TransPAC3- Asia US High Performance International Networking
(Award #0962968) Quarterly Report
1-March-2014 through 31-May-2014

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(Prepared by Alice Jackson, Jennifer Schopf,)

Summary

During the quarter of March 1, 2014 through May 31, 2014, the TransPacific Asia-US High Performance International Networking project (TransPAC) continued its collaborative and engineering activities to support international science. This report outlines collaborations, software and systems work, operational activities, and usage statistics for the project. Highlights include senior network engineer, Brent Sweeny awarded the 2014 Internet2 President's Leadership Award; PI, Jennifer Schopf investigating opportunities to collaborate with University of Hawaii and with Woods Hole Oceanographic Institute; and no unscheduled outages for the TransPAC circuit.

1. TransPAC Overview

The TransPAC project supports three circuits and a set of network services between the US West coast and Asia. In the current set up, these circuits are:

- The TransPAC Circuit: a10Gbps link between Los Angeles, California, and Tokyo, Japan. This is the primary, NSF-funded circuit for the project and used for the bulk of the production project network bandwidth.
- The JGN-X Circuit: a 10Gbps layer-2 circuit, largely used for experiments and Software Defined Networking (SDN) trials. The Japan Gigabit Network Extension (JGN-X) project is a testbed funded by the Japanese National Institute of Information and Communications Technology (NICT) (http://www.nict.go.jp/en). This link is not supported by NSF funds. A backup routed peering connection between TransPAC and APAN also runs across this link.
- The CERNET circuit: a 10Gbps link between Los Angeles, California, and Beijing, China, which is only partially funded by NSF. This is a layer3-only connection at this time.

These circuits are used in production to support a wide variety of science applications and demonstrations of advanced networking technologies. In addition, the TransPAC award supports tool development, SDN experimental work, measurement deployments, and security activities.

Please note that some of the activities (outreach to Africa, PerfSONAR training, etc.) are also included in the ACE quarterly report project, as appropriate, as joint funding supports these efforts.

2. Staffing

Prior to this quarter, project staff consisted of:

- Jennifer Schopf, Director
- Brent Sweeny, primary TransPAC senior network engineer
- Scott Chevalier, primary contact for GlobalNOC support desk
- Alice Jackson, administration
- George McLaughlin, Asia-Pacific network consultant
- Dale Smith, consultant

Brent Sweeny retired from Indiana University at the end of this quarter. The position was posted and interviews are being conducted.

George McLaughlin's contract was going to be competed July, 2014, but he has requested an earlier completetion date due to health issues. His last charge for services will be in May.

3. Collaborations, Travel, and Training

TransPAC staff participated in various meetings to support their role in collaborations in Asia including crossover meetings with ACE.

Schopf, Sweeny, and Smith participated in the Internet2 Global Summit meeting held in Denver, Colorado (April 6 – 10). Sweeny was presented with the 2014 Internet2 President's Leadership Award. Sweeny and Schopf attended the Jet meeting that was held concurrent to the Global Summit meeting. Schopf ran a panel session entitled "Real Use of 100G Networks: The Good, the Bad, and What to Expect When You Go Beyond a Demo." Various side meetings took place to discuss to support TransPAC. In addition, there was a focused meeting on setting up an international end-to-end testing and support service with ESnet and Internet2, with ongoing conversations to follow.

Schopf met with Jason Leigh at University Hawai'i Manoa (April 24-25), to discuss opportunities related to visualizing monitoring data related to international network measurements. While there, she also discussed collaboration opportunities with David Lassner and Gwen Jacobs. In addition, Alan Winery spent an hour getting her up to speed on his work with using inexpensive nodes for perfSonar data collection, which may be a part of TransPAC going forward.

Schopf presented at the CC:NIE PI workshop held April 30 – May 1 on the Role of Campus Infrastructure in International Science Projects.

May 23 – May 24, Schopf visited her previous collaborators at the Woods Hole Oceanographic Institution to investigate the possibility of collaborating over the use of TransPAC and ACE links for better data transfers for large scale oceanographic and climate data sets. Part of this discussion also included gauging their interested for an upcoming Internet2/ESnet Cross Connect meeting on International Climate Science, to take place in June, which members of TransPAC are helping to plan. The work with WHOI is ongoing.

Sweeny and Schopf attended the TERENA Networking Conference (TNC2014) in Dublin, Ireland (May 17-22). While this meeting primarily focuses on European networks, many of our Asia-Pacific partners attended and substantial meetings were had with members of the Japanese, Singapore, Chinese, and Taiwanese networks, in addition to DANTE, TEIN, and APAN members. Sweeny presented his work in BGP Path Hinting. Additional conversations with ESnet on the possible shared use of TransPAC going forward also took place.

4. Software and Systems Work

A. Tool Development

Tool development continued this quarter with expected patches and upgrades to existing tools. No new tools were developed.

B. Dynamic Circuits

The TransPAC project provides Dynamic Layer 2 Network services through the OSCARS software suite. This service peers with the Internet2 ION project and the JGN-X Dynamic network facilities. Researchers and scientists can interactively create a layer2 dynamic circuit between Asia and the US to transfer data.

C. Software Defined Networking (SDN) Activities

One of the primary research goals of the TransPAC project is to enable Software Defined Networking (SDN) using Open Flow to provide a mechanism to dynamically configure and control circuit behavior between the US and Asia. Support for JGN-X's RISE and Open Flow experiments continue in this quarter.

D. Measurement Activities

The TransPAC project supports a perfSONAR deployment in Los Angeles that provides periodic testing between several US and Asian sites. A testing matrix is available at http://tp3-3.transpac3.iu.edu/maddash-webui/ . The status of this matrix was discussed at the TERENA meeting, with possible follow-on indicated.

5. Operational Activities

A. Network Engineering

The TransPAC circuit between Los Angeles, California, and Tokyo, Japan, continues to function as designed with no unscheduled outages. It supports IPv4, IPv6, and dynamic-circuit functions, and is prototyping OpenFlow 1.0 capabilities.

The JGN-X circuit between Los Angeles, California, and Tokyo, Japan, operates in layer 2 between switches in Tokyo and Los Angeles, and is primarily used for experimental network research, particularly DCN, OpenFlow, GLIF, Optical testbeds, and OpenGOLEs.

The CERNET circuit between Los Angeles, California, and Beijing, China, saw increasing usage, with peaks reaching 5 Gb/sec.

Within the Global NOC, a new Customer Service project was generated to assist with post-mortem analysis and allow for better tracking of staff communications of complex troubleshooting events. This project is aimed at continuous improvement of service processes. The Service Desk also performed a Disaster Recovery exercise to showcase the versatility of

the support mechanisms in place. During this exercise the IU Global NOC Service Desk and Engineering relocated services without disruption.

B. Traffic Graphs

Figure 1 and Figure 2 show the traffic on the TransPAC network during the period of March 1 , 2014 – May 31 2014, and Figures 3 and 4 shows data for the CERNET connection for the same period. Monitoring data is not available for the JGN-X circuit.

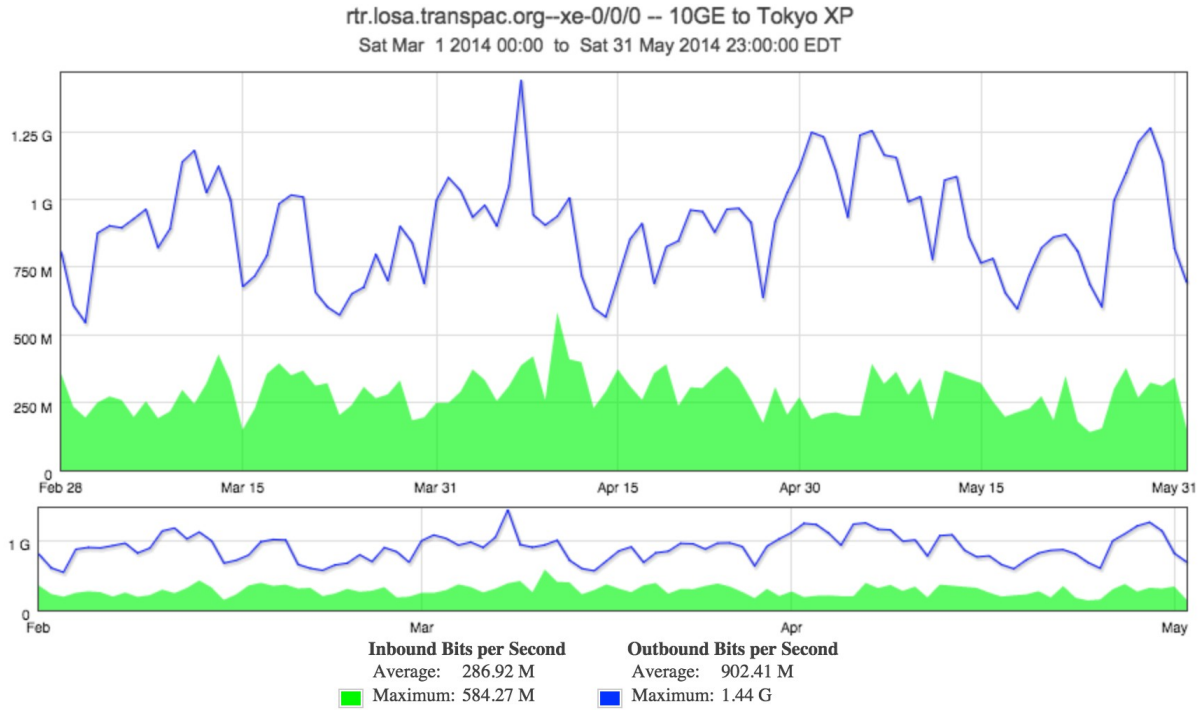

Figure 1: Aggregate traffic using smoothed daily averages on the 10Gbps TransPAC (NSF-funded) circuit between Los Angeles and Tokyo.

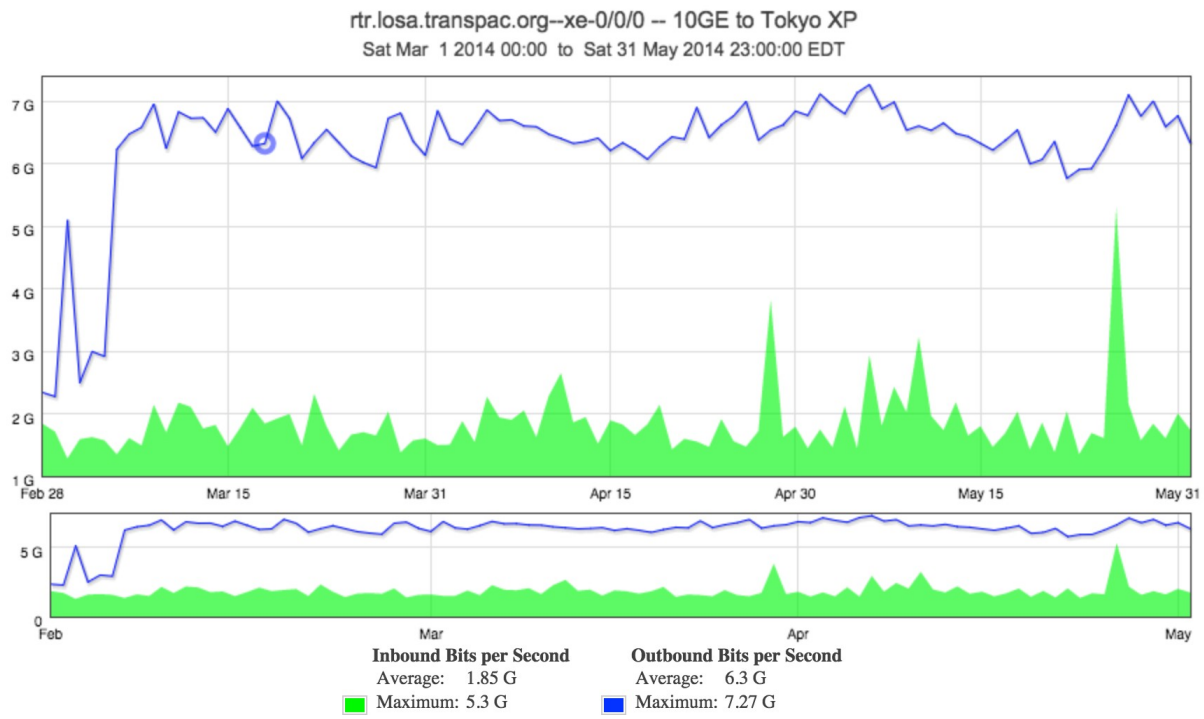

Figure 2: Aggregate traffic using maximum daily values on the 10Gbps TransPAC (NSF-funded) circuit between Los Angeles and Tokyo.

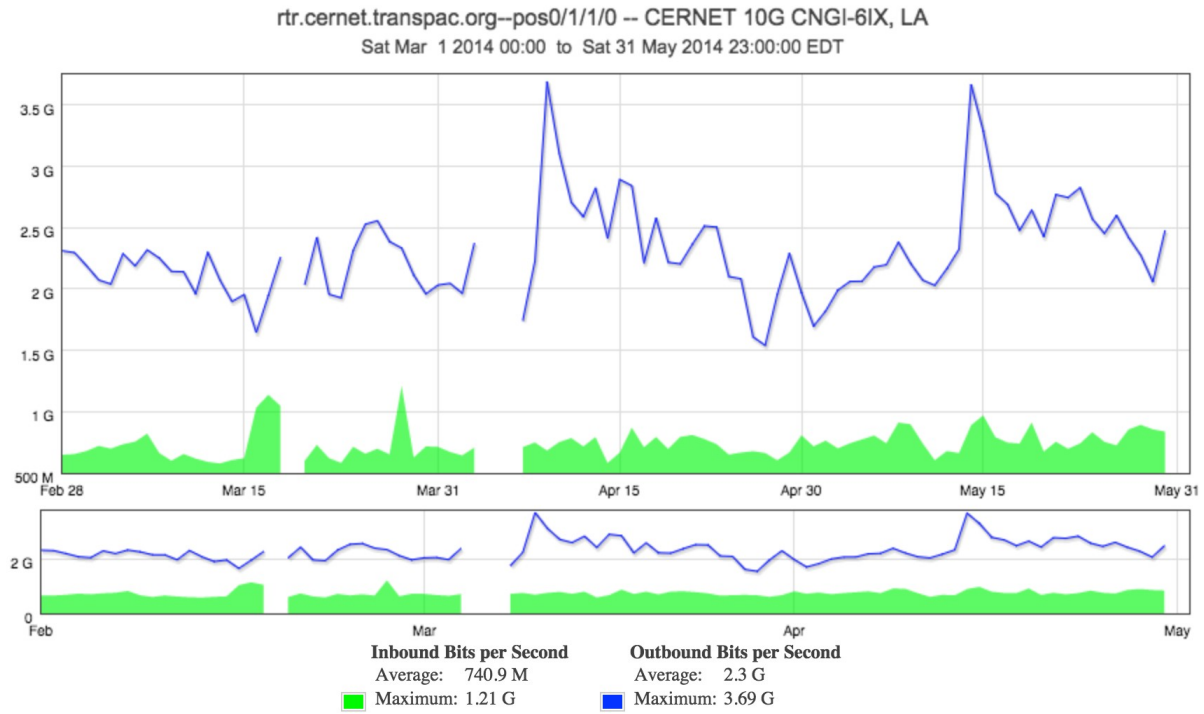

Figure 3: Aggregate traffic using average daily value on the 10G CERNET circuit between Beijing and Los Angeles.

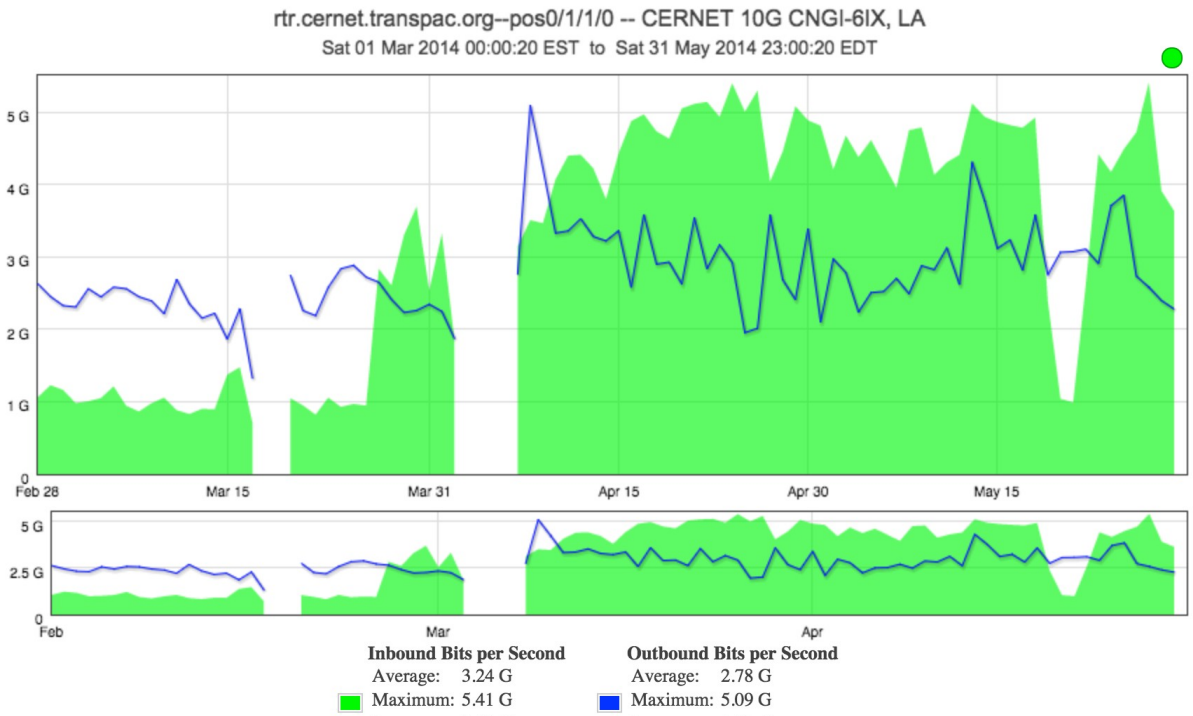

Figure 4: Aggregate traffic using maximum daily values on the 10G CERNET circuit between Beijing and Los Angeles.

Please note that the gaps appearing in the CERET graphs (Figures 3 and 4) are periods where the polling server is unable to contact the switch to gather data. No reason for this outage was given by our CERNET colleagues.

C. Trouble Tickets

During this quarter, there was one ticket for a scheduled maintenance, detailed in Table 1. Additional trouble ticket information is available at https://tick.globalnoc.iu.edu/fp_tools/public_ticket_viewer/index.cgi .

Ticket Number	Customer Impact	Network Impact	Title	Maintenance Type	Source Of Impact	Start Time (UTC)	End Time (UTC)
1438	4-Normal	3-Elevated	Maintenance 1 of 2 Completed - TransPAC Backbone TOKY-TransPAC LOSA	Circuit	Vendor	03/06/2014 11:39 AM	03/06/2014 12:50 PM

Table 1: Scheduled maintenance tickets for the TransPAC circuits.

D. Downtime

Table 2 shows the reported downtime and availability for the circuits in the TransPAC project.

TransPAC Core Nodes	Down Time	Reporting Period Availability	52 Week Availability
TransPAC MX480 - LA	0 hr 0 min	100.00%	99.99%
Brocade MLXe4	0 hr 0 min	100.00%	100.00%
3410 Ethernet Switch	0 hr 0 min	100.00%	100.00%
OOB Router	0 hr 0 min	100.00%	100.00%
Aggregate TransPAC Core Nodes	0 hr 0 min	100.00%	100.00%

TransPAC Backbone Circuits	Down Time	Reporting Period Availability	52 Week Availability
TransPAC LOSA-JGN2 LOSA 10GigE	0 hr 0 min	100.00%	100.00%
TransPAC LOSA-Pacific Wave LOSA 10GigE	0 hr 0 min	100.00%	100.00%
TransPAC TOKY-TransPAC2 LOSA	1 hr 11 min	99.95%	99.80%
Aggregate All TransPAC Backbone Circuits	1 hr 11 min	99.98%	99.93%

Table 2. Downtime and availability for TransPAC core nodes and circuits.

6. Security Events and Activities

Basic security measures are being maintained, and there were no security incidences to report for this quarter.

7. Reporting against Objectives Jan 2014 – March 2014

1. Overall – new director to review activities and adjust as needed
    a. Contacted possible additional collaborators for continuing project (Section 3)
2. Collaboration and Demonstrations
    a. Meeting with APAN colleagues at Internet2 Global Summit in April (Section 3)
3. Systems and Software Work
    a. Continue to define monitoring framework (Section 4.D)
    b. Continue support of JGN-X RISE Experiments (Section 4.C)
4. Operational Activities
    a. Continue full support of TransPAC circuit (Section 5)
5.

a. Continue to shift production system support to production GlobalNOC teams

8. Plans for June-2014-August-2014

1. Overall – new director to review activities and adjust as needed
2. Collaboration and Demonstrations
    a. Attend APAN 38 in Nantou,Taiwan to meet with APAN colleagues
    b. Support additional work in Lower Mekong region workshop
    c. Continue to seek additional collaborators for project going forward
3. Systems and Software Work
    a. Continue to define monitoring framework
    b. Work with ESnet to help bring tool information to end users at International Climate Science Cross Connect (scheduled for June)
    c. Identify and if possible implement flow-analysis tools
4. Operational Activities
    a. Continue full support of TransPAC circuit