

**Report on the Special Interest Groups (working groups)
Convened at CANS 2011, Kunming, Yunnan, China, 8 August 2011**

Report on the end-to-end performance SIG

Michael Sinatra, ESnet

The end-to-end performance SIG met at 9:00 AM. Attendance was very good.

Of the three co-chairs, Jilong Wang did not attend and Steve Cotter was still in transit. I chaired the meeting along with Hiana Tang.

Presentations were given on Campus Network Designs and their impact on end-to-end performance (Sinatra), Network Monitoring and Management as a Service (Tang), CERNET Performance and Monitoring Tools (Xing), and a brief overview of the Science DMZ (Sinatra).

- I. Key issues that need to be addressed collaboratively
 - a. Need more perfSONAR deployment, but there was also concern among the Chinese group (particularly in CERNET) that perfSONAR was too complicated to be easily implemented. There was a desire for a lighter-weight version of perfSONAR.
 - b. Need for application-level performance monitoring and active testing. It was recognized that not all applications use the network in the same way. perfSONAR does a good job of identifying network-layer issues, but some issues develop as a result of application bottlenecks, such as static buffers. At the same time, perfSONAR *can* effectively eliminate the network layer as a cause of end-to-end performance issues. Nevertheless, it is important to include endpoints' network and application stacks in the end-to-end performance milieu. To this end, CERNET has developed a utility to test DVTS performance (DVPing). An avenue for collaboration would be to identify other applications where application-layer tests are needed and can be fruitful.
 - c. Possible need for passive performance measurement. A desire was expressed for systems that monitor network links, identify applications using the link, and determine application performance on the network.
 - d. Within the US delegation, there was a desire for better end-to-end visibility for outsourced data center applications (e.g. email, calendaring, student systems, data storage, etc.). While we have paid attention to end-to-end issues in R&E, very little attention has been paid to end-to-end issues that affect outsourced (e.g. "cloud") service performance and reliability. However, this is not an issue for the Chinese, as they are not outsourcing these services. I bring it up because I see it as an issue in both the ESnet and I2 communities.

- e. Mechanisms for diverting flows to “large-flow” paths. ESnet is in the process of working on mechanisms to automatically monitor and divert large data “elephant” flows from the standard routed network to ESnet’s Science Data Network using OSCARS and possibly OpenFlow. Xing Li discussed a potential technique called “address switching” which would achieve a similar function. Although it’s not critical that we all adopt one interoperable system, it might be useful to share experience and develop best practices as these efforts progress.
- II. Identify projects
- a. Continue to make perfSONAR easier to “load and go” and possibly provide a lighter-weight version that can provide a basic set of ongoing tests with minimal intervention.
 - b. Identify (i.e. create a list) of applications that need performance monitoring and testing done at the application level, and develop tools to make this happen (a la DVPing).
 - c. Develop elephant-flow migration mechanisms so that large flows can be migrated to networks designed for such flows.
- III. Specific milestones: Many of these projects are either a bit abstract or are sufficiently nascent that it is difficult to develop very *specific* milestones. Here is an attempt to present somewhat more general milestones.
- a. perfSONAR: It isn’t clear whether a clear set of milestones can be developed here. I think we need to figure out the point where perfSONAR will be sufficiently easy, yet useful enough, that it will achieve sufficient uptake to provide a “critical mass” interdomain test network.
 - b. Application performance monitoring milestones:
 - i. Identify applications that need better instrumentation (i.e. those that are being used and where end-to-end performance is critical). E.g. DVTS.
 - ii. Identify methods of passive monitoring of performance.
 - iii. Develop tools for active monitoring of performance. E.g. DVPing.
 - c. “Elephant-flow” identification and migration
 - i. Develop mechanisms to identify flows that would benefit from migration to dedicated large-flow networks.
 - ii. Develop mechanisms to transfer such flows, without loss of connectivity or performance, as the flow is in progress. These mechanisms should be integrated with existing bandwidth-reservation and flow-manipulation tools (e.g. OSCARS and OpenFlow).
 - iii. Determine scalability of such systems. See if they will scale over the larger network backbones.
- IV. Leadership: I think some of these projects are sufficiently abstract and nascent, and given my lack of experience in CANS, I am reluctant to identify specific shepherds for these projects at this time.

IPv6 issues revolve around two complementary areas.

The first area centers on IPv6 deployment and what research networks in China and the US can do to facilitate deployment.

The second area is on measurement of IPv6 networks so we can

- 1) identify deployment barriers,
- 2) develop shared metrics to characterize IPv6 deployment,
- 3) provide valuable assessments of IPv6 deployment progress

We identified four projects:

1. Establish video telepresence over IPv6 between US and China universities.

Leaders: Ma, kc, Dan,

Objectives: this projects serves as both a collaboration tool to facilitate improved discussion and joint work between the sites and also serves a driving application to promote IPv6 deployment at the US side and make use of IPv6 connectivity; so we have traffic to measure in later projects.

Next steps:

- 1) possible video telepresence and talk APAN August 24th
- 2) Video conference link in place - planning discussion in next 2 months to determine challenges and hopefully a deployment schedule

2. Evaluate allocation strategy guidelines (the 2nd 64 bits)

Leaders: Wei, kc, Dan

Objectives: there was discussion of how to best allocate and assign address space within the university/organizations

Next Steps:

- 1) team to evaluate current recommendations and determine whether this is a problem of finding the right existing document or beginning to develop a new document.

3. Develop a set of important metrics

Leaders: kc, Dan, Wei, Ma

Objectives: the talks revealed we are collecting very similar data on routing, DNS, and some data plane. A benefit here is we are looking at similar data so there may be common ground on defining important metrics. Yet at the same time, we get different numbers using different methodologies. For example, routing table control plane data seems to show 3K ASNs using IPv6 while data plane results see approximately 700.

- 1) provide input into FCC guidelines on IPv6 deployment - input needed in next few weeks

2) investigate the ability to generate IPv6 Netflow stats on Internet2 - next step is investigating whether Internet 2 infrastructure can be upgraded to support this at feasible cost.

4. Deploy shared IPv6 Monitoring

Leaders: Wei, Dan, kc, Ma

Objectives: we want shared data collection infrastructure in place this year

1) An assessment of .cn authoritative server reachability. Next steps: Wei to provide server IP address information. Dan to evaluate reachability using BGP data and kc will do this using ARK. - initial results in 3 months

2) shared DNS data collection. all sides have been collecting similar DNS data on query types, resolver behaviors. US side would like to better understand resolver behavior, Chinese side would like to develop better resolver performance profiles. the tasks are complimentary.

3) deployment of BGPmon data collectors and ARK data collectors in China - Next steps: investigate where to deploy. ARK could be at the edge, BGPmon prefers to peer with a router that gets full tables. Ideally, ARK is downstream of a BGPmon. within 3 months identify deployment locations and monitors in place within 6 months.

OpenFlow SIG

1. Key issues

- 1.1 IPv6 extensions to OF
- 1.2 Enabling/enhancing QoS in and between slices on an OF switch
- 1.3 Extending the NDDI substrate to China
- 1.4 Collaboration

2. Specific projects - same as key issues

3. Specific tasks

- 3.1 IPv6 extensions to OF
 - 3.1.1 Technical - TBD
 - 3.1.2 Standardization path - engage Stanford and ONF
- 3.2 Tasks TBD
- 3.3 Extending NDDI substrate to CN
 - 3.3.1 Initiate engineering study
 - 3.3.2 Engage CERNET
- 3.4 Collaboration
 - 3.4.1 Establish mailing list
 - 3.4.2 Agree on collaboration tools

4. Personnel

1. Continue federation topic at CANS 2012. Target Fall 2011.
Decide if federation will be a topic next year. We recommend that Co-chairs be established soon on both sides to coordinate over the next year on preparing for CANS 2012.
2. Sharing experience on Grouper, Identity Management, Wireless and Video Conferencing. Target late-fall or early winter.
 - A. Hold Grouper teleconference in fall to discuss new Grouper features and determine if there is benefit in holding a workshop on grouper prior to CANS 2012. Target date late-Fall.
 - B. Hold Identity Management teleconference call to discuss options for Identity Management. Late-fall.
 - C. Work with Professors Ling and Chen and their colleagues in China to have them describe their work in identity management, federated video conferencing and federated wireless.
4. Business planning.
 - A. InCommon will share business plans - August, 2011.
 - B. InCommon and will set up teleconference on certificate service business model. Target late-fall.
 - C. Invite Chinese co-chairs to come to the 2012 Spring Internet2 member meeting to give talks on their work and continue planning for the Federated topics in CANS 2012.

IRNC Grant –Bill Chang from the National Science Foundation announced the approval of an IRNC proposal for a 10GB R/E link from Los Angeles to Beijing. The formal announcement of the approval will be made soon, and the link should be delivered by November 1st.

CIO Meetings and Side Trips -