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27 October 2003

TO: Distribution
FROM: David Lapsley
SUBJECT: 20 October 2003 e-VLBI telecon summary

Attendees:

Pat Gary, Chuck Kodak – GSFC
Steve Bernstein, Terry Gibbons, Rick Larkin – MIT Lincoln Lab
Kevin Dudevoir, Hans Hinteregger, David Lapsley, Arthur Niell, 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.

Glownet/Bossnet

Alan reported that he and David had attended the Internet2 Fall Members Meeting to give an e-VLBI demonstration. He mentioned that there did appear to be some losses on BOSSnet. David reported that the weekend before last, testing had shown that throughput coming out of Westford was not as good as throughput coming in. David had emailed Tom Lehman regarding this and Tom had mentioned that he had noticed a 20% packet loss from Lincoln Laboratory to ISI-E. Other direction seemed OK. Tom thought it might have had something to do with the hurricane a while back. Tom cc-ed Peter Schulz to see if he could have a look at this as well.

Terry mentioned that he had spoken with Tom about this and they felt since data was being passed, it would be better to wait until this week to isolate the problem (rather than bringing down the link completely in order to diagnose the problem).

Pat reported that he had seen some of the Internet2 traffic activity on their MRTG monitoring system. They observed some of the test transfers last week. Pat said he would send a link to the monitoring page for the port on the Extreme 5i switch at the GGAO site. The measuring interval was quite coarse, 5 minute, 30 minute averages, etc. Pat said that the peak in the graph was at about 3 am on Thursday morning (October 16th). 5 minute average peak was ~ 148.9 Mbps. During the week, there was a 30 minute average with a sustained 128.7 Mbps moved for a 30 minute period. Pat said that he was happy to see the link being used.

Alan was concerned that the link between Haystack and GGAO may not be as good as it was a year ago and that the performance monitoring aspect of the network is more and more valuable and we

need to get this going on a regular basis and keep track of these things.

Alan mentioned to Steve and Rick that there were some packet losses on BOSSnet in the direction from Haystack to Washington that caused a fair amount of slowdown.

David reported that Tom had done some additional testing after we had let him know about that. Tom had seen ~ 20 % packet loss on the link between Lincoln and Washington. The throughput of the link appeared to be fairly steady. The traffic was traversing the gigabit Ethernet wavelength. Tom had said that the packet loss appeared to be on the link from Lincoln Lab to Washington.

Steve said that he would investigate that.

Terry said that he and Tom would spend time on Wednesday looking into this.

Alan reported that Tom Lehman emailed him regarding connection of BOSSnet in the Washington area to the DC network, he has secured funding for the next 3 months of that connection. Tom said that the DRAGON program may be able to help support that connection beyond that.

Terry has already had conversations with Tom regarding this and that his conversations matched with Alan's understanding.

ACTION ITEM: Terry and Tom to investigate cause of packet loss on Glownet/Bossnet.

Internet2 Demonstration

Alan reported on the Internet2 demonstration. A booth was setup with two Mark5 systems with a nice exhibit. The main purpose was to educate people about what e-VLBI is and what sort of activity is being done. The response was pretty good. People came and asked questions about e-VLBI and we explained it to them. David had setup connections to 7 or 8 sites around the world: Europe, Japan, Australia, HI, AO, GGAO and Haystack and we moved data over them and tried to make people aware of what e-VLBI was about. There were some NSF and Internet2 people who stopped by. Hopefully, we are getting the word out regarding e-VLBI. Still getting a lot of enthusiasm from people about using the network for this type of activity. Internet2 people are still very interested. Charles Yun is still interested and really pushing this activity. It was good exposure. We would have liked to have seen some higher data transfer rates, but what it emphasized was that you cannot just plug a terminal into the wall anywhere and expect to get 1 Gigabit per second. We actually had a 10 G trunk coming into the hotel and we had a 1 Gbps connection that was dedicated and one that was shared. Had really good connectivity locally, but connectivity to the rest of the world was not quite as good.

David: TCP throughput varied. Regular TCP ~ 40 Mbps, HSTCP ~ 70-300 Mbps between Japan and Indianapolis. We had planned to try FAST from the Japanese end, but were not able to get it installed in time. Running from Westford, we were able to get 460 Mbps from Westford.

Pat asked David if he had kept statistics or measures to Europe, Hawaii and other sites. David: I have some statistics (UDP throughput, TCP and RTT). UDP throughput, to Australia ~ 80 Mbps. Europe: 600 Mbps, Japan, 900 Mbps, AO ~ 100 Mbps, Haystack ~ 600 Mbps, GGAO ~ 900 Mbps. Noticed that even though there were high UDP numbers for 10 s iperf tests, there was definitely some packet loss, at one stage we noticed that we were getting periodic packet losses, spoke to the guys at Internet2 and the packet loss went away. There was also wide area packet loss, it was obvious from the difference in performance between regular TCP and the high speed variants. A big difference was observed.

Pat asked if we could capture some of these observations in some notes or a separate writeup.

ACTION ITEM: David to distribute a writeup of the Internet2 demonstration

Performance Testing

Alan: David is anxious to start more performance monitoring from Haystack, and now that the demonstration is over will have some time to work on that.

David: we had a lot of interest from all of these sites around the world, so we wanted to build on that and get our performance monitoring system up and running over the next couple of weeks/months so that we can keep track of UDP and TCP throughput between the various sites. I will be looking at this over the next short while.

Pat reported that Bill Fink commented that one of his colleagues that works very closely with the Naval Research Labs (Rob Scott) has continued to evolve nuttcp. The most recent augmentations to that tool allow tests to be done over ipv6 networks. This tool will be deployable on DREN and other networks that NRL folks are interested in. Bill also talked about some other cleanups that have been done. They also have a binary for use on Windows machines. One issue is that Bill has a nice tool that is deployed to a few close friends, any further broad deployment is a challenge. Most of the Internet2 community and others use the widely distributed iperf tool. Nuttcp has a few extra features and only really gets known by word of mouth. Pat mentioned that he would try to find time to work with David and others. But was concerned that we currently don't seem to have a focused systems approach. We have pieces and parts, but trying to get a whole collective effort will take much more work.

Kevin reported that Kokee park lost their system administrator, our main contact there. They are temporarily working with an ITT-based contractor, Roger Hall, who is the main ATM engineer there. Roger acknowledged our throughput problem and said that the high packet loss is due to our Ethernet traffic being squashed by Constant Bit Rate traffic. They also have a lot of other data acquisition and video traffic coming down from sensors on the hill. Roger was not surprised at all that our Ethernet link to Kokee gets squashed and that we suffer high packet loss. He proposed two solutions:

1. They will probably run fiber up the hill from PMRF to Kokee; that is a long term (year plus) \$7 million project but will definitely happen due to a bunch of other high profile customers pushing for it.
2. In the short term: Roger offered us as a target date the end of October, an OC3 radio link from PMRF to Kokee to support a couple of customers who are also having problems. Priority is to paying customers (not us). Suspected we could get 20-30 Mbps. Hope to get hold of him this week. Pat Alvarez is the temporary network manager. We have tried to contact him, but have not heard from him. Hopefully, should have link up in a week or so.

ACTION ITEM: David and Bill to work on Performance monitoring.

ACTION ITEM: Kevin to follow up with PMRF on the new link.

Funding Opportunities

Alan reported that UltraLight was rising from the ashes again. Not quite clear what role e-VLBI would have in the new proposal. The High Energy Physics community is responding to a proposal from the Physics Division of the NSF for Physics Information Frontiers. Still trying to figure out how e-VLBI would be a part of it. They are anxious to have e-VLBI as part of this proposal as they believe it will help to strengthen the proposal by showing that other applications/communities can

make use of the same infrastructure. Physics is not likely to fund VLBI, so we will work with physicists to come up with something that is sensible for e-VLBI to do for the Astronomy side and then go to NSF Astronomy to see if they will support a low level effort as a part of a proposal to the Physics division. Still not sure where this will go. Astronomy needs to position itself to take advantage of the opportunities that may arise from the Cyber-infrastructure mandate to NSF at \$1 billion per year for 5 years.

Pat reported on new technology for e-VLBI. National Lambda Rail. Last week at Goddard they hosted a meeting for people from UC San Diego and SDSC for NSF-funded project: Geo-Sciences Cyber-Infrastructure Network (GEON). A few scientists and some information technology/network people from Goddard. Goddard has been invited to become a participant in this. They showed some of the Geoscience work that Goddard has been involved in: Geodetic, Geomagnetism, VLBI, etc. They were very interested in the Crustal Dynamics Data Information System which is a repository for data. GEON project has 13 science Co-Is with various pieces of data. They realize that they can't do "big-science" if they stay in their own "cubby holes". Want to be able to integrate all of their data. One challenge is how to correlate different types of data. May lead to more needs in IT area, as well as more networking connectivity. Goddard still trying to explore connections to new networks that may get them connected to SDSC. One of the people attending was one of the end sites for NLR on the west coast who is also working on the Opti-puter (Dr Larry Smarr): distributed computing coast to coast. Pat is looking to explore some of these opportunities, which could lead to more money and allow them to move along technology curve at some pace. Bill Wildes was not there, but Herb Frye and Ben Chao were present. Herb and Ben are two branch heads associated with geosciences were there, Dr. Steve Cohen has also been listening/participating in telecons on GEON. Still trying to find their way. e-VLBI mentioned as one of the geo-Science projects.

Alan: CDDIS is the name of the database that stores all of the geodetic VLBI results. Herb Frye and Ben Chao have been associated with that for a long time. Alan mentioned that there may be some opportunities there.

Next telecon

Next telecon is scheduled for Monday, 17 November 2003 at 2 pm EDT

cc:	Steve Bernstein, LL	Aruna Muppalla, GSFC
	Jim Calvin, LL	Mary Shugrue, GSFC/ADNET
	Rick Larkin, LL	Bill Wildes, GSFC
	Lorraine Prior, LL	Dan Magorian, UMCP
	Peter Schulz, LL	Tom Lehman, ISI-E
	Leslie Weiner, LL	Jerry Sobieski, MAX
	Herbert Durbeck, GSFC	Guy Almes, Internet2
	Bill Fink, GSFC	Charles Yun, Internet2
	Lee Foster, GSFC	Richard Crowley, Haystack
	Pat Gary, GSFC	Kevin Dudevoir, Haystack
	Andy Germain, GSFC	Hans Hinteregger, Haystack
	Chuck Kodak, GSFC	David Lapsley, Haystack
	Kevin Kranacs, GSFC	Arthur Niell, Haystack
	Paul Lang, GSFC	Joe Salah, Haystack