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10 August 2002

TO: Distribution

FROM: Alan R. Whitney

SUBJECT: 9 August 2002 e-VLBI telecon summary

Attendees:
Lee Foster, Bill Fink, Pat Gary, Paul Lang – GSFC
Steve Bernstein, Lorraine Prior, Peter Schultz – Lincoln Laboratory
Tom Lehman – ISI-E
Richard Crowley, Hans Hinteregger, Arthur Niell, Mike Titus, Alan Whitney – Haystack Observatory

This telecon is one of an ongoing series of telecons to prepare for gigabit/sec e-VLBI demonstrations between NASA GSFC and MIT Haystack Observatory using a combination of network facilities including all or part of Glownet, Bossnet, ISI-E, SuperNet, Max and GSFC/HECN.

ACTION ITEMS ARE HIGHLIGHTED IN RED.

Status Reports

The attached figures of the e-VLBI path have been updated to reflect current status and are pretty much self-explanatory; critical status items are indicated in red. In addition, the following comments are relevant:

- Peter reported that Bossnet will be down 1-2 hours on 21 August as LL tries to isolate the problem causing the OC-48 link to work improperly. Peter will notify everyone of exact down times when that is known. The Bossnet problem appears to be somewhere in the path between New York and Newark.
- Tom has received some 10 Gbps equipment (Nortel Passport 8500 with beta software) that he would like to try on Bossnet over the next month or so. He will send equipment to LL. This equipment was purchased by DARPA; Tom does not know cost, but will look into it. Since no one yet has a 10Gbps source, testing will take place using multiple simultaneous GigE streams up to at least 4-5 Gbps.
- Lee reported he has found information on the web about a 10 Gbps host; Lee will distribute reference via e-mail.
- Bill reported that the asymmetric performance results observed by Kevin some weeks ago were due to an MTU mismatch between the ISI-E Juniper M40 (G10), which was set at 4448, and the MAX Juniper M160 (H3), which was set at 4470. Kevin had noted that the

asymmetry disappeared when he set the MTU size down to 4448 and things worked well.

- Bill reported that Abilene is planning to go to 9K MTU size, so we should plan to upgrade to 9K as well if possible.
- Bill reported that, prior to the near-Gbps performance tests that Kevin did on 18 July, he had discovered a high number of retries on link H6 in the direction from UMCP to ISI-E which limited aggregate throughput to ~150 Mbps. Reseating connections on UMCP equipment raised speed to ~700Mbps, but not to ~950Mbps expected. Temporary fix was to re-route UMCP-to-ISI traffic the other (long) way around the MAX ring; a subsequent sustained 2-hr test by Bill showed 931Mbps UMCP-to-LL and 906Mbps in reverse direction (MTU=4448). Kevin's tests on 18 July were carried out with this asymmetric configuration. The reason for the problem in the direct link from UMCP to ISI-E is not clear and needs further investigation; Bill, Tom, Jerry and Dan will pursue this.
- Pat reported nuttcp package has now been ported to Windows. Lee's testing showed 860-880Mbps from 'xly' (K6A) to Pluto (L6).
- Pat suggested that we plan to convene a face-to-face 'team' meeting of e-VLBIL project team, perhaps next spring, in advance in the international e-VLBI meeting to be held in The Netherlands in spring 2003. All agreed this is a good idea, and would be an opportunity for planning and organizing future e-VLBI activities. Alan will pick up the ball on this and begin to get organized; Haystack will be happy to host such a meeting, but some people waxed less than enthusiastic for Boston in January or February; we will keep this in mind!
- Alan reported that Haystack, in collaboration with MIT LL and MIT Lab for Computer Science, has been awarded an NSF grant under the Strategic Technology for Internet (STI) program to develop an IP protocol specifically designed for e-VLBI and similar applications. This project will attempt to make best use of unused ('scavenged') bandwidth in a 'background' mode which does not interfere with higher priority 'foreground' usesr. The project is funded for 3 years and includes demonstrations of high-speed e-VLBI connections both with the U.S. and to Europe and Japan. Alan will distribute the text of the proposal to the group. Pat expressed a strong interest in trying to obtain GSFC support to evolve GSFC capabilities in parallel with the activities under the NSF grant.
- Alan reported that Haystack and Bill Wildes are working to organize e-VLB connections from Kokee Park in Hawaii to Haystack and from Univ. of Regensburg in Germany to Haystack, both probably at OC-3. Excellent cooperation is being received from PMRF (Pacific Missile Range Facility) people on Kauai and from the Germans in working to establish these links. The goal is have demonstrate both of these with the next couple of months. Haystack will contact Steve Corbato (corbato@internet2.edu), director of Abilene, to coordinate the use of peered connection to Abilene at ISI-E.
- Alan will give a short presentation on U.S. e-VLBI activities at the URSI meeting in The Netherlands later this month and a longer presentation in November in Korea. He will prepare some slides to share with everyone.
- Haystack is planning to spruce up the e-VLBI web page at the Haystack web site in the near future. Some recent work has been done on the Mark 5 web page and it is looking a lot better (http://web.haystack.mit.edu/mark5/Mark5.htm).

- Lee suggested everyone should take at look at the 10GigE Alliance web site (http://www.10gea.org/) for up-to-date information on 10GigE stuff.
- Alan reported that Haystack is planning to send two Mark 5 systems down to GGAO by ~16 Aug. The plan is to use two Mark 5 systems in parallel at both the Westford and GGAO antennas to achieve a near-Gbps aggregrate data rate. An additional copper GigE port is available on the switch (L2) at GGAO for the second Mark 5 (first Mark 5 will be also be copper). It appears that an additional SX port is available at Westford (first Mark 5 will also be SX). Lorraine and Kevin will check and Haystack will procure necessary NIC cards. Control of the Mark 5's will be on a different network with minimal traffic; a VLAN might be set up for this purpose.

Performance Testing

Kevin did a 10-hour performance test on 18 July that showed an average of ~960Mbps GGAO-to-Haystack and ~900Mbps Haystack-to-GGAO (see attached Figure). Kevin will document these results in a formal memo.

As reported above, a sustained 2-hr test by Bill (immediately followed Kevin's 18 July test) showed 931Mbps UMCP-to-LL and 906Mbps in reverse direction (MTU=4448).

Tom reported he had done some performance testing between ISI-E and LL and found numbers similar to what Kevin and Bill reported in tests between Haystack and GGAO.

As reported above, Lee's testing showed 860-880Mbps from 'xly' (K6A, a Windows machine) to Pluto (L6).

Next telecon

Next telecon will be Mon, 26 Aug 2002 at 2 pm.

xc: Steve Bernstein, LL
Jim Calvin, LL
Lorraine Prior, LL
Leslie Weiner, LL
Herbert Durbeck, GSFC
Lee Foster, GSFC
Pat Gary, GSFC
Chuck Kodak, GSFC
Kevin Kranacs, GSFC
Paul Lang, GSFC
Aruna Muppalla, GSFC
Bill Wildes, GSFC
Dan Magorian, UMCP
Tom Lehman, ISI
Jerry Sobieski, Max
Richard Crowley, Haystack
Kevin Dudevoir, Haystack
Hans Hinteregger, Haystack
Arthur Niell, Haystack
Joe Salah, Haystack

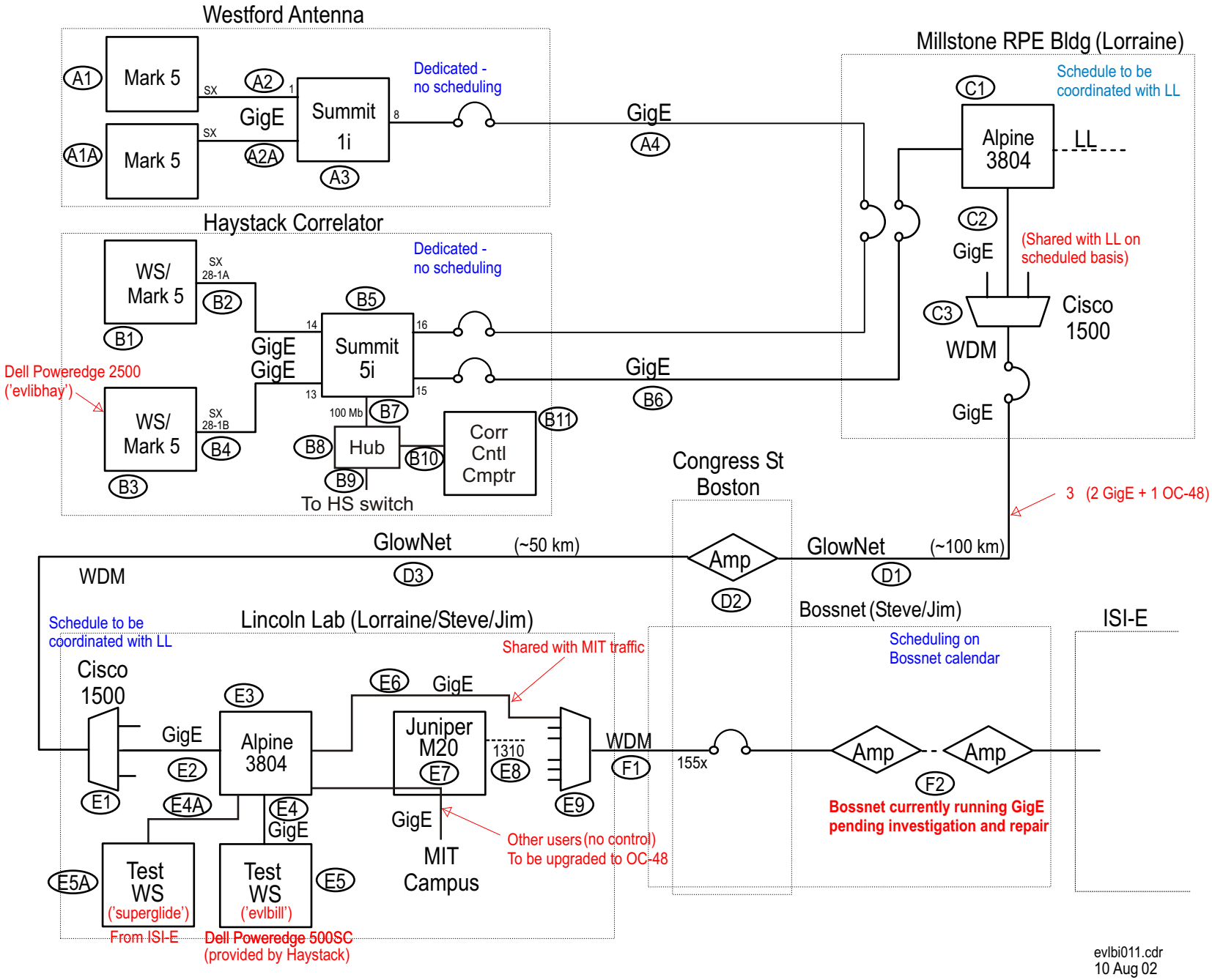


Figure 1: e-VLBI Path - Haystack to ISI-E

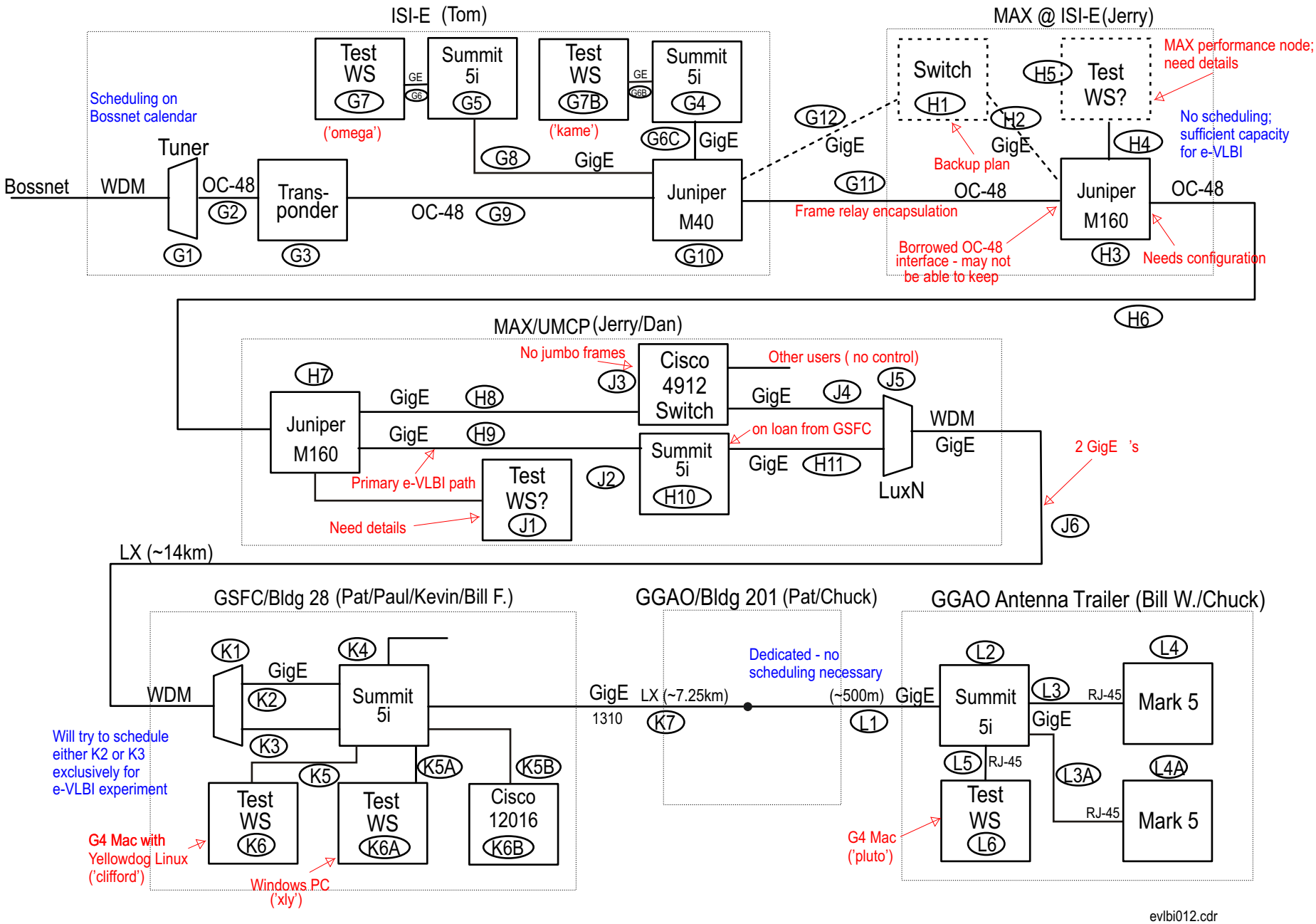
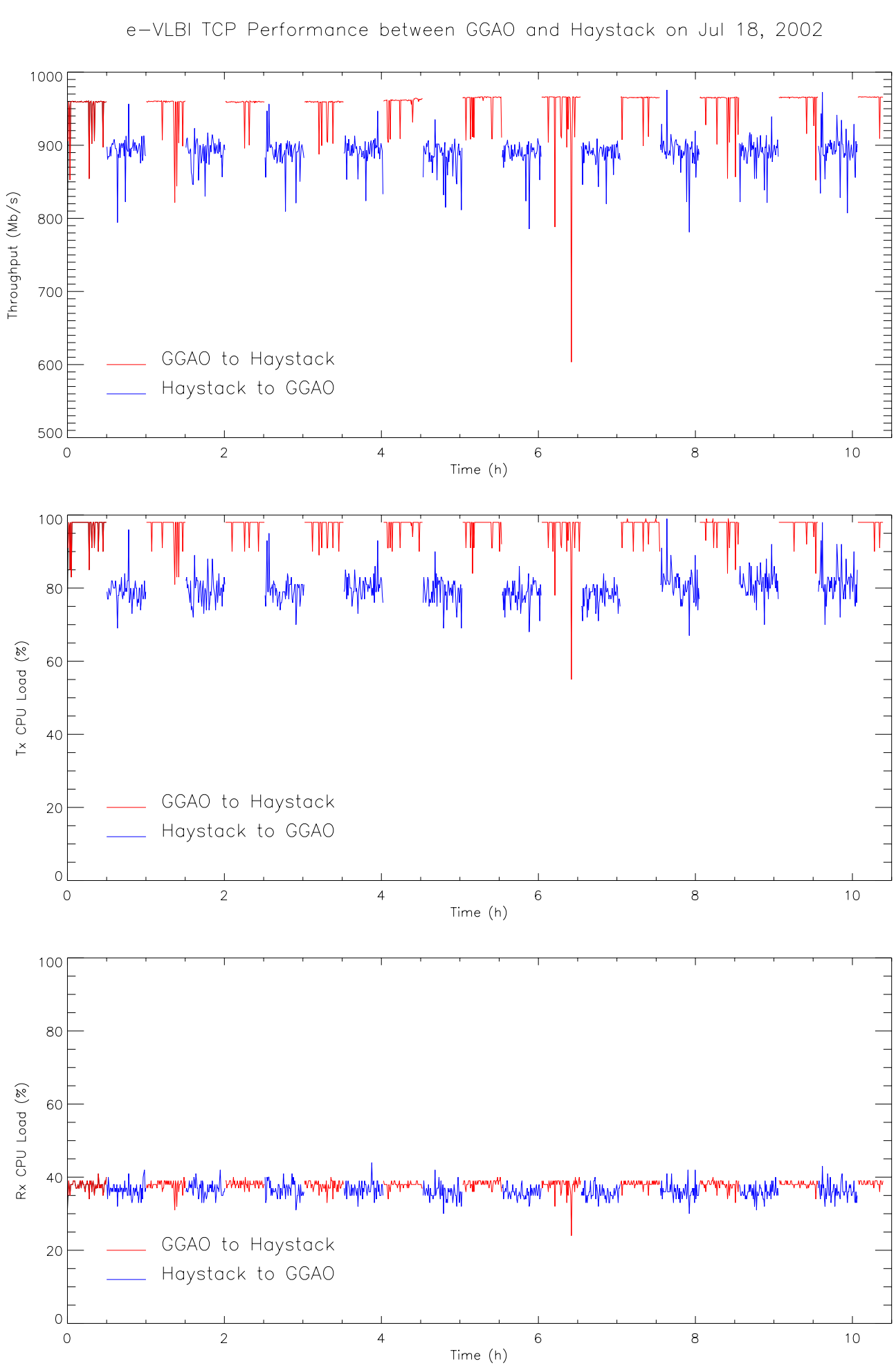


Figure 2: e-VLBI Path - ISI-E to GSFC/GGAO


e−VLBI TCP Performance between GGAO and Haystack on Jul 18, 2002
Throughput (Mb/s)
1000
900
800
700
600
500
GGAO to Haystack
Haystack to GGAO
0
2
4
6
8
10
Time (h)
Tx CPU Load (%)
100
80
60
40
20
0
GGAO to Haystack
Haystack to GGAO
Time (h)
Rx CPU Load (%)
100
80
60
40
20
0
GGAO to Haystack
Haystack to GGAO
Time (h)