

**TransPAC3- Asia US High Performance  
International Networking  
(Award #0962968)  
Quarterly Report Year 5, Q 2  
1-June-2014 through 31-August-2014**

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(Prepared by Jennifer Schopf, Alice Jackson)

## ***Summary***

During the quarter of June 1, 2014 through August 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 presentations at several meetings, continued support of the 3 circuits, and additional outreach.

## **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**: a 10Gbps 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
- Scott Chevalier, primary contact for GlobalNOC support desk
- Alice Warner, administration
- Dale Smith, consultant

Interviews were conducted for a replacement for Brent Sweeny, who retired from Indiana University at the end of May. Joe Lappa, formerly of PSC, was hired to be the new TransPAC Senior Engineer and began on July 28, 2015.

## 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 gave the opening keynote at the 2014 Environmental Data Summit (<http://environmentaldatasummit2014.deltacouncil.ca.gov/>), held in Sacramento on June 4-6, which is part of the California Delta Science project. At this meeting, she made contacts with water researchers interested in data sharing with Europe and Asia, as well as with researchers interested in the upcoming Lower Mekong Valley water resource workshop. Following this workshop, she met with members of the ESnet team to discuss ongoing monitoring and measurement efforts strongly related to what is trying to be rolled out on the TransPAC links.

Schopf helped co-organize the Focused Technical Workshop on Global climate science, held in Boulder July 13-16 (<http://meetings.internet2.edu/2014-cc-climate/>), jointly with ESnet, NOAA, and Internet2. Several talks were highly relevant to the data transfers that TransPAC is starting to see from these communities. Following this, she continued ongoing collaborations with members of the Woods Hole Oceanographic institute who are beginning to look at data sharing with several Asian collaborators.

Schopf and Lappa traveled to Nantou, Taiwan for APAN 38, held August 9-15. They met with JGN-X personal to discuss network planning and reporting requirements, among others. Meetings were held with representatives from Japan, China, Taiwan, Singapore, Malaysia, Indonesia, Vietnam, and other countries. Schopf chaired 2 sessions, one for the Future Internet Testbed Working Group and a second for the Network Engineering Workshop. Steve Wallace, IU, remotely presented on several networking-related open source tools. Schopf gave an overview of TransPAC plans.

Schopf continued on to Hanoi, Vietnam, for the Lower Mekong Water Resource workshop (<http://internationalnetworking.iu.edu/archives/LMI/index.html>), where Lee, Smith, and other members of the NSRC team joined her. This weeklong meeting brought together networking people with water resource researchers from the US and Asia and was highly relevant to TransPAC.

## 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/>, however it was noted that much of this data is not being collected due to incompatible versioning. This was discussed at the APAN meeting, and also with ESnet collaborators. The possibility of collecting flow data was also discussed.

## ***5. Operational Activities***

During this quarter, there were no significant operational changes made at the GlobalNOC Service Desk. The TransPAC operated without interruption, circuits did not experience any unscheduled outages and no maintenance was scheduled.

### ***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 steady usage at around 2 Gb/sec.

A Systems Support staff member (Sanderson) spent a day at the Los Angeles Point of Presence verifying the hardware and software set up, and documenting the resources.

## B. Traffic Graphs

Figure 1 and Figure 2 show the traffic on the TransPAC network during the period of June 1, 2014 – August 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.

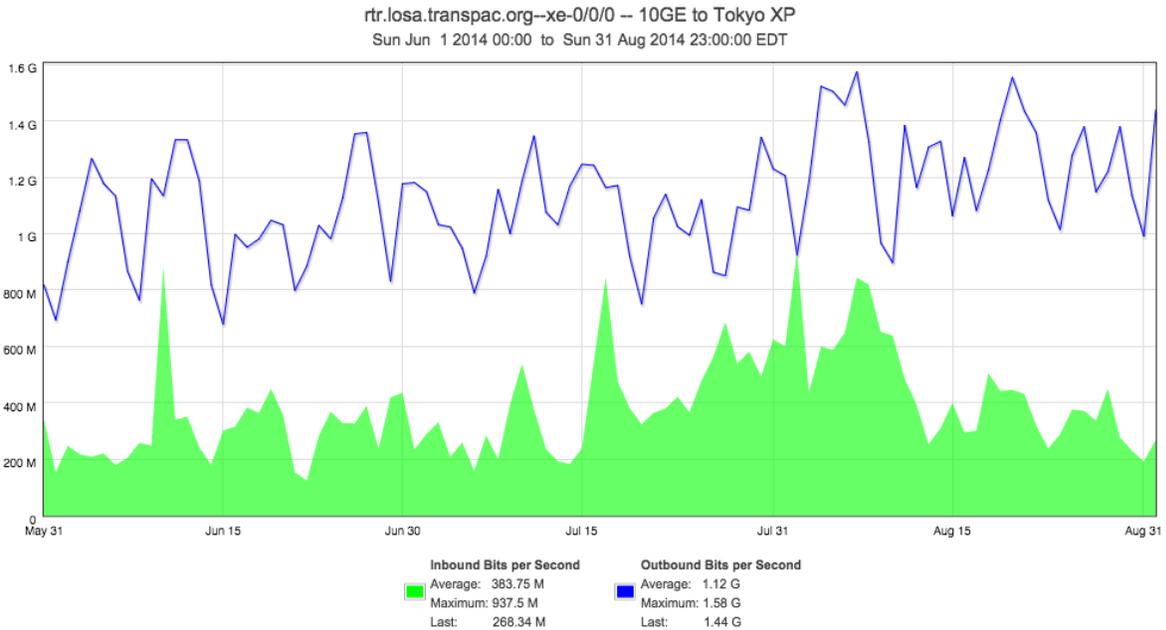


Figure 1: Aggregate traffic using average daily values on the 10Gbps TransPAC (NSF-funded) circuit between Los Angeles and Tokyo

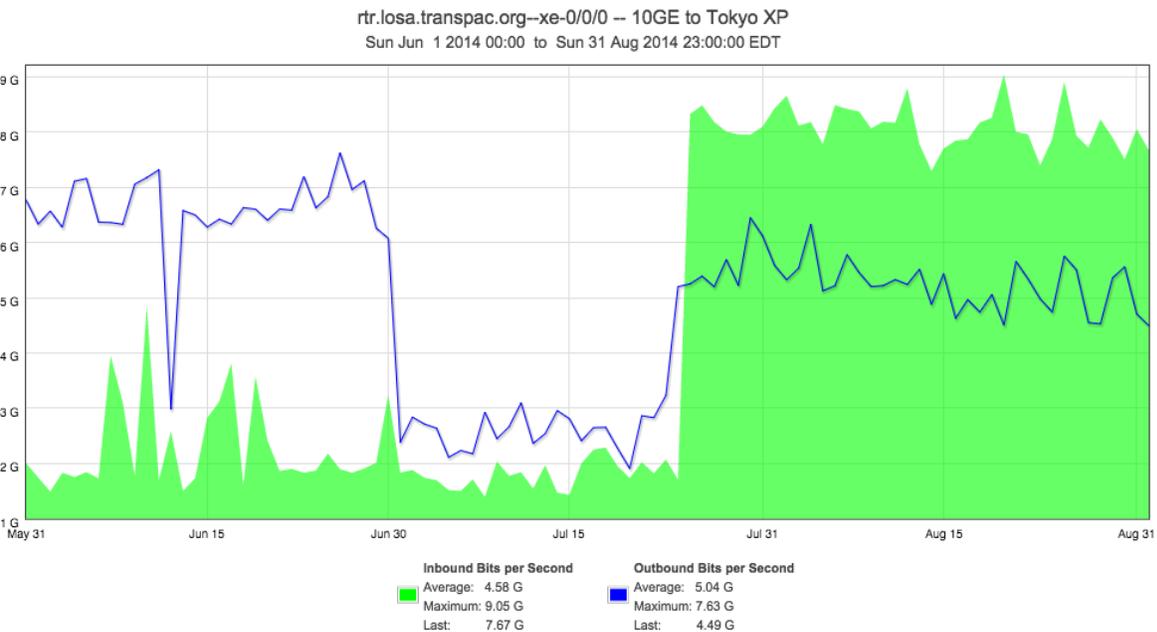


Figure 2: Aggregate traffic using maximum daily values on the 10Gbps TransPAC (NSF-funded) circuit between Los Angeles and Tokyo

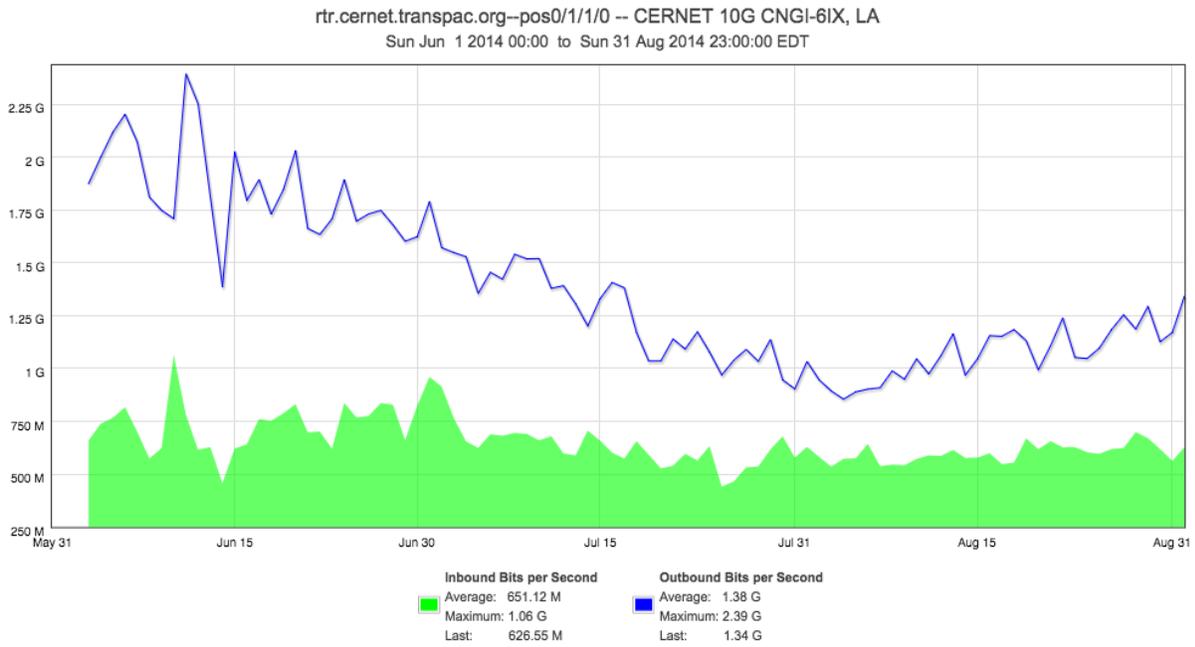


Figure 3: Aggregate traffic using average daily values on the 10G CERNET circuit between Beijing and Los Angeles

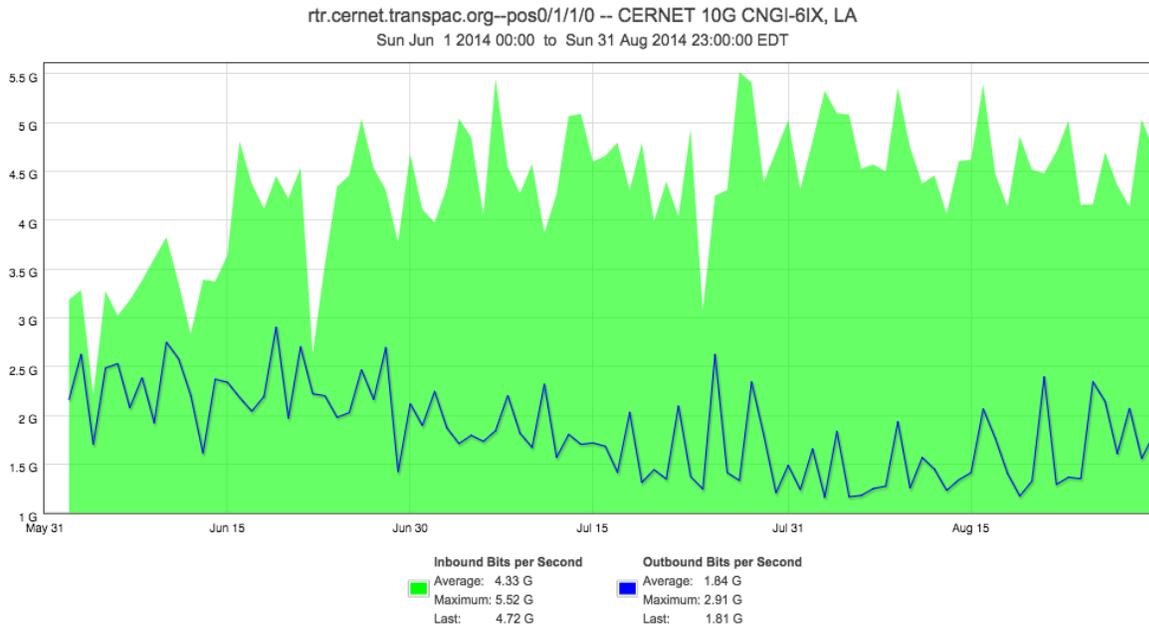


Figure 4: Aggregate traffic using maximum daily values on the 10G CERNET circuit between Beijing and Los Angeles

## C. Trouble Tickets

During this quarter, there were no trouble tickets for TransPAC this quarter.

## D. Downtime

During this quarter, there were no reported downtimes. Table 1 shows the downtime information for both core nodes and 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%
<b>Aggregate TransPAC Core Nodes</b>	0 hr 0 min	100.00%	100.00%

Table 1. Reported downtime for TransPAC core nodes and circuits.

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	0 hr 0 min	100.00%	99.80%
<b>Aggregate All TransPAC Backbone Circuits</b>	0 hr 0 min	100.00%	99.93%

Table 2. Reported downtime for TransPAC core nodes and circuits.

## 6. Security Events and Activities

Basic security measures were maintained over the course of the quarter, and there were no security incidences to report.

## 7. Reporting against Objectives March, 2014 – May, 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
- 4) Climate Science Cross Connect (scheduled for June)
  - a) Identify and if possible implement flow-analysis tools
- 5) Operational Activities
  - a) Continue full support of TransPAC circuit

## **8. Plans for September, 2014 – November, 30 2014**

1. Overall – new director to review activities and adjust as needed
2. Collaboration and Demonstrations
  - a. Attend CANS
  - b. Attend GLIF
  - c. Attend PRAGMA
  - d. Attend GENI meeting
  - e. Attend TechExchange
  - f. Attend SC 2015
  - g. Continue to seek additional collaborators for project going forward
3. Systems and Software Work
  - a. Continue to define monitoring framework
  - b. Identify and if possible implement flow-analysis tools
  - c. Support SDN experiments for CANS, GLIF, GENI, and SC
4. Operational Activities
  - a. Continue full support of TransPAC circuit