EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the measured performance against the requirements. Currently using updated BAH requirements (Feb '03), including missions through 2006.

All results are reported on the web site:
http://netstats.eos.nasa.gov/performance/Net_Health/EMSnet_list.html.

Note the new web page URL!!!!

It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.
(The old URL will continue to work for a while too).

Highlights:

- Most test results were stable.
- Updated to the April '03 values for "Current" requirements. This increase resulted in ratings downgrade for EDC and LaRC.
- Rating for US →NASDA remains low due to the inclusion of 4 ISTs for AMSR-E into the requirement. Note: this is possibly an excessive requirement.
- JPL EMSnet redesign is still in progress

.Ratings:

Rating Categories:

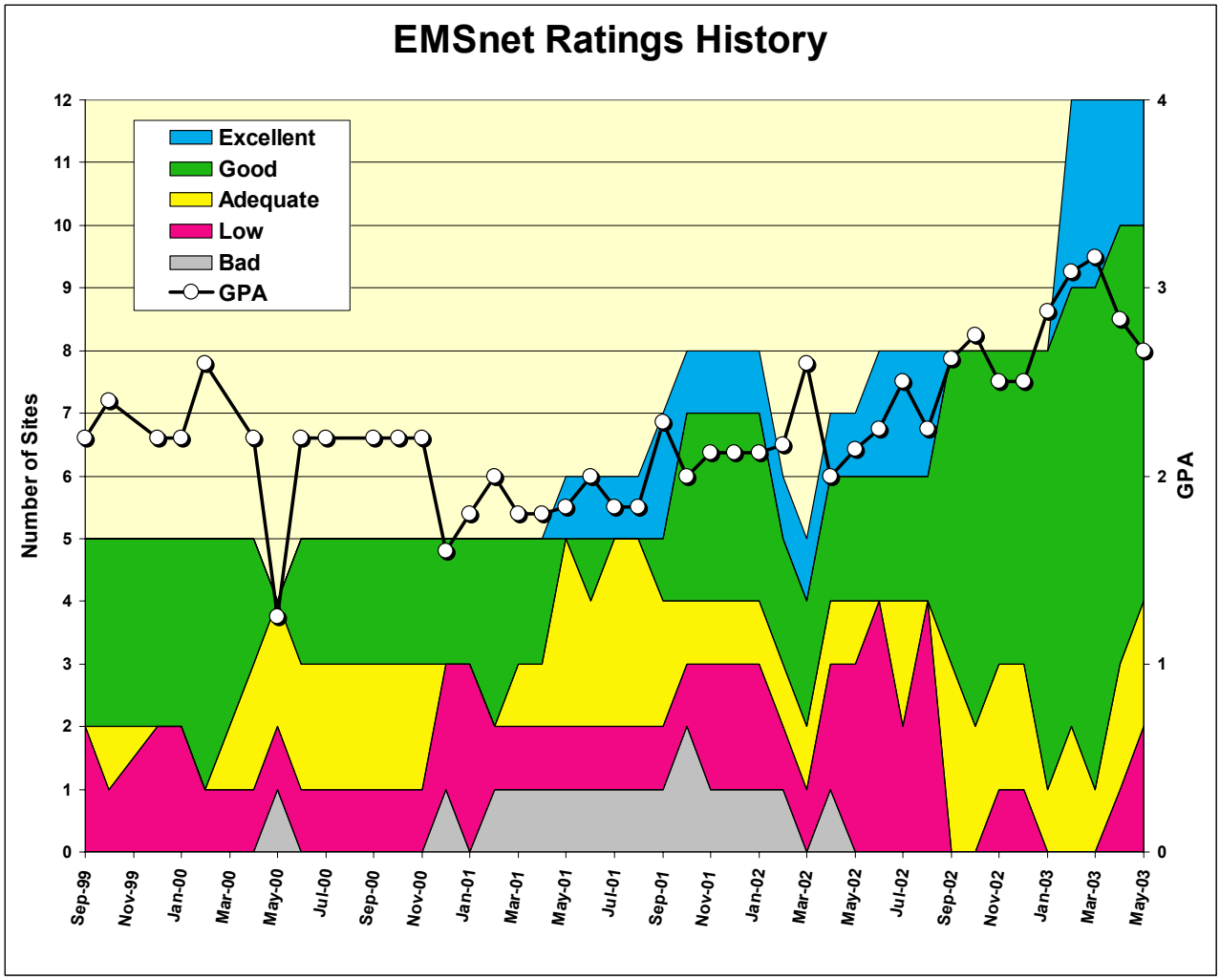
Excellent : **Total Kbps** > Requirement * 3
Good : 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate : Requirement < **Total Kbps** < Requirement * 1.3
Low : **Total Kbps** < Requirement.
Bad : **Total Kbps** < Requirement / 3

Where Total Kbps = User Flow + iperf monthly average

Upgrades: ↑
NASDA → US: Adequate → **Good**

Downgrades: ↓:
GSFC → EDC: Adequate → **Low**
GSFC → LaRC: Good → **Adequate**
GSFC → ERSDAC: Good → **Adequate**

The chart below 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. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



EMSnet Sites:
Network Requirements vs. Measured Performance

May 2003		Requirements (kbps)		Testing								
Source -> Destination	Team (s)	Current Apr-03	Future Oct-03	Source Node : Test Period	Raw MRTG	Perf -> MRTG	Avg User Flow kbps	Perf Avg kbps	Total Avg kbps	Current Status re Apr-03	Prev Stat	Current Status re Oct-03
ASF-> NOAA	ADEOS II	1864	1864	ASF->NESDIS: 29-Nov-02 - 31-May-03	526	69	404	2447	2851	GOOD	G	GOOD
GSFC->EDC	MODIS, LandSat	216574	216574	DOORS-EDCTest: 01-May-03 - 31-May-03	168900	2077	149933	57190	207123	LOW	A	LOW
GSFC->ERSDAC	ASTER	664	664	GDAAC: 03-Jan-03 - 31-May-03	62	6	43	778	821	Adequate	G	Adequate
GSFC -> JPL	ASTER, QuikScat, MLS, etc	1609	1300	MTVS1: 17-Aug-02 - 31-May-03	1275	150	870	5745	6615	Excellent	E	Excellent
JPL -> GSFC	ADEOS II, AMSR, etc.	4863	4693	JPL -> GSFC: 13-Jan-03 - 31-May-03	630	130	374	9098	9472	GOOD	G	GOOD
LaRC -> JPL	TES	0	30585	LDAAC: 15-Aug-02 - 31-May-03	112	49	40	5917	5957	n/a	n/a	BAD
GSFC->LARC	CERES, MISR, MOPITT	52446	52664	GDAAC: 01-May-03 - 31-May-03	14500	377	11223	45187	56410	Adequate	G	Adequate
LaRC -> GSFC	MODIS, TES	6777	44795	LDAAC --> GDAAC: 09-Sep-02 - 31-May-03	1322	200	858	23999	24857	Excellent	E	LOW
US ->NASDA	QuikScat, TRMM, AMSR	2856	2623	CSAFS: 23-Aug-02 - 31-May-03	556	29	416	1780	2196	LOW	L	LOW
NASDA->US	AMSR	1559	1559	NASDA->JPL-SEAPAC: 01-Mar-03 - 31-May-03	146	45	72	1982	2054	GOOD	A	GOOD
JPL -> NSIDC	AMSR	1540	1540	JPL: 13-Jan-03 - 31-May-03	37	33	0	4012	4012	GOOD	G	GOOD
NSIDC->GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC -> GDAAC: 23-Oct-02 - 31-May-03	362	131	159	15675	15834	GOOD	G	GOOD
GSFC-> NSIDC	MODIS, ICESAT, QuikScat	38234	38234	GDAAC: 01-May-03 - 31-May-03	7741	404	5789	48460	54249	GOOD	G	GOOD

Notes: All flow requirements listed are the greater of inflow or outflow
Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II

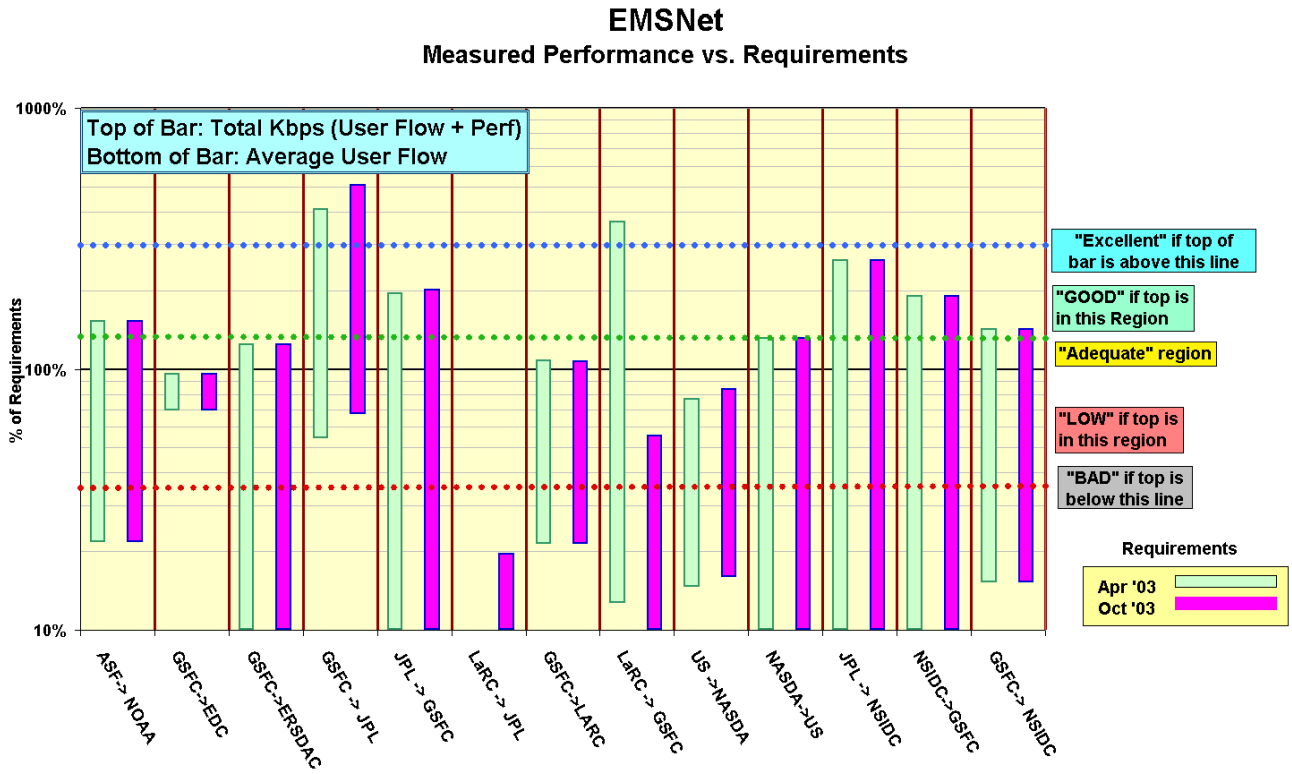
*Criteria:		
	Excellent	**Total Kbps** > Requirement * 3
	GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3
	LOW	**Total Kbps** < Requirement
	BAD	**Total Kbps** < Requirement / 3

Ratings Summary	Apr-03 Score	Apr-03 Prev	Oct-03 Score
Excellent	2	2	1
GOOD	6	7	6
Adequate	2	2	2
LOW	2	1	3
BAD	0	0	1
Total	12	12	13
GPA	2.67	2.83	2.23

Change History:		
	27-Sep-99	Original - TRMM, Terra, and QuikScat
	19-Jan-01	Incorporated BAH requirements including additional missions
	9-Apr-01	Updated BAH requirements
	4-Jun-01	Added 50% contingency to BAH requirements
	16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria
	2-Oct-02	Updated to revised BAH requirements
	7-Mar-03	Updated Requirements, Added tests to GSFC, improved User flow calculation

Comparison of measured performance with 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 (Dec '02, and Oct. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below.

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess 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.

Details on individual sites:

1) ASF ←→ CONUS:

Rating: Continued **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	User Flow	TOTAL
ASF → NESDIS	2546	2447	667	404	2850
ASF → GSFC-CSAFS	2624	2342	1039		
ASF→ JPL-SEAPAC	2799	2611	1363		
GSFC-CSAFS → ASF	2766	2710	1208	49	

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'03, '04	1.86	Good

Comments: The 2.85 mbps total from ASF → NOAA is very good for a 2 * T1 (3.1 mbps) circuit. Since this is more than 30% over the Dec '02 requirement, the rating is "Good".

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2) GSFC → EDC:

Rating: ↓ Adequate → **Low**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
DOORS → EDC Test	141.7	57.2	38.4	149.9	207.1
DOORS → EDC DAAC	130.2	46.4	29.0		
G-DAAC→ EDC DAAC	83.8	27.0	12.8		

Requirements:

Date	mbps	Rating
April, Oct '03	216.6	Low

The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall to the ECS DAAC, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has much of an effect on thruput, but the GSFC firewall does

This month the user flows increased about 12 mbps, andt the corresponding thruput tests also increased, for an increase in the total of about 20 mbps. However, the requirement also increased – it was 170 mbps last month. So the combined MRTG + thruput is lower than the April and Oct '03 requirement, so that rating remains "Low". Since this is now the requirement used as the basis for the rating, the rating drops to "Low"

3) JPL:

Ratings: GSFC → JPL: Continued **Excellent**
JPL → GSFC: Continued **Good**
LaRC → JPL (Oct '03): Continued **Bad**

Web Pages:

http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC-MTVS1 → JPL-PODAAC	6.00	5.75	4.53	0.87	6.62
LaRC DAAC → JPL-TES	6.03	5.92	3.98	0.04	5.96
GSFC-CSAFS → JPL-SEAPAC	6.05	2.26	1.33		
JPL-PODAAC→ GSFC DAAC	11.57	9.10	4.93		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Dec '02	1.61	**Excellent**
GSFC → JPL combined	Oct '03	1.30	**Excellent**
JPL → GSFC combined	Dec '02	4.86	**Good**
LaRC DAAC → JPL-TES	Oct '03	30.6	**Bad**

The GSFC-JPL requirement above was revised in August '02 to include all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating was previously based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the user flow value above also includes these flows.

Performance on this circuit was very stable since the BOP switchover on 15 August '02, until April 23 '03. At that time the thruput from GSFC-CSAFS to JPL-SEAPAC became very noisy – the peaks are still about 6 mbps, but the median dropped from 5.8 mbps last month to 2.3 mbps this month.

However, testing on the same EMSnet circuit from MODIS (MTVS1) to PODAAC remained clean. This test uses the same EMSnet WAN circuits, and previously had tracked closely with the GSFC-CSAFS to JPL-SEAPAC flow. So the conclusion appears to be that the WAN is still clean, but there is some local congestion at CSAFS or SEAPAC. So the rating will now be based on the MTVS1-PODAAC flow. With the combined requirement of 1.6 mbps, the rating remains "Excellent".

Performance from LDAAC to JPL-TES has also been very stable since it improved from 2.9 to 6.0 mbps on Aug 15, due to BOP. However, the new Oct. '03 requirement for this flow is 30 mbps. This is well above the current capability, which was not designed to accommodate this flow (the current route is via NSIDC). Accordingly, an NSR is in progress to provide a direct VC with increased capability.

The route from GDAAC to JPL-TES and JPL-PODAAC changed to EMSnet on 12 February '03 – it had been using NISN SIP since May 8 '02. Performance has been very steady at 6 mbps since the BOP upgrade on 15 August '02.

Also now being tracked is the requirement from JPL to GSFC. It includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. The combined Dec. '02 requirement is 4.86 mbps, and the thruput (9.11 mbps) is more than 30% above that, so the rating remains "Good". **Note, however, that according to MRTG, this circuit is rated at only 7.5 mbps, so the performance measured appears to exceed the circuit parameters! (Under investigation)**

4) NSIDC:

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

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html

GSFC ←→ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**User Flow**	**TOTAL**
GSFC-DAAC → NSIDC	86.9	48.5	20.2	5.8	54.2
NSIDC → GSFC-DAAC	16.6	15.7	9.4	0.2	15.8

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → NSIDC	April, Oct '03	38.2	**Good**
NSIDC → GSFC	'03, '04	8.3	**Good**

Performance from GSFC to NSIDC and from NSIDC to GSFC remains steady, with the ratings for both FY '03 and '04 remaining "Good".

Note: the MRTG values through May had a limit of 30 mbps imposed on all 5 minute readings – so the monthly averages could have actually been higher than reported. This has now been corrected, and will be incorporated in the data next month.

Other Testing:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**Requirement**	**Rating**
JPL → NSIDC-SIDADS	5.71	4.01	3.07	1.54	**Good**
LDAAC - NSIDC	4.81	4.69	4.47	0.07	**Excellent**

Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement.

Thruput from LDAAC to NSIDC has been steady at about 4.5 mbps since 28 November. The very low requirement produces a rating of "Excellent".

5) GSFC ←→ LaRC:

Ratings: GDAAC → LDAAC: ↓ Good → **Adequate**
LDAAC → GDAAC: Continued **Excellent**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	**Median**	**Worst**	**User Flow**	**TOTAL**
GDAAC → LDAAC	84.2	45.2	24.2	11.1	56.4
LDAAC → GDAAC	25.4	24.0	15.9	0.9	24.9

Requirements:

Source → Dest	Date	mbps	Rating
GDAAC → LDAAC	Apr, Oct '03	52.7	**Adequate**
LDAAC → GDAAC	Apr '03	6.8	**Excellent**
LDAAC → GDAAC	Oct '03	44.8	**Low**

Performance has been stable since the BOP switchover in August '02, although noisiness increased in May (with a resulting decrease in average thruput). Also, the requirements from GSFC → LaRC increased in March – was 37.7 mbps. The measured thruput is still above the April and Oct. '03 requirement, but not with a 30% margin, so the rating drops to "Adequate".

The LaRC → GSFC requirement is now tracked. While the current performance is "Excellent", by FY '04 it is planned to backhaul all LaRC science outflow via GSFC, greatly increasing this requirement. A circuit upgrade will be required to meet this future requirement.

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6) GSFC → ERSDAC:

Rating: ↓ Good → **Adequate**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	**Median**	**Worst**	**User Flow**	**TOTAL**
GSFC → ERSDAC	801	779	376	43	821

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'03, '04	664	**Adequate**

Thruput since June '02, using the 1 mbps ATM connection had been very stable (except for a problem period from 12 November '02 to 3 Jan '03). The user flow decreased a little this month (was 109 kbps last month), and iperf was stable. The total is just below 30 % over the requirement, so the rating drops to "Adequate".

7A) US → NASDA:

Rating: Continued **Low**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC-CSAFS → NASDA-EOC	2.15	1.78	0.49	0.42	2.20
ASF → NASDA-EOC	2.24	1.90	0.50		

Requirements:

Source → Dest	FY	mbps	Rating
GSFC → NASDA	Dec '02	2.86	Low
GSFC → NASDA	Oct '03	2.62	Low

Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Results from ASF to NASDA were slightly better than from CSAFS. The requirements above include 4 ISTs at NASDA for AMSR-E. Each IST has a requirement for 311 kbps, for a total increase of 1244 kbps. This requirement drops the rating to "Low", even thought the performance was stable. It could be questioned whether NASDA intends to operate all four of the ISTs simultaneously, or whether some ISTs are backups, in which case the network reqauirements would be reduced to a value attainable with the current circuit.

7B) NASDA → US:

Rating: Adequate → **Good**

Web Pages: http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
NASDA-EOC → JPL-SEAPAC	2.33	1.98	1.09	0.07	2.05
NASDA-EOC → GSFC-CSAFS	1.40	1.24	0.59		

Requirements:

Source → Dest	FY	mbps	Rating
NASDA → US	'02, '03	1.56	Good

Performance continues stable on the new circuit. A slight increase in performance this month (total was 2.01 mbps last month) raises the total just above 130% of the requirement, improving the rating to "Good".

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely 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.