

EOS Production Sites Network Performance Report

This is a monthly summary of EOS network performance testing between production sites for March 2006 -- comparing the measured performance against the requirements.

Highlights:

- Stable performance
- Began testing to LASP via IOnet – from EDOS and ASF
- Outstanding Issues:
 - GSFC to JPL-AIRS via PIP
 - **Note: Fixed in April!**
 - New requirements are still being worked
 - Old requirements used again this time.
- Significant changes in testing are indicated in Blue, Problems in Red

Ratings:

Rating 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)

Else = User Flow + iperf monthly average

Ratings Changes:

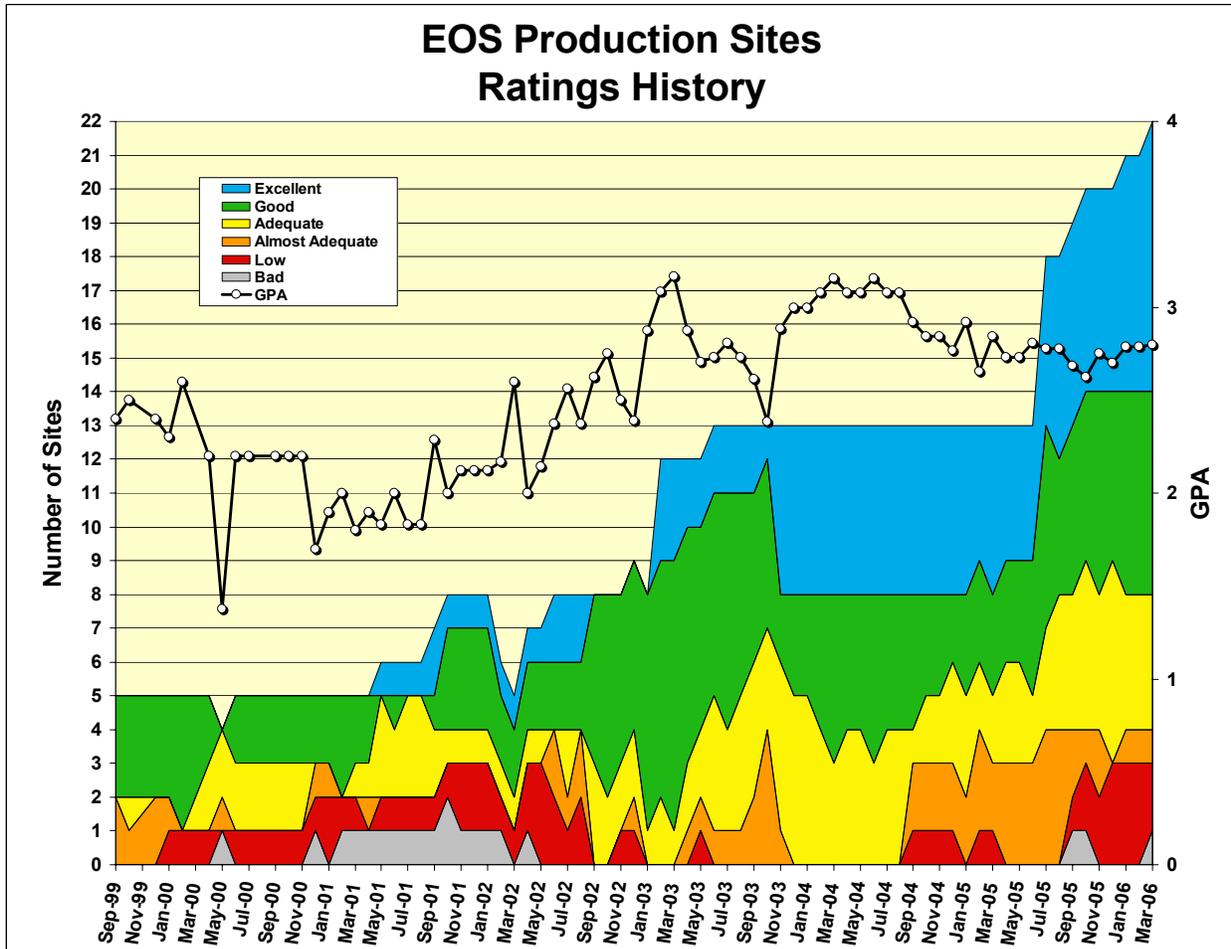
Upgrades: ↑ None

Downgrades: ↓

GSFC to JPL-AIRS : Low → **BAD**

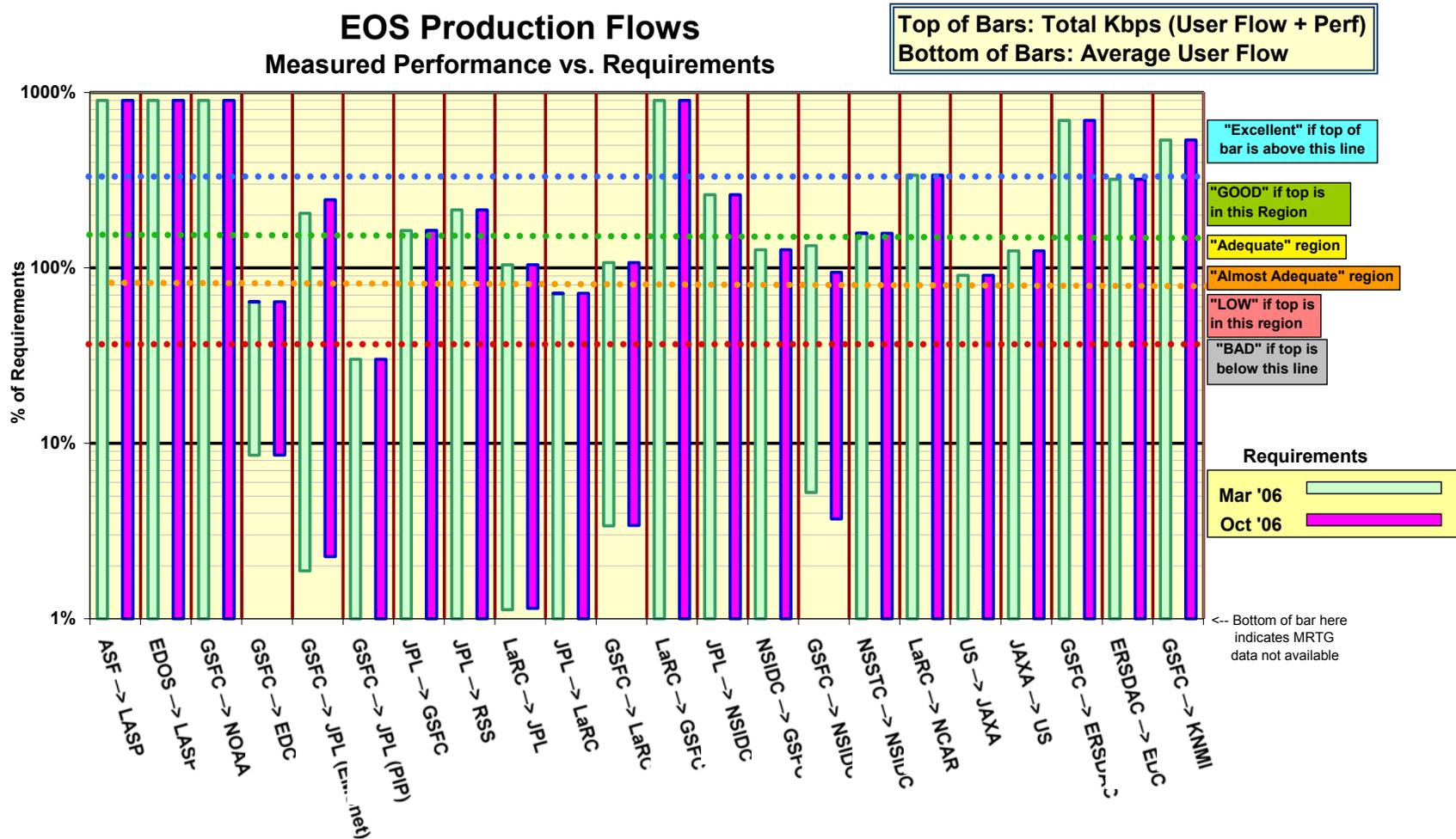
New:

EDOS → LASP: **Excellent**



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

This graph shows two bars for each source-destination pair. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (March and October, '06). Thus as the requirements increase, the same measured performance will be lower in comparison.



Interpretation: The bottom of each bar is the average measured MRTG flow to a site. Thus the bottom of each bar indicates the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested. The top of each bar represents the sum of the MRTG user flow plus the iperf measurement – it is this value which is used as the basis of the ratings

1) EROS:Rating: Continued **Low**Web Page: <http://ensight.eos.nasa.gov/Networks/emsnet/EDC.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GSFC-DAAC → EROS LPDAAC	206.5	172.7	78.8	24.4	197.1	182.7
GSFC-PTH → EROS PTH	125.9	44.1	23.7			
ERSDAC → EROS	88.7	85.9	22.7	(via APAN / Abilene / vBNS+)		
EROS LPDAAC → GSFC DAAC	123.1	90.1	14.6			
EROS LPDAAC → GSFC ECHO	84.3	69.4	52.4			
EROS PTH → GSFC PTH	236.9	207.3	180.5			

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → EROS	FY '06	285.4	Low
ERSDAC → EROS	FY '06	26.8	Excellent

Comments:

The problem from GSFC-PTH to EDC-PTH remains (apparently packet loss on or near vBNS+), so the rating is again based on testing between from GDAAC to EDC LPDAAC. The PTH hosts are outside the EDC firewalls, and therefore normally have higher thruput – but that is true this month only for EDC → GSFC flows.

The rating is based on the "Integrated" measurement, and as usual is lower than the sum of the User Flow + iperf. The user flow this month decreased, and had only a small contribution to the integrated measurement. This 183 mbps value is below 30% under the requirement, so the rating remains "Low". Hopefully when the PTH problem is fixed the rating will improve again.

The median thruput from ERSDAC to EDC-PTH (in support of the ERSDAC to EDC ASTER flow, replacing tapes) is more than 3 times the 26.8 mbps requirement, resulting in an "Excellent" rating.

Note: thruput from EROS-PTH to GSFC-PTH improved substantially in April – now typically over 300 mbps..

2) JPL:**2.1) JPL ↔ GSFC**

Ratings: GSFC → JPL: PIP: ↓ Low → **BAD**
 EMSnet: Continued **Good**
 JPL → GSFC: Continued **Good**

Web Pages:

http://ensight.eos.nasa.gov/Networks/emsnet/JPL_SEAPAC.shtml
http://ensight.eos.nasa.gov/Networks/emsnet/JPL_PODAAC.shtml
http://ensight.eos.nasa.gov/Missions/aqua/JPL_AIRS.shtml

Test Results:

Source → Dest	NET	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
		Best	Median	Worst			
GSFC-CSAFS → JPL-QSCAT	EMS	7.7	6.4	0.6	0.06	6.5	6.4
GSFC-CSAFS → JPL-QSCAT-BU	EMS	7.6	7.3	4.5			
GSFC-PTH → JPL-PODAAC	EMS	6.3	6.1	4.6			
GSFC-DAAC → JPL-AIRS	PIP	14.3	4.7	1.2			
GSFC-PTH → JPL-AIRS	PIP	6.4	2.7	0.8			
GSFC-CNE → JPL-AIRS	SIP	17.5	1.6	0.4			
GSFC-CNE → JPL-MISR	SIP	22.5	19.1	11.4			
JPL-PODAAC → GSFC DAAC	EMS	12.3	12.1	0.6			

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL via EMSnet	Mar '06	3.1	Good
GSFC → JPL via PIP	Mar '06	15.8	Bad
JPL → GSFC combined	Mar '06	7.4	Good

Comments:

GSFC → JPL: Most GSFC-JPL flows moved from EMSnet to NISN PIP on 2 December (But some remained on EMSnet); the requirements are therefore correspondingly divided.

EMSnet: Typical performance on this circuit dropped in mid February to 1-4 mbps (had dropped to 6 mbps in January from 8 mbps in December). But performance recovered to 8 mbps in mid March, and remains OK. Testing started to QSCAT-BU in late March; performance is similar to the primary. The rating remains "Good".

PIP: The PIP flows include QA data from GDAAC to JPL-AIRS, ISTs for several missions (but the JAXA AMSR-E ISTs flow to JPL via EMSnet), and science user flow estimates, totaling 15.76 mbps. **The thruput to AIRS via PIP is very noisy** -- note the high ratio (>10:1) of daily median to daily worst. This month the noisiness increased, dropping the daily median and worst, and lowering the rating to "Bad".

Note: performance from GSFC to JPL-AIRS improved dramatically on approx April 1. Thruput is now approx 40 mbps and will be rated "Good" next month.

JPL → GSFC: The MLS requirements increased last month (total was 3.18 mbps in December). Performance was stable; the rating remains "Good".

2.2) JPL ↔ LaRC

Ratings: LaRC → JPL: Continued **Adequate**
 JPL → LaRC: Continued **Low**

Web Pages:

http://ensight.eos.nasa.gov/Networks/emsnet/JPL_TES.shtml

http://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
LaRC PTH → JPL-PTH	41.0	40.9	33.1	0.4	41.3	40.9
LaRC DAAC → JPL-TES	40.6	37.2	11.7			
LaRC DAAC → JPL-MISR	39.6	17.8	10.8			
JPL-PTH → LaRC PTH	37.6	37.6	37.3			

Requirements:

Source → Dest	Date	Mbps	Rating
LaRC DAAC → JPL-TES	Mar '06	29.8	Adequate
LaRC DAAC → JPL-MISR	Mar '06	18.5	Good
LaRC DAAC → JPL-Combined	Mar '06	39.6	Adequate
JPL → LaRC	Mar '06	52.6	Low

Comments:

LaRC → JPL: Performance has been stable since this flow was switched to NISN PIP in Feb '05; MRTG data became unavailable at that time -- the passive "flows" data is now being used instead. The "integrated" thrupt is slightly above the requirement; the rating remains "Adequate".

JPL → LaRC: This requirement is for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving. The measured thrupt was again stable this month. However, the nominal requirements increased in December (was 35.1 mbps previously) to support increased TES reprocessing. The rating remains "Low".

2.3) ERSDAC → JPL ASTER IST

Rating: n/a

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
ERSDAC → JPL-ASTER-IST	85.2	51.6	15.0

Comments:

ERSDAC → JPL-ASTER-IST: This test was initiated in March '05, via APAN replacing the EBnet circuit. The typical 52 mbps must be well in excess of the requirements (IST requirements are generally 311 kbps).

3) Boulder CO:

Ratings: GSFC → NSIDC: Continued **Good**
 NSIDC → GSFC: Continued **Adequate**

Web Pages: http://ensight.eos.nasa.gov/Networks/emsnet/NSIDC_EMS.shtml
http://ensight.eos.nasa.gov/Missions/aqua/NSIDC_u.shtml

GSFC ↔ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GSFC-DAAC → NSIDC-DAAC	90.1	84.4	33.6	3.4	87.7	85.6
GSFC-PTH → NSIDC-DAAC	90.7	85.0	41.2			
NSIDC DAAC → GSFC-DAAC	17.0	16.9	8.5			

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	Mar '06	64.0	Good
NSIDC → GSFC	FY '06	13.3	Adequate

Comments: GSFC → NSIDC: This rating is based on testing from GDAAC to the NSIDC DAAC. The iperf and integrated thruput values were stable this month. The requirement, however, varies from month to month, based on planned ICESAT reprocessing. This month the reprocessing **IS NOT** included. Since the thruput is more than 30% above this reduced requirement, the rating remains "Good".

NSIDC → GSFC: Performance from NSIDC to GSFC was stable this month, and the median remains slightly less than 30% above the requirement, so the rating remains "Adequate".

Other Testing:

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
JPL → NSIDC-SIDADS	4.1	3.5	1.5	1.34	Good
GSFC-ISIPS → NSIDC (iperf)	89.8	83.2	31.9		
GSFC-ISIPS → NSIDC (ftp)	23.1	23.0	10.1		
NSIDC → GSFC-ISIPS (iperf)	16.1	15.7	13.7		
NSSTC → NSIDC DAAC	12.7	11.8	0.4	7.5	Good
ASF → LASP	1.27	1.10	0.70	0.024	Excellent
GSFC EDOS → LASP	6.9	4.5	3.2	0.4	Excellent
GSFC PTH → LASP	34.6	21.5	10.1		

Comments:

JPL → NSIDC-SIDADS: This flow switched from EMSnet to PIP in Feb '05, and thruput dropped from 6.1 mbps previously. Thruput remains below 3 x the requirement, so the rating remains "Good".

GSFC-ISIPS ↔ NSIDC: Performance from ISIPS to NSIDC was fixed in Feb '05, after having problems since July '04. Performance is at nominal levels for the circuit capacity. Testing from NSIDC to ISIPS is stable and gets thruput similar to NSIDC to GDAAC.

NSSTC (GHCC) → NSIDC: NSSTC (Huntsville, AL) sends AMSR-E L2/L3 data to NSIDC. Median thruput is more than 30 % over the requirement, so is rated "Good"

LASP: The requirements are now divided into ASF and GSFC sources: (Note: these tests were switched to IOnet this month).

ASF → LASP: Thruput from ASF to LASP is limited by ASF T1 circuit, rating "Excellent", due to the modest requirement

GSFC → LASP: Began testing from GSFC-EDOS to LASP this month (previously from GSFC-SAFS) – thruput is well above the requirement, rating "Excellent". However, LASP POC reports sftp performance is not nearly as good as indicated above – under investigation. Also initiated testing from GSFC-PTH; thruput is much better – EDOS will be at about this level in April.

4) GSFC ↔ LaRC:

Ratings: LDAAC → GDAAC: Continued **Excellent**
 GSFC → LARC: Continued **Adequate**

Web Pages: <http://ensight.eos.nasa.gov/Networks/emsnet/LARC.shtml>
http://ensight.eos.nasa.gov/Missions/sage/SAGE_MOC.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GDAAC → LDAAC	77.6	62.8	15.5	2.0	64.8	62.8
GSFC-NISN → LaTIS	79.0	60.5	14.2			
GSFC-PTH → LaRC-PTH	78.5	70.0	32.9			
GSFC-SAFS → LaRC-SAGE III MOC	5.4	4.8	1.4			
LDAAC → GDAAC	52.2	48.7	5.8	0.003	48.7	48.7
LDAAC → GSFC-ECHO	43.3	38.4	22.8			

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → LARC (Combined)	FY '06	58.5	Adequate
GDAAC → LaRC ECS	FY '06	17.8	Excellent
GSFC-SAFS → LaRC-SAGE III MOC	FY '06	0.26	Excellent
GSFC → LATIS	FY '06	40.7	Good
LDAAC → GDAAC	FY '06	3.2	Excellent

Comments:

GSFC → LaRC: The combined 58.5 mbps requirement had been split between LDAAC and LaTIS when the flows were on separate circuits, but is now treated as a single requirement as they have been both on PIP since Feb '05. So the rating is now based on the GDAAC to LaRC ECS DAAC thruput, compared to the combined requirement. MRTG and LaTIS user flow data are also no longer available (but the ECS user flow data is used for the "User Flow" above).

So the GSFC → LaRC ECS DAAC thruput is now above the combined requirement, but by less than 30%, so the combined rating remains "Adequate".

GSFC-SAFS → LaRC-SAGE III MOC flows were moved to this section in December -- from the SCF report. Although the thruput is much lower than the other GSFC-LaRC flows, it is more than 3 times the modest requirement, resulting in an "Excellent" rating". *Note: The Meteor III spacecraft (on which the SAGE III instrument is flying) stopped responding in March.*

LaRC → GSFC: Performance from LDAAC → GDAAC remained stable with the switch to PIP in Feb '05. The thruput remains more than 3 x the 3.2 mbps requirement (with the backhaul flows removed), so the rating continues as "Excellent".

The thruput from LDAAC to GSFC-ECHO is similar to but a bit lower than LDAAC to GDAAC.

5) ASFRating: **Excellent**Web Page: http://ensight.eos.nasa.gov/Networks/emsnet/ASF_EMS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-CSAFS → ASF	1.45	1.44	1.33
ASF → LASP	1.27	1.10	0.70
ASF → GSFC-CSAFS	1.39	1.32	0.60

Comments: Testing to ASF transitioned to IOnet this month – accordingly, testing was discontinued from ASF to NOAA and JPL-SEAPAC, and user flow data is no longer available. The LASP requirement was raised from 16 kbps (housekeeping data flow rate) to 24 kbps to allow for overhead and contingency.

Performance is consistent with the T1 (1.5 mbps) circuit capacity.

Requirements:

Source → Dest	Date	kbps	Rating
ASF → LASP	FY '06	24	Excellent

6) NOAA NESDIS:Rating: Continued **Excellent**Web Page: http://ensight.eos.nasa.gov/Networks/emsnet/NOAA_NESDIS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-SAFS → NOAA	7.05	6.82	4.03
JAXA → NOAA	1.81	1.80	1.68
JPL → NOAA	4.82	4.74	4.18

Requirements:

Source → Dest	FY	Mbps	Rating
GSFC-CSAFS → NESDIS	'06	0.19	Excellent

Comments: The NOAA EMSnet test host was replaced in October '05; all flows are now via the MAX connection. The dominant flow to NOAA is Quikscat data, from GSFC CSAFS. Thruput was stable from all sources, and much higher than the requirement, rating “Excellent”. Thruput to this node from JAXA is consistent with circuit limitations. [Testing from ASF was stopped on Feb 14 with the ASF switch to IOnet.](#)

7) US ↔ JAXA:

Ratings: JAXA → US: Continued **Adequate**
 US → JAXA: Continued **Almost Adequate**

Web Pages http://ensight.eos.nasa.gov/Networks/emsnet/JAXA_EOC.shtml
http://ensight.eos.nasa.gov/Networks/emsnet/JPL_SEAPAC.shtml
http://ensight.eos.nasa.gov/Networks/emsnet/GSFC_SAFS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-CSAFS → JAXA-EOC	1.51	1.30	0.78
JPL → JAXA-EOC	1.67	1.36	0.50
JAXA-EOC → JPL-SEAPAC	1.61	1.60	0.75
JAXA-EOC → GSFC-DAAC	1.50	1.39	0.50

Requirements

Source → Dest	Date	mbps	Rating
GSFC → JAXA	FY '05, '06	1.43	Almost Adequate
JAXA → US	FY '04 - '06	1.28	Adequate

Comments:

The JAXA circuit was moved to PIP on December 2 – performance reductions were observed. Also, MRTG data was no longer available.

US → JAXA: Performance from GSFC was stable this month – thruput remains below but within 30% of the requirement, so the rating remains “Almost Adequate”.

Performance from JPL was similar, with slightly higher peaks..

Testing between JAXA and ASF was terminated on Feb 14, with the ASF switch to IOnet.

JAXA → US: Performance remained consistent with the ATM PVC. The requirement was increased in Version 1.4 of the EOS Networks Handbook. This month testing from JAXA to JPL was stable; but without adding the MRTG, the thruput was no longer 30% over the requirement, so the rating remains “Adequate”.

SInet / APAN Testing:

It is planned to remove the NASA – JAXA dedicated circuit above, by September 2006. After that, all the above data will be transferred via SInet or APAN. Accordingly, the following tests are run via SInet:

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
GSFC → JAXA	9.78	9.70	9.39	1.43	Excellent
JAXA → GSFC	8.80	8.77	7.20	1.28	Excellent

Thruput from GSFC to JAXA is considerably better via this path than the dedicated ATM circuit. Beginning July 1 '05, JAXA upgraded their infrastructure, and thruput was 20-30 mbps from GSFC to JAXA, and 10 mbps from JAXA to GSFC. But on 13 September, thruput abruptly dropped, accompanied by significant packet loss. This problem cleared up for JAXA to US in late November, improving the thruput from a median of 1.1 mbps. It cleared up for US to JAXA flows in January (median was 2.2 mbps in December).

So this path is now clearly superior to the ATM circuit (also cheaper!). However, in early April a problem developed with this circuit, significantly reducing thruput. The problem is under investigation.

8) ERSDAC ↔ US:Rating: Continued **Excellent**Web Page : <http://ensight.eos.nasa.gov/Networks/emsnet/ERSDAC.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GDAAC → ERSDAC	23.8	16.3	7.6
GSFC ENPL (Fast Ethernet) → ERSDAC	89.2	86.2	31.6
GSFC-EDOS → ERSDAC	5.0	2.4	1.6

Requirements:

Source → Dest	FY	Mbps	Rating
GSFC → ERSDAC	'03 - '06	12.5	Excellent

Comments: Dataflow from GSFC to ERSDAC was switched to APAN in February '05, and the performance above is via that route. MRTG and user flow data are no longer available due to this change.

The thrupt from GDAAC is apparently limited by packet loss at the GigE to FastE switch at Tokyo-XP. The GigE GDAAC source does not see any bottlenecks until this switch (The Abilene and APAN backbones are 10 Gbps), and thus exceeds capacity of the switch's FastE output circuit. But the FastE connected GSFC-ENPL node is limited to 100 mbps by its own interface, so does not suffer performance degrading packet loss – its performance is much higher. **Note: Testing from EDOS to ERSDAC was switched in late March to an EDOS FastE production node, but no performance improvement was observed – under investigation.**

The requirement now includes the level 0 flows which used to be sent by tapes. The thrupt is still more than 3 x this increased requirement, so the rating remains "Excellent".

Other Testing:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
ERSDAC → JPL-ASTER IST	85.2	51.6	15.0
ERSDAC → EROS	88.7	85.9	22.7

Requirements:

Source → Dest	Date	mbps	Rating
ERSDAC → EROS	FY '06	26.8	Excellent

Comments:

ERSDAC → EROS: The results from this test (in support of the ERSDAC to EROS ASTER flow, replacing tapes) were stable this month. Thrupt improved to these present values in April '05 after the Abilene to NGIX-E connection was repaired. The median thrupt is more than 3 x the requirement, so the rating remains "Excellent"

ERSDAC → JPL-ASTER-IST: This test was initiated in March '05, via APAN replacing the EBnet circuit. The results are much higher than previously via the 1 mbps ATM circuit, and should be considered "Excellent" (no requirement is specified at this time – but other IST requirements are 311 kbps)

9) SIPS Sites:

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

Test Results:

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
LaRC → NCAR	23.0	18.2	13.5	5.4	Excellent
GSFC → NCAR	93.1	93.0	93.0	5.1	Excellent
JPL → RSS	5.5	5.3	2.9	2.4	Good
GHCC → NSIDC	12.7	11.8	0.4	7.5	Good
GSFC → KNMI-ODPS	17.7	17.6	16.5	3.3	Excellent
GSFC → KNMI-ODPS-B/U	84.4	84.1	76.1		

Comments: These sites were previously reported in the QA/SCF report. But have been moved to this report since as SIPS, they are part of the EOS data production process. Note that they are not connected by EMSnet.

NCAR: NCAR (Boulder, CO) is a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS QA (Aura, from GSFC) requirements. Thruput from LaRC (via NISN to MAX to Abilene) is a bit above 3 x the requirement, so the rating remains “Excellent”. From GSFC the median thruput is extremely steady at well over 3 x the requirement (from a Fast-E test source), so that rating also remains “Excellent”. From a GigE test source, a problem similar to the ERSDAC “GigE” problem, above, exists, and creates considerable variability to the results. Thruput therefore has higher peaks and medians (154 and 142 mbps), but lower dips (19 mbps) than from the Fast-E source.(

RSS: RSS (Santa Rosa, CA) is a SIPS for AMSR-E, receiving data from JPL, and sending its results to GHCC (Huntsville, AL). The NISN dedicated circuit from JPL to RSS was upgraded in August '05 from 2 T1s (3 mbps) to 4 T1s (6 mbps) to accommodate the larger RSS to GHCC flow. Thruput improved to the above values at that time – more that 30% above the requirement, the rating remains “Good”.

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

GHCC (NSSTC) → NSIDC: This flow represents Layer 2 and 3 AMSR-E products produced at GHCC, and sent to NSIDC for archiving. Median thruput is more than 30% over the requirement, rating “Good”.

KNMI: KNMI (DeBilt, Netherlands) is a SIPS and QA site for OMI (Aura). The route from GSFC is via MAX to Abilene, peering in NY with Surfnet’s 10Gbps circuit to Amsterdam. Thruput to the ODPS backup server at KNMI is limited only by a Fast Ethernet connection at KNMI, and gets about 80 mbps steady! The rating is based on the results to the OMI PDR primary server, protected by a firewall, and are quite a bit lower. Thruput is still well above 3 x the requirement, rating “Excellent”.