



CEOS-WGISS-Network Task Team Network Performance Project

Andrew Germain

CEOS WGISS NTT-2

Chiang Mai, Thailand

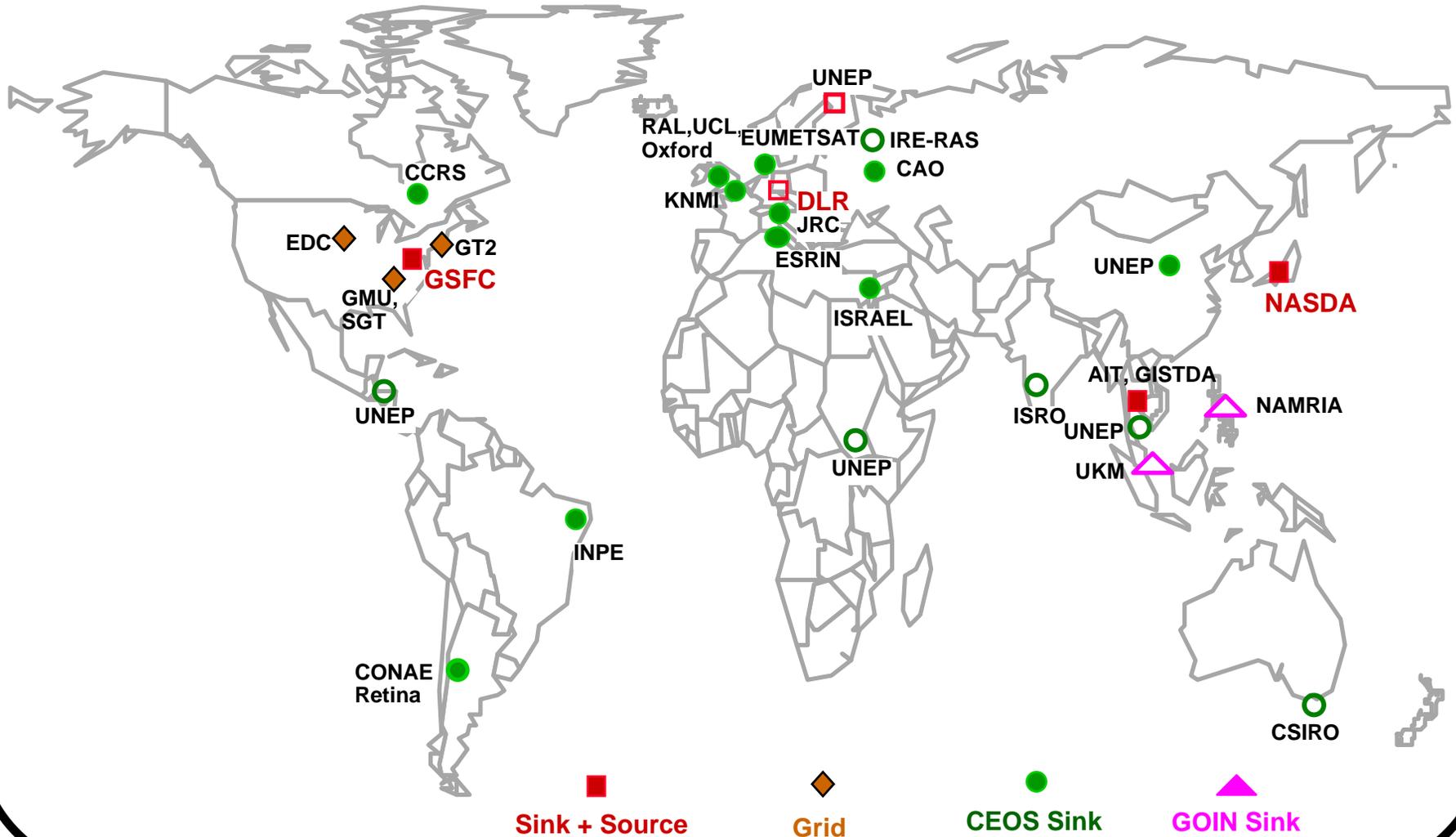
September 2003

Network Performance Testing Highlights



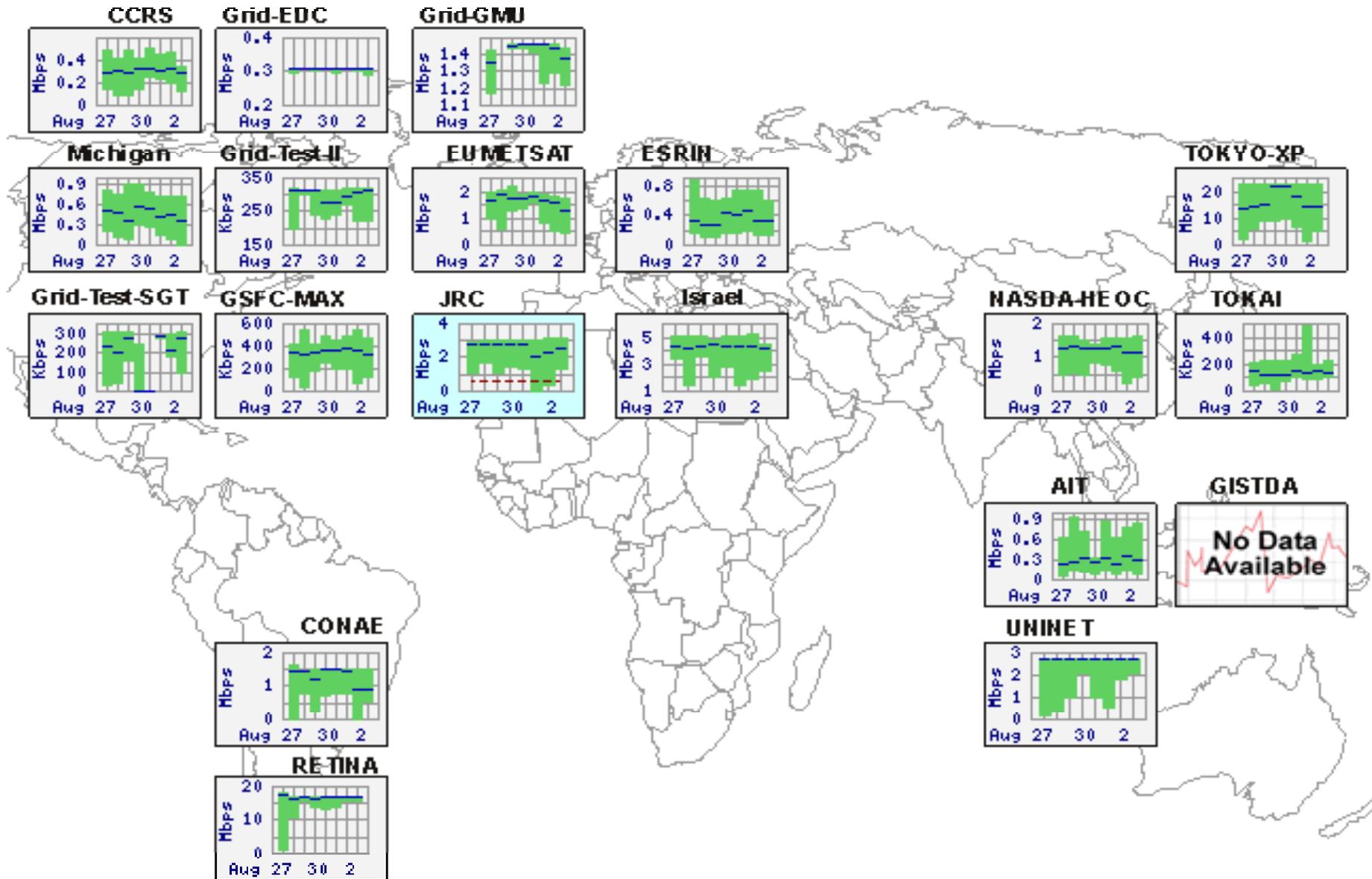
- **Daily results online:**
 - http://netstats.eos.nasa.gov/performance/Net_Health/CEOS.list.html
- **New Web site (Under development):**
 - <http://ensight.eos.nasa.gov/Organizations/ceos/index.html>
- **Active Sources:**
 - GSFC
 - AIT, GISTDA
 - NASDA
 - Looking for a replacement European host (still)

CEOS & GOIN Performance Test Sites



CEOS Network Performance Home Page

<http://ensight.eos.nasa.gov/Organizations/ceos/index.html>



Sample Site Page (ESRIN)

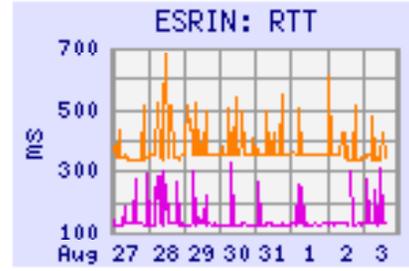
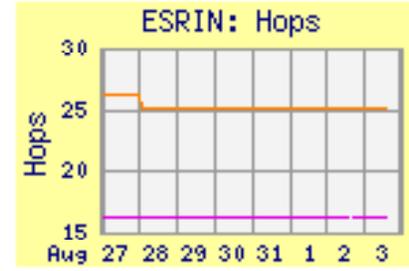
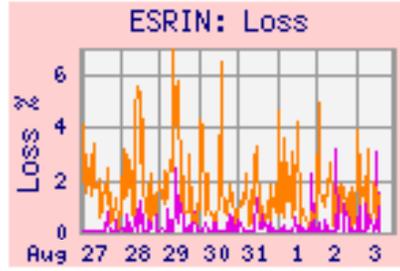
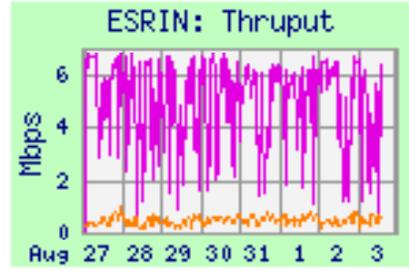
Thruput

Loss

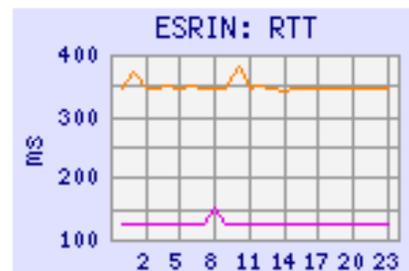
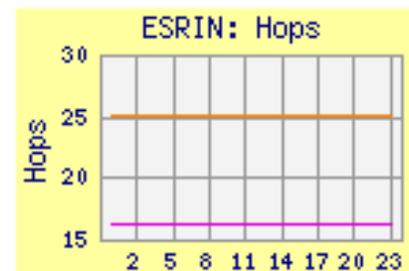
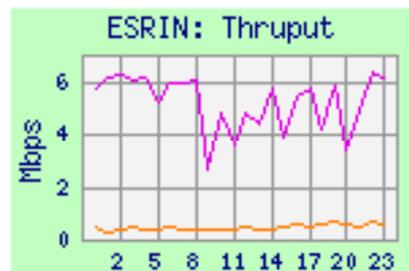
Hops

RTT

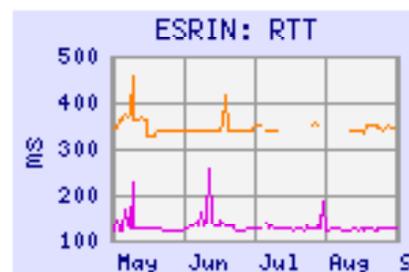
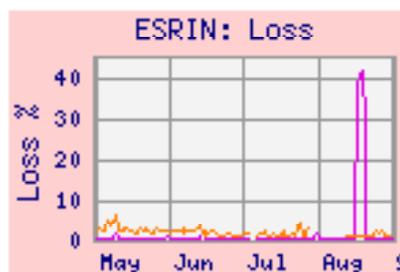
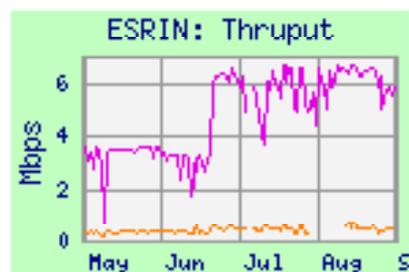
Current Week:
Hourly Medians



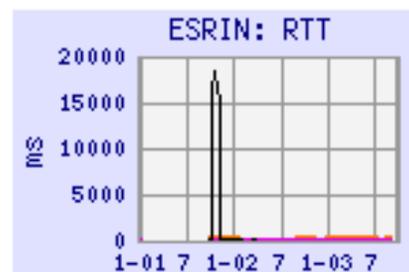
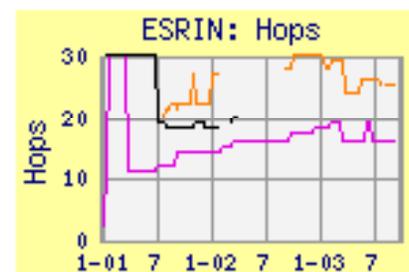
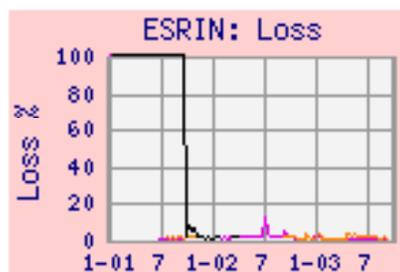
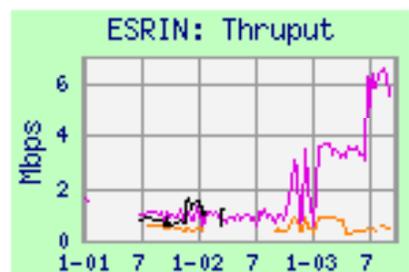
Current Week:
Median by GMT hour



5 Month:
Daily Medians



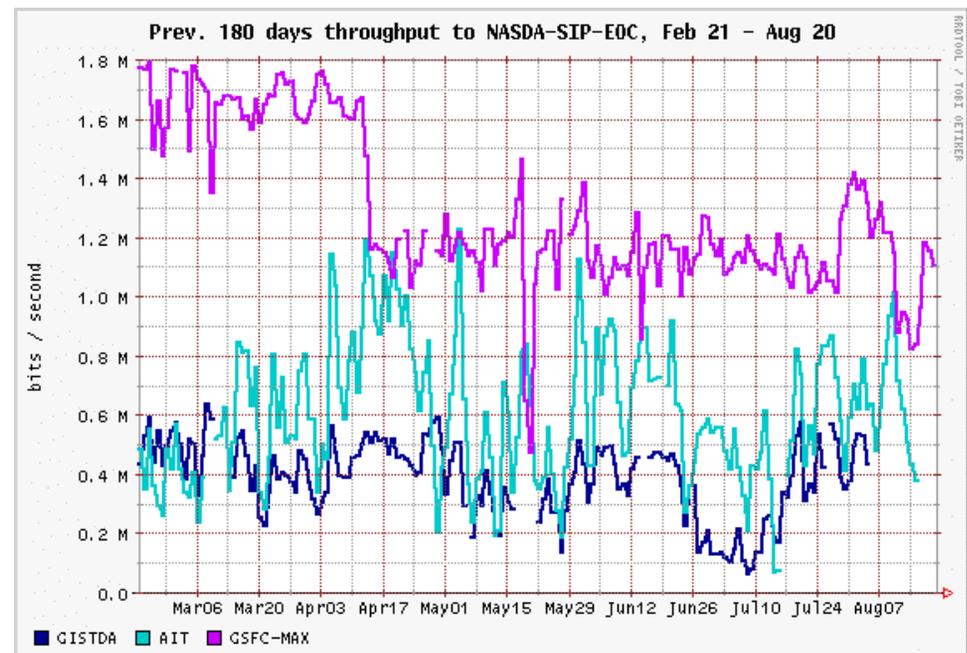
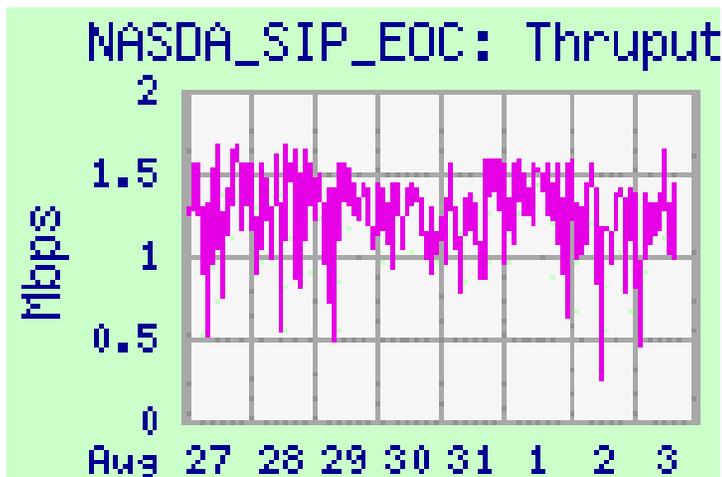
3 Year:
Weekly Medians





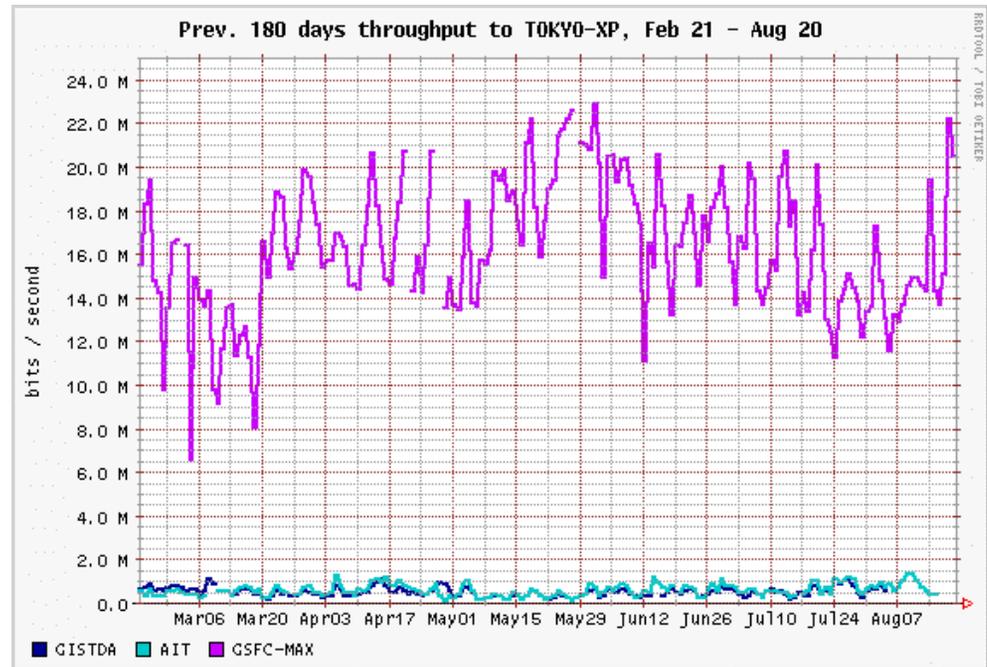
• NASDA EOC - Hatoyama: via Snet since April '03

- NASA-NASDA private 3 mbps ATM service -- for mission support only.
- Route via Snet – peering with Abilene in NY
 - » Typical 0.6 - 1.6 mbps -- median 1.1 mbps
 - » 1.2-1.8 mbps from GSFC via TransPac / APAN until 13 April
- 200-650 kbps from GISTDA via APAN
- Multiple routes from AIT



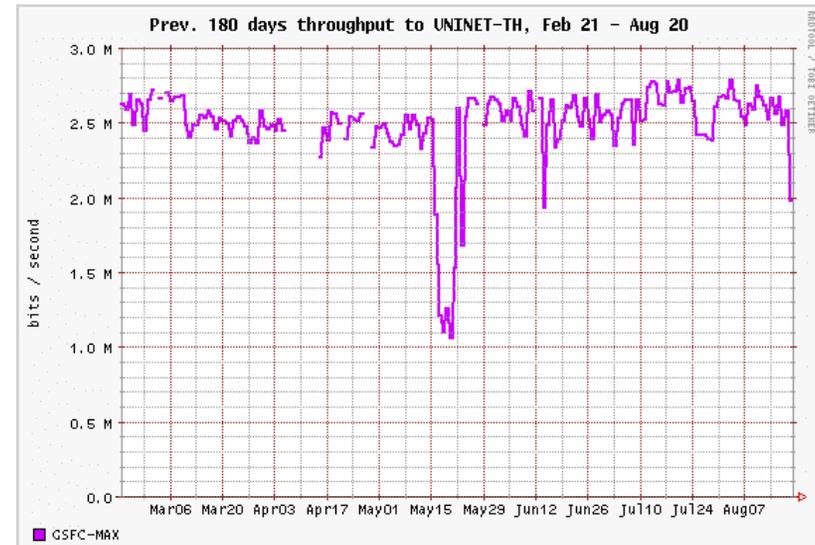
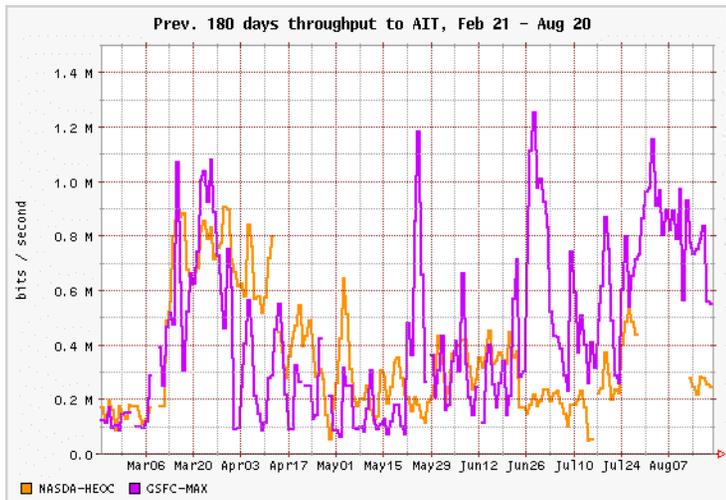


- **Tokyo-XP**: Shows potential thruput to Japan
 - From GSFC:
 - » via Abilene / TransPac / APAN – peering at PNW
 - » multiple performance levels:
 - 7-15 mbps (most of July '02 to Jan '03),
 - 12-23 mbps (April-Aug '03)
 - from AIT, GISTDA: via APAN
 - » 150- 1100 kbps since Sept '02





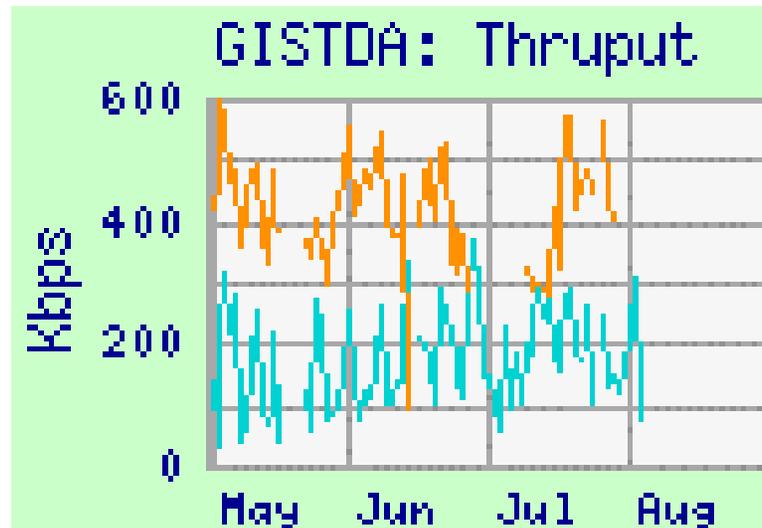
- **AIT**: Multiple routes from both NASDA and GSFC
 - » Dec '02 - Feb '03 via commodity internet -- BHM = 70 kbps
 - » Better performance via APAN: BHM = 300 kbps
 - Route from GSFC via Abilene – PNW
 - » Since Aug '03: via UNINET: 0.1-1.24 mbps, median 667 kbps
 - » Testing from NASDA: 125-550 kbps, recent BHM = 550 kbps
- **UNINET via Abilene peering in LA:**
 - » Stable at 2.7 mbps from GSFC since November '02



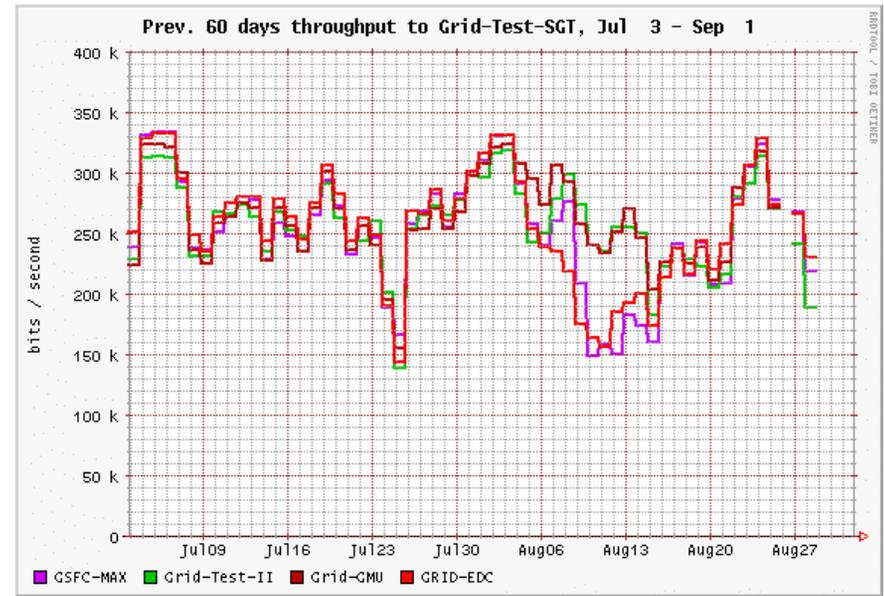
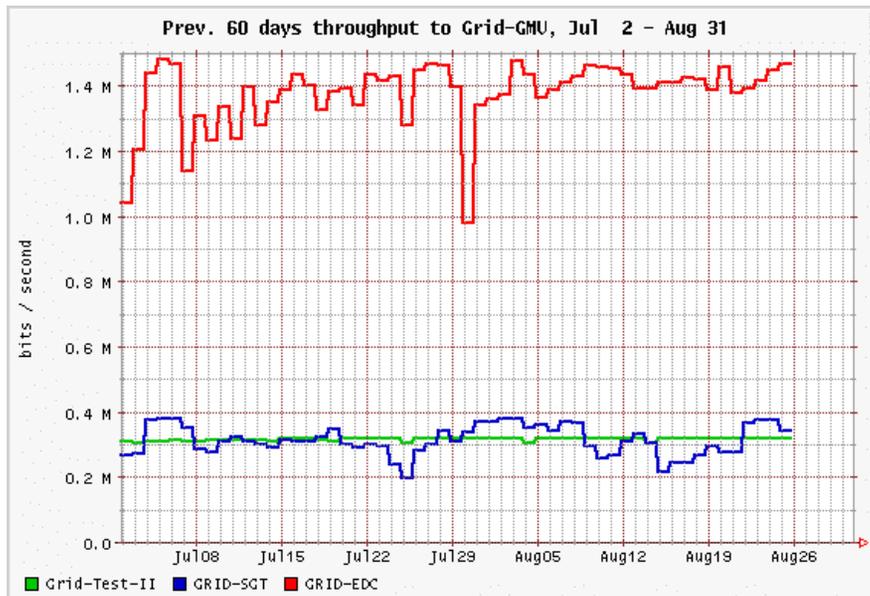
Site Updates: Thailand (2): GISTDA



- GISTDA Test Node down since 3 August 2003 (Source and sink)
- From GSFC: Multiple routes
 - » BHM 20 kbps until Jan '03 (range 3-150 kbps)
 - » Recently better via AT&T - INET: still severe congestion
 - » BHM = 78 kbps, range = 13-550 kbps)
- Testing from NASDA restarted Nov. '02
 - Pretty steady around 600 kbps (typical range 400-750)

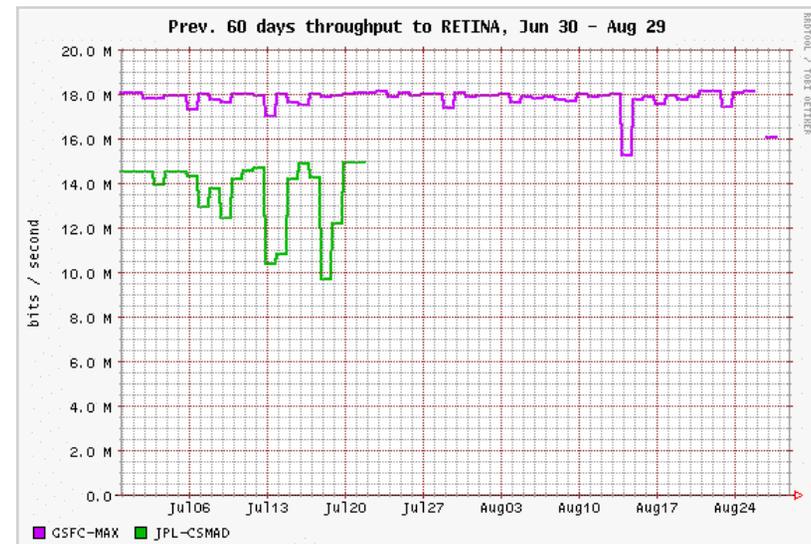
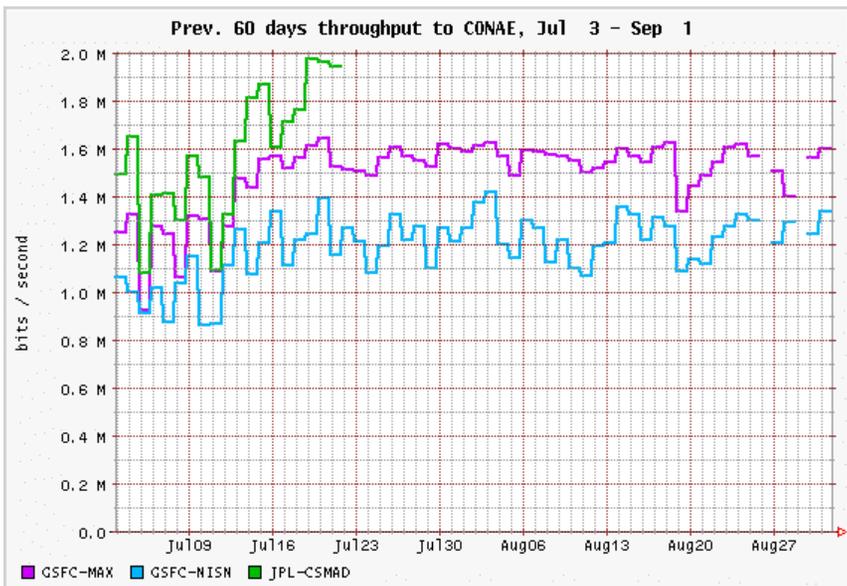


- 4 Grid Sites (still) -- will add more when available
- Full mesh testing:
 - "Grid-Test-II": Boston -- DSL 384 kbps connection
 - GMU: Virginia -- T1 (1.5 mbps) connection
 - SGT: Maryland -- DSL 384 kbps connection
 - EDC: South Dakota -- OC-12 600 mbps connection



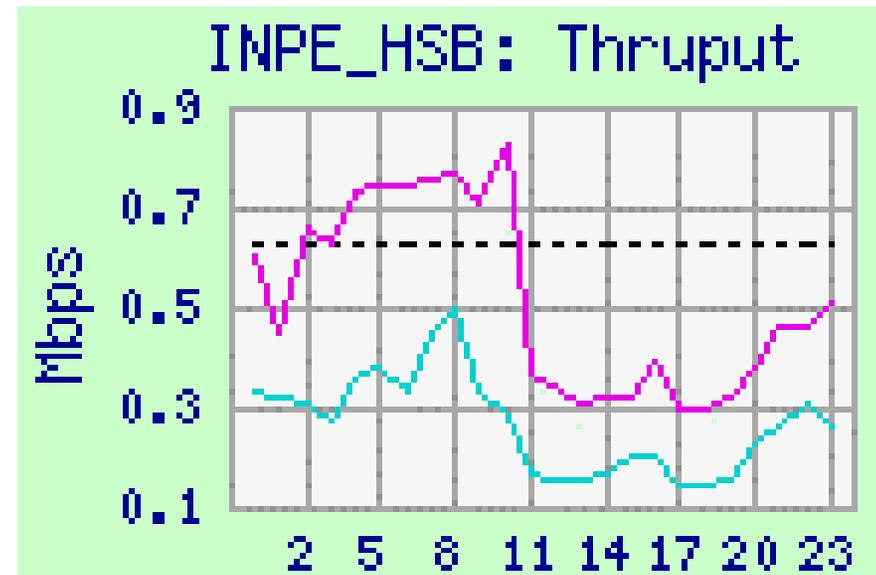
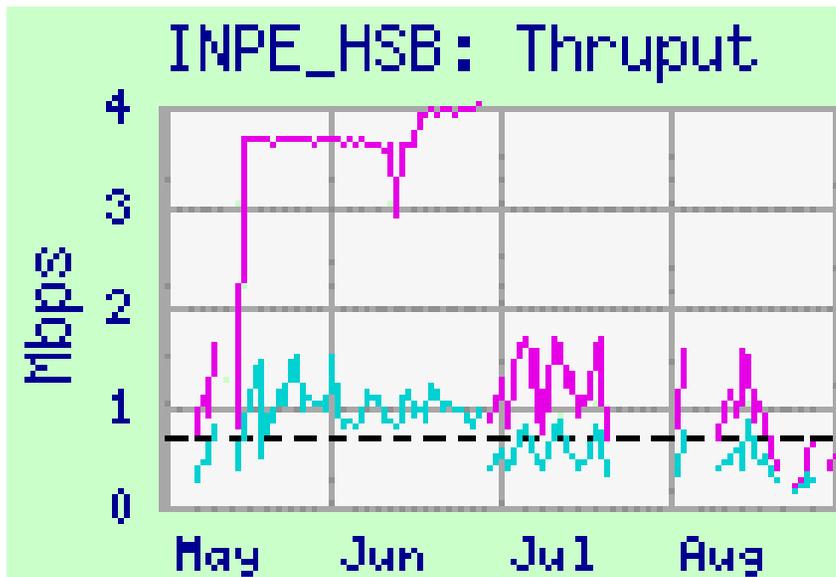


- **CONAE: performance stable**
 - Route via Comsat from Miami
 - » BH range improved to 900-1700 kbps (was 500-1600 kbps)
- **RETINA: Research Network - performance stable**
 - testing via Abilene / SFG / AMPATH to RETINA test node
 - » Thruput is limited by window size at destination
 - » 32 KB windows @ 170 ms RTT → 1.7 mbps per stream
 - » Using 9 streams to achieve 16 mbps aggregate thruput



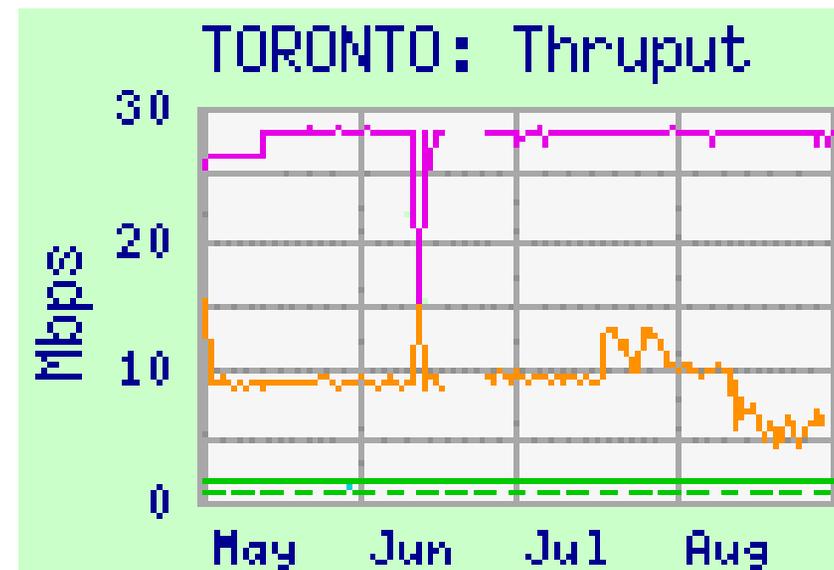
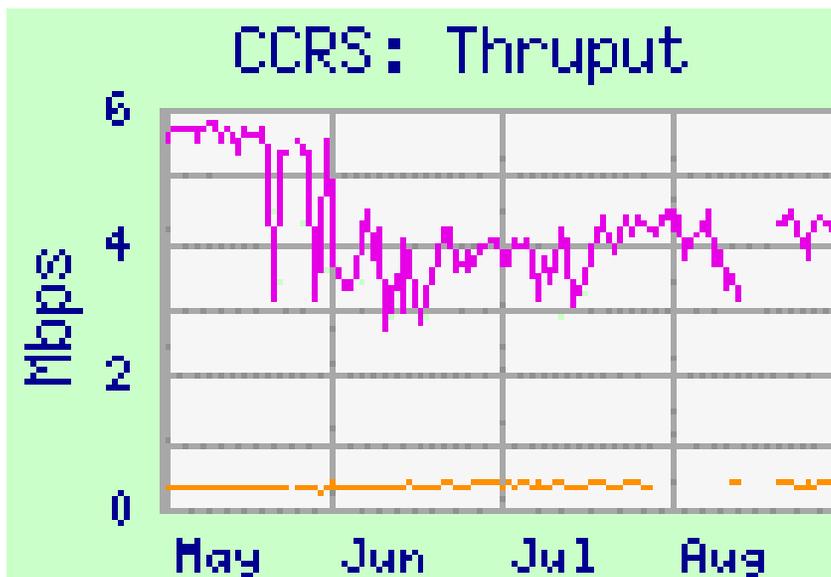


- **INPE (Sao Paolo) : using AMPATH**
 - HSB node: From GSFC-MAX
 - » Route via Abilene --> AMPATH (Mia) --> ANSP
 - » Performance dropped at the end of June
 - Was 3-4 mbps, Now 500-2000 kbps (median 1100)
 - Also from GSFC-NISN via GBLX --> ANSP
 - » Similar performance
 - So congestion appears to be in ANSP





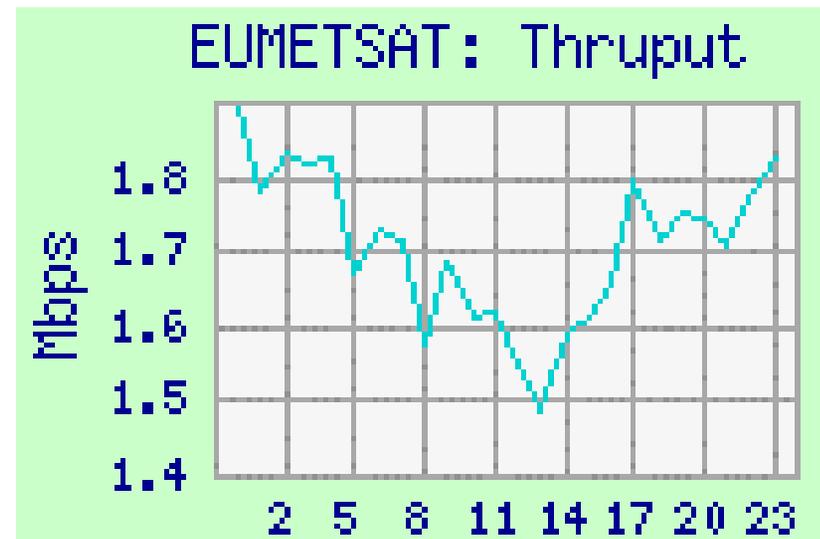
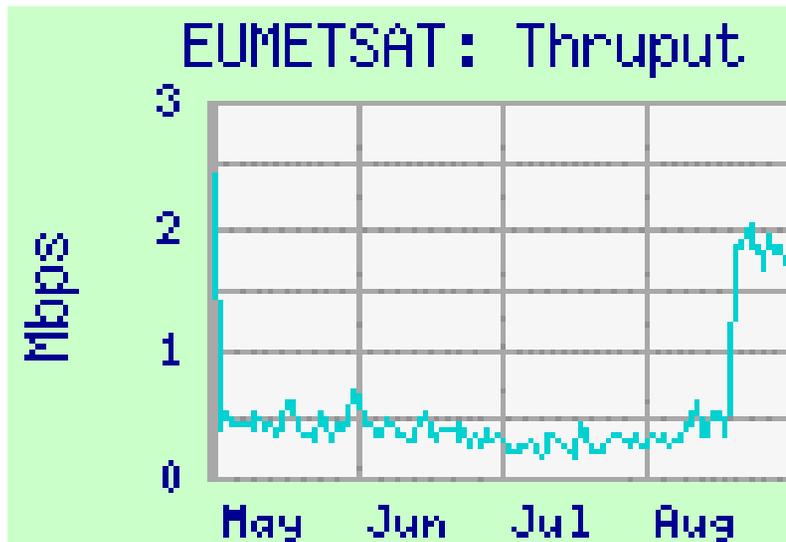
- **CCRS (Ottawa): Stable performance**
 - Route from GSFC was via Abilene, StarTap (Chicago), CA*Net4, Onet until June
 - » Peaks over 6 mbps -- BH Median 5.7 mbps thru May '03
 - June - Aug: switched to AT&T Commodity ISP: 4 mbps median
 - Testing from NASDA: stable at 1 mbps until April 13 '03
 - switched from APAN to Sinet -- now 300 kbps
- **Also testing to Univ. Toronto via Abilene/CA*net4 route**
 - recent median 28 mbps!





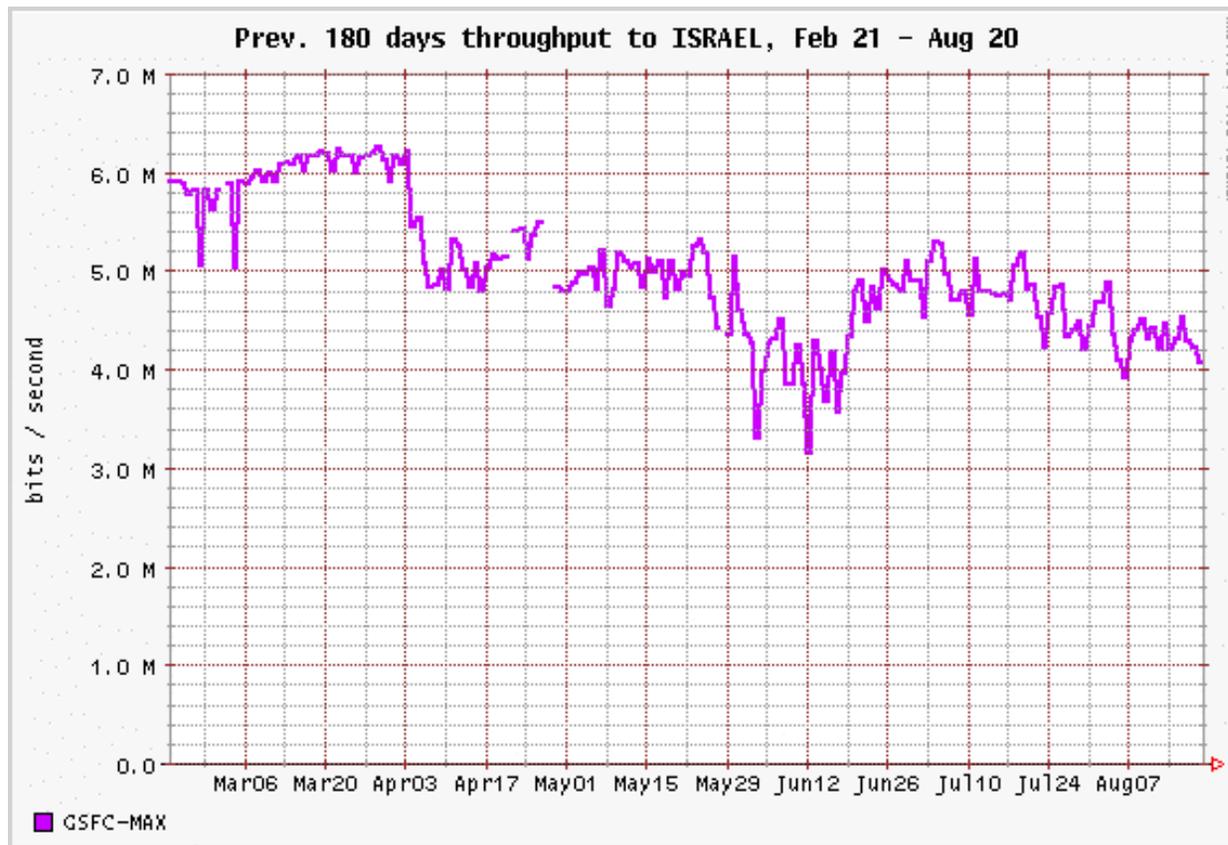
- **Germany:**

- **DLR (Oberpfaffenhofen):** Testing stopped July '99
 - » Route via Geant, DFN
- **Eumetsat (Darmstadt)**
 - » **Route since June '02: MFN/abovenet to Darmstadt**
 - (via NY, Amsterdam, Frankfurt)
 - Multiple performance levels:
 - 2.4 mbps, typical (range = 0.6 to 3.3) until end of Jan '03
 - Then only about 500 kbps until August
 - Back to 2 mbps typical





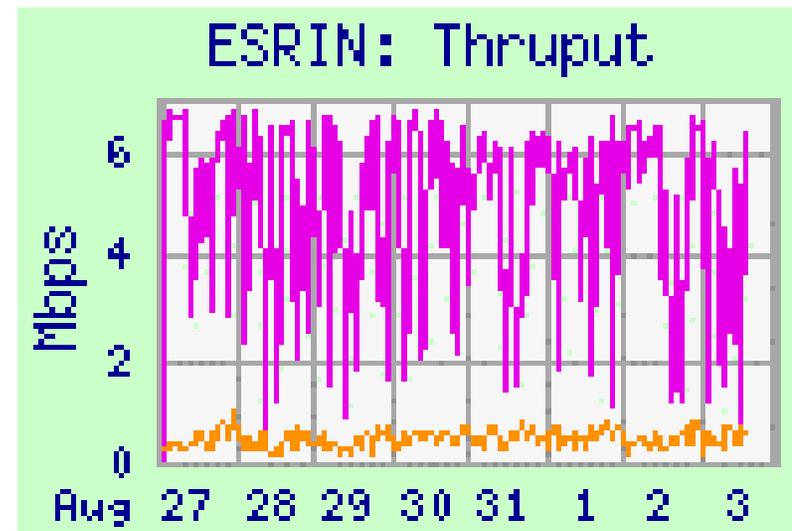
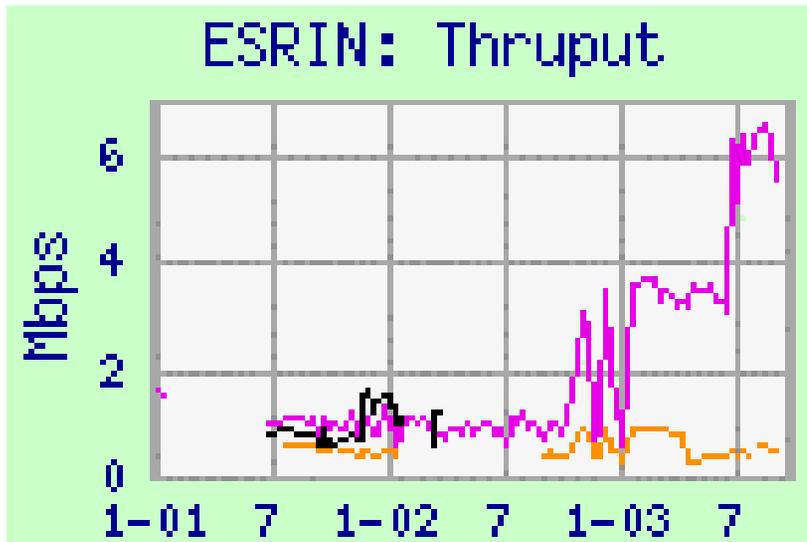
- **Tel Aviv University: Steady Performance**
 - Performance slowly dropping 6 - 4.5 mbps since Jan '03
 - Route via Abilene peering with Geant in NY





- **ESRIN - Frascati: Performance improved**

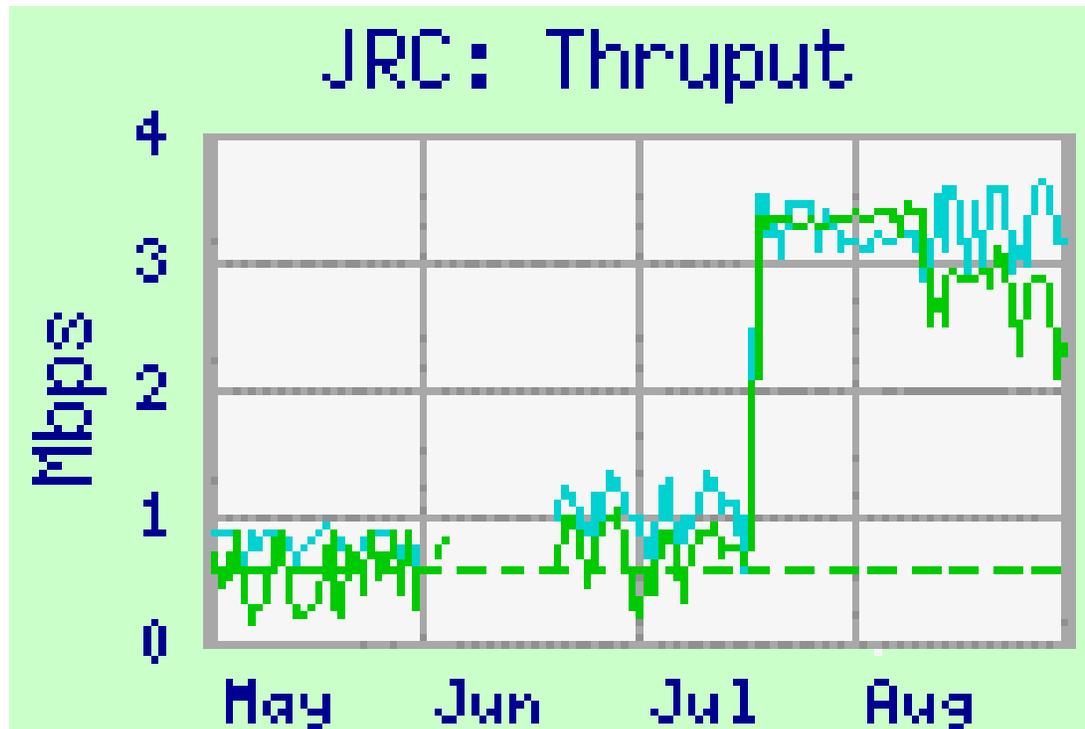
- BHM from GSFC was stable at 3.5 mbps from mid January to mid June:
- Improved to 1-7 mbps in mid June (noisy)
- Route stable: via MAX, Abilene to NY, GEant, GARR
- Testing from NASDA 100-365 kbps via Slnet





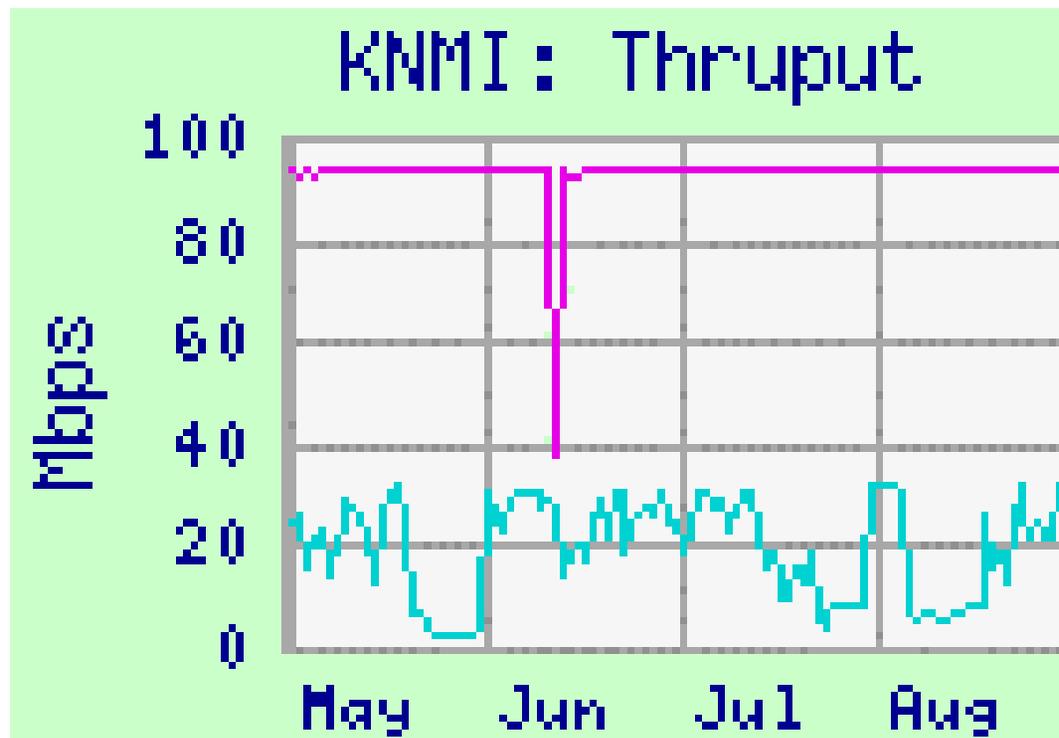
JRC - Ispra: Big Improvement in July '03

- Now: steady, 2-3.5 mbps
- Previously: BH Median about 560 kbps, Typical Range 200-850 kbps
- Route: UUNet from DC all the way to Milan.



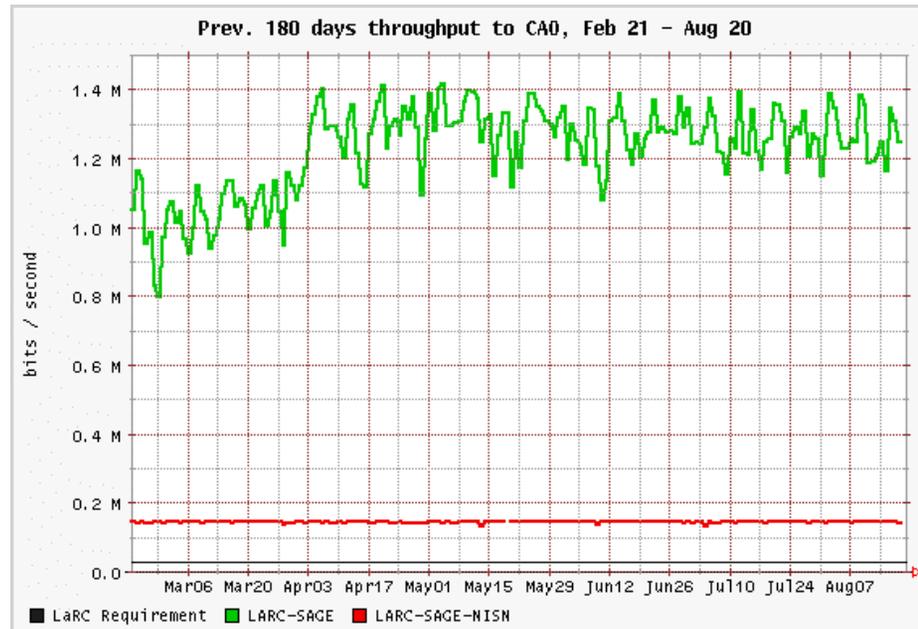


- **KNMI**: spectacular Intercontinental performance
 - Route from GSFC-MAX via Abilene to SurfNet in Chicago
 - Median Performance now 92 mbps!
 - » Using multiple TCP streams





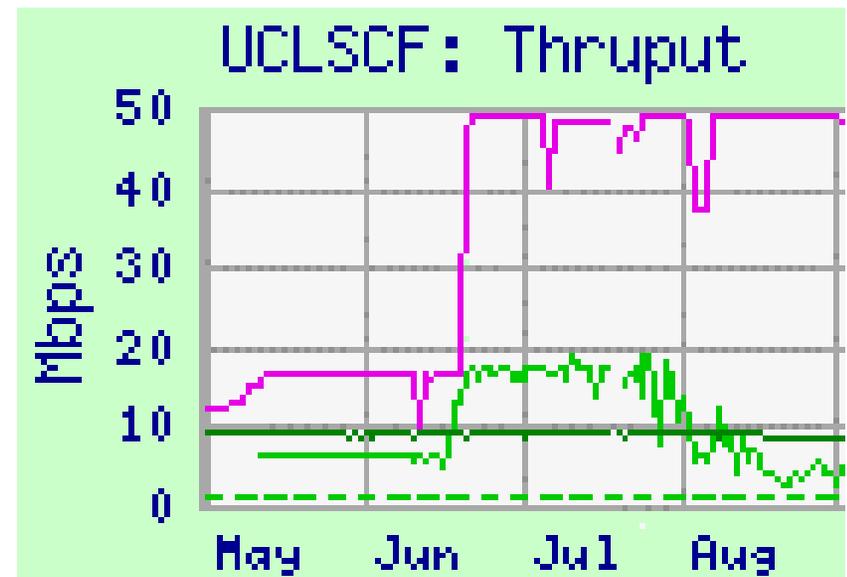
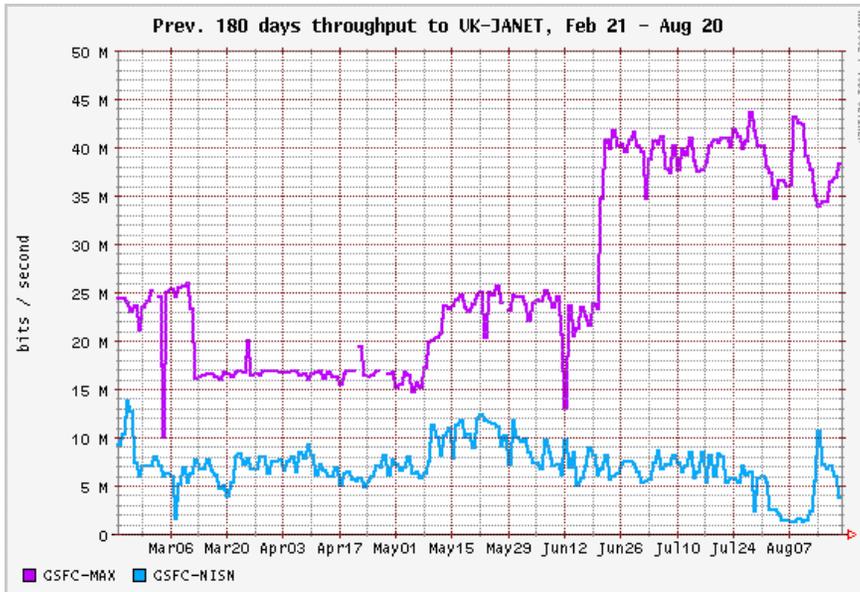
- **IRE-RAS - Moscow: Last Tested Oct - Dec '00**
 - Route was via Internet -- Rostelecom in NY
 - Performance was BHM = 75 kbps, Daily range = 13 - 30 kbps
- **CAO - Moscow: SAGE III Project**
 - Dual Routes since Nov '01
 - NASA dedicated circuit: very steady 140 kbps
 - via NY to C&W to Moscow to MIPT -- 1.3 mbps typ (200-1500 kbps)



Site Updates: UK



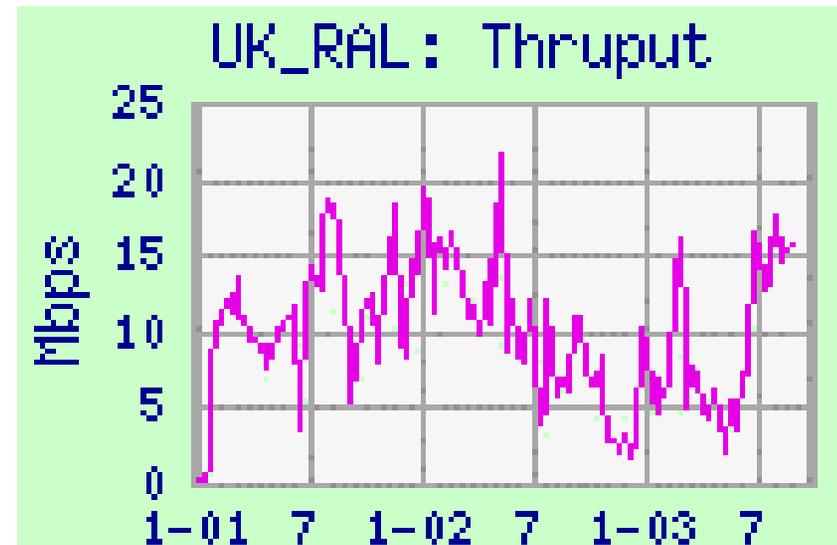
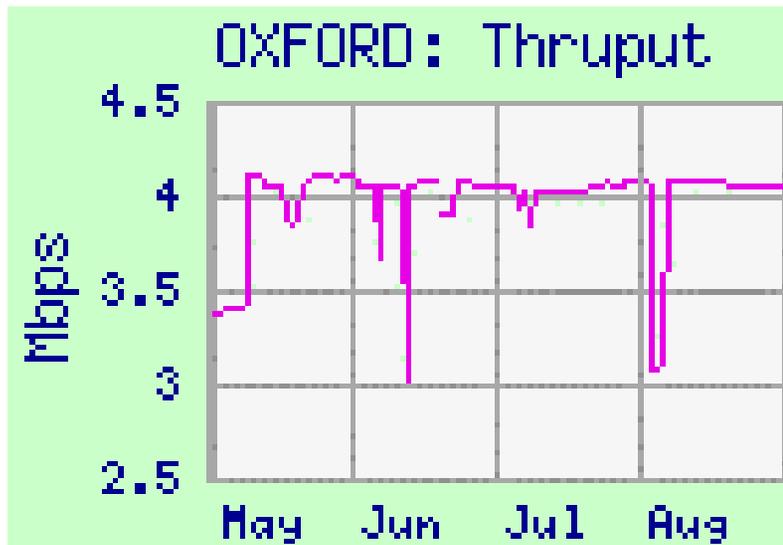
- **From GSFC: via Abilene to GEant in NY**
 - **JAnet core (London): Improved to 40 mbps in June**
 - » stable at various levels (16.5, 25, 28) for different periods
 - » 5 mbps via NISN / Chicago / CA*net4 / GEant
 - **UCL: Currently 50 mbps steady!**
 - » Was 4.5-6 mbps steady (June '02 – May '03)



Site Updates: UK (2)

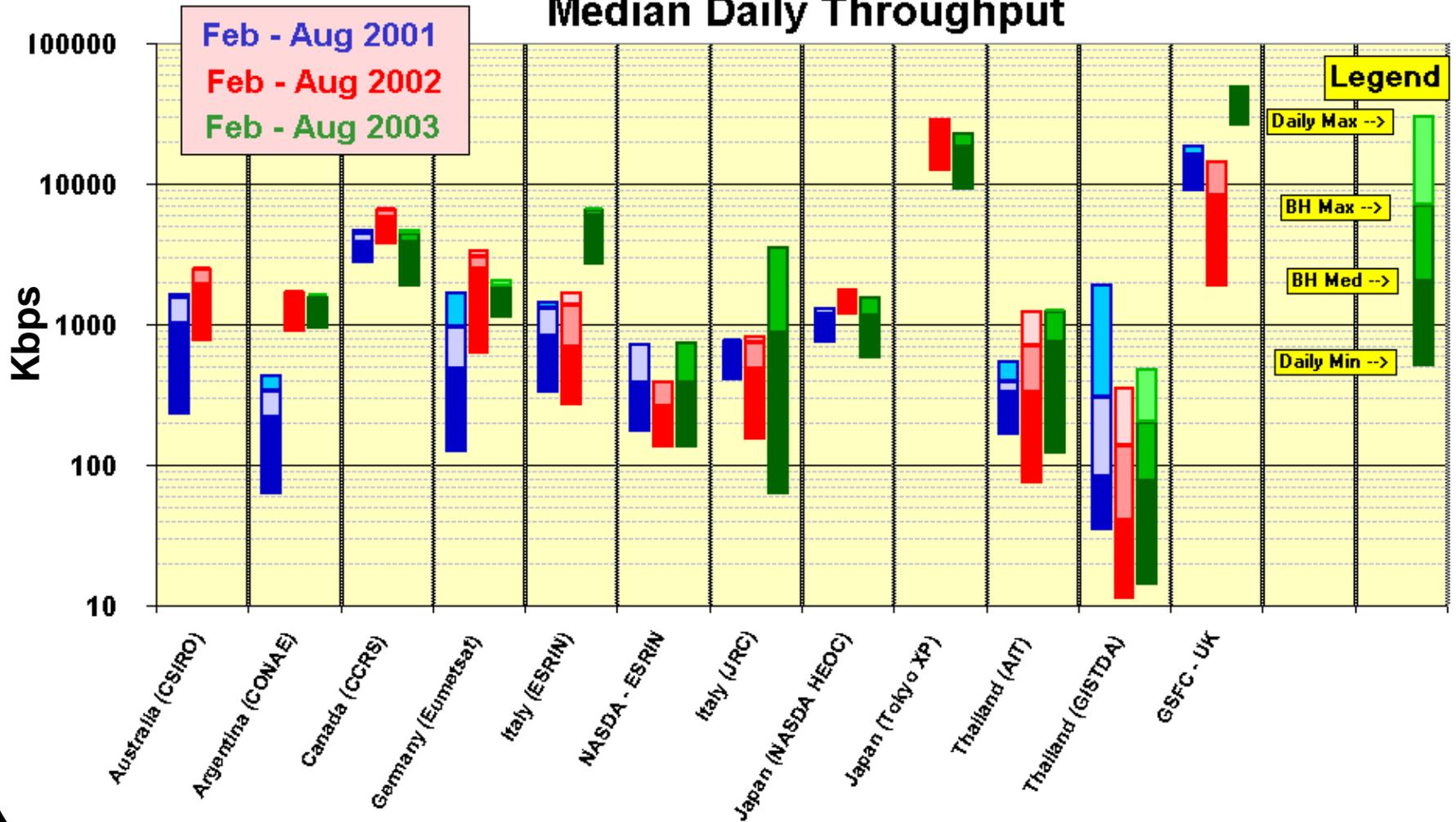


- **Oxford: steady at 4.1 mbps since May 03**
 - Previously variable 4-6 mbps since July '01
- **RAL: Multimode:**
 - 1) BHM = 13 mbps (3-20): Feb, July-Aug '03, May-June '02
 - 2) BHM = 6 mbps (2.5-12): Dec '02-Jan '03, Mar-Apr '03
 - 3) others variations too





Median Daily Throughput





Median Daily Thruput: Grid Sites

