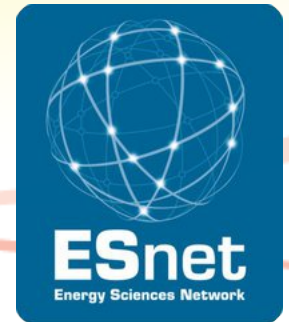




PSC

PITTSBURGH SUPERCOMPUTING CENTER

INTERNET
2



July 22nd 2013, XSEDE Network Performance Tutorial

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Software Configuration

Outline

- **Installation**
- Configuration
 - Administrative Information
 - NTP
 - Services
 - Regular Testing
- Measurement Results Tour
 - Home Page
 - Throughput Tools
 - Latency Tools

Configuration Based on Use Case

- The best source of information is here:
 - <http://code.google.com/p/perfsonar-ps/wiki/pSPerformanceToolkit33>
- There are two use cases for configuration:
 - Diagnostic
 - Burn CD, insert, boot, Done!
 - You can't configure regular testing, but you can test to this/log on and test with it
 - Permanent
 - Couple of steps to install the Linux Distro

Configuration - Permanent

- Booting:



Configuration - Permanent

- Installation through console:



Configuration - Permanent

- Installation through console:

```
Welcome to CentOS
```

Package Installation

Name : glibc-2.5-49.el5_5.6-i686
Size : 12660k
Summary: The GNU libc libraries.

Status:

0%

	Packages	Bytes	Time
Total :	510	834M	0:09:31
Completed:	21	112M	0:01:16
Remaining:	489	722M	0:08:14

13%

```
<Space>,<+>,<-> selection | <F2> Group Details | <F12> next screen
```

Configuration - Permanent

- Logging on (first time):

```
CentOS release 5.5 (Final)
Kernel 2.6.18-194.3.1.el5.web100 on an i686

localhost login: root
Password:
You are required to change your password immediately (root enforced)
Changing password for root
(current) UNIX password:
New UNIX password: _
```

Configuration - Permanent

- Console Configuration Menu:

```
[root@localhost ~]# sudo /opt/perfsonar_ps/toolkit/scripts/nptoolkit-configure.py

Internet2 Network Performance Toolkit customization script
Options in MAGENTA have yet to be configured
Options in GREEN have already been configured

1. Configure drive to hold data/customizations
2. Set built-in account passwords
3. Configure Networking
4. Manage Users
0. exit

Make a selection: _
```


Configuration - Permanent

- Main Screen:

The screenshot displays the pS-Performance Node main screen, which is a web-based interface for managing network performance tools. The interface is organized into several sections:

- Host Information:** A table with fields for Organization Name, Host Location, Administrator Name, and Administrator Email.
- Communities This Host Participates In:** A table showing the community pS-NPToolkit-3.2.1.
- Host Status:** A table with fields for Primary Address, MTU, NTP Status, and Globally registered, with corresponding status values.
- Services Offered:** A table listing various services and their status (Running or Not Running).

Service	Status
Bandwidth Test Controller (BWCTL)	Not Running
Lookup Service	Not Running
Network Diagnostic Tester (NDT)	Running
Network Path and Application Diagnosis (NPAD)	Running
One-Way Ping Service (OWAMP)	Running
perfSONAR-BUOY Regular Testing (Throughput)	Not Running
perfSONAR-BUOY Measurement Archive	Not Running
perfSONAR-BUOY Regular Testing (One-Way Latency)	Not Running
PingER Measurement Archive and Regular Tester	Not Running
SNMP Measurement Archive	Not Running
Traceroute Measurement Archive	Running
Traceroute Regular Testing	Running
- Software Versions:** A table listing the versions of various software components.

Software	Version
pS-Performance Toolkit	3.2.1-rc3
perfSONAR-PS Lookup Service	3.2.1
perfSONAR-PS PingER MA/MP	3.2.1
perfSONAR-PS perfSONAR-BUOY	3.2.1
perfSONAR-PS SNMP MA	3.2.1
perfSONAR-PS Traceroute MA/MP	3.2.1
BWCTL	1.3
OWAMP	3.2rc2
NDT	3.6.4
NPAD	1.5.6
Traceroute	1.7e

The interface also includes a sidebar with navigation links for User Tools, Service Graphs, Toolkit Administration, and Performance Toolkit.



Outline

- Installation
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Administrative Info

- Do this first, otherwise a lot of other stuff won't work.
- Authentication is required
- Always remember to save when you are done.

Administrative Info



Safari can't verify the identity of the website "192.168.69.138".

The certificate for this website was signed by an unknown certifying authority. You might be connecting to a website that is pretending to be "192.168.69.138", which could put your confidential information at risk. Would you like to connect to the website anyway?



Show Certificate

Cancel

Continue



To view this page, you must log in to this area on lab236.internet2.edu:443:

Password Required

Your login information will be sent securely.

Name:

root

Password:

.....

☐ Remember this password in my keychain

Cancel

Log In



INTERNET

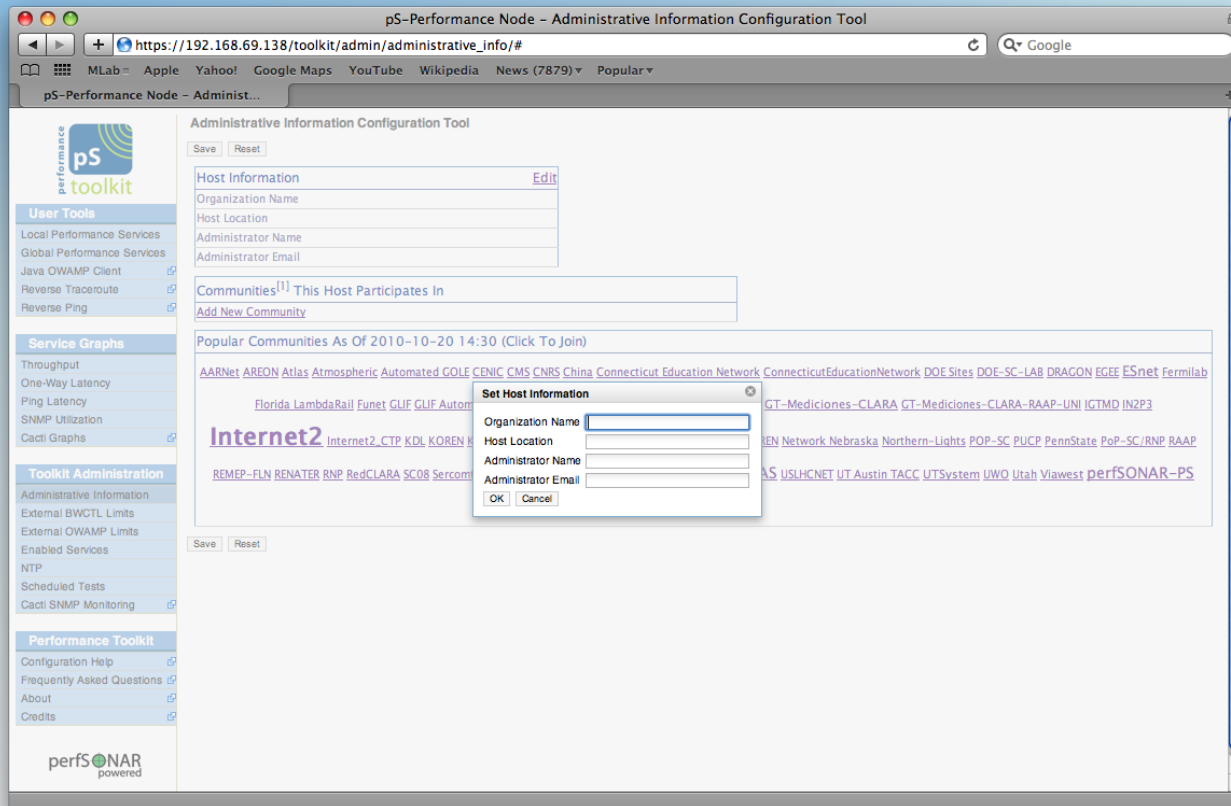
Administrative Info

- Blank Information, click on 'edit':

The screenshot shows a web browser window titled "pS-Performance Node - Administrative Information Configuration Tool". The address bar shows the URL "https://192.168.69.138/toolkit/admin/administrative_info/". The page has a sidebar on the left with the "ps toolkit" logo and several menu sections: "User Tools" (Local Performance Services, Global Performance Services, Java OWAMP Client, Reverse Traceroute, Reverse Ping), "Service Graphs" (Throughput, One-Way Latency, Ping Latency, SNMP Utilization, Cacti Graphs), "Toolkit Administration" (Administrative Information, External BWCTL Limits, External OWAMP Limits, Enabled Services, NTP, Scheduled Tests, Cacti SNMP Monitoring), and "Performance Toolkit" (Configuration Help, Frequently Asked Questions, About, Credits). The main content area is titled "Administrative Information Configuration Tool" and contains a "Host Information" form with fields for Organization Name, Host Location, Administrator Name, and Administrator Email. Below this is a "Communities" section with a list of popular communities as of 2010-10-20 14:30, including AARNet, AREON, Atlas, Atmospheric, Automated, GOLF, CENIC, CMS, CNRS, China, Connecticut Education Network, Connecticut Education Network, DOE Sites, DOE-SC-LAB, DRAGON, EGEE, ESnet, Fermilab, Florida LambdaRail, Funet, GLIF, GLIF Automated, GOLF Project, GT-MEDICIONES - CLARA-RAAP-UNI, GT-Mediciones-CLARA, GT-Mediciones-CLARA-RAAP-UNI, IGTM, IN2P3, Internet2, Internet2_CTP, KDI, KOREN, KREONET, LHC, LHCOPN, LLNL-GDO, Los Nettos, MAX, NCREN, Network Nebraska, Northern-Lights, POP-SC, PUCP, PennState, PoP-SC/RNP, RAAP, REMEP-FLN, RENATER, RNP, RedCLARA, SC08, Sercomtel, Server, StarLight, ThaiREN, UARK, UCR, UFSC, USATLAS, USLHCNET, UT Austin, TACC, UTSysnet, UWQ, Utah, Viawest, perfSONAR-PS, and roedunet. The page also includes "Save" and "Reset" buttons.

Administrative Info

- Dialog Box, press “ok” and “save” when done:



Outline

- Installation
- **Configuration**
 - Administrative Information
 - **NTP**
 - Services
 - Regular Testing
- Measurement Results Tour
 - Home Page
 - Throughput Tools
 - Latency Tools

NTP

- Do this second. Note that it may take a day to fully stabilize the clock
- Pick 4 – 5 Close servers for NTP
- We have a fast way to do this, or you can manually select
- Can also add your own servers if you don't like ours
- **Note: Clocks are stable, no one should 'save', but feel free to play around and select closer ones if you want.**

NTP

- The List. Press “select closest” to run a selection

The screenshot shows a web browser window titled "pS-Performance Node - NTP Configuration Tool" with the URL "https://lab236.internet2.edu/toolkit/admin/ntp/". The interface includes a sidebar with navigation links and a main content area with a table of NTP servers.

ps toolkit

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Ping Latency
- SNMP Utilization
- Cacti Graphs

Toolkit Administration

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring

Performance Toolkit

NTP Configuration Tool

Save Reset

Server	Description	Actions
<input checked="" type="checkbox"/> chronos.es.net	ESnet - New York, NY USA	Delete
<input type="checkbox"/> saturn.es.net	ESnet - Sunnyvale, CA USA	Delete
<input checked="" type="checkbox"/> owamp.atla.net.internet2.edu	Internet2 - Atlanta, GA USA	Delete
<input checked="" type="checkbox"/> owamp.chic.net.internet2.edu	Internet2 - Chicago, IL USA	Delete
<input type="checkbox"/> owamp.hous.net.internet2.edu	Internet2 - Houston, TX USA	Delete
<input type="checkbox"/> owamp.losa.net.internet2.edu	Internet2 - Los Angeles, CA USA	Delete
<input checked="" type="checkbox"/> owamp.newy.net.internet2.edu	Internet2 - New York, NY USA	Delete
<input type="checkbox"/> owamp.salt.net.internet2.edu	Internet2 - Salt Lake City, UT USA	Delete
<input type="checkbox"/> tick.mhpcc.hpc.mil	Maui HPC Center - Maui, HI USA	Delete
<input type="checkbox"/> time-a.nist.gov	NIST - Gaithersburg, MD USA	Delete
<input type="checkbox"/> tick.usnogps.navy.mil	Naval Observatory - Colorado Springs, CO USA	Delete
<input checked="" type="checkbox"/> navobs1.oar.net	Naval Observatory - Columbus, OH USA	Delete
<input type="checkbox"/> ntp-ua.usno.navy.mil	Naval Observatory - Fairbanks, AK USA	Delete
<input type="checkbox"/> ntp-ucla.usno.navy.mil	Naval Observatory - Los Angeles, CA USA	Delete
<input type="checkbox"/> ntp-uw.usno.navy.mil	Naval Observatory - Seattle, WA USA	Delete
<input type="checkbox"/> ntp0.usno.navy.mil	Naval Observatory - Washington, DC USA	Delete
<input type="checkbox"/> a.ntp.monipe.rnp.br	RNP Time Server #1 - Brazil	Delete
<input type="checkbox"/> b.ntp.monipe.rnp.br	RNP Time Server #2 - Brazil	Delete
<input type="checkbox"/> c.ntp.monipe.rnp.br	RNP Time Server #3 - Brazil	Delete
<input type="checkbox"/> d.ntp.monipe.rnp.br	RNP Time Server #4 - Brazil	Delete
<input type="checkbox"/> e.ntp.monipe.rnp.br	RNP Time Server #5 - Brazil	Delete

Add New NTP Server Select Closest Servers

Save Reset

NTP

- Add in a server manually:

The screenshot shows a web browser window titled "pS-Performance Node - NTP Configuration Tool" with the URL <https://lab236.internet2.edu/toolkit/admin/ntp/>. The interface includes a sidebar with "User Tools" (Local Performance Services, Global Performance Services, Java OWAMP Client, Reverse Traceroute, Reverse Ping) and "Service Graphs" (Throughput, One-Way Latency, Ping Latency, SNMP Utilization, Cacti Graphs). The main area is titled "NTP Configuration Tool" and contains a table of servers with checkboxes, descriptions, and "Delete" links. An "Add New NTP Server" dialog box is open, showing the "Address" field with "clock.psu.edu" and the "Description" field with "Penn State - University Park PA".

Server	Description	Actions
<input checked="" type="checkbox"/> chronos.es.net	ESnet - New York, NY USA	Delete
<input type="checkbox"/> saturn.es.net	ESnet - Sunnyvale, CA USA	Delete
<input checked="" type="checkbox"/> owamp.atla.net.internet2.edu	Internet2 - Atlanta, GA USA	Delete
<input checked="" type="checkbox"/> owamp.chic.net.internet2.edu	Internet2 - Chicago, IL USA	Delete
<input type="checkbox"/> owamp.hous.net.internet2.edu	Internet2 - Houston, TX USA	Delete
<input type="checkbox"/> owamp.losa.net.internet2.edu	Internet2 - Los Angeles, CA USA	Delete
<input checked="" type="checkbox"/> owamp.newy.net.internet2.edu	Internet2 - New York, NY USA	Delete
<input type="checkbox"/> owamp.salt.net.internet2.edu	Internet2 - Salt Lake City, UT USA	Delete
<input type="checkbox"/> tick.mhpc.hpc.mil	Maui HPC Center - Maui, HI USA	Delete
<input type="checkbox"/> time-a.nist.gov		Delete
<input type="checkbox"/> tick.usnogps.navy.mil		Delete
<input checked="" type="checkbox"/> navobs1.oar.net		Delete
<input type="checkbox"/> ntp-ua.usno.navy.mil		Delete
<input type="checkbox"/> ntp-ucla.usno.navy.mil		Delete
<input type="checkbox"/> ntp-uw.usno.navy.mil	Naval Observatory - Seattle, WA USA	Delete
<input type="checkbox"/> ntp0.usno.navy.mil	Naval Observatory - Washington, DC USA	Delete
<input type="checkbox"/> a.ntp.monipe.rnp.br	RNP Time Server #1 - Brazil	Delete
<input type="checkbox"/> b.ntp.monipe.rnp.br	RNP Time Server #2 - Brazil	Delete
<input type="checkbox"/> c.ntp.monipe.rnp.br	RNP Time Server #3 - Brazil	Delete
<input type="checkbox"/> d.ntp.monipe.rnp.br	RNP Time Server #4 - Brazil	Delete
<input type="checkbox"/> e.ntp.monipe.rnp.br	RNP Time Server #5 - Brazil	Delete

At the bottom of the main area, there are buttons for "Add New NTP Server" and "Select Closest Servers", along with "Save" and "Reset" buttons.

Outline

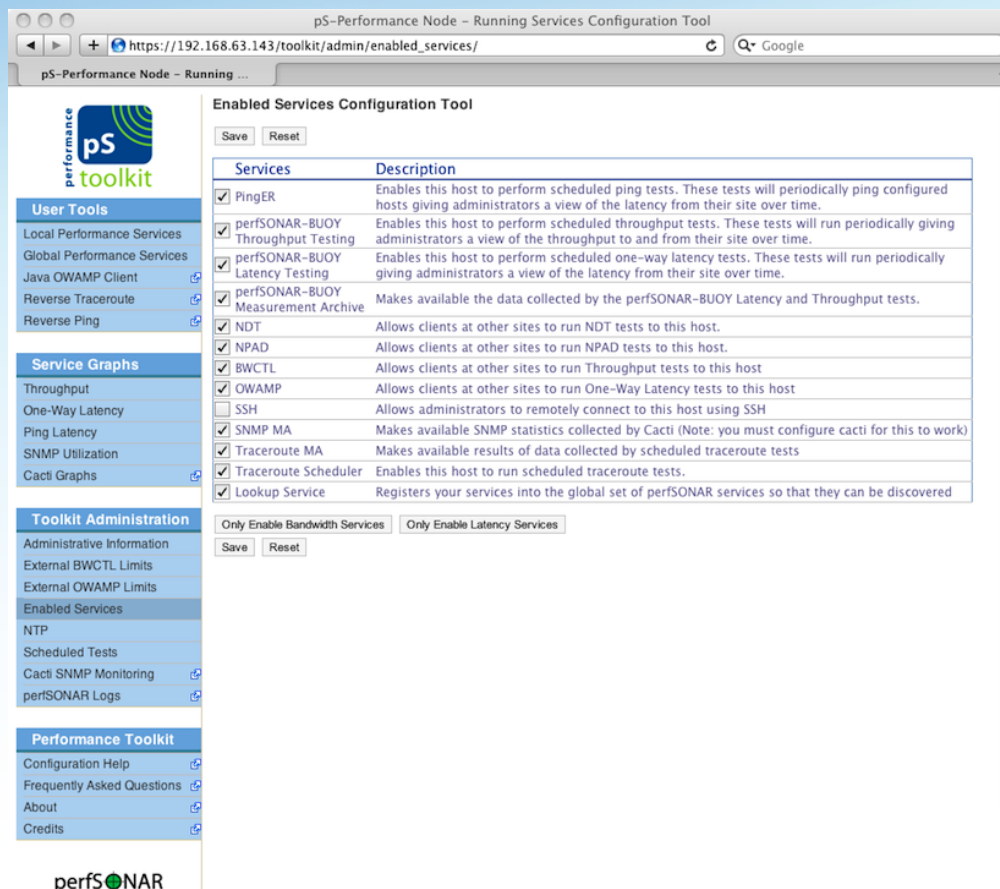
- Installation
- **Configuration**
 - Administrative Information
 - NTP
 - **Services**
 - Regular Testing
- Measurement Results Tour
 - Home Page
 - Throughput Tools
 - Latency Tools

Services

- Services should be enabled/disabled from this screen (don't use chkconfig, we overwrite that with each save...)
- Shortcuts to enable bandwidth only vs latency only
- SSH is disabled by default!
- Note: Don't 'save' after this part either, but feel free to see what the buttons do.

Services

- All services, pressing either of the enable buttons will select/de-select:



Outline

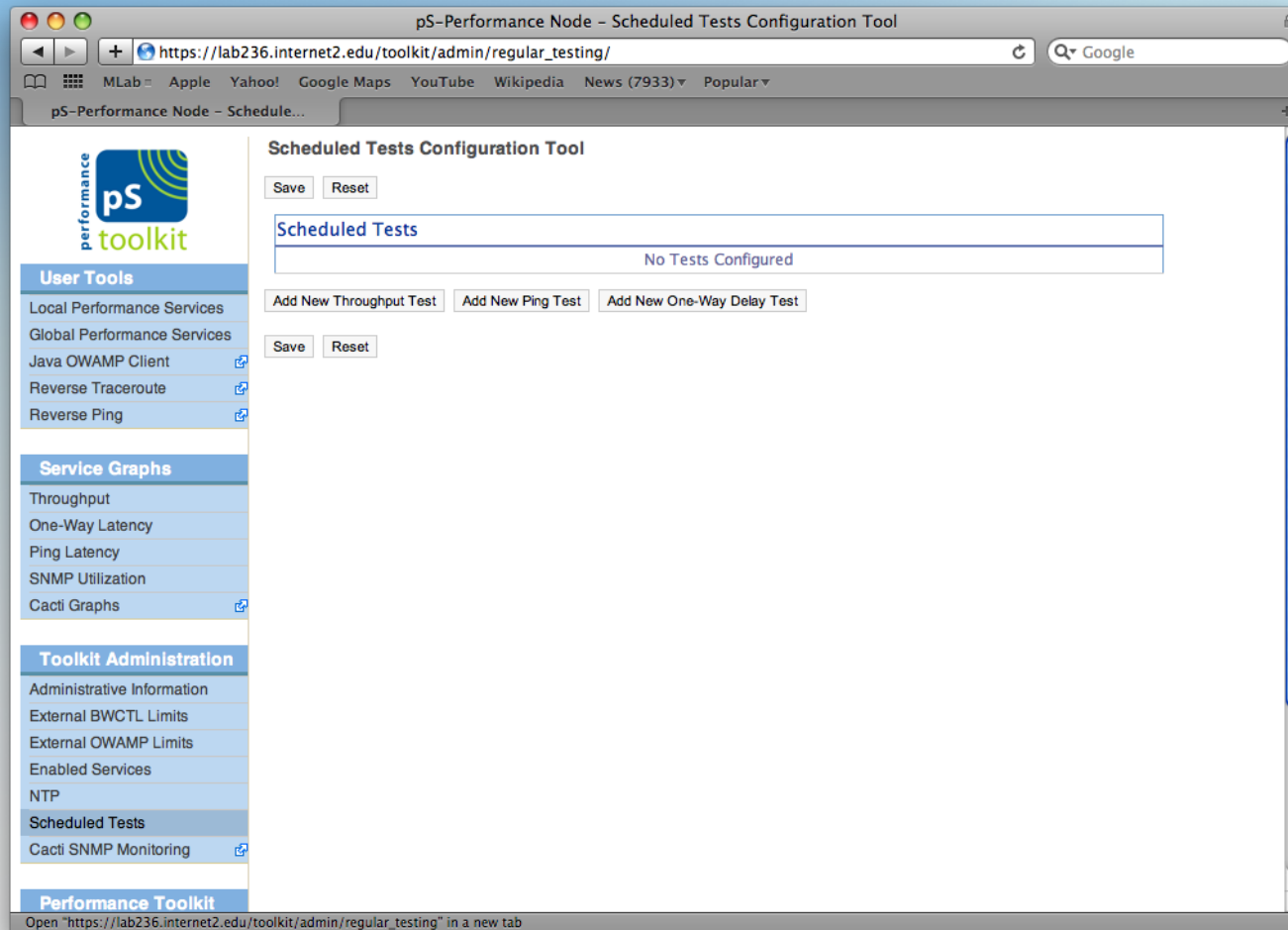
- Installation
- **Configuration**
 - Administrative Information
 - NTP
 - Services
 - **Regular Testing**
- Measurement Results Tour
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Regular Testing

- All regular testing follows the same pattern:
 - Select a Type
 - Select Parameters
 - Add Hosts
 - Save
- Will only go over BWCTL here

Regular Testing

- Blank Screen:



Regular Testing

- Configure parameters (for our purposes, lets do a test every 10 minutes, 20 second duration):

pS-Performance Node - Scheduled Tests Configuration Tool

https://lab236.internet2.edu/toolkit/admin/regular_testing/

Scheduled Tests Configuration Tool

Save Reset

Scheduled Tests

No Tests Configured

Add New Throughput Test Add New Ping Test Add New One-Way Delay Test

Save Reset

Add New Throughput Test

Description: BWCTL Testing

Time Between Tests: 1 Hours

Test Duration^[1]: 10 Seconds

Bandwidth Tester: lperf

Protocol: TCP

Use Autotuning: ☒

Add Cancel

25 7/21/13, © 2013 ESnet, Internet2, PSC

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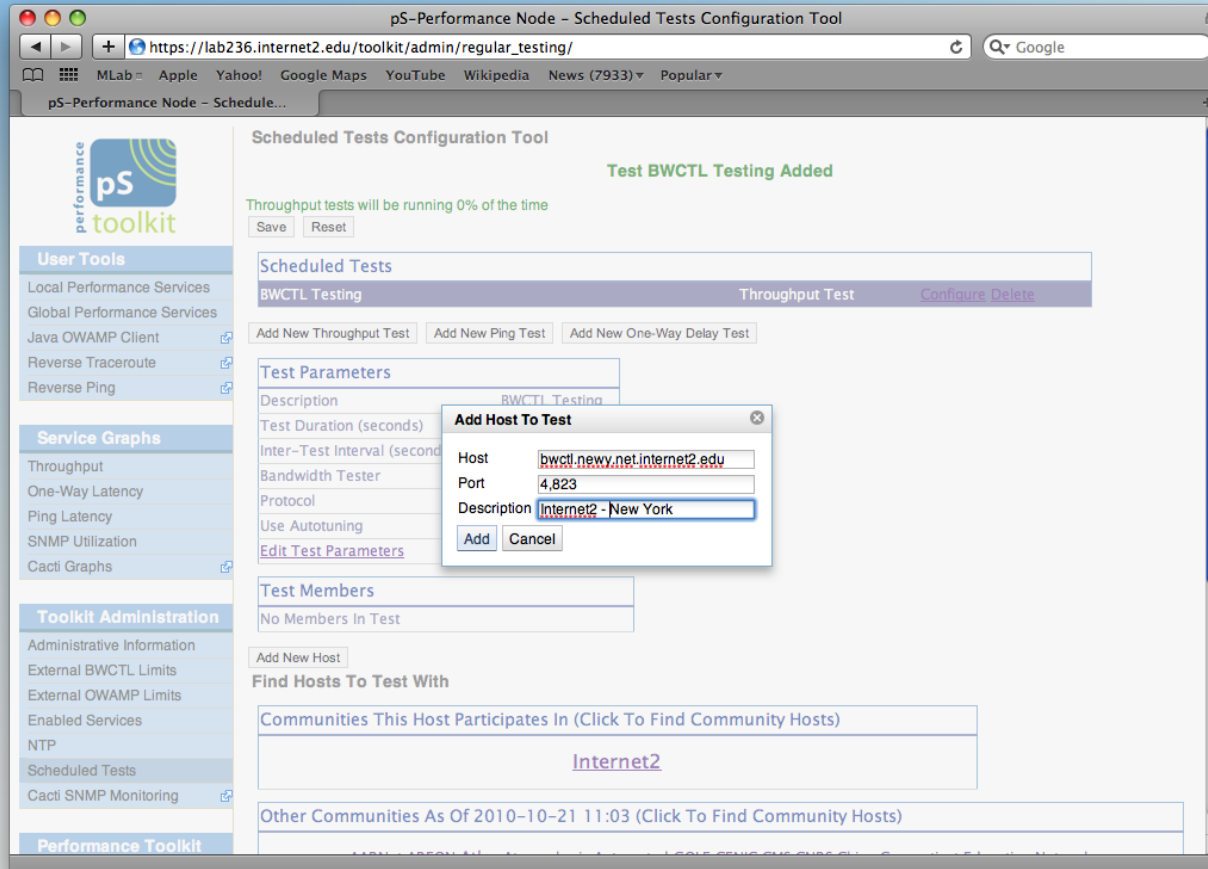
Regular Testing

- After setting up the test, now add hosts:

The screenshot shows a web browser window with the URL https://lab236.internet2.edu/toolkit/admin/regular_testing/. The page title is "pS-Performance Node - Scheduled Tests Configuration Tool". The interface includes a sidebar with navigation links: "User Tools" (Local Performance Services, Global Performance Services, Java OWAMP Client, Reverse Traceroute, Reverse Ping), "Service Graphs" (Throughput, One-Way Latency, Ping Latency, SNMP Utilization, Cacti Graphs), "Toolkit Administration" (Administrative Information, External BWCTL Limits, External OWAMP Limits, Enabled Services, NTP, Scheduled Tests, Cacti SNMP Monitoring), and "Performance Toolkit". The main content area displays "Scheduled Tests Configuration Tool" with a green message "Test BWCTL Testing Added". Below this, it states "Throughput tests will be running 0% of the time" and provides "Save" and "Reset" buttons. A table titled "Scheduled Tests" shows "BWCTL Testing" as the selected test, with "Throughput Test" and "Configure Delete" links. Below the table are buttons for "Add New Throughput Test", "Add New Ping Test", and "Add New One-Way Delay Test". The "Test Parameters" section shows details for "BWCTL Testing": Description (BWCTL Testing), Test Duration (seconds) (10), Inter-Test Interval (seconds) (3600), Bandwidth Tester (Iperf), Protocol (TCP), Use Autotuning (yes), and an "Edit Test Parameters" link. The "Test Members" section shows "No Members In Test" and an "Add New Host" button. The "Find Hosts To Test With" section includes a box for "Communities This Host Participates In (Click To Find Community Hosts)" containing the link "Internet2", and another box for "Other Communities As Of 2010-10-21 11:03 (Click To Find Community Hosts)".

Regular Testing

- Manually add hosts:



Regular Testing

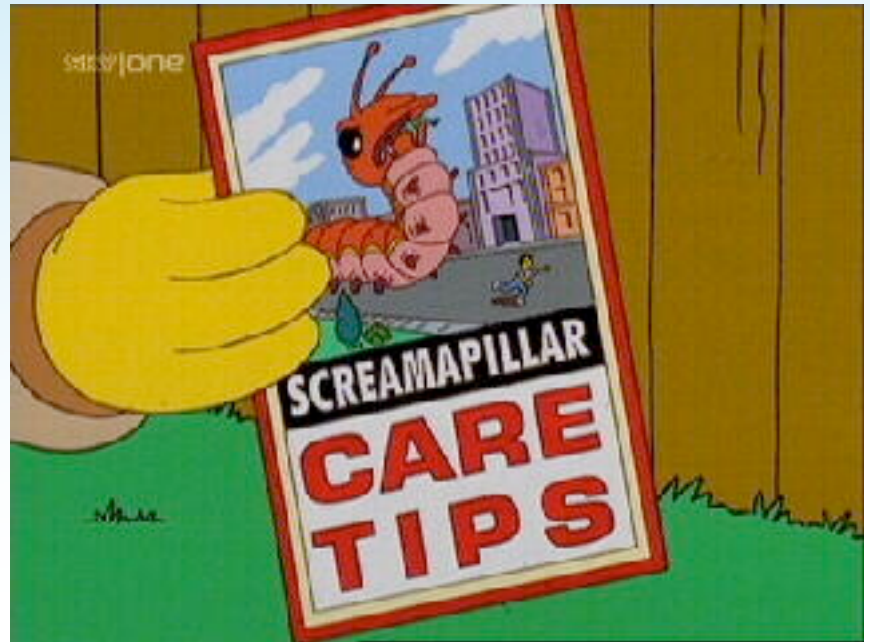
- Lets use these:
 - Test to 1 or 2 of your neighbors (perfsonar-ws-X.internet2.edu)
 - Test to Internet2
 - Ping/OWAMP: owamp.losa.net.internet2.edu, owamp.chic.net.internet2.edu, owamp.hous.net.internet2.edu, owamp.salt.net.internet2.edu
 - Traceroute/BWCTL: bwctl.losa.net.internet2.edu, bwctl.chic.net.internet2.edu, nms-bwctl.hous.net.internet2.edu, nms-bwctl.salt.net.internet2.edu
- Set up Latency, BW, Ping, and Traceroute tests

Outline

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Your pSPT Deployment and You

- The pSPT nodes are designed to help two constituencies
 - Engineers – Regular monitoring to catch problems earlier
 - Users – Distributed test points to validate their own performance
- Work as a system, the following will describe:
 - The tools
 - The operations methodology
 - Maintenance steps
- Can integrate with others
 - Deployed on Backbones
 - Other regionals
 - Campuses



Home Page

The screenshot shows a web browser window titled "pS-Performance Node - pS-Performance Node" with the address bar displaying "http://npw.internet2.edu/toolkit/". The browser's search bar contains "Google". Below the address bar, a navigation bar lists links: MLab, Apple, Yahoo!, Google Maps, YouTube, Wikipedia, News (7937), and Popular. The main content area is titled "pS-Performance Node" and contains several sections:

- User Tools:** Local Performance Services, Global Performance Services, Java OWAMP Client, Reverse Traceroute, Reverse Ping.
- Service Graphs:** Throughput, One-Way Latency, Head Ping Latency, Red PC Ping Latency, Green PC Ping Latency, Blue PC Ping Latency, SNMP Utilization, Cacti Graphs.
- Performance Toolkit:** Configuration Help, Frequently Asked Questions, About, Credits.
- perfSONAR powered** logo.
- Host Information:** Organization Name, Host Location, Administrator Name, Administrator Email.
- Communities This Host Participates In:**
- Host Status:** Primary Address: npw.internet2.edu.
- Services Offered:**
 - Bandwidth Test Controller (BWCTL):** Running
 - tcp://npw.internet2.edu:4823
 - tcp://ipv6-annarbor-ofc.internet2.edu:4823
 - tcp://192.168.0.1:4823
 - Lookup Service:** Disabled
 - http://npw.internet2.edu:9995/perfSONAR_PS/services/hLS
 - http://ipv6-annarbor-ofc.internet2.edu:9995/perfSONAR_PS/services/hLS
 - http://192.168.0.1:9995/perfSONAR_PS/services/hLS
 - Network Diagnostic Tester (NDT):** Running
 - tcp://npw.internet2.edu:3001
 - http://npw.internet2.edu:7123
 - tcp://ipv6-annarbor-ofc.internet2.edu:3001
 - http://ipv6-annarbor-ofc.internet2.edu:7123
 - tcp://192.168.0.1:3001

Outline

- Installation
- Configuration
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Throughput Measurements

The screenshot shows a web browser window titled "pS-Performance Node - pS-Performance Node" with the URL <http://npw.internet2.edu/toolkit/>. The page features a sidebar on the left with a "performance pS toolkit" logo and two main sections: "User Tools" and "Service Graphs". Under "User Tools", there are links for "Local Performance Services", "Global Performance Services", "Java OWAMP Client", "Reverse Traceroute", and "Reverse Ping". Under "Service Graphs", there is a list of graph types: "Throughput", "One-Way Latency", "Head Ping Latency", "Red PC Ping Latency", "Green PC Ping Latency", "Blue PC Ping Latency", "SNMP Utilization", and "Cacti Graphs". The "Throughput" option is circled in red. Below the sidebar, there is a "Performance Toolkit" section with links for "Configuration Help", "Frequently Asked Questions", "About", and "Credits". The main content area is titled "pS-Performance Node" and contains several sections: "Host Information" (with fields for Organization Name, Host Location, Administrator Name, and Administrator Email), "Communities This Host Participates In", "Host Status" (showing Primary Address as npw.internet2.edu), "Services Offered" (listing Bandwidth Test Controller (BWCTL) as Running, Lookup Service as Disabled, and Network Diagnostic Tester (NDT) as Running), and "Network Diagnostic Tester (NDT)" (listing various test URLs and ports).

pS-Performance Node

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Head Ping Latency
- Red PC Ping Latency
- Green PC Ping Latency
- Blue PC Ping Latency
- SNMP Utilization
- Cacti Graphs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

pS-Performance Node

Host Information

Organization Name
Host Location
Administrator Name
Administrator Email

Communities This Host Participates In

--

Host Status

Primary Address	npw.internet2.edu
-----------------	-------------------

Services Offered

Bandwidth Test Controller (BWCTL) [\[1\]](#) **Running**

- tcp://npw.internet2.edu:4823
- tcp://ipv6-annarbor-ofc.internet2.edu:4823
- tcp://192.168.0.1:4823

Lookup Service [\[1\]](#) **Disabled**

- http://npw.internet2.edu:9995/perfSONAR_PS/services/hLS
- http://ipv6-annarbor-ofc.internet2.edu:9995/perfSONAR_PS/services/hLS
- http://192.168.0.1:9995/perfSONAR_PS/services/hLS

Network Diagnostic Tester (NDT) [\[1\]](#) **Running**

- tcp://npw.internet2.edu:3001
- <http://npw.internet2.edu:7123>
- tcp://ipv6-annarbor-ofc.internet2.edu:3001
- <http://ipv6-annarbor-ofc.internet2.edu:7123>
- tcp://192.168.0.1:3001

Regular testing between beacons

- TCP Testing
 - Recommend to do at least a 20 second test every 4 hours. (less duration is ok for short RTT, can test more or less often)
 - TCP is elastic, numbers should be close to capacity unless link is heavily used. If they drop it may be congestion related or real problem related
- UDP Testing
 - Be careful, not elastic. If you are going to do it, pick your peers. Set a bandwidth limit, try to mimic a UDP application (e.g. video)
- Testing from others:
 - Encourage connectors to test to a close beacon.
 - Test to Internet2/MCNC etc.

Throughput Tests

ps-Performance Node - Throughput Tests

http://npw.internet2.edu/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://localhost:8085/perfSONAR_PS/services/pSB&eventTy Google

MLab Apple Yahoo! Google Maps YouTube Wikipedia News (7937) Popular

performance ps toolkit

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- Head Ping Latency
- Red PC Ping Latency
- Green PC Ping Latency
- Blue PC Ping Latency
- SNMP Utilization
- Cacti Graphs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

Throughput Tests

Active Data Sets

First Host	First Address	Second Host	Second Address	Protocol	Duration	Window Size	Bandwidth Limit	Bi-Directional	Line Graph	Scatter Graph
blue-pc1	192.168.0.4	green-pc1	192.168.0.3	TCP	20	4		Yes	-- Select --	-- Select --
blue-pc1	192.168.0.4	head	192.168.0.1	TCP	20	4		Yes	-- Select --	-- Select --
blue-pc1	192.168.0.4	red-pc1	192.168.0.2	TCP	20	4		Yes	-- Select --	-- Select --
green-pc1	192.168.0.3	head	192.168.0.1	TCP	20	4		Yes	-- Select --	-- Select --
green-pc1	192.168.0.3	red-pc1	192.168.0.2	TCP	20	4		Yes	-- Select --	-- Select --
head	192.168.0.1	red-pc1	192.168.0.2	TCP	20	4		Yes	-- Select --	-- Select --

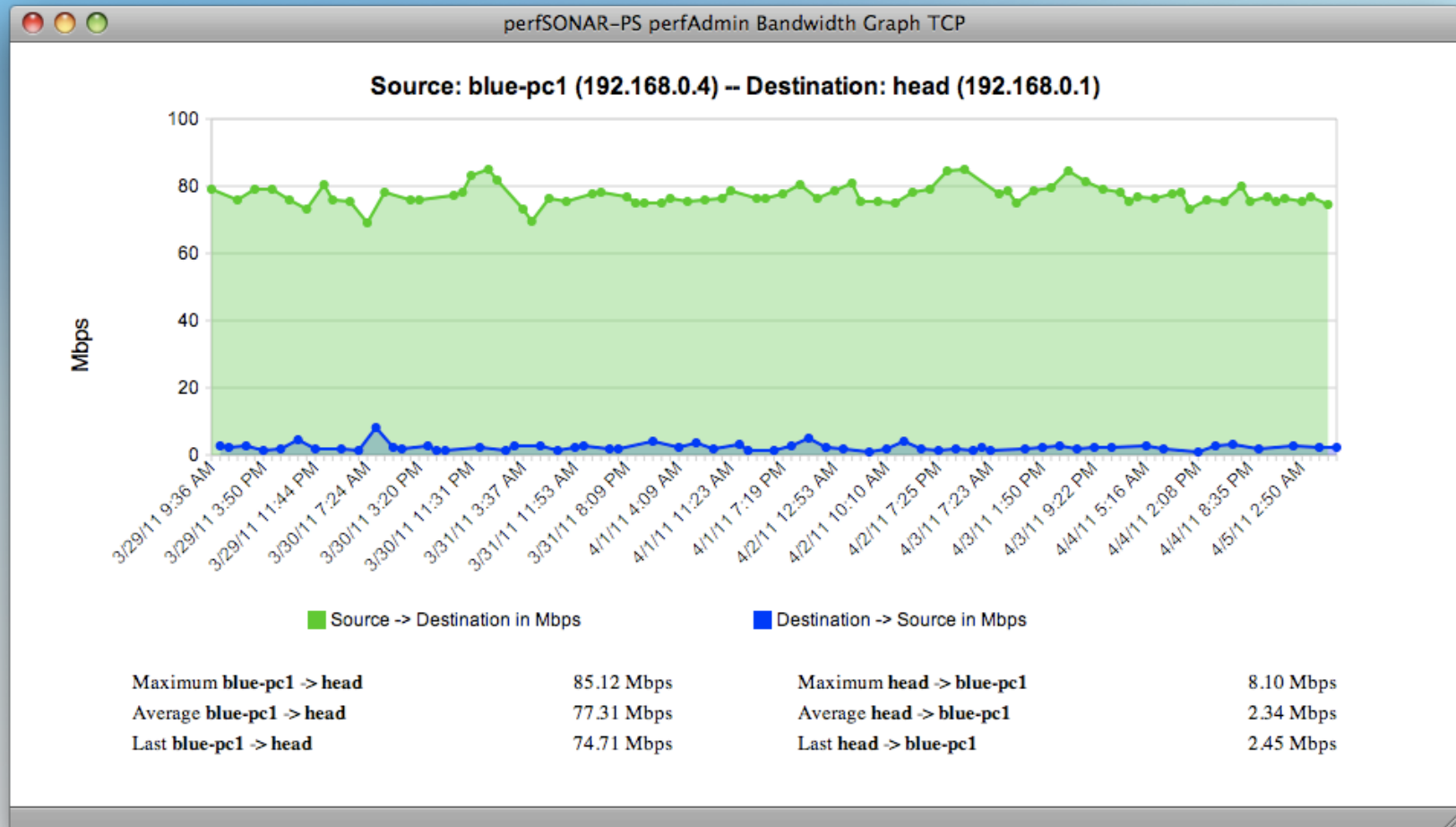
1 Week Average Bandwidth in Mbps

Host	In BW (Mbps)	Out BW (Mbps)
blue-pc1	60	85
green-pc1	90	90
head	85	45
red-pc1	75	90

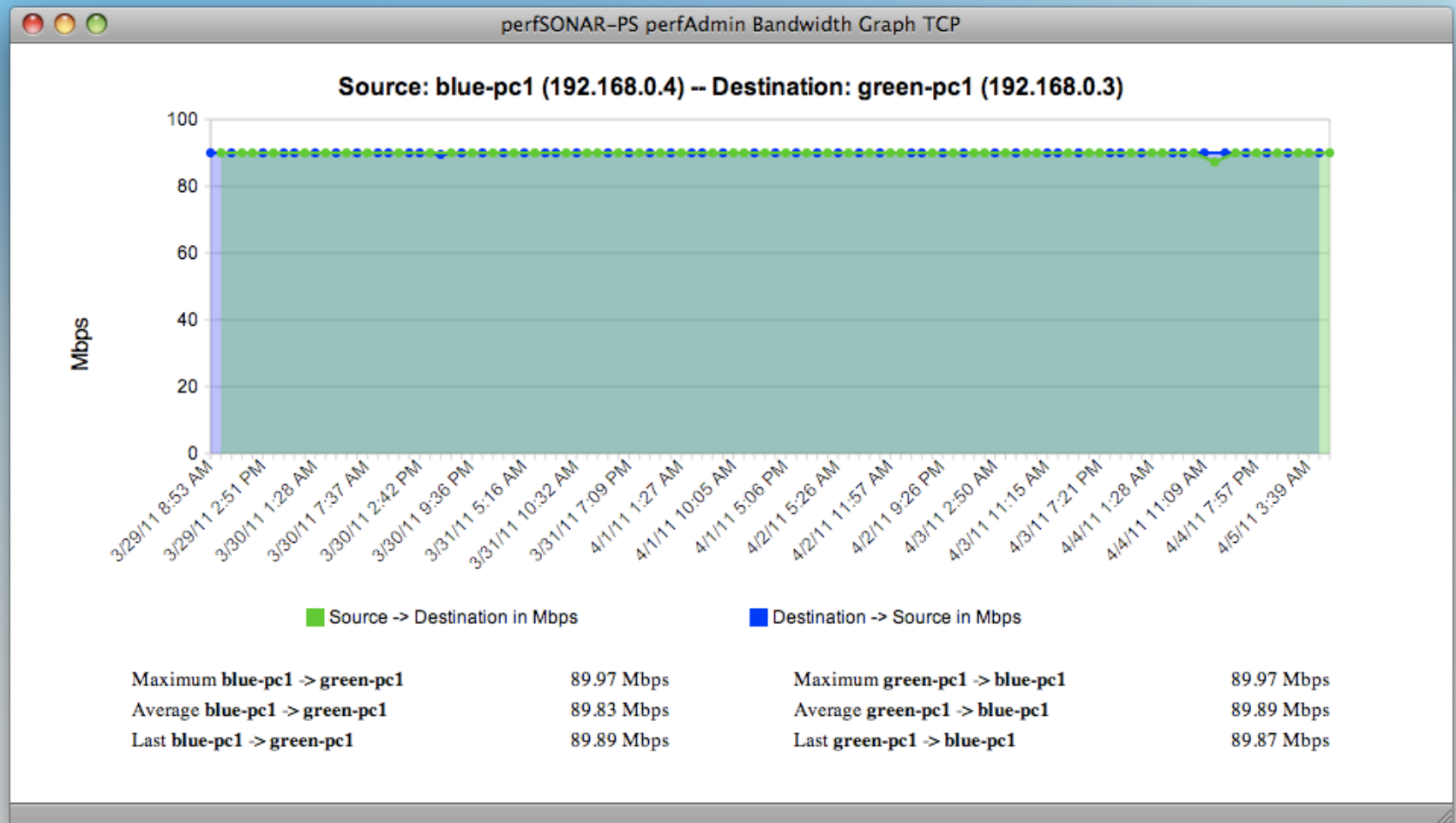
perfSONAR powered

Open "http://npw.internet2.edu/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://localhost:8085/perfSONAR_PS/services/pSB&eventType=http://ggf.org/ns/nmwg/tools/iperf/2.0" in a new tab

Bad Throughput ... What Next?



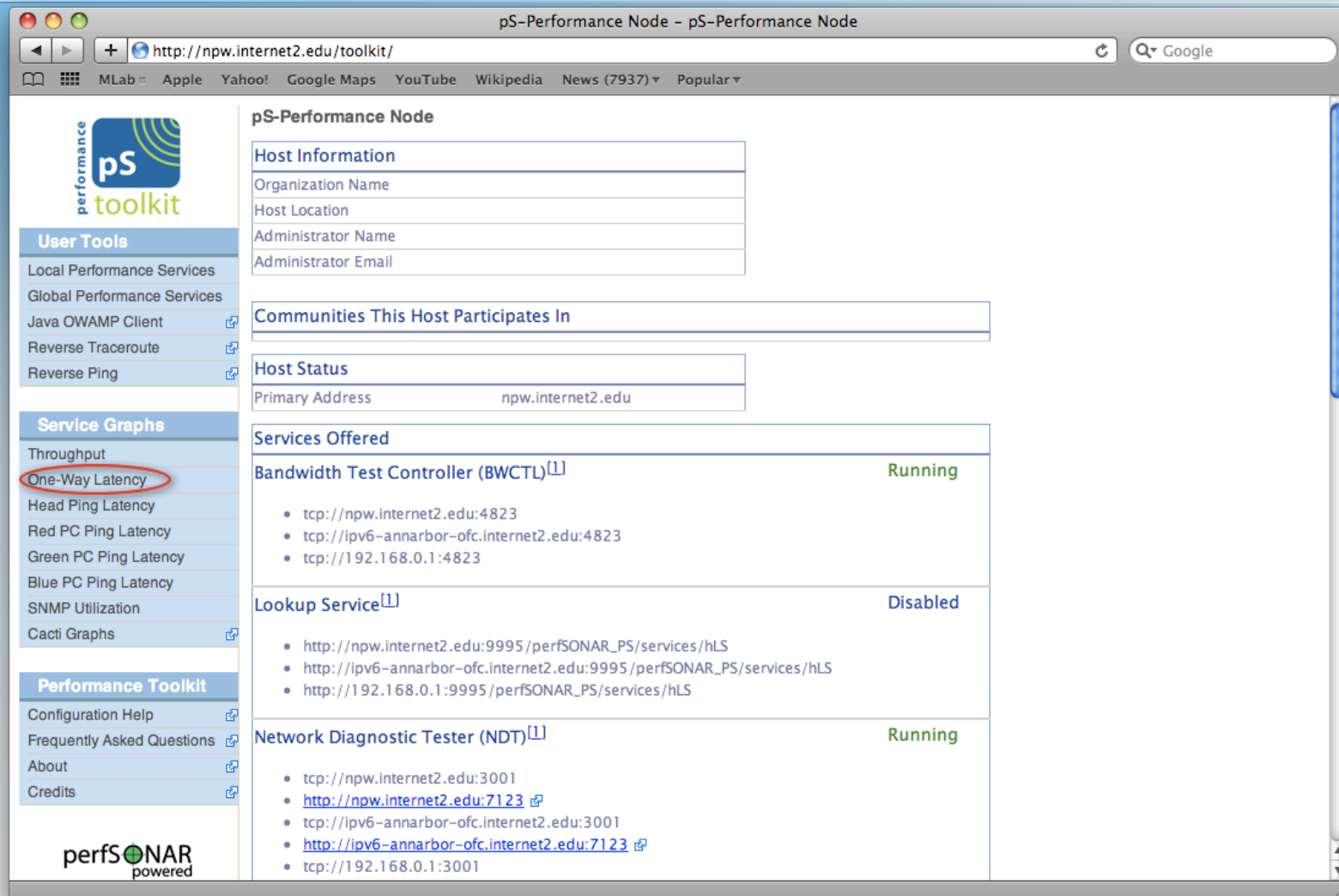
Expected Throughput



Outline

- Installation
- Configuration
 - Administrative Information
 - NTP
 - Services
 - Regular Testing
- Measurement Results Tour
 - Home Page
 - Throughput Tools
 - Latency Tools

One Way Latency Tests



The screenshot shows a web browser window titled "pS-Performance Node - pS-Performance Node" with the URL <http://npw.internet2.edu/toolkit/>. The page displays the "pS-Performance Node" interface. On the left sidebar, under "Service Graphs", the "One-Way Latency" option is selected and circled in red. The main content area shows the "Host Information" for "npw.internet2.edu", including fields for Organization Name, Host Location, Administrator Name, and Administrator Email. Below this, the "Communities This Host Participates In" section is empty. The "Host Status" section shows the Primary Address as "npw.internet2.edu". The "Services Offered" section lists three services: "Bandwidth Test Controller (BWCTL)" (Running), "Lookup Service" (Disabled), and "Network Diagnostic Tester (NDT)" (Running). Each service has a list of endpoints.

Host Information

Organization Name
Host Location
Administrator Name
Administrator Email

Communities This Host Participates In

--

Host Status

Primary Address	npw.internet2.edu
-----------------	-------------------

Services Offered

Bandwidth Test Controller (BWCTL)	Running
<ul style="list-style-type: none">tcp://npw.internet2.edu:4823tcp://ipv6-annarbor-ofc.internet2.edu:4823tcp://192.168.0.1:4823	
Lookup Service	Disabled
<ul style="list-style-type: none">http://npw.internet2.edu:9995/perfSONAR_PS/services/hLShttp://ipv6-annarbor-ofc.internet2.edu:9995/perfSONAR_PS/services/hLShttp://192.168.0.1:9995/perfSONAR_PS/services/hLS	
Network Diagnostic Tester (NDT)	Running
<ul style="list-style-type: none">tcp://npw.internet2.edu:3001http://npw.internet2.edu:7123tcp://ipv6-annarbor-ofc.internet2.edu:3001http://ipv6-annarbor-ofc.internet2.edu:7123tcp://192.168.0.1:3001	

One Way Latency != Round Trip Latency

- One Way:
 - Detect problems in one direction vs the other (e.g. queueing, loss, out of order packets)
 - Helps detect “download” vs “upload” issues
- RTT:
 - Masks problems like queueing
 - ICMP packets are not respected
- OWAMP Graphs:
 - Feature two lines for each direction.
 - Very sensitive, even to NTP differences
 - Loss/duplication shows up as an event flag
 - Congestive loss as well loss caused by other reasons (equipment failures)

All OWAMP Tests

ps-Performance Node – One-Way Latency Tests

http://npw.internet2.edu/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://localhost:8085/perfSONAR_PS/services/pSB&eventTyp

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performance toolkit

User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency**
- Head Ping Latency
- Red PC Ping Latency
- Green PC Ping Latency
- Blue PC Ping Latency
- SNMP Utilization
- Cacti Graphs

Performance Toolkit

- Configuration Help
- Frequently Asked Questions
- About
- Credits

One-Way Latency Tests

Active Data Sets					
First Host	First Address	Second Host	Second Address	Bi-Directional	Graph
blue-pc1	192.168.0.4	blue-pc1	192.168.0.4	Yes	-- Select --
blue-pc1	192.168.0.4	green-pc1	192.168.0.3	Yes	-- Select --
blue-pc1	192.168.0.4	head	192.168.0.1	Yes	-- Select --
blue-pc1	192.168.0.4	red-pc1	192.168.0.2	Yes	-- Select --
green-pc1	192.168.0.3	green-pc1	192.168.0.3	Yes	-- Select --
green-pc1	192.168.0.3	head	192.168.0.1	Yes	-- Select --
green-pc1	192.168.0.3	red-pc1	192.168.0.2	Yes	-- Select --
head	192.168.0.1	head	192.168.0.1	Yes	-- Select --
head	192.168.0.1	red-pc1	192.168.0.2	Yes	-- Select --
red-pc1	192.168.0.2	red-pc1	192.168.0.2	Yes	-- Select --

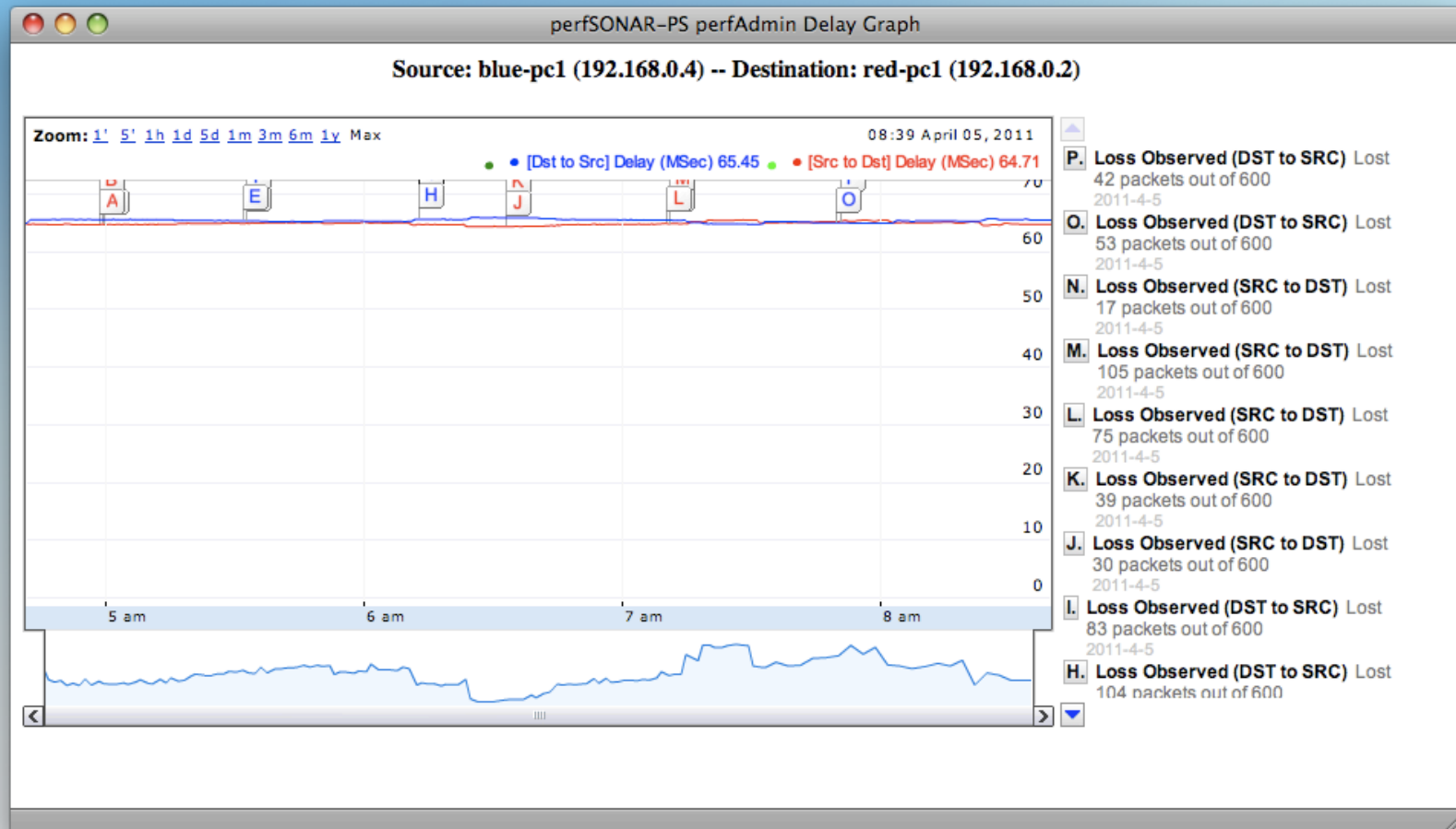
30 Minute Performance Summary (Min/Max Delay [MSec])				
	blue-pc1	green-pc1	head	red-pc1
blue-pc1	0.0067 / 0.0710	34.6718 / 65.7053	74.6770 / 215.7650	64.5232 / 135.7020
green-pc1	45.3148 / 9976.4500	0.0048 / 1.0490	30.0083 / 504.6930	19.9013 / 98.6629
head	75.2988 / 76.8461	30.0231 / 36.5620	0.0062 / 1.1902	9.9220 / 11.1976
red-pc1	65.2380 / 68.4700	19.8088 / 93.0333	9.8529 / 51.2662	0.0062 / 0.4311

Non-Active Data Sets					
First Host	First Address	Second Host	Second Address	Bi-Directional	Graph

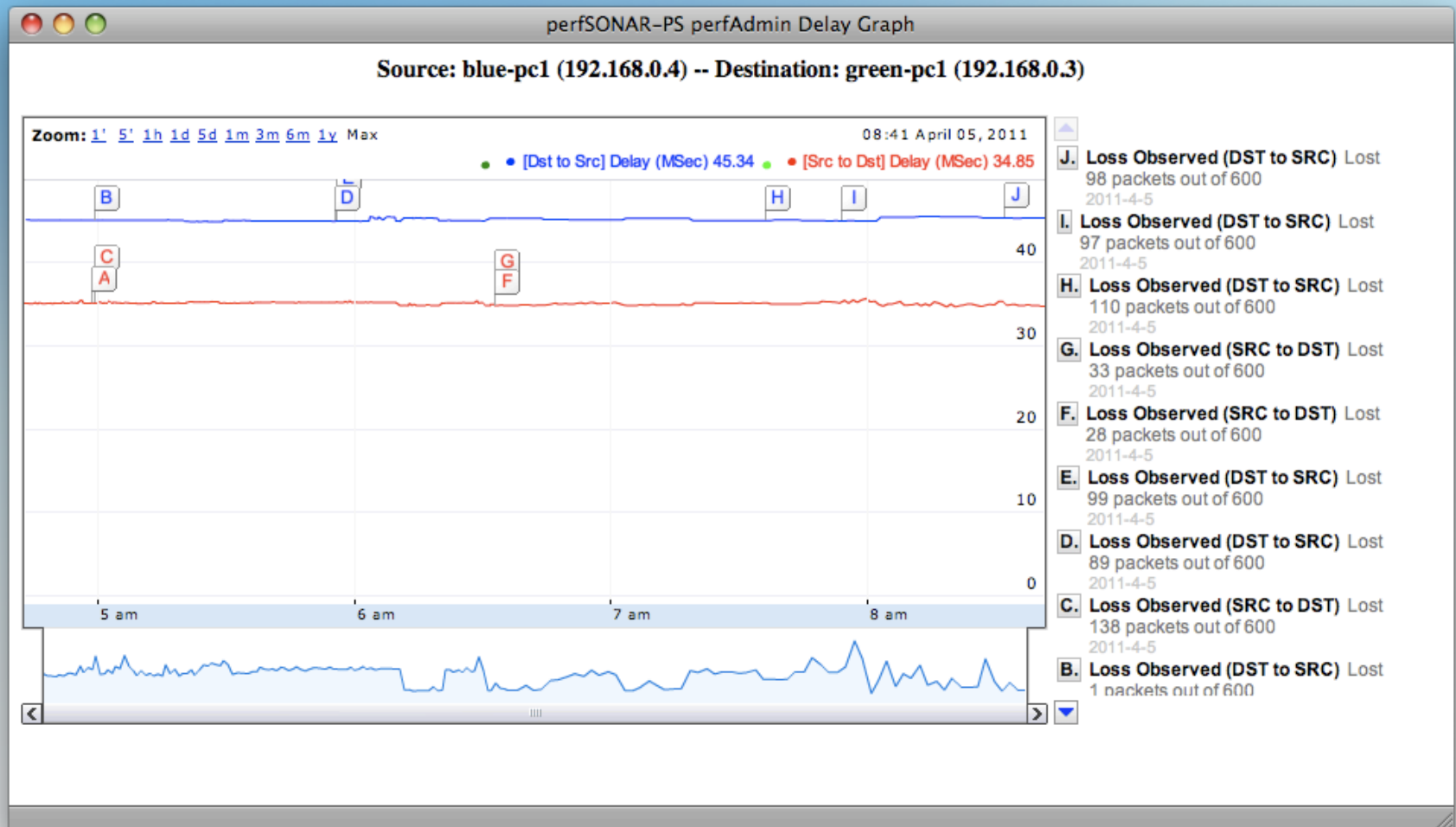
perfsONAR powered

Open "http://npw.internet2.edu/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://localhost:8085/perfSONAR_PS/services/pSB&eventType=http://ggf.org/ns/nmwg/characteristic/delay/summary/20070921" in a new tab

Similar Latencies, Some Loss



Different Latencies with pockets of Loss




PingER Select Data

ps-Performance Node - PingER Tests At http://ps-wsu-lt.kanren.net:8075/perfSONAR_PS/services/pinger/ma

https://ps-data.kanren.net/toolkit/gui/perfAdmin/serviceTest.cgi?url=http://ps-wsu-lt.kanren.net:8075/perfSC

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User Tools

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping

Service Graphs

- Throughput
- One-Way Latency
- WSU Ping Latency
- KSU Ping Latency
- KU Ping Latency
- 1102 Grand Ping Latency
- OWAMP Jitter
- Cacti Graphs

Toolkit Administration

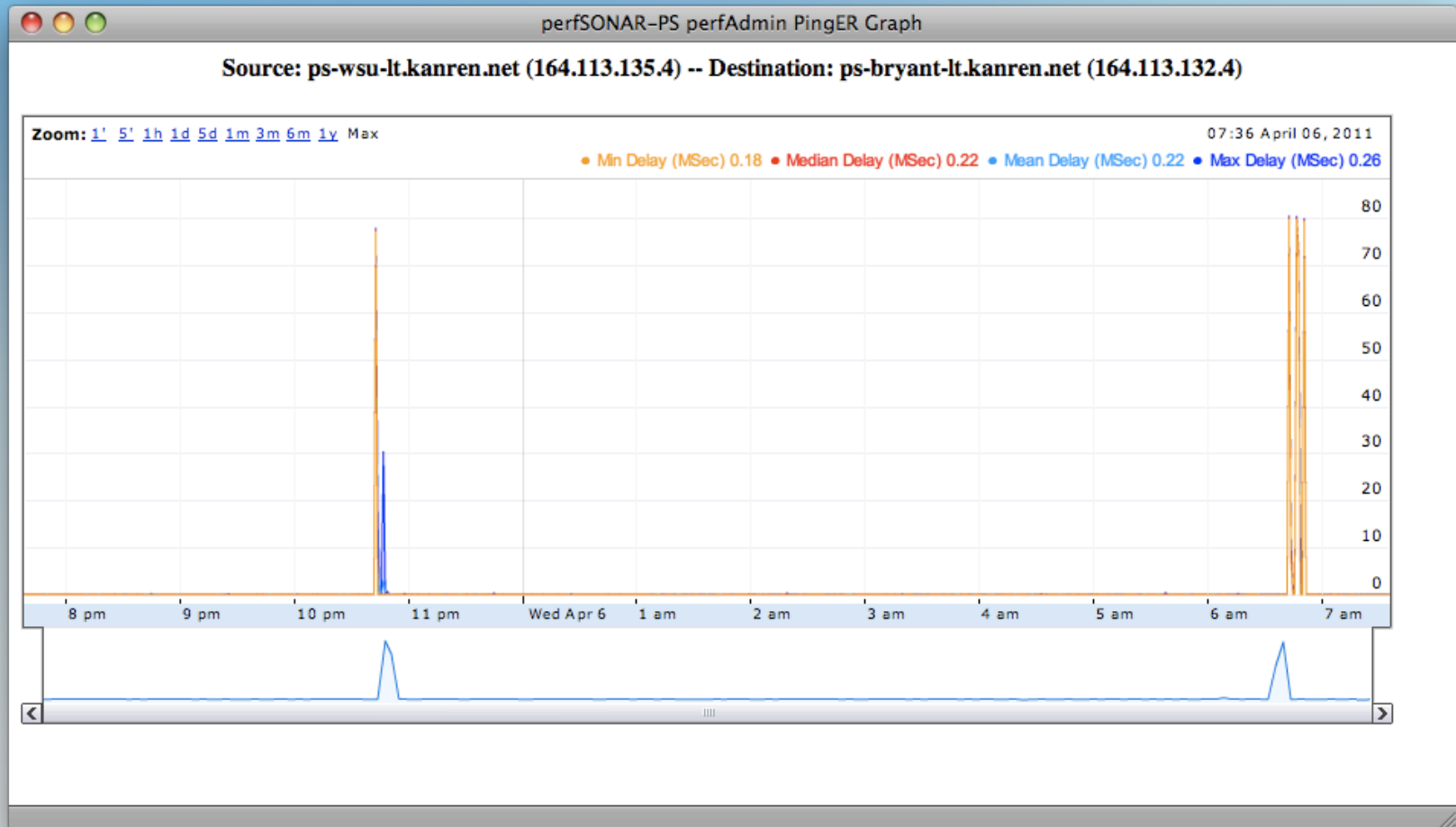
- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests

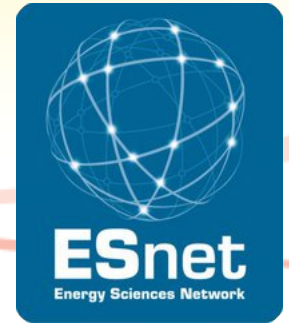
PingER Tests At http://ps-wsu-lt.kanren.net:8075/perfSONAR_PS/services/pinger/ma

Active Data Sets				
Source Address	Source Host	Destination Address	Destination Host	Graph
164.113.135.4	ps-wsu-lt.kanren.net	164.113.132.4	ps-bryant-lt.kanren.net	-- Select --
164.113.135.4	ps-wsu-lt.kanren.net	164.113.134.4	ps-ksu-lt.kanren.net	-- Select --
164.113.135.4	ps-wsu-lt.kanren.net	164.113.133.4	ps-ku-lt.kanren.net	-- Select --
164.113.135.4	ps-wsu-lt.kanren.net	164.113.135.4	ps-wsu-lt.kanren.net	-- Select --

Non-Active Data Sets				
Source Address	Source Host	Destination Address	Destination Host	Graph
164.113.135.4	ps-wsu-lt.kanren.net	127.0.0.1	localhost	Start: Feb 6 2011 End: Apr 6 2011 Graph

PingER Graph with spikes of activity





Software Configuration

July 22nd 2013, XSEDE Network Performance Tutorial

Jason Zurawski – Internet2/ESnet

Kathy Benninger - Pittsburgh Supercomputing Center

For more information, visit <http://www.internet2.edu/workshops/npw>