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.
- 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 PVC from LaRC implemented; further changes still in progress

.Ratings:

Rating Categories:

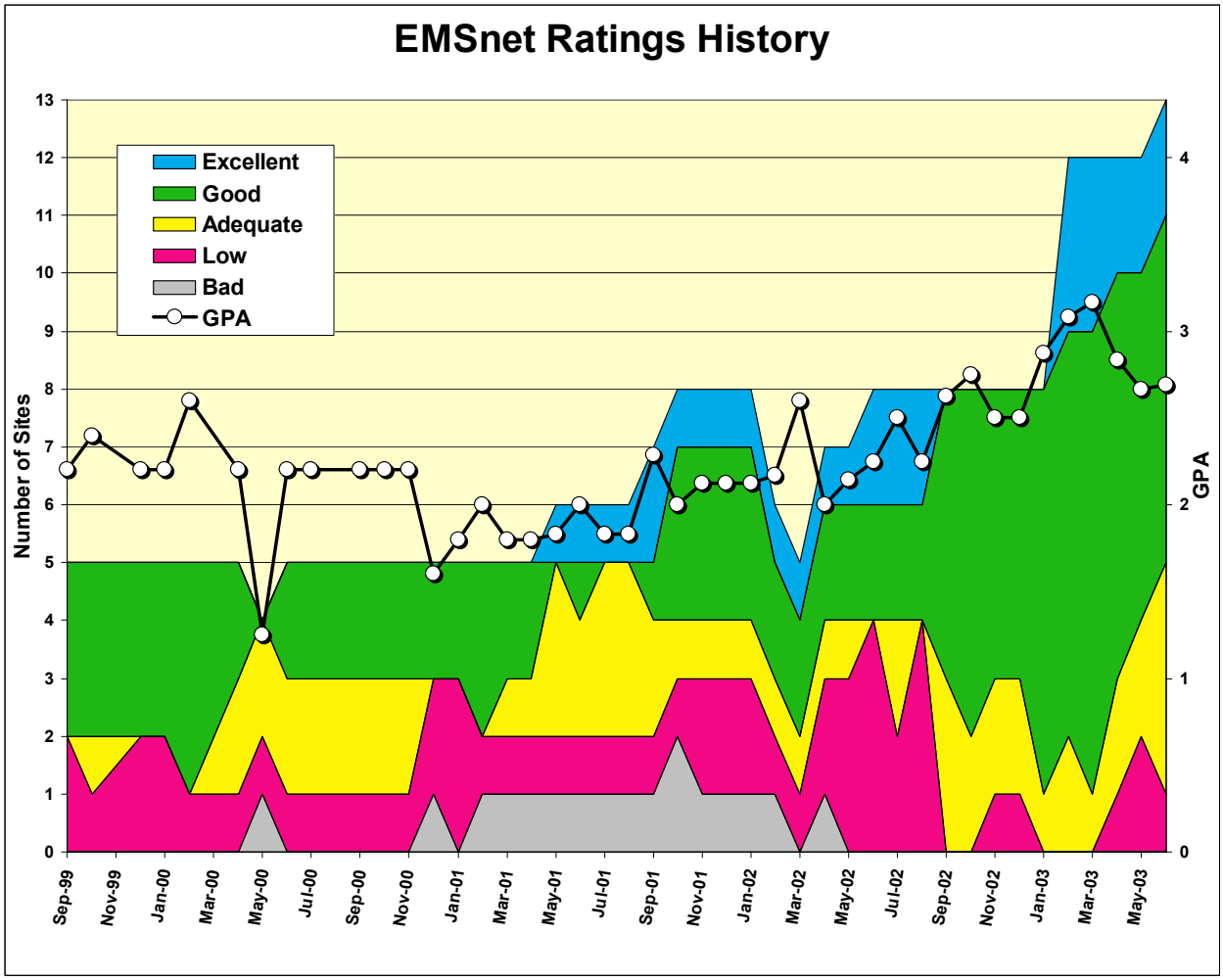
Excellent : **Total Kbps** > Requirement * 3
Good : 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate : Requirement < **Total Kbps** < Requirement * 1.3
Low : **Total Kbps** < Requirement.
Bad : **Total Kbps** < Requirement / 3

Where Total Kbps = User Flow + iperf monthly average

Upgrades: ↑
GSFC → EDC: Low → **Adequate**
LaRC → JPL: Bad → **Good**

Downgrades: ↓:
NASDA → US: 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

June 2003		Requirements (kbps)		Testing								
Source -> Destination	Team (s)	Current Jun-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 Jun-03	Prev Stat	Current Status re Oct-03
ASF-> NOAA	ADEOS II	1864	1864	ASF->NESDIS: 28-May-03 - 30-Jun-03	964	67	800	2180	2980	GOOD	G	GOOD
GSFC->EDC	MODIS, LandSat	216574	216574	DOORS-EDCTest: 01-Jun-03 - 30-Jun-03	164300	2201	145669	72137	217805	Adequate	L	Adequate
GSFC->ERSDAC	ASTER	664	664	GDAAC: 03-Jan-03 - 30-Jun-03	72	6	51	779	830	Adequate	A	Adequate
GSFC -> JPL	ASTER, QuikScat, MLS, etc.	1810	1300	CSAFS: 16-Jun-03 - 30-Jun-03	1311	147	902	5339	6241	Excellent	E	Excellent
JPL -> GSFC	ADEOS II, AMSR, etc.	5385	4693	JPL -> GSFC: 13-Jan-03 - 30-Jun-03	1018	130	685	9050	9734	GOOD	G	GOOD
LaRC -> JPL	TES	30585	30585	LDAAC: 24-Jun-03 - 30-Jun-03	545	336	100	40323	40423	GOOD	n/a	GOOD
GSFC->LARC	CERES, MISR, MOPITT	52446	52664	GDAAC: 18-Jun-03 - 30-Jun-03	12100	378	9302	45339	54641	Adequate	A	Adequate
LaRC -> GSFC	MODIS, TES	6777	44795	LDAAC --> GDAAC: 17-Jun-03 - 30-Jun-03	848	401	278	48081	48359	Excellent	E	Adequate
US ->NASDA	QuikScat, TRMM, AMSR	2856	2623	CSAFS: 23-Aug-02 - 30-Jun-03	637	29	481	1780	2260	LOW	L	LOW
NASDA->US	AMSR	1559	1559	NASDA->JPL-SEAPAC: 01-Mar-03 - 19-Jun-03	161	44	84	1936	2020	Adequate	G	Adequate
JPL -> NSIDC	AMSR	1540	1540	JPL: 13-Jan-03 - 30-Jun-03	77	33	0	4003	4003	GOOD	G	GOOD
NSIDC->GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC -> GDAAC: 23-Oct-02 - 30-Jun-03	338	131	140	15665	15805	GOOD	G	GOOD
GSFC-> NSIDC	MODIS, ICESAT, QuikScat	38234	38234	GDAAC: 01-May-03 - 30-Jun-03	10300	413	7827	49503	57330	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

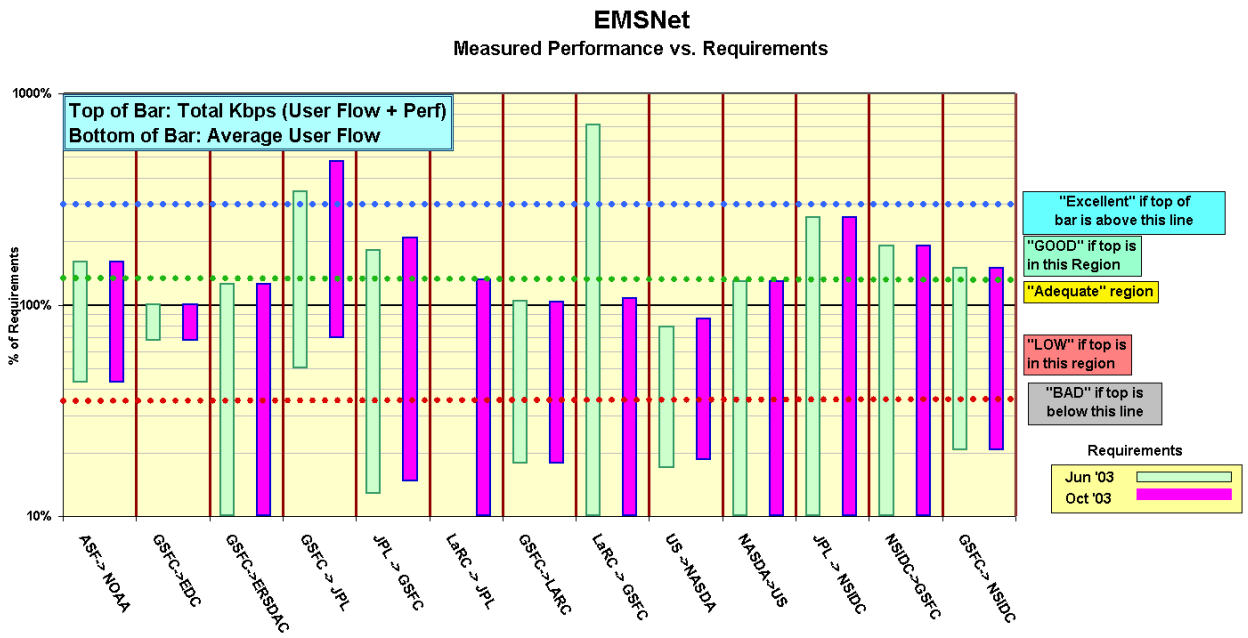
*Criteria:		
	Excellent	**Total Kbps** > Requirement * 3
	GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3
	LOW	**Total Kbps** < Requirement
	BAD	**Total Kbps** < Requirement / 3

Ratings Summary	Jun-03 Score	Jun-03 Prev	Oct-03 Score
Excellent	2	2	1
GOOD	6	6	6
Adequate	4	2	5
LOW	1	2	1
BAD	0	0	0
Total	13	12	13
GPA	2.69	2.67	2.54

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, improveded 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 (mbps)				
	Best	Median	Worst	User Flow	TOTAL
ASF → NESDIS	2.60	2.18	0.46	0.80	2.98
ASF → GSFC-CSAFS	2.61	2.24	0.51		
ASF→ JPL-SEAPAC	2.80	2.61	1.35		
GSFC-CSAFS → ASF	2.77	2.68	1.12	49	

Requirements:

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

Comments: The 2.98 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 remains "Good".

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2) GSFC → EDC:

Rating: ↑ Low → **Adequate**

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	157.5	72.1	44.4	145.7	217.8
DOORS → EDC DAAC	145.9	62.4	36.0		
G-DAAC→ EDC DAAC	81.8	32.4	16.1		

Requirements:

Date	mbps	Rating
April, Oct '03	216.6	Adequate

Comments: 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. Note that the GDAAC has been sending out an average of over 200 mbps for the past month, much of it to EDC.

This month the user flows dropped a bit, and the corresponding thruput tests increased, for an increase in the total of about 10 mbps. The combined MRTG + thruput is now slightly higher than the April and Oct ’03 requirement, so the rating improves to “Adequate”.

3) JPL:

Ratings: GSFC → JPL: Continued **Excellent**
JPL → GSFC: Continued **Good**
LaRC → JPL ↑ Bad → **Good**

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-CSAFS → JPL-SEAPAC	6.09	5.34	2.62	0.90	6.24
LaRC DAAC → JPL-TES	40.55	40.32	26.57	0.10	40.42
JPL-PODAAC→ GSFC DAAC	11.55	9.05	4.91	0.68	9.73

Requirements:

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

Comments:

GSFC → JPL: 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 were still about 6 mbps, but the median dropped from 5.8 mbps in April to 2.3 mbps in May. For this period the rating was based on testing from MTVS1 to PODAAC, which uses the same WAN circuit, but remained clean throughout this period. The SEAPAC problem was corrected on 16 June, and the ratings are again the flow from GSFC-SAFS to SEAPAC.

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.

LDAAC→ JPL-TES: Performance from LDAAC to JPL-TES has been very stable since it improved from 2.9 to 6.0 mbps on Aug 15, due to BOP. In order to meet the new 30 mbps requirement for this flow beginning in June. '03, the PVC was increased on 17 June, and again on 23 June. The performance shown above reflects the circuit after the 23 June upgrade. The 40 mbps thruput rates as "Good" vs. the 30 mbps requirement. Note: the LDAAC to MISR flow is planned to be migrated to this circuit in July.

JPL → GSFC: 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: MRTG, has now been corrected to show that this circuit is rated at 15 mbps

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	87.7	49.5	23.4	7.8	57.3
NSIDC → GSFC-DAAC	16.6	15.7	9.1	0.1	15.8

Requirements:

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

Comments:

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 the MRTG now shows peaks to 100 mbps. The average user flow measurement only increased.a little -- was 5.8 mbps last month.

Other Testing:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	Requirement	Rating
JPL → NSIDC-SIDADS	5.68	4.00	3.07	1.54	Good
GSFC-ISIPS → NSIDC	7.39	6.87	6.66		
LDAAC → NSIDC	4.85	4.70	4.48	0.07	Excellent

Comments:

JPL → NSIDC-SIDADS: Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement.

GSFC-ISIPS → NSIDC: Testing is ftp pulls by NSIDC from ISIPS. Performance is very steady at 7 mbps, apparently limited by ftp window size. Manual testing using iperf between the same machines in the same direction gets over 20 mbps.

LDAAC → NSIDC: 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: Continued **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	57.5	45.3	18.4	9.3	54.6
LDAAC → GDAAC	51.1	48.1	16.3	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	Adequate

Comments: Performance dropped noticeably on 18 June, when the circuits were reconfigured: the peaks dropped from 88 to 57 mbps, but the median stayed almost the same. The measured thruput is still above the April and Oct. '03 requirement, but not with a 30% margin, so the rating remains "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. The circuit was upgraded to meet this requirement on 18 June -- median thruput was 24 mbps prior to that. The Oct '03 rating increases from Low to Adequate.

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6) GSFC → ERSDAC:

Rating: Continued **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	421	51	830

Requirements:

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

Comments: 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 increased slightly this month, and iperf was stable. The total is just a bit below 30 % over the requirement, so the rating remains "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	0.48	2.26
ASF → NASDA-EOC	2.24	1.91	0.51		

Requirements:

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

Comments: 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 though 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: ↓ Good → **Adequate**

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	1.94	1.08	0.08	2.02
NASDA-EOC → GSFC-CSAFS	1.40	1.24	0.58		

Requirements:

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

Comments: Performance continues stable on the new circuit. A slight decrease in performance this month (total was 2.05 mbps last month) drops the total just below 130% of the requirement, reducing the rating to "Adequate".

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.