

EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing for July 2005 -- comparing the measured performance against the requirements.

Highlights:

- NOAA test host down since 21 June – replacement host is being installed. Also, the dedicated circuit to NOAA was removed in July – flows will now go via MAX; performance has been much higher via that route.
- The router flow measurements have replaced MRTG for the circuits which transitioned to PIP (LaRC and NSIDC). The "Integrated measurements" continue to be used as the basis for the ratings (where available). However, some flows to LaRC and NSIDC are no longer included in the measurements.
- Very stable performance – The only ratings change was due to a change in the requirements, not network performance
- Outstanding Issues – same as last month:
 - ASF to NSIDC flow
 - ERSDAC requirements need to be updated for L0 and L1 flows via network
 - LaRC to GSFC Backhaul requirement is not valid
- 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

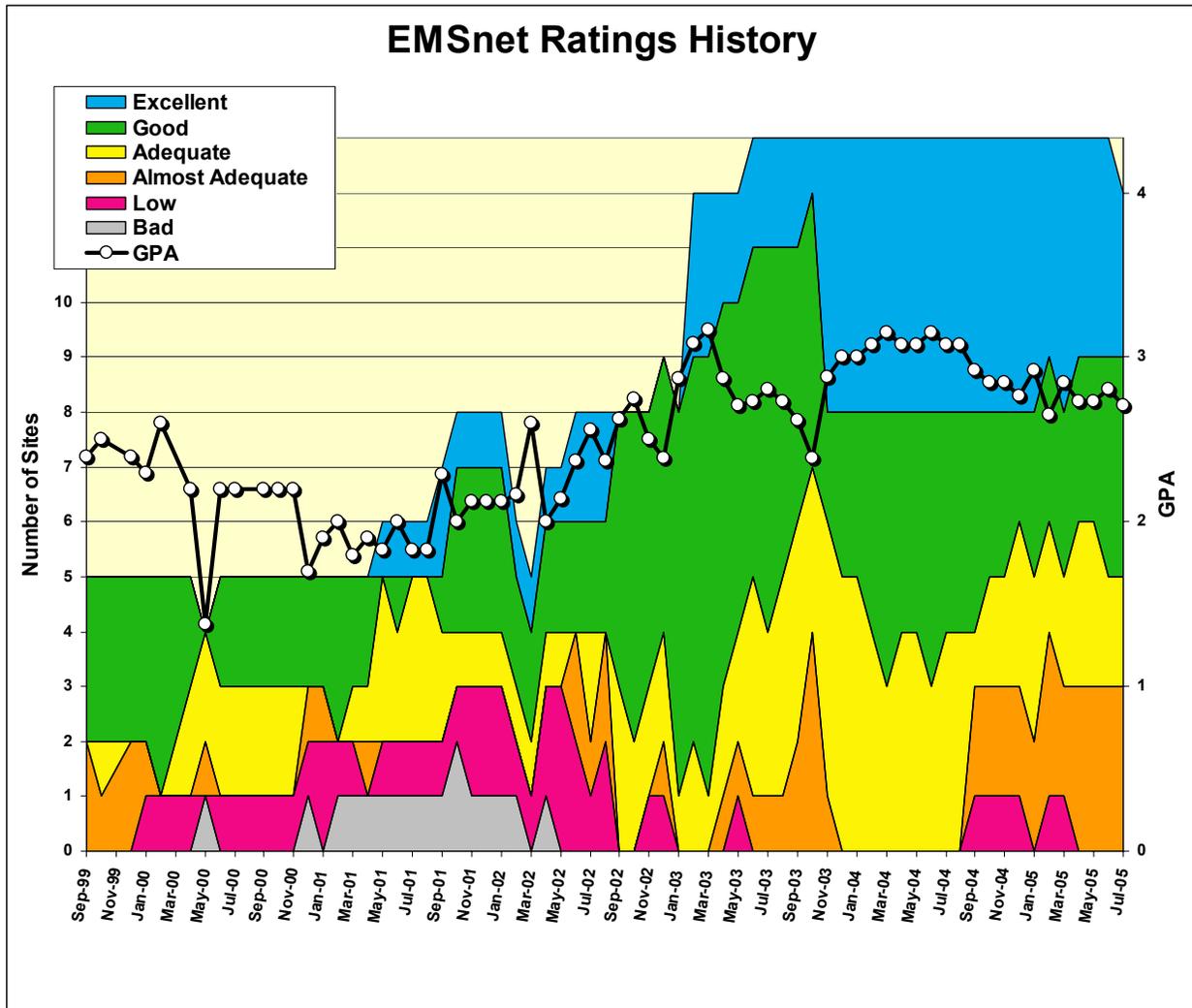
Where Total Kbps = Integrated Kbps (where available)

Else = User Flow + iperf monthly average

Ratings Changes:

Upgrades: ↑ None

Downgrades: ↓ None

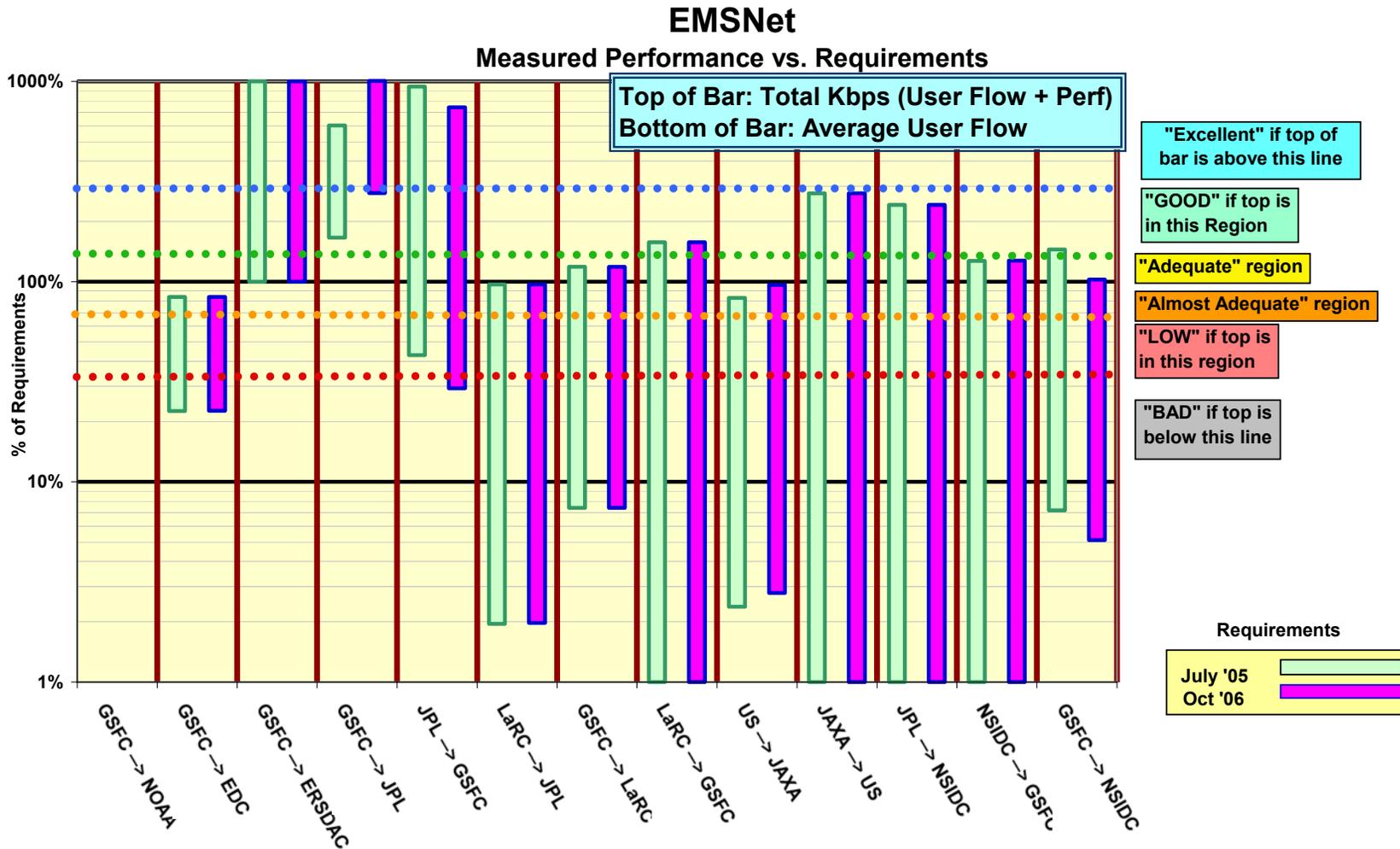


The chart above shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements.

Network Requirements vs. Measured Performance

July 2005		Requirements (kbps)		Testing								
Source → Destination	Team (s)	Current	Future	Source → Dest Nodes	Avg User Flow kbps	iperf Avg kbps	Total Avg kbps	Integrated kbps	Rating re Current Requirements		Rating re	
		Jul-05	Oct-06						Jul-05	Prev	Oct-06	
GSFC → ASF	QuikScat, Radarsat	n/a	n/a	GSFC-CSAFS → ASF	1	1321	1321	1321	n/a	n/a	n/a	
ASF → JPL	QuikScat, Radarsat	n/a	n/a	ASF → JPL-SEAPAC	57	1362	1419		n/a	n/a	n/a	
GSFC → NOAA	QuikScat	189	0	GSFC-CSAFS → NESDIS	n/a				n/a	E	n/a	
GSFC → EDC	MODIS, LandSat	285361	285361	GSFC-PTH → EDC PTH	64477	228832	293309	239152	AA	AA	AA	
GSFC → ERSDAC	ASTER	568	568	GDAAC → ERSDAC	n/a	14127	14127		Excellent	E	Excellent	
GSFC → JPL	ASTER, QuikScat, MLS, etc.	1272	762	GSFC-CSAFS → JPL-SEAPAC	2110	6960	9069	7662	Excellent	E	Excellent	
JPL → GSFC	AMSR, etc.	1155	1695	JPL-PODAAC → GDAAC	497	12069	12566		Excellent	E	Excellent	
LaRC → JPL	TES, MISR	40311	40311	LDAAC → JPL-TES	787	38994	39781	39074	AA	AA	AA	
GSFC → LaRC	CERES, MISR, MOPITT	58456	58594	GDAAC → LDAAC	4329	68778	73107	69352	Adequate	A	Adequate	
LaRC → GSFC	MODIS, TES	31695	31691	LDAAC → GDAAC	262	49864	50126	49864	GOOD	G	GOOD	
US → JAXA	QuikScat, TRMM, AMSR	1665	1431	GSFC-CSAFS → JAXA	40	1295	1334	1379	AA	AA	AA	
JAXA → US	AMSR	512	512	JAXA → GDAAC	0	1414	1414		GOOD	G	GOOD	
JPL → NSIDC	AMSR	1342	1342	JPL-PODAAC → NSIDC SIDADS	n/a	3243	3243		GOOD	G	GOOD	
NSIDC → GSFC	MODIS, ICESAT, QuikScat	13326	13317	NSIDC DAAC → GDAAC	n/a	16927	16927		Adequate	A	Adequate	
GSFC → NSIDC	MODIS, ICESAT, QuikScat	64118	90813	GSFC-PTH → NSIDC-DAAC	4621	88267	92888		GOOD	G	Adequate	
Notes: Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS-II					Ratings Summary							
								Jul-05	Req	Oct-06		
								Score	Prev	Score		
*Criteria:	Excellent	Total Kbps > Requirement * 3			Excellent			3	4	3		
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3			GOOD			4	4	3		
	Adequate	Requirement < Total Kbps < Requirement * 1.3			Adequate			2	2	3		
	Almost Adequate	Requirement / 1.3 < Total Kbps < Requirement			Almost Adequate			3	3	3		
	LOW	Requirement / 3 < Total Kbps < Requirement / 1.3			LOW			0	0	0		
	BAD	Total Kbps < Requirement / 3			BAD			0	0	0		
					Total			12	13	12		
					GPA			2.71	2.81	2.63		

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 (May '05 and September '05). 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) ASF

Rating: **N/A**

Web Page: http://ensight.eos.nasa.gov/Networks/emsnet/ASF_EMS.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GSFC-CSAFS → ASF	1.39	1.32	0.73	0.01	1.33	1.32
ASF → NESDIS	n/a	n/a	n/a			
ASF → NSIDC	0.18	0.18	0.12			
ASF → GSFC-CSAFS	1.40	1.40	0.64			
ASF → JPL-SEAPAC	1.39	1.36	0.83			

Comments: Thruput were stable this month to and from all destinations – except that testing to NOAA stopped since the NOAA host was down. The approx 1.4 mbps outbound total is as expected for a single T1 (1.54 mbps) circuit, as is the 1.3 mbps inbound. **The performance to NSIDC is still low due to the NSIDC switch from EMSnet to PIP in February** (previously performance was over 1 mbps -- similar to the other destinations).

Since the requirement from ADEOS has been deleted, the remaining ASF requirements are very low, and are mostly based on estimated ECS interDAAC queries, not production flows. These flow estimates are not considered reliable enough to use as a basis for testing, so the rating is "N/A".

2) EDC:

Rating: Continued **Almost Adequate**

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-PTH → EDC PTH	241.8	228.8	198.8	64.5	293.3	239.2
GSFC-DAAC → EDC LPDAAC	223.5	194.7	73.6			
ERSDAC → EDC	87.7	87.4	23.0	(via APAN / Abilene / vBNS+)		
EDC DAAC → GSFC DAAC	131.6	119.1	83.7			
EDC PTH → GSFC PTH	348.3	312.4	229.6			

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → EDC	FY '05	285.4	Almost Adequate
ERSDAC → EDC	FY '05	20	Good

Comments:

The rating is based on testing between from GSFC PTH to EDC PTH. The PTH hosts are outside the EDC firewalls, and therefore have higher thruput.

The rating is based on the "Integrated" measurement, and as usual is lower than the sum of the MRTG and iperf. The user flow this month had only a small contribution to the integrated measurement. This 239 mbps value remains below the requirement, but by less than 30%, so the rating continues to be "Almost Adequate".

The results from ERSDAC to EDC-PTH (in support of the ERSDAC to EDC ASTER flow, replacing tapes) improved to their present values in April (median was 5.6 mbps in March), after an optical jumper was replaced in the Abilene to NGIX-E connection. The 20 mbps requirement is approximate, based on EDC estimates. This results in a "Good" rating.

3) JPL:

Ratings: GSFC → JPL: Continued **Excellent**
 JPL → GSFC: Continued **Excellent**
 LaRC → JPL: Continued **Almost Adequate**

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/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			
GSFC-CSAFS → JPL-SEAPAC	8.5	7.0	1.0	2.1	9.1	7.7
GSFC-MODIS → JPL-PODAAC	4.5	3.2	0.5	2.1	5.3	5.0
LaRC DAAC → JPL-TES	40.5	39.0	21.9	0.8	39.8	39.1
LaRC DAAC → JPL-MISR	40.9	40.0	23.8			
ERSDAC → JPL-ASTER-IST	87.9	87.5	19.6			
LaRC PTH → JPL-PTH	N/A	N/A	N/A			
JPL-PODAAC → GSFC DAAC	12.3	12.1	4.7	0.5	12.6	

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → JPL combined	June '05	1.60	Excellent
JPL → GSFC combined	June '05	0.63	Excellent
LaRC DAAC → JPL-TES	June '05	30.6	Adequate
LaRC DAAC → JPL-MISR	June '05	18.5	Good
LaRC DAAC → JPL-Combined	June '05	40.3	Almost Adequate

Comments:

GSFC → JPL: Performance on this circuit improved from 6 mbps peaks to 8 mbps in late March with a NISN PVC change -- had been mostly stable since the BOP switchover on 15 August '02; well above the requirement; the rating remains "Excellent". The CSFAS to SEAPAC "integrated" data is (like most other sites) just a bit higher than the iperf results alone, and lower than the sum of the median iperf and average MRTG. This again indicates that adding a small average user flow to the median iperf overstates the true situation.

LDAAC → JPL: Performance has been stable since this flow was switched to NISN PIP on 10 Feb; MRTG data became unavailable at that time -- the passive "flows" data is now being used instead. The LaRC-PTH to JPL-PTH testing also was disabled by this transition, since the LaRC-PTH node switched to PIP, while JPL-PTH remained on EMSnet, and thus did not have connectivity.

Note:the MISR requirement is open to some interpretation. The formal QA flow is only 9.7 mbps – this value is used to generate the "combined" requirement. But the science data also flows on the same circuit. This would push the total MISR flow requirement to 18.5 mbps, and the total LaRC → JPL requirement to 49.1 mbps. This configuration is based on a management decision to reduce cost, in the expectation that both projects' requirements are bursty and include contingency. Thus the actual requirements of both projects are expected to be met with this circuit capacity.

ERSDAC → JPL-ASTER-IST: This test was initiated in March, via APAN replacing the EBnet circuit. The typical 87 mbps must be well in excess of the requirements.

JPL → GSFC: The requirement from JPL to GSFC includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. Since many of these flows were related to ADEOS, this requirement dropped substantially with the removal of ADEOS. The combined requirement is now only 0.63 mbps, and the combined 10.9 mbps thruput is more than 3 times that, so the rating remains "Excellent".

4) NSIDC:

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

Web Page: http://ensight.eos.nasa.gov/Networks/emsnet/NSIDC_EMS.shtml

GSFC ↔ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GSFC-DAAC → NSIDC-DAAC	91.0	88.3	31.6	4.6	92.9	89.0
GSFC-PTH → NSIDC-DAAC	91.0	88.3	31.6			
NSIDC DAAC → GSFC-DAAC	17.0	16.9	13.3			

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → NSIDC	June '05	64.1	Good
NSIDC → GSFC	Dec '04	13.3	Adequate

Comments:

GSFC → NSIDC: This flow was switched from EMSnet to NISN PIP on 8 February -- as a result of this switch, the MRTG data became unavailable -- [the passive "flows" data is now being used instead](#). There were problems this month from GSFC-PTH to NSIDC-PTH (Ethernet duplex mismatch on NSIDC-PTH, cleared up in August), so the rating is now based on testing from GDAAC to the NSIDC DAAC. The iperf and integrated thrupt 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. Thus although network performance was stable, it is now 30% above the requirement, so the rating remains "Good".

NSIDC → GSFC: Performance from NSIDC to GSFC was stable this month, and the median remains slightly below 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	3.8	3.2	2.1	1.34	Good
GSFC-ISIPS → NSIDC (iperf)	90.4	89.1	50.9		
GSFC-ISIPS → NSIDC (ftp)	23.9	23.8	18.8		
NSIDC → GSFC-ISIPS (iperf)	16.0	15.7	13.9		
ASF → NSIDC	0.18	0.18	0.12	0.73	Bad

Comments:

JPL → NSIDC-SIDADS: This flow switched from EMSnet to PIP on Feb 8, and thrupt dropped from 6.1 mbps previously. Thrupt remains below 3 x the requirement, so the rating remains "Good".

GSFC-ISIPS ↔ NSIDC: Performance from ISIPS to NSIDC was fixed on 8 February, after having problems since July '04. Performance is at nominal levels for the circuit capacity. Testing from NSIDC to ISIPS is stable and gets thrupt similar to NSIDC to GDAAC.

ASF → NSIDC: The median thrupt dropped with the NSIDC switch to PIP in February (was 1.4 mbps prior to that). It remains at less than 30% of the requirement, so the rating remains "Bad".

5) GSFC ↔ LaRC:

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

Web Page: <http://ensight.eos.nasa.gov/Networks/emsnet/LARC.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GDAAC → LDAAC	77.7	68.8	20.8	4.3	73.1	69.4
GSFC-NISN → LaTIS	79.0	66.8	10.1			
GSFC-PTH → LaRC-PTH	78.4	67.1	10.5			
LDAAC → GDAAC	51.1	49.9	22.7	0.2	50.1	49.9

Requirements:

Source → Dest	Date	Mbps	Rating
GSFC → LARC (Combined)	FY '05	58.5	Adequate
GDAAC → LaRC ECS	FY '05	17.8	Excellent
GSFC → LATIS	FY '05	40.7	Good
LDAAC → GDAAC	FY '05	31.8	Good

Comments:

GSFC → LaRC: The GSFC→ LaRC ECS DAAC flow was switched from EMSnet to NISN PIP on 8 February (GSFC → LaTIS had been flowing on PIP since November). The combined 58.5 mbps requirement had been split as indicated above when the flows were on separate circuits, but is now treated as a single requirement as they are now both on PIP. So the rating is now based on the GDAAC to LaRC ECS DAAC thrupt, compared to the combined requirement. MRTG and LaTIS user flow data are also no longer available (but the ECS user flow data was restored in March, and is used for the "User Flow" above).

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

LaRC → GSFC: Performance remained stable with the switch to PIP. The requirement jumped from 6.8 mbps to 31.7 mbps in Oct '03, to incorporate the backhaul of all LaRC science outflow via GSFC. However, most of the LaRC outflow was switched to MAX via SIP in April, improving the performance, so the backhaul portion of the requirement should be removed.

The thrupt is more than 30% above this requirement, so the rating remains "Good".

6) NOAA NESDIS:

Rating: n/a

Web Page: http://ensight.eos.nasa.gov/Networks/emsnet/NOAA_NESDIS.shtml

The NOAA Test host was removed on 23 June; a replacement is being sought. Note: It is planned to move all flows to use the MAX connection, and remove the 3 mbps private circuit.

Requirements:

Source → Dest	FY	Mbps	Rating
GSFC-CSAFS → NESDIS	'05	0.19	n/a

Comments: The dominant flow to NOAA is Quikscat data, from GSFC CSAFS.

7) US ↔ JAXA:

Ratings: JAXA → US: Continued **Good**

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)			User Flow	TOTAL	Integrated
	Best	Median	Worst			
GSFC-CSAFS → JAXA-EOC	1.51	1.29	0.76	0.04	1.33	1.38
JAXA-EOC → JPL-SEAPAC	n/a	n/a	n/a			
JAXA-EOC → GSFC-DAAC	1.46	1.41	0.50			

Requirements

Source → Dest	Date	mbps	Rating
GSFC → JAXA	FY '05	1.67	Almost Adequate
JAXA → US	FY '04, '05	0.51	Good

Comments:

US → JAXA: The requirements above were reduced in November '03, due to the removal of ADEOS flows. They have again been reduced in January '05 (were 2 mbps previously).

Performance has been stable since it recovered in January, below this requirement, but by less than 30%, so the rating remains "Almost Adequate".

Note: The requirement still includes 4 ISTs at JAXA for AMSR-E. Each IST has a requirement for 311 kbps, for a total of 1244 kbps. It could be questioned whether JAXA intends to operate all four of the ISTs simultaneously, or whether some ISTs are backups, in which case the network requirements would be reduced to a lower value.

JAXA → US: Performance remained consistent with the reduced ATM PVC. The requirement was reduced in November '03 due to the removal of ADEOS requirements.

Note: JAXA is still working on testing with multiple TCP streams, so performance to GSFC is limited by the TCP window size on JAXA's test machine, in conjunction with the long RTT. In order to reflect the actual capability of network, the rating is normally derived from testing from JAXA to JPL, which uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be limited by the TCP window size. The Trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.

However, again this month testing from JAXA to JPL has still been down (working with JAXA to restore). Thus the rating reverted to the JAXA to GSFC performance, which kept the rating as "Good" (had been "Excellent" to JPL).

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 (via APAN)	20.3	14.1	6.6
GSFC ENPL (Fast Ethernet) → ERSDAC (via APAN)	89.4	89.1	31.8

Requirements:

Source → Dest	FY	Kbps	Rating
GSFC → ERSDAC	'03 - '05	568	Excellent

Comments: Dataflow from GDAAC to ERSDAC was switched to APAN in late February, 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: EDOS is also FastE connected, and gets the higher performance levels.

The requirement will be revised to include the level 0 flows which used to be sent by tapes, but this value is not known at this time, so the old (primarily ICC) value is used here. Thus the rating remains “Excellent”.

Other Testing: .

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
ERSDAC → JPL-ASTER IST	87.9	87.5	19.6
ERSDAC → EDC	87.7	87.4	23.0

ERSDAC → EDC: The results from this test (in support of the ERSDAC to EDC ASTER flow, replacing tapes) were stable this month. Thrupt improved to these present values in April (median was 5.6 mbps in March), after an optical jumper was replaced in the Abilene to NGIX-E connection.

ERSDAC → JPL-ASTER-IST: This test was initiated in March, via APAN replacing the EBnet circuit. The results are much higher than previously via the 1 mbps ATM circuit, and should be considered “Excellent” (although no requirement is specified at this time)