps	Prev	Rating
NPP-SD3E	FY'14 -	242.3	237.2	Excellent
GSFC MODAPS	FY'14 -	21.9	16.5	Excellent
GSFC Combined	FY'14 -	264.2	253.7	Excellent
LaRC Combined	CY'12 -	n/a	7.9	n/a

Comments: The University of Wisconsin is included in this Production report due to its function as Atmosphere PEATE for NPP. Wisconsin continues to be an SCF on the MODIS, CERES and AIRS teams.

GSFC: Testing from **NPP-SD3E** was switched to Wisconsin's 10 gig server in May 2013, with initial thruput usually close to 2 gbps! There was a significant performance drop in mid-October (but improved again in December). The median integrated thruput from **NPP-SD3E** remained above the NPP requirement by more than 3 x, so the NPP rating remains **Excellent**. It was also above the GSFC combined requirement by more than 3 x, so the combined rating also remains **Excellent**.

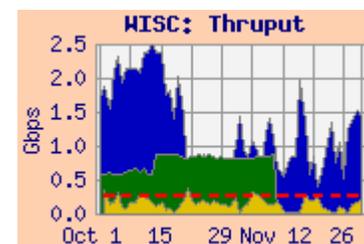
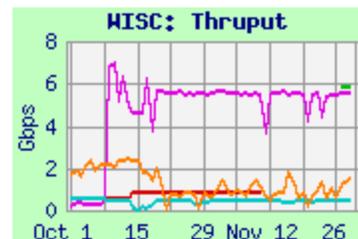
User flow was consistent to the requirement, similar to last month.

The route from EBnet at GSFC is via MAX to Internet2, peering with MREN in Chicago.

Testing from **GSFC-ENPL** was switched to the 10 gig server at Wisconsin (SSEC) in March 2013. Due to problems, testing was switched to a backup server in September, with reduced results, and back to the 10 gig server in early October.

Testing from **GSFC-ENPL** using IPv6 was added in late November. It's performance was slightly better than IPv4 performance.

LaRC: There is no longer a CERES requirement from LaRC to Wisconsin. In April 2013, testing from **LaRC ANGe** was switched to the new SSEC 10 gig server; performance improved at that time. Thruput from **LaRC ANGe** remains well above the previous 7.9 mbps requirement; it would be rated **Excellent**. The route from LaRC is via NISN, peering with MREN in Chicago.



7) KNMI:

Rating: Continued **Excellent**

Web Page http://ensight.eos.nasa.gov/Missions/aura/KNMI_ODPS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
OMISIPS → KNMI-ODPS	135.9	82.7	61.5	2.3	82.8
GSFC-ENPL → KNMI-ODPS	195.5	89.5	38.7		

Requirements:

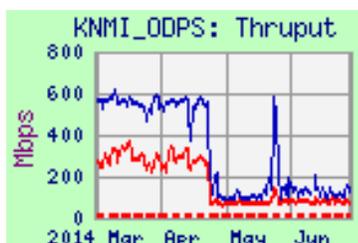
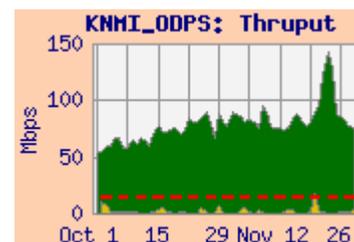
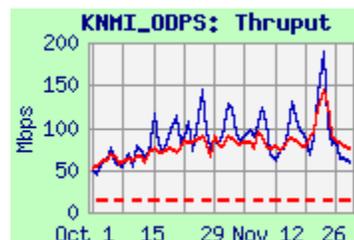
Source Node	Date	mbps	Prev	Rating
OMISIPS	CY'12 -	13.4	0.03	Excellent

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 2+ x 10 gbps circuit to Frankfurt, then via Surfnet through Amsterdam.

The requirement was increased with the use of the database to 13.4 mbps, a much more realistic value than the previous 0.03 mbps.

The rating is based on the results from **OMISIPS** on EBnet at GSFC to the ODPS primary server at KNMI. **Thruput from both sources was stable until near the end of April, when it dropped significantly, due to increased packet loss. But the median thruput remains well above 3 x the increased requirement, so the rating remains **Excellent**.**

The user flow, however, averaged only 2.3 mbps this month, similar to recent months, but only 17% of the revised requirement.



8) JSpace - ERSD:

Ratings: **GSFC** → **ERSD**: Continued **Excellent**
ERSD → **EROS**: Continued **Excellent**
ERSD → **JPL-ASTER-IST**: N/A

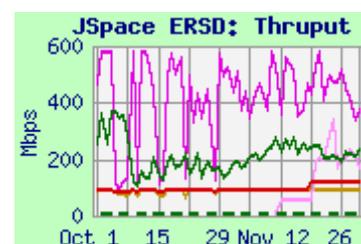
Web Page: <http://ensight.eos.nasa.gov/Organizations/production/ERSDAC.shtml>

US ↔ JSpace - ERSD Test Results

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-EDOS → JSpace-ERSD	370.4	220.7	91.4	7.0	222.0
GES DISC → JSpace-ERSD	95.3	92.4	70.3		
GSFC ENPL (FE) → JSpace-ERSD	92.0	91.9	91.7		
GSFC ENPL (GE) → JSpace-ERSD	586.0	445.3	83.2		
GSFC ESDIS-PTH → JSpace-New	266.1	168.2	51.7		
JSpace-ERSD → EROS	312.0	295.6	226.2	3.6	295.8
JSpace-New → EROS-PTH	256.2	178.2	94.3		
JSpace-ERSD → JPL-TES	93.4	40.0	9.6		

Requirements:

Source → Dest	CY	Mbps	Prev	Rating
GSFC → JSpace-ERSD	'14 -	16.4	6.75	Excellent
JSpace-ERSD → JPL-ASTER IST	'12 -	0.31	0.31	Excellent
JSpace-ERSD → EROS	'12 -	8.33	8.3	Excellent



Comments: **8.1 GSFC → JSpace-ERSD:** The median thrupt to JSpace-ERSD from most sources improved in September 2011, when the connection from JSpace-ERSD to Tokyo-XP was upgraded to 1 gbps (from 100 mbps).

Performance from all sources recovered in November, after becoming more noisy at the end of September. Median integrated thrupt from **GSFC-EDOS** was well above 3 x the increased requirement, so the rating remains **Excellent**. The 7 mbps user flow from GSFC to JSpace-ERSD was close to normal this month, close the increased requirement without contingency.

Thruput from **GSFC ENPL** was also noisy, but averaged over 400 mbps.

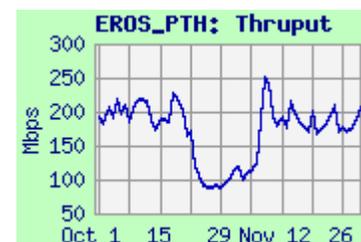
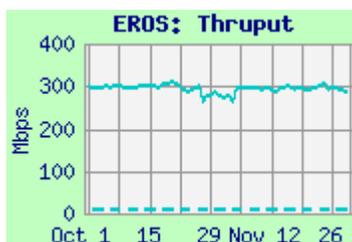
Testing to a new server at ERSD was initiated from **ESDIS-PTH** in November, and returned later in the month. Performance was lower than to the existing node, but would still be rated **Excellent**.

8.2 JSpace-ERSD → JPL-ASTER-IST: The JPL-ASTER-IST test node was retired in October 2012. JPL no longer uses a distinct IST; instead, JPL personnel log in directly to the IST at JSpace-ERSD. As a substitute, testing was initiated from ERSD to a different node at JPL ("TES"). Results to TES improved, but were again noisy this month; the rating would remain **Excellent**.



8.3 JSpace-ERSD → EROS: Thruput was very stable and remains well above the requirement, so the rating remains **Excellent**. The 3.6 mbps user flow this month was consistent with the requirement, without contingency.

Testing from the new server at **JSpace** was initiated to EROS-PTH in October. Performance was lower than from the existing node, but would still be rated **Excellent**.



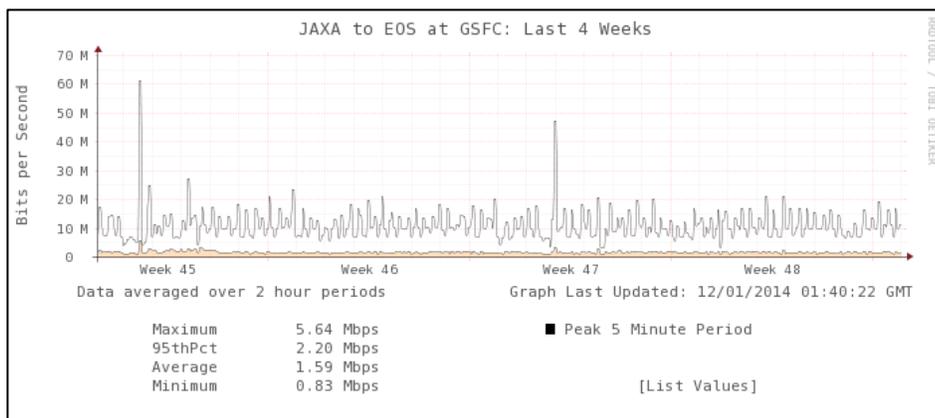
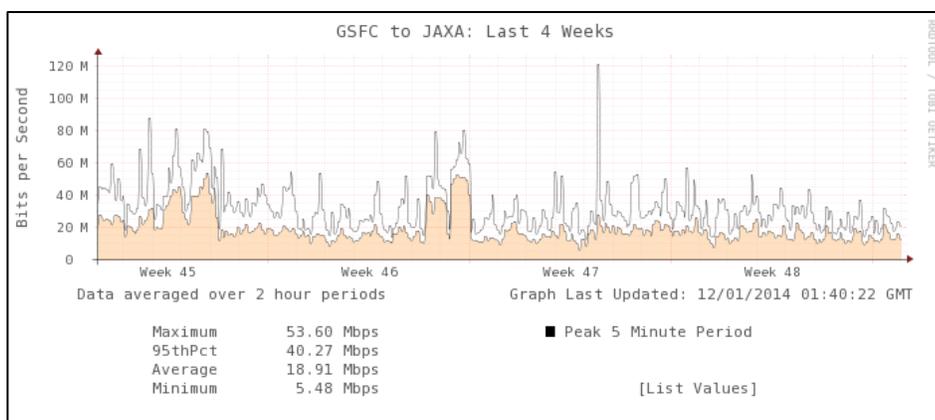
10) GSFC ↔ JAXA

Ratings: GSFC → JAXA: N/A
 JAXA → GSFC: N/A

The JAXA test hosts at EOC Hatoyama were retired on March 31, 2009. No additional testing is planned for AMSR or TRMM. All testing to JAXA-TKSC for ALOS was terminated at the end of June '09. Tests are being conducted with JAXA to evaluate different file transfer protocols for GPM -- but results are not suitable for this report.

However, the user flow between GSFC-EBnet and JAXA continues to be measured. As shown below, the user flow this month averaged 19.4 mbps from GSFC-EBnet to JAXA, and 1.6 mbps from JAXA to GSFC-EBnet.

These values are more or less consistent with the new database requirements of 15.4 mbps from GSFC to JAXA, and 3.3 mbps from JAXA back to GSFC (The AMSR-E requirement from JAXA to JPL has been removed, due to AMSR-E failure). However, since no iperf tests are run, the true capability of the network cannot be determined, and therefore no rating is assigned.



For comparison, testing is performed from GSFC to a test node at the Tokyo Exchange point, which is on the route from GSFC to JAXA. Performance to the Tokyo-XP 10 gig server, is well in excess of the JAXA requirements.

