

**perfSONAR MDM updates for LHCONE:
VRF monitoring, updated web UI, VM images**

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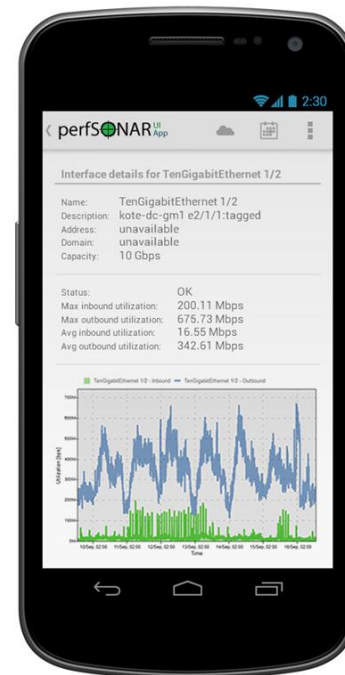
LHCONE Meeting Oslo – 20-21 September 2012

- New LHCONE VRF monitoring infrastructure in place
 - Three NRENs already joined
 - First measurements already available
- perfSONAR MDM training for LHCONE (Autumn 2012, Berlin).
 - Places available!
- perfSONAR MDM pre-installed VM images
 - With all components to be interoperable with perfSONAR PS
- Revised version of the perfSONAR web UI:
 - Path analysis
 - On-demand one-way delay tests (using OWAMP)
 - End-point availability check
- Revised version of the perfSONAR weathermap:
 - Able to retrieve data from HADES and OWAMP archives

What's next?



- perfSONAR2Go: fully working perfSONAR MDM deployment on a USB stick
 - Any laptop can become a perfSONAR MP in 30 seconds
- perfSONAR App: iOS/Android application
 - To visualise perfSONAR metrics
 - Joint project with ESNNet
 - First prototype will be focused on transatlantic links monitoring



perfSONAR VRF monitoring

- Three NRENs volunteered to start a first perfSONAR MDM deployment within the LHCONE L3VPN (VRF)
 - DFN
 - GARR
 - RENATER
- Each NREN deployed a perfSONAR MDM server within LHCONE VRF
- DANTE/GÉANT is running:
 - Central monitoring based on NAGIOS
 - Service desk (run by the Multi-Domain Service Desk)
 - Central archives
 - Central scheduling
 - perfSONAR web UI server
 - perfSONAR weathermap server

Status of the VRF monitoring



- GARR, DFN, RENATER deployed three servers within LHCONE VRF
- A perfSONAR dedicated web UI has been deployed for LHCONE and soon made available to the community
- Nagios monitoring is in place
- Service desk function is in place
- More NRENs to come.
- Please feel free to contact us to be added to the infrastructure or for additional info
 - Open to MDM and PS sites
 - On-demand capabilities only available with perfSONAR MDM
 - You can use a pre-installed VM image to be immediately onboard:
 - <ftp://ftp.uni-ruse.bg/perfsonar-vm/>

NAGIOS monitoring in place for LHCONE VRF MPs



Nagios Core - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Nagios Core

nagios-lhcone.geant.net/nagios/

Most Visited Le Monde.fr : Actualité... Rhône - Le Progrès Live Traffic Google Traduction perfSONAR web user i... perfSONAR web user i... perfSONAR web user i... WebCNM (cnmb1.srv...

Nagios®

General

- Home
- Documentation

Current Status

- Tactical Overview
- Map
- Hosts
- Services

Host Groups

- Summary
- Grid

Service Groups

- Summary
- Grid

Problems

- Services (Unhandled)
- Hosts (Unhandled)
- Network Outages

Quick Search:

Current Network Status
 Last Updated: Thu Sep 20 16:08:13 UTC 2012
 Updated every 90 seconds
 Nagios® Core™ 3.4.1 - www.nagios.org
 Logged in as nagiosadmin

Host Status Totals

Up	Down	Unreachable	Pending
6	0	0	0

All Problems All Types

0	6
---	---

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
19	0	0	0	0

All Problems All Types

0	19
---	----

View History For all hosts
 View Notifications For All Hosts
 View Host Status Detail For All Hosts

Service Status Details For All Hosts

Limit Results: 100

Host	Service	Status	Last Check	Duration	Attempt	Status Information
GARR-LHCONE-MP	PING	OK	09-20-2012 16:05:31	0d 0h 47m 42s	1/4	PING OK - Packet loss = 0%, RTA = 20.20 ms
	perfSONAR_BWCTL-MP_echo_tests	OK	09-20-2012 16:07:48	0d 0h 45m 25s	1/4	193.206.128.82 BWCTL-MP OK - Elapsed time: .0756 - Time corrected for http delay: .0276
	perfSONAR_BWCTL-MP_selfcheck	OK	09-20-2012 16:05:35	0d 0h 43m 9s	1/4	OK - 3 self-tests: 3 successful, 0 failed (ntpd_running_test :: success - Service ntpd is running.: bwctl_command_test :: success - Service tool bwctl found and is executable.: bwctld_running_test :: success - Service bwctld is running.).
LHCONE-PSUI	PING	OK	09-20-2012 16:05:53	2d 8h 42m 0s	1/4	PING OK - Packet loss = 0%, RTA = 0.59 ms
LHCONE-SQL-MA	EXIST_check	OK	09-20-2012 16:03:52	0d 4h 39m 21s	1/4	HTTP OK: HTTP/1.1 200 OK - 12672 bytes in 0.029 second response time
	PING	OK	09-20-2012 16:07:56	0d 4h 40m 17s	1/4	PING OK - Packet loss = 0%, RTA = 1.67 ms
	perfSONAR_SQL-MA_echo_tests	OK	09-20-2012 15:58:11	2d 21h 42m 52s	1/4	t-sqlma-lhcone.geant.net SQL-MA OK - Elapsed time: .0192 - Time corrected for http delay: .0082
LHCONE-WEBCNM	PING	OK	09-20-2012 16:06:40	2d 8h 38m 20s	1/4	PING OK - Packet loss = 0%, RTA = 0.61 ms
LHCTR-SQL-MA	EXIST_check	OK	09-20-2012 16:04:39	0d 5h 8m 34s	1/4	HTTP OK: HTTP/1.1 200 OK - 12672 bytes in 0.103 second response time
	PING	OK	09-20-2012 16:07:09	12d 22h 6m 4s	1/4	PING OK - Packet loss = 0%, RTA = 29.45 ms
	perfSONAR_SQL-MA_echo_tests	OK	09-20-2012 15:55:49	0d 5h 12m 24s	1/4	lhctr-sqlma.geant.net SQL-MA OK - Elapsed time: .0843 - Time corrected for http delay: .0143
	perfSONAR_SQL-MA_selfcheck	OK	09-20-2012 16:06:18	0d 5h 11m 55s	1/4	OK - 3 self-tests: 3 successful, 0 failed (xmldb-access-test :: success - Xml Database ver. 1.2.6 is accessible.: random-fetch-test :: success - Fetching data from the relational database is correct.: xmldb-content-test :: success - Number of all

First screenshot of the LHCONE VRF monitoring



The screenshot shows the perfSONAR web user interface in a Mozilla Firefox browser window. The browser address bar shows the URL `psui-lhccone.geant.net:8080/perfsonar-ui/`. The main interface includes a navigation menu on the left with sections for "Access", "Analyse", and "Settings". The central area contains a configuration panel with buttons for "Pick source", "Pick destination", "Perform test", and "Swap endpoints". The configuration panel also includes fields for "Protocol" (TCP, UDP), "Address type" (IPv4, IPv6), "Test duration (s)" (30), "Reporting interval (s)" (6), and "Type of Service bits".

A modal dialog box titled "Please select measurement source" is open in the center of the screen. It contains a table with the following data:

Name	URL
DFN-LHCONE	<code>http://psmp-fra2.x-win.dfn.de:8090/services/MP/BWCTL</code>
GARR-LHCONE	<code>http://193.206.128.82:8090/services/MP/BWCTL</code>
RENATER-LHCONE	<code>http://193.51.191.197:8090/services/MP/BWCTL</code>

At the bottom of the dialog box are three buttons: "Check all", "Cancel", and "Select".

rate

First results from LHCONE VRF monitoring web UI



perfSONAR web user interface - Mozilla Firefox

File Edit View History Bookmarks Tools Help

psui-lhccone.geant.net:8080/perfsonar-ui/

Most Visited Le Monde.fr: Actualité... Rhône - Le Progrès Live Traffic Google Traduction perfSONAR web user i... perfSONAR web user i... perfSONAR web user i...

perfSONAR MDM
WEB USER INTERFACE

<< < > >>

From: 19/Sep/2012 - 23:05

To: 20/Sep/2012 - 11:05

hour 6 hours day week

Access

Access utilization data

Access one way delay, jitter, loss and traceroute data

Access available throughput historical data

Make available throughput measurement

Make one-way latency measurement

Analyse

Settings

GÉANT

Pick source: GARR-LHCONE Protocol: TCP UDP Address type: IPv4 IPv6 Test duration (s): 30

Pick destination: DFN-LHCONE TCP Window size (bytes): Reporting interval (s): 6

Perform test Swap endpoints Type of Service bits:

Interval measurements Average measurement

Interval	Transferred	Throughput
0s - 6s	599.9 MB (629,040,672 B)	838.7 Mbps (838,720,896 bps)
6s - 12s	635.9 MB (666,799,272 B)	889.1 Mbps (889,065,696 bps)
12s - 18s	635.9 MB (666,761,064 B)	889 Mbps (889,014,752 bps)
18s - 24s	635.8 MB (666,725,504 B)	889 Mbps (888,967,339 bps)
24s - 30s	635.7 MB (666,625,760 B)	888.8 Mbps (888,834,347 bps)
Average	3.1 GB (3,296,854,016 B)	878.7 Mbps (878,735,997 bps)

**Training event for LHCONE NRENs/sites
part of the VRF**

- First training event for sites/NRENs in the LHCONE VRF.
- Info: <http://www.terena.org/activities/training/perfsonar/ws4/>
- Focus on creating a live monitoring environment based on perfSONAR MDM
- The course will also explain how to access measurements from a web-interface
- Training objectives:
 - configuring perfSONAR MDM to create a real monitoring environment.
 - configuring of all the components required for the interoperability with perfSONAR PS and other deployments.
- It will include practical exercises, live, on-demand and scheduled measurements
- Date: Targeting **Autumn 2012, date to be confirmed soon.**

**perfSONAR web UI:
The new path analysis feature**

- New perfSONAR web interface for LHC:
 - <http://psui-lhc.grid.aau.dk/perfsonar-ui/>
 - Same credentials (username is perfsonar)
- Added path analysis
- Added OWAMP on-demand measurement
- In progress: retrieving OWAMP data from the perfSONAR PS OWAMP archives from this UI

- New functionality added to the perfSONAR User Interface
- Based on RRD-MA statistics
- Analyse IP paths
 - Hop by hop
 - Visualising link utilisation and error stats
 - Identifying immediately any bottleneck or drop
- Min/Max/Average inbound and outbound utilisation displayed
- How does it work:
 1. Copy and paste a traceroute output in a web text area
 2. Click on the analyse button
 3. The analysis tool will look for the statistics for the router interfaces along the way, reporting and graphing them

Path analysis screenshot



perfsONAR web user interface - Mozilla Firefox

psui.grid.aau.dk/perfsonar-ui/

perfsONAR MDM WEB USER INTERFACE

Analyze

```
1 ge0-vlan91.rt1.ams.nl.geant2.net (62.40.123.161) 0.390 ms 0.334 ms 0.336 ms
2 so-2-0-0.rt1.fra.de.geant2.net (62.40.112.9) 7.129 ms 7.120 ms 7.130 ms
3 so-5-0-0.rt1.gen.ch.geant2.net (62.40.112.162) 15.070 ms 15.094 ms 15.028 ms
4 as0.rt1.mad.es.geant2.net (62.40.112.26) 37.168 ms 37.345 ms 37.560 ms
```

Hop	Address	Hostname	Interface Name	Description	Capacity	Max inbound utilization	Avg inbound utilization	Max outbound utilization	Avg outbound utilization
1	62.40.123.161	ge0-vlan91.rt1.ams.nl.geant2.net	-	-	-	-	-	-	-
2	62.40.112.9	so-2-0-0.rt1.fra.de.geant2.net	so-2/0/0.0	Link (L) to NL-GN 40g	39.81 Gbps	11.05 Gbps 27.7%	4.57 Gbps 11.5%	4.07 Gbps 10.2%	2.61 Gbps 6.5%
3	62.40.112.162	so-5-0-0.rt1.gen.ch.geant2.net	so-5/0/0.0	Link (L) to DE-GN 40G	39.81 Gbps	12.26 Gbps 30.8%	6.86 Gbps 17.2%	12.87 Gbps 32.3%	8.32 Gbps 20.9%
4	62.40.112.26	as0.rt1.mad.es.geant2.net	-	-	-	-	-	-	-

From: 16/Aug/2012 - 04:31
To: 16/Aug/2012 - 10:31

hour 6 hours day week

Analyze

Analyze path segments

Access

Settings

**perfSONAR web UI:
On-demand one-way delay measurement**

On-demand one-way delay measurement (OWAMP)



- New functionality added to the perfSONAR User Interface
- A MP has been built around OWAMP enabling
 - Successful interaction with perfSONAR PS
 - On-demand one-way delay measurement from the web interface
- Interoperable with Internet2/ESnet perfSONAR PS Measurement Points
- Tests are fully configurable:
 - Number of packets
 - Wait time and start delay
 - Timeout
 - Packet Size

On-demand one-way delay measurement screenshot



perfSONAR web user interface - Mozilla Firefox

File Edit View History Bookmarks Tools Help

perfSONAR web user interface

psui-lhc.grid.aau.dk/perfsonar-ui/

perfoNAR^{MDM} WEB USER INTERFACE

Pick source: OWAMP-Test Packet count: 10

Pick destination: ES-PIC more options

Perform test Swap endpoints

Measurement summary

Min packet delay	24.19 ms (0.024192999815568328 s)	Max est. error (±)	0.47 ms
Max packet delay	24.25 ms (0.02425400004722178 s)	Sent packets	10
Min TTL	243	Lost packets	0
Max TTL	243	Duplicate packets	0

From: 20/Sep/2012 - 02:18

To: 20/Sep/2012 - 14:18

hour 6 hours day week

Access

- Access utilization data
- Access one way delay, jitter, loss and traceroute data
- Access available throughput historical data
- Make available throughput measurement
- Make one-way latency measurement

Analyse

Settings

Sequence number	0	1	2	3	4	5	6	7	8	9
Packet delay	24.25 ms	24.20 ms	24.22 ms	24.21 ms	24.20 ms	24.20 ms	24.19 ms	24.20 ms	24.22 ms	24.23 ms
Estimated error	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms	0.47 ms

GÉANT

rate

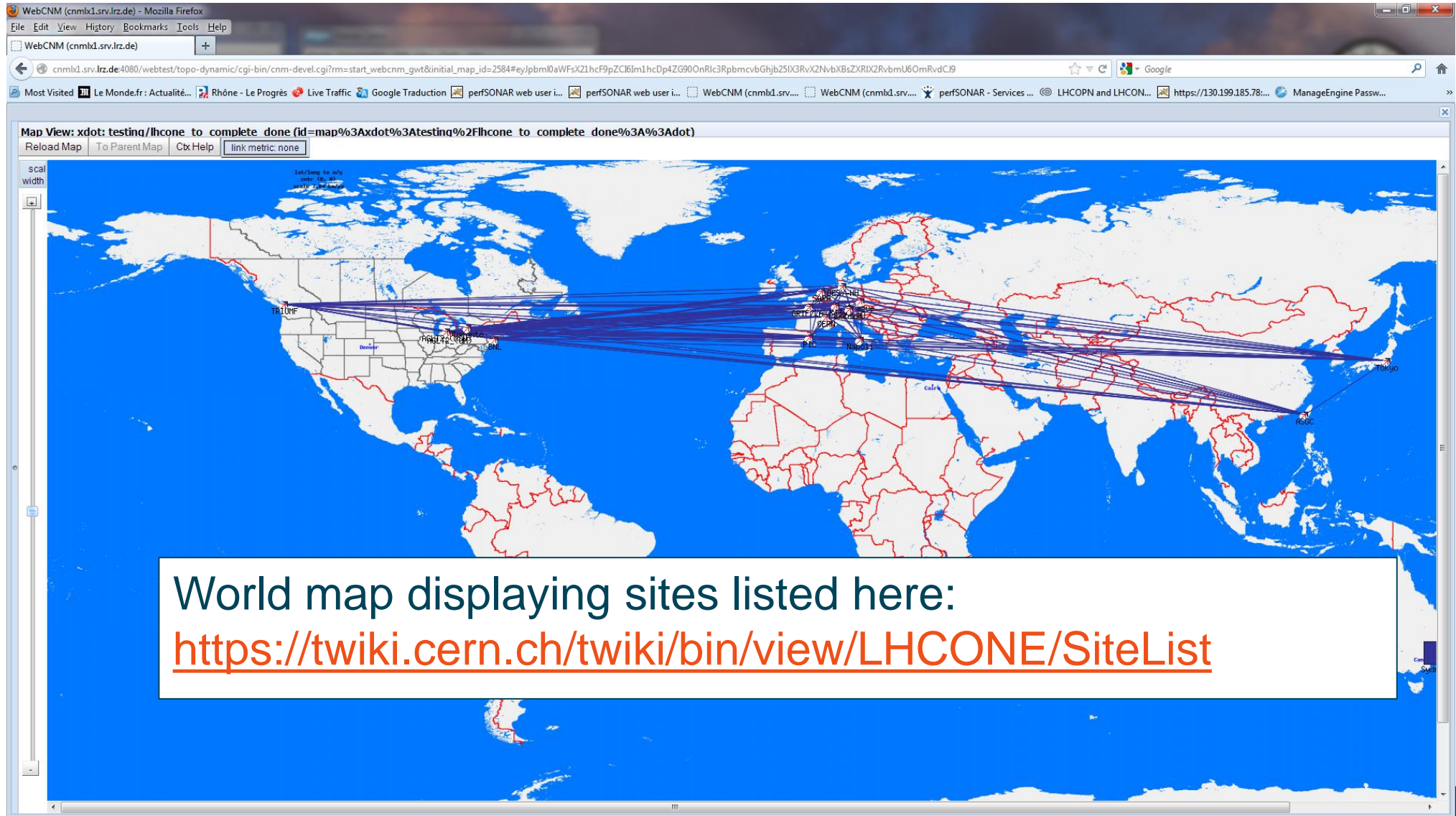
**perfSONAR MDM weathermap for LHCONE
(Interoperability use case)**

New weathermap for LHCONE online now!



- New LHCONE weathermap
- <http://tiny.cc/lhconemap>
 - Credentials: webcnm_lhcopn with password: Txc5,Mb5
- World map displaying sites listed here:
<https://twiki.cern.ch/twiki/bin/view/LHCONE/SiteList>
- It can retrieve data from both HADES and OWAMP archives
- Complete interoperability perfSONAR MDM/PS
- Previous version for LHCOPN is still working and reachable here:
- <http://tiny.cc/lhcopn>
 - Same credentials (webcnm_lhcopn)

LHCONE weather-map displaying live active measurements



World map displaying sites listed here:

<https://twiki.cern.ch/twiki/bin/view/LHCONE/SiteList>

It is possible to zoom in...



WebCNM (cnmlx1.srv.lrz.de) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

WebCNM (cnmlx1.srv.lrz.de)

cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/cgi-bin/cnm-devel.cgi?rm=start_webcnm_gwt&initial_map_id=2584&initial_metri

Most Visited Le Monde.fr: Actualité... Rhône - Le Progrès Live Traffic Google Traduction perfSONAR web user i... perfSONAR web user i... perfSONAR web user i...

Map View: xdot: testing/lhcone core (id=map:xdot:testing/lhcone core::dot)

Reload Map To Parent Map Ctx Help link metric: OWAMP delay max

scal width

The map displays a network topology over North America. A red line outlines the continent. Numerous black lines represent network paths connecting various nodes. A legend on the right indicates the maximum OWAMP delay for these paths, color-coded as follows:

- 0 - 200 ms (Green)
- 200 - 398 ms (Yellow)
- 398 - 1e+04 ms (Pink)
- unknown (Blue)

(Thu Sep 20 13:55:30 2012)

Denver

cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/c...age_type_id=4&server_topmap_cared_list=true#

Clicking on any site it is possible to get detailed information (Ex. BNL)



WebCNM (cnmlx1.srv.lrz.de) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

WebCNM (cnmlx1.srv.lrz.de)

cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/cgi-bin/cnm-devel.cgi?rm=start_webcnm_gwt&initial_map_id=2584&initial_metri

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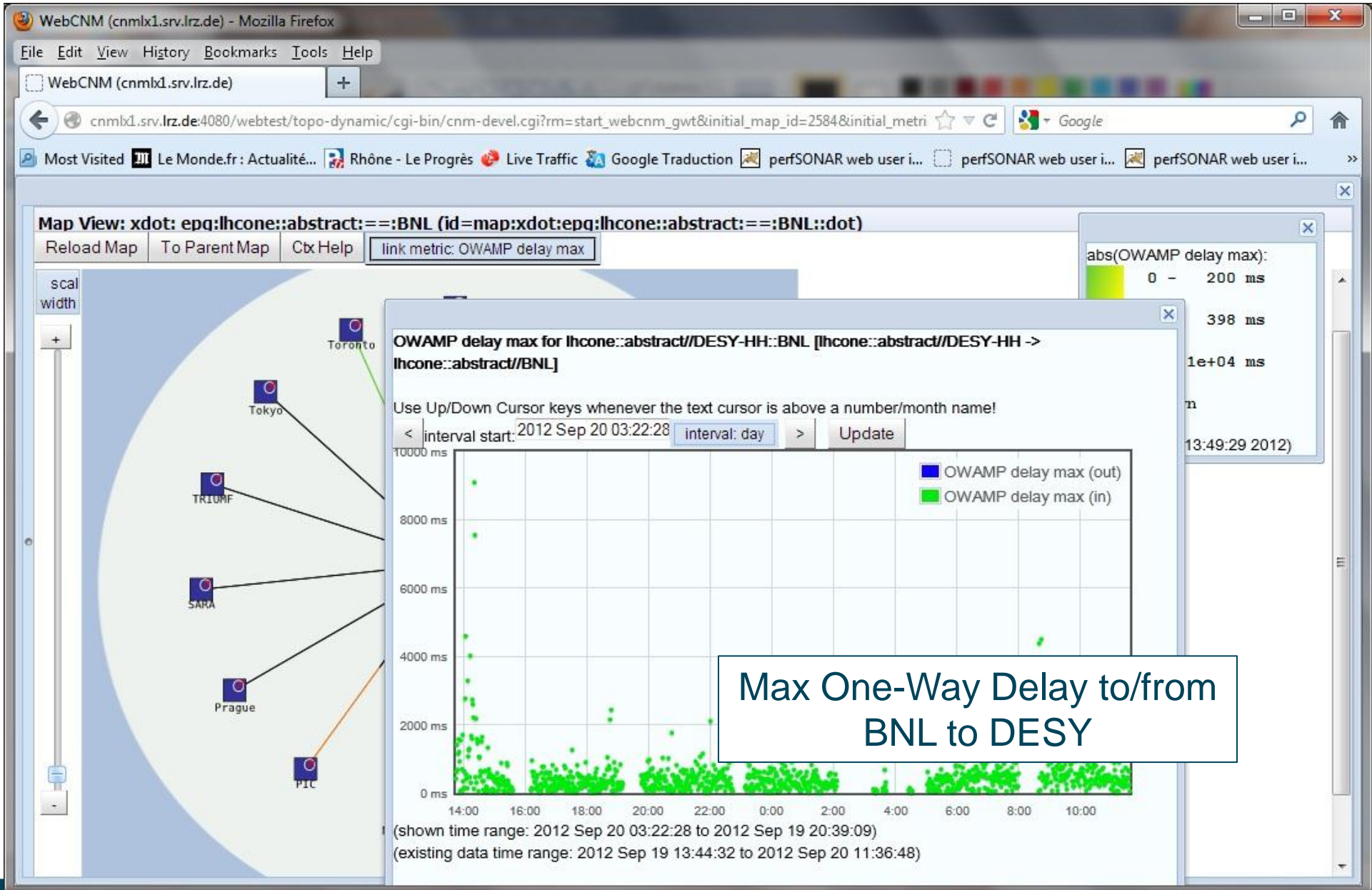
Map View

Reload Map To Parent Map Ctx Help link metric: none

scal width

The network topology map displays a central node labeled "BNL" (represented by a blue square with a red circle) connected to 15 peripheral nodes. Each peripheral node is represented by a blue square with a red circle and a label. The nodes are arranged in a circular pattern around the central node. The labels for the peripheral nodes are: Toronto, AGLT2 (MSU), AGLT2 (UM), ASGC, CERN, DESY-HH, GRIFF/LAL, KIT, LRZ-EMU, Napoli, PIC, Prague, SARA, TRIUMF, and Tokyo. The map is displayed within a browser window with a vertical scrollbar on the right and a zoom control on the left.

Clicking on any link it is possible to access the measurements



Details of the interoperability: perfSONAR MDM and PS connected



WebCNM (cnmlx1.srv.lrz.de) - Mozilla Firefox (Private Browsing)

File Edit View History Bookmarks Tools Help

WebCNM (cnmlx1.srv.lrz.de) WebCNM (cnmlx1.srv.lrz.de) webcnm20120405-4-lhcopn-stat-link...

http://cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/cgi-bin/cnm-devel.cgi?rm=start_webcnm_gwt&initial_map_id=2584&initial_m

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Map Tree View

Full Map Hierarchy

Expand All Collapse All

Name

- Core Access Points of GEANT (European Education and Research Ba
- Topology of lhcopn_abstract
- Topology of lhcopn_abstract (map2012)
- Topology of owmap md topo : owamp_i2_dice

Map View

Reload Map To Parent Map Ctx Help link metric: OWAMP delay max

scale width

abs(OWAMP delay max):

- 0 - 200 ms
- 200 - 398 ms
- 398 - 1e+04 ms
- unknown

(Tue May 1 16:27:32 2012)

I2 Node with PS

GÉANT Node with MDM

Traceroute View

LHCOPN weather map integration 19 perfSONAR parameters available



WebCNM (cnmlx1.srv.lrz.de) - Mozilla Firefox

The Multi-Domain Service Desk (MD... x) perfSONAR web user interface x New Tab x WebCNM (cnmlx1.srv.lrz.de) x +

http://cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/cgi-bin/cnm-devel.cgi?rm=start_webcnm_gwt&initial_map_ Google

Most Visited Le Monde.fr : Actualité... Rhône - Le Progrès Live Traffic perfSONAR web user i... perfSONAR web user i... WebCNM (cnmlx1.srv.l...

Map View

Reload Map Link Metric Selection current selected metric: Hades one_way_delay med (Mon Jan 30 03:06:23 2012)

scale width none

LHC Experiments Key

- LHCb
- CMS
- Alice
- ATLAS

Weathermap Key

- warning
- up
- down

CH-CERN

US-T1-BNL

US-FNAL-CMS

FR-CCIN2P3

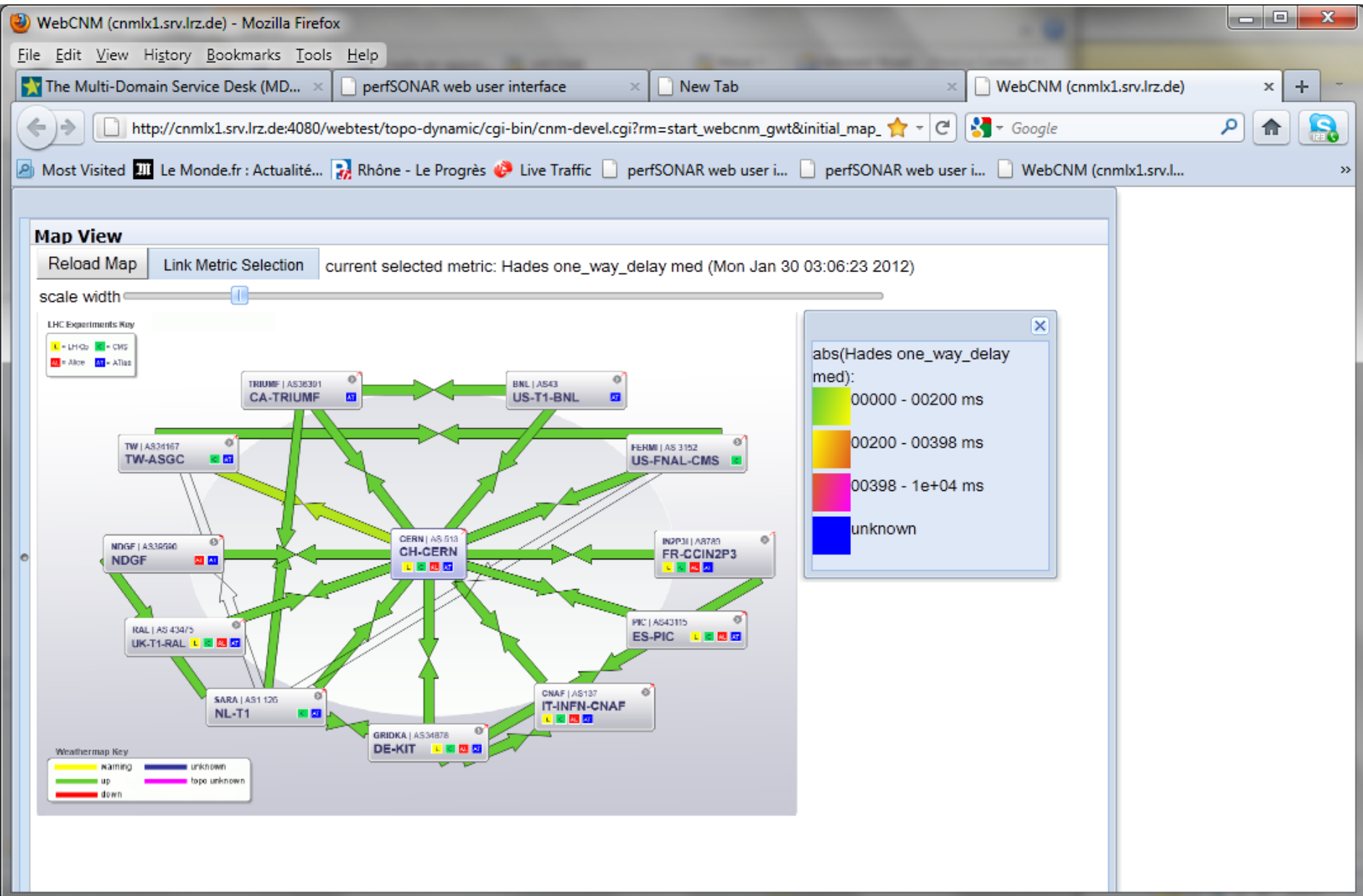
ES-PIC

IT-INFN-CNAF

abs(Hades one_way_delay med):

- 00000 - 00200 ms
- 00200 - 00398 ms
- 00398 - 1e+04 ms
- unknown

Weather map examples (One-way delay)



Example: Selecting one-way delay metric and clicking on a link



WebCNM (cnmlx1.srv.lrz.de) - Mozilla Firefox (Private Browsing)

File Edit View History Bookmarks Tools Help

WebCNM (cnmlx1.srv.lrz.de) x WebCNM (cnmlx1.srv.lrz.de) x webcnm20120405-4-lhcopn-stat-link... x +

http://cnmlx1.srv.lrz.de:4080/webtest/topo-dynamic/cgi-bin/cnm-devel.cgi?rm=start_webcnm_gwt&initial_map_id=2584&initial_m... noms de les nations

Most Visited Le Monde.fr : Actualité... Rhône - Le Progrès Live Traffic perfSONAR web user i... perfSONAR web user i... WebCNM (cnmlx1.srv.l... WebCNM (cnmlx1.srv.l...

Map Tree View

Full Map Hierarchy

Expand All Collapse All

Name

- Core Access Points of GEANT (European Educatio
- Topology of lhcopn_abstract
- Topology of lhcopn_abstract (map2012)
- Topology of owmap md topo : owamp_i2_dice

Map View

Reload Map To Parent Map Ctx Help link metric: Hades one_way_delay med

scale LHC Experiments: Key

Hades one_way_delay med for lhcopn_abstract//CH-CERN::US-T1-BNL [lhcopn_abstract//CH-CERN -> lhcopn_abstract//US-T1-BNL]

Use Up/Down Cursor keys whenever the text cursor is above a number/month name!

interval start: 2012 Feb 27 03:00:0 interval: day Update

(shown time range: 2012 Feb 27 03:00:00 to 2012 Feb 28 03:00:00)
(existing data time range: 2012 Feb 27 03:00:00 to 2012 Feb 27 15:20:00)

Traceroute View

abs(Hades one_way_delay med):

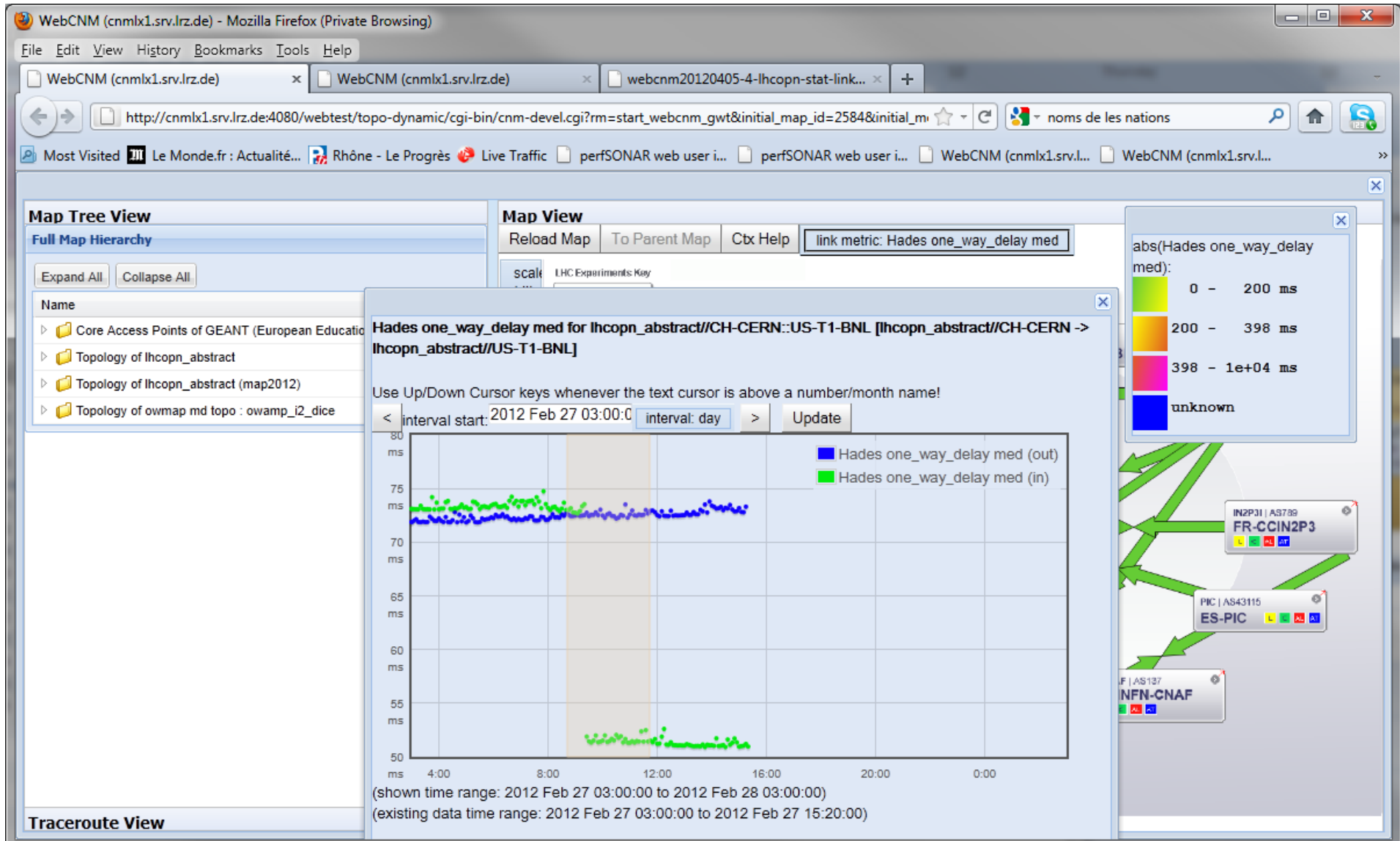
- 0 - 200 ms
- 200 - 398 ms
- 398 - 1e+04 ms
- unknown

IN2P3 | AS788
FR-CCIN2P3

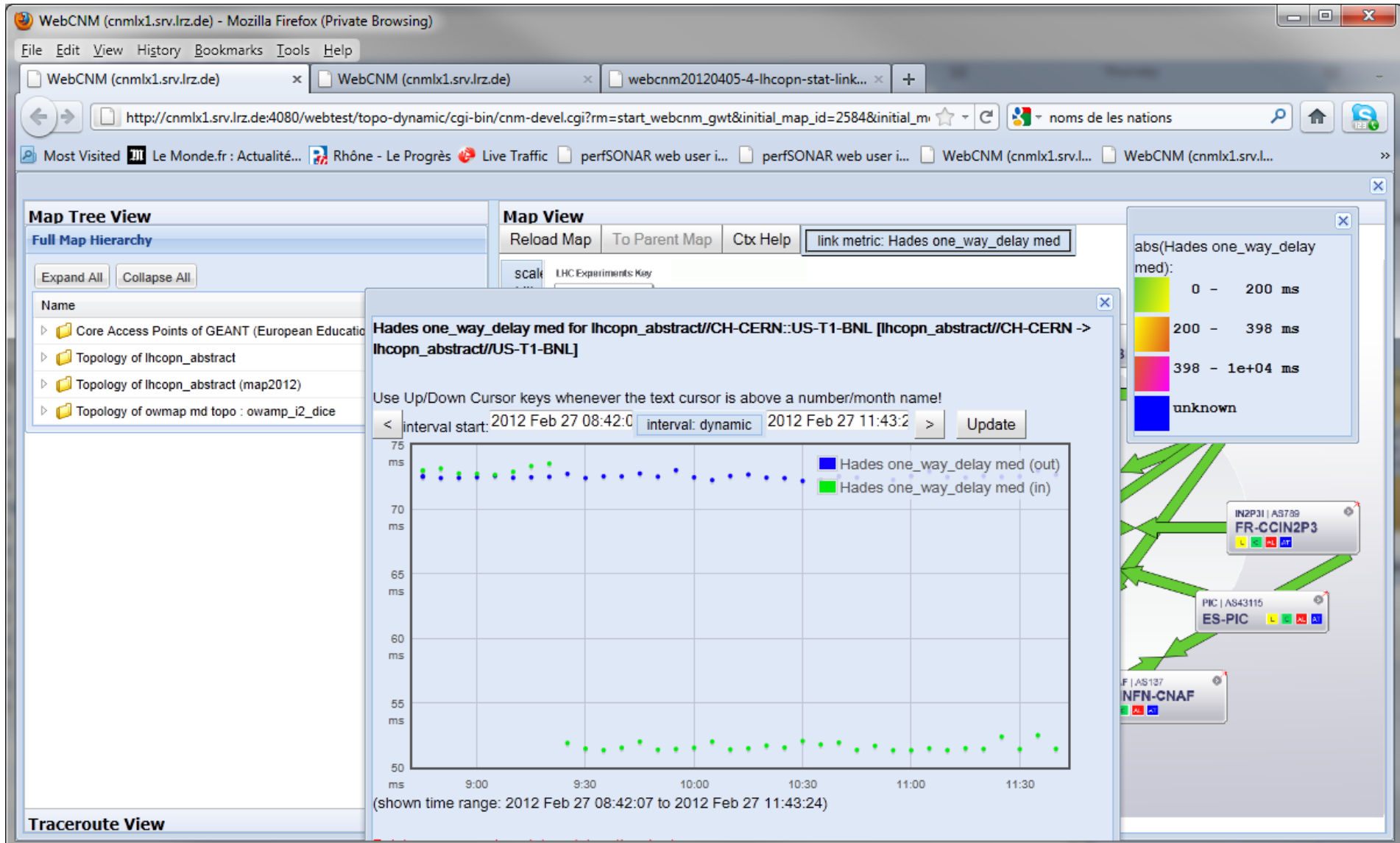
PIC | AS43115
ES-PIC

INFN-CNAF

It is possible to select an area to magnify for further inspection

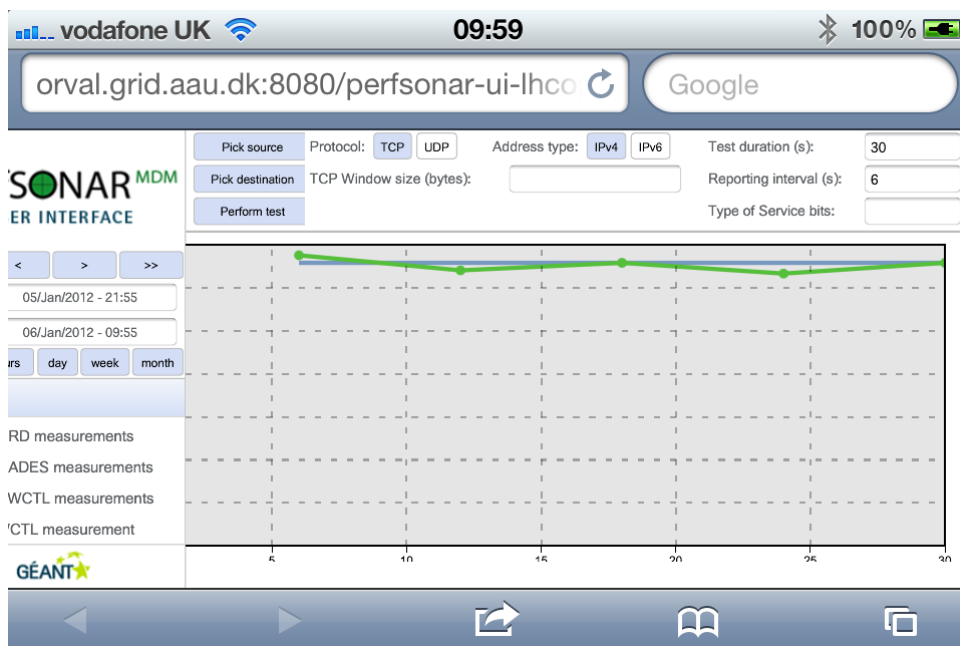


The OWD results after having magnified the area



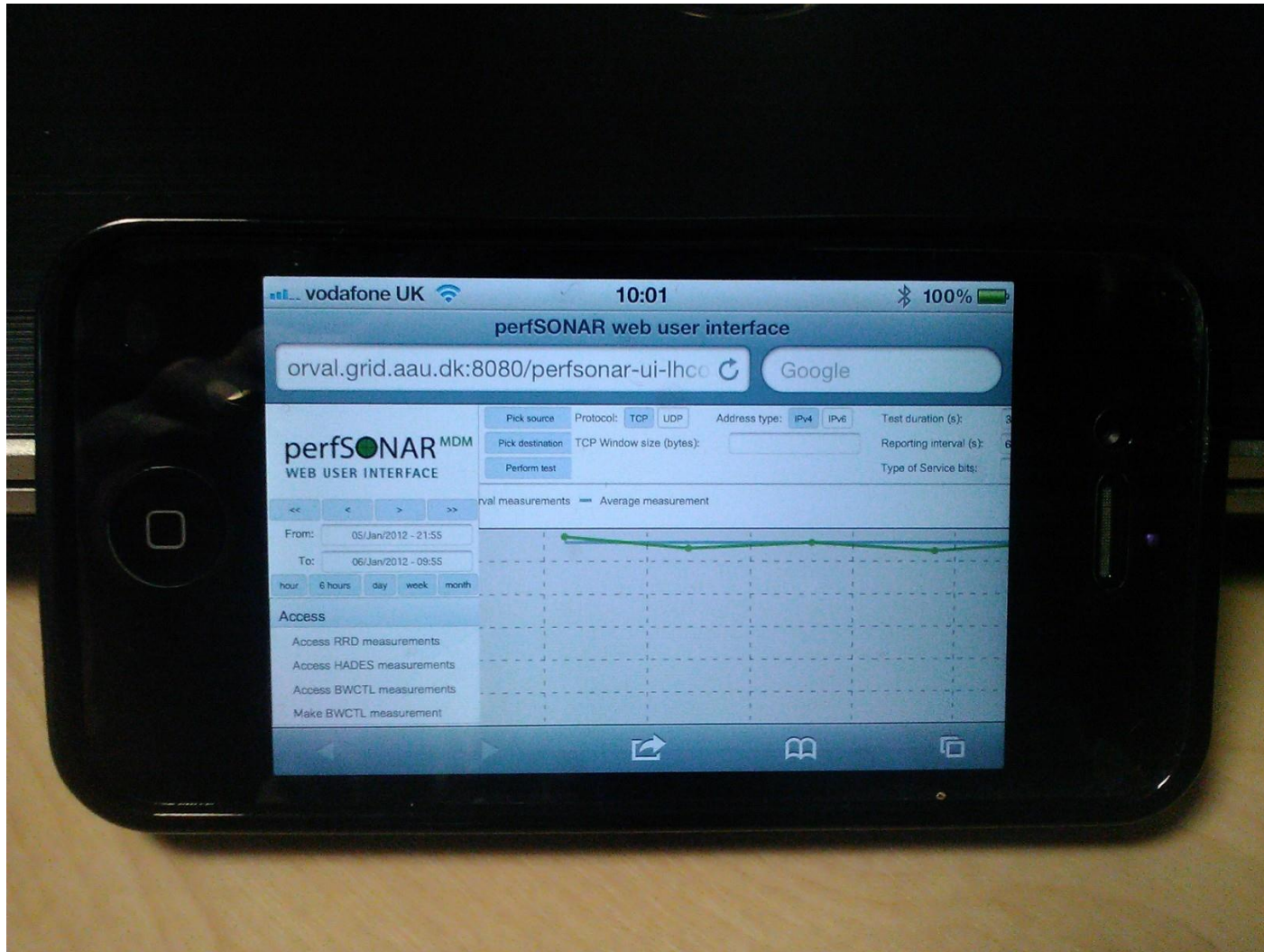
Coming soon: perfSONAR UI App

The present: Interface accessible from mobile devices



The interface on a smartphone (Apple iPhone)

Current interface enabling troubleshooting on the move



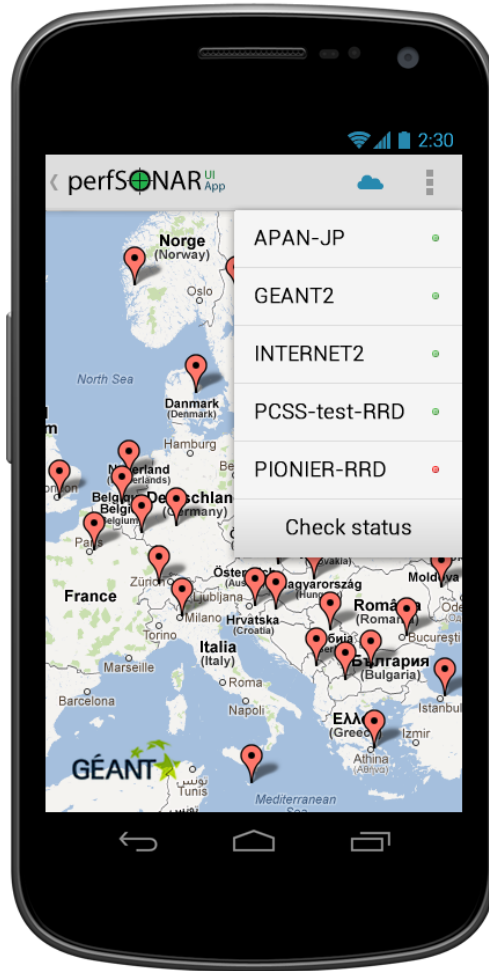
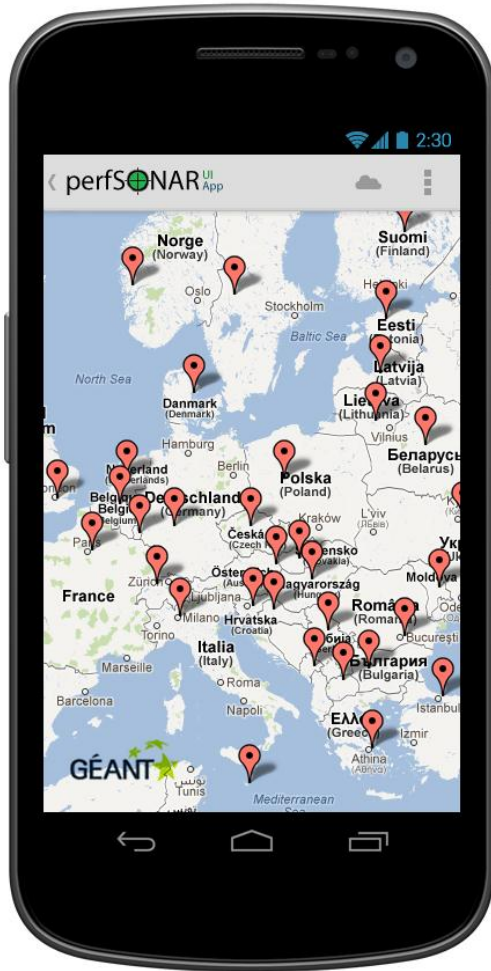
The result of an on-demand Bandwidth test run from an iPhone

The future: perfSONAR UI App



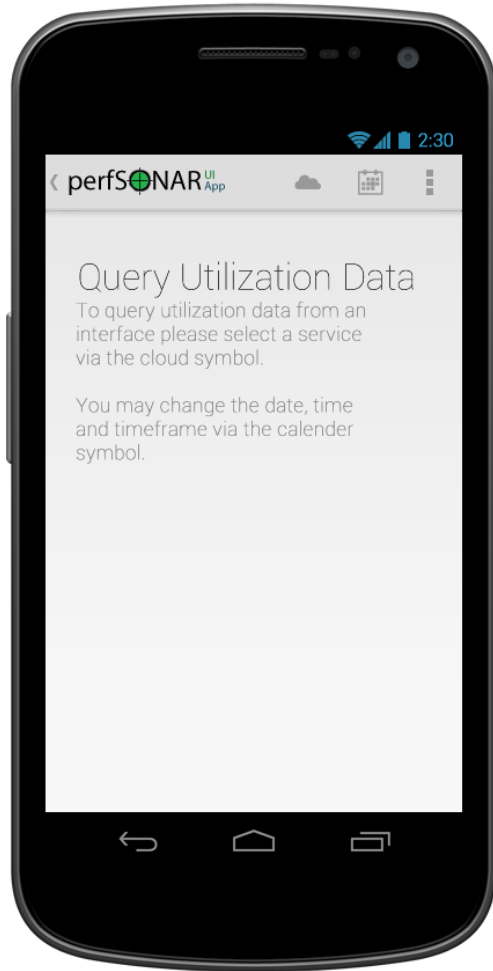
- Targeting mobile users
- Joint GÉANT/Esnet project (in collaboration with FH Luebeck) to develop a native iOS/Android mobile App
 - September 2012 till January 2013
 - Interest in showing LHCONE data:
- Allowing them to get an overview of the network performance
 - With an easy to use interface
 - Created for the features of their devices
- Next slides are showing screenshots from our first mock-up/prototype

perfSONAR UI App: Example Map View



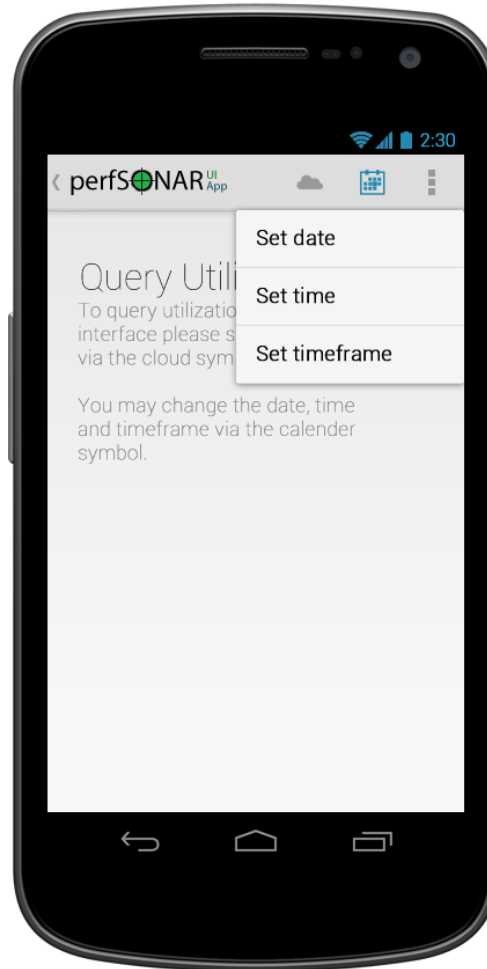
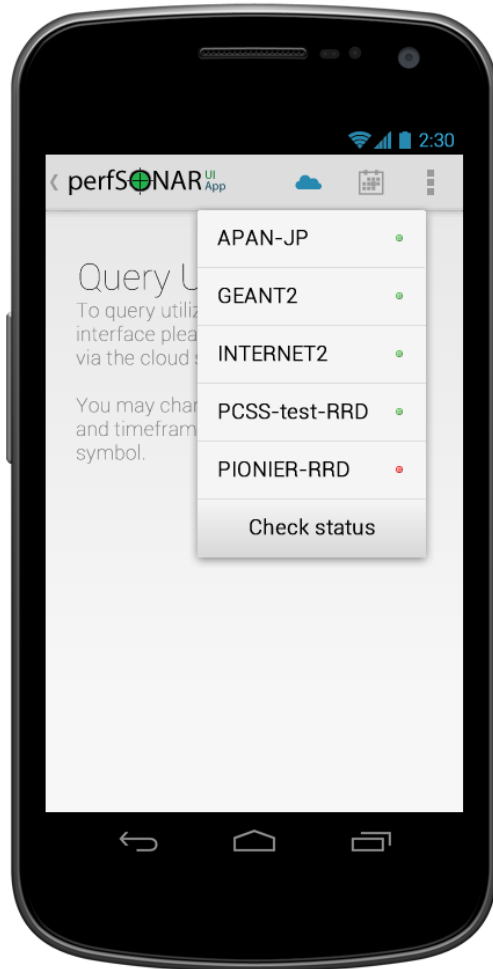
- Map View
 - Check service availability
 - Display interfaces
- Feasibility pending
 - Connection status
 - Detailed status

perfsonarUI App: Example Metric Query



- Query data
 - Direct access to detailed data
- Access a multitude of data
 - Utilization data
 - Delay, jitter, loss, traceroute
 - Historical throughput data

perfonarUI App: Example Configuration



- Set service
 - Quickly accessible
 - Check service availability
- Set region of interest
 - Set date
 - Set time
 - Set timeframe

perfsonarUI App: Example of Access to Utilization Data



- List of interfaces
 - Quick view list
 - Easy to browse
- Detailed information
 - Basic data
 - Inbound / Outbound Utilization data
 - Interactive graph
 - Fullscreen graph in landscape mode

perfSONAR MDM website: <http://perfsonar.geant.net>



Home page - Windows Internet Explorer

http://www.geant.net/service/perfsonar/pages/home.aspx

File Edit View Favorites Tools Help

Home page

SEARCH advanced search

perSONAR^{MDM}
PART OF THE GÉANT SERVICES PORTFOLIO

ABOUT perSONAR | USER EXPERIENCE | FAQs | RESOURCES | CONTACT US | ABOUT US

Part of the GÉANT Services Portfolio Monday 23 May 2011 | Time - 10:57

NREN NOC & PERT engineers
Find out how perSONAR can make your life easier.

Do you work for an NREN?
Find out more about how perSONAR can help you.

Are you a researcher, scientist or student?
Find out how perSONAR monitoring can improve your network performance.

perSONAR MDM
The multi-domain monitoring service for the GÉANT Service Area enabling NREN NOCs and PERTs to collaborate in providing seamless network performance for their network users.

Join the pilot phase for perSONAR MDM - the only tool for network monitoring across multiple domains! perSONAR MDM is currently in a pilot phase that will last until June, with the production service planned for the autumn. DANTE and several NRENS across the GÉANT Service Area are implementing the perSONAR MDM service for their NOCs. More NRENS are invited to join the pilot - find out how by contacting the perSONAR team.

perSONAR Resources
| Manuals | Guides | Training | Downloads | Bug Tracking |
click here to find out more

Deployment Status : March 2011

perSONAR Updates

Follow perSONAR on Twitter!

perSONAR developers can get their hands on the latest code at **GÉANT Forge**

The first perSONAR **User Panel** meeting will meet at TNC for users to give feedback and look at new features.

perSONAR now uses the Agile/Scrum development model to ensure a more rapid development process

GÉANT News

18 May | 2011

Russian Research Collaboration advances through high speed network connection

Link between GÉANT and new Russian Point of Presence brings together millions of researchers

GÉANT Media Centre

Goals:

- Single point of access for perSONAR
- Contact points, FAQs, resources & downloads, and support
- **Host news and success stories from Users**

• communicate • collaborate

perfSONAR Twitter



Weekly tweets

Messages re-tweeted by other sister networks and organisations

Growing community of followers around the world

@perfSONAR MDM

ct • communicate • collaborate

perfSONAR MDM. Be part of it.



Follow perfSONAR at:

<http://twitter.com/#!/perfSONARMDM>

- Website: <http://perfsonar.geant.net>
- Twitter: @perfSONARMDM
- Info: domenico.vicinanza@dante.net

Extra slides for questions



Why multi-domain monitoring?



- Collaboration in R&E is becoming increasingly international:
 - Sharing experiences
 - Offering remote access to unique resources
 - Creating virtual stages for artistic events

In a way which is unimaginable only a few years ago!



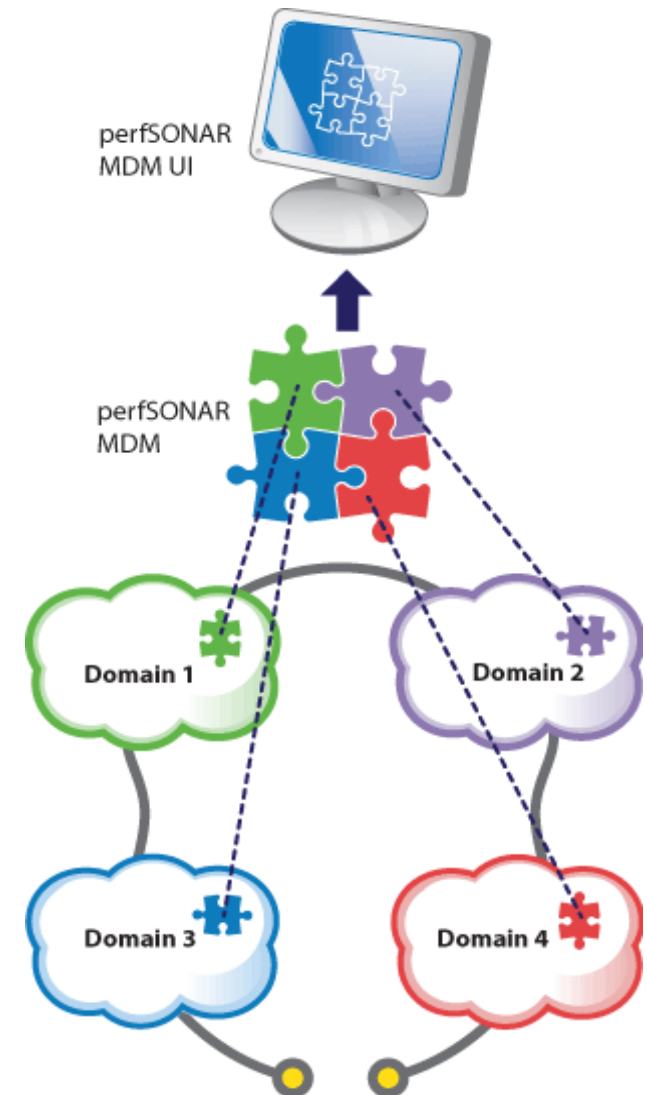
GÉANT launch event performance:
Musicians in Stockholm
Dancers in Kuala Lumpur

<http://www.geant.net/Events/LaunchEvent/Pages/EventHighlights-Day1.aspx>

Collaboration + brilliant performances: effective monitoring



- Collaboration requires effective coordinated network operations
- Effective operations require proper **network troubleshooting** at an international scale
- The solution: perfSONAR
 - Gathering information from different network domains and building a global picture
- Two main implementations committed to interoperate:
 - perfSONAR MDM within GÉANT:
<http://perfsonar.geant.net>
 - perfSONAR PS within I2/ESnet:
<http://psps.perfsonar.net/>



What is perfSONAR MDM?



- perfSONAR MDM (Multi-Domain-Monitoring) is the multi-domain monitoring service part of the GEANT portfolio
- Based on the perfSONAR protocol
 - Interoperable with hundreds of deployments around the world
- Suitable for NRENs, research projects, international collaborations
- With dedicated support from the GÉANT MultiDomain Service Desk



(from the perfsonar.geant.net website)

perfSONAR

NREN NOC
& PERT engineers

Find out how perfSONAR can
make your life easier.

(from the perfsonar.geant.net website)

A new perfSONAR MDM: Compatible, open, interoperable



- Actively working with the user community
 - Using **direct user feedback** to keep meeting their expectations
 - perfSONAR **User Panel** to gather requirements and steer development
- **Simplifying** installation procedure
 - RPMs and DEB packages available
 - Pre-installed, ready to use, Virtual Machines available
 - *Currently working on perfSONAR-take-away (live distribution on a USB stick)*
- Revised documentation (lightweight and modular)
- **Interoperable with perfSONAR-PS**
- Successful use-cases: <http://bit.ly/pdJJlf>, <http://bit.ly/pc5sZO>,

Similarities: both perfSONAR PS and MDM

- use the perfSONAR protocol to exchange data
- both share the same overall design goals

But they have different

- Software development process, product life cycles, interaction with the users
- implementation and deployment models

Summarising:

- perfSONAR MDM is designed to provide a service, with federated deployment, centrally monitored and coordinated, and full support.
- perfSONAR PS has a distributed support model with the goal of proliferating the number of performance nodes deployed across the community.

How does perfSONAR work?



- PerfSONAR operates by installing measurement points (MPs) across the networks.
- The MP is a small server (or virtual server) connected to a suitable network interface in the Point of Presence
- Each MP runs the perfSONAR software to measure the following metrics:
 - Available Bandwidth
 - One Way Delay
 - Jitter (One Way Delay variation)
 - Route Tracing
- At any time, network engineers can access the PerfSONAR MDM web interface to
 - Inspect measurements regularly scheduled between any two MPs
 - Request a variety of ad hoc measurements.

perfSONAR MDM adoption



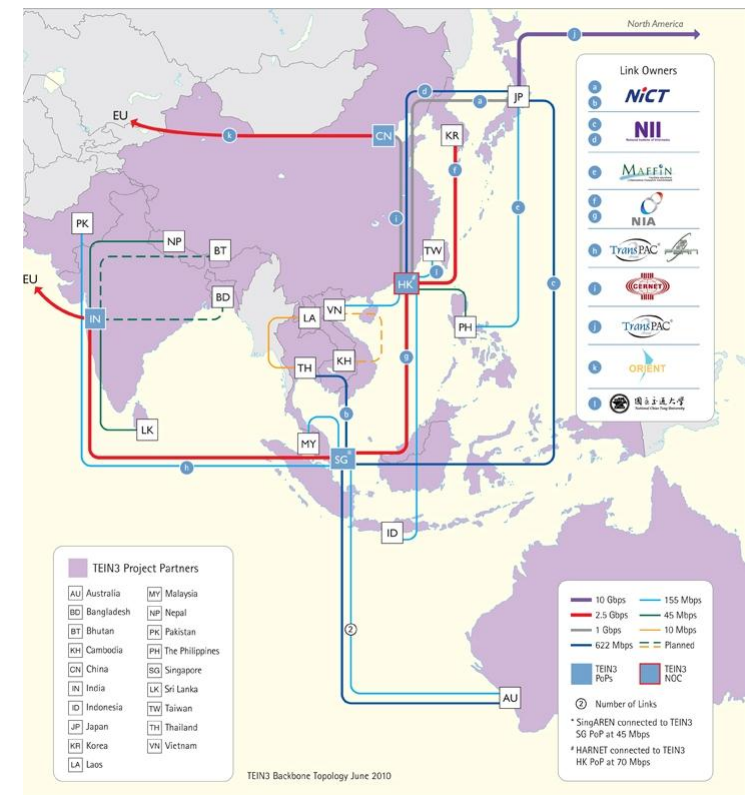
- 13 NRENs (+GEANT Backbone) evaluating/implementing the perfSONAR MDM service for their NOC/PERT engineers.
- Second group of 8 NRENs now targeted → More NRENs will join the pilot
- Liaising with other communities outside EU:
 - TEIN, RedCLARA, GISELA, ...



perfSONAR MDM deployment in Asia/Pacific



- Within the TEIN3 project
 - three PoPs are going to be instrumented with perfSONAR MDM
- Hardware has been already installed in three locations:
 - Singapore
 - Hong Kong (under deployment)
 - Beijing (deployment finished)
- perfSONAR software is currently being installed in the three locations.



The interoperability with perfSONAR PS?



- perfSONAR MDM servers are being equipped with everything needed for the perfSONAR PS interoperability
- perfSONAR user interface is able to interact with either perfSONAR MDM and PS measurement points
- perfSONAR weathermap is already able to retrieve data from OWAMP archives
- Currently working on retrieving OWAMP archives data from the web UI
 - Retrieving and displaying measurements from any MP in the world



Interoperability with perfSONAR PS



- 43 measurement points in the **GÉANT** service area
- 8 measurement points in **ESnet**
- 9 measurement points in **Internet2**
- Measurements between perfSONAR MDM and PS from the same interface
 - **Towards a full interoperability with perfSONAR-PS**

The list is loaded from <https://forge.geant.net/forge/download/attachments/491888/MA.conf>
Select MA(s)

Use	Measurement arch...	URL	Schema	Status	Status explanation
<input type="checkbox"/>	GEANT_Prague	http://mp1.pra.cz.g... bwctl		?	?
<input type="checkbox"/>	GEANT_Riga	http://mp1.rig.lv.ge... bwctl		?	?
<input type="checkbox"/>	GEANT_Sofia	http://mp1.sof.bg.g... bwctl		?	?
<input type="checkbox"/>	GEANT_Talin	http://mp1.tal.ee.g... bwctl		?	?
<input type="checkbox"/>	GEANT_Vienna	http://bmp1.vie.at... bwctl		?	?
<input type="checkbox"/>	ESnet-Upton_NY_USA	http://bnl-pt1.es.ne... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Batavia_IL_USA	http://fnal-pt1.es.n... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Palo_Alto_CA...	http://slac-pt1.es.n... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Washington_...	http://wash-pt1.es... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-New_York_N...	http://newy-pt1.es... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Berkeley_CA...	http://lbl-pt1.es.net... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Chicago_IL...	http://chic-pt1.es.n... bwctl_destination		?	?
<input type="checkbox"/>	ESnet-Houston_TX...	http://hous-pt1.es... bwctl_destination		?	?
<input type="checkbox"/>	INTERNET2_Atlanta...	http://64.57.16.66... bwctl_destination		?	?
<input type="checkbox"/>	INTERNET2_Chicag...	http://64.57.17.2:4... bwctl_destination		?	?
<input type="checkbox"/>	INTERNET2_Housto...	http://64.57.16.13... bwctl_destination		?	?

URL:
Name: Schema:
Event type: Supported event types:

Service status | Load | Save | New | Remove

**perfSONAR MDM monitoring components
and the new web user interface**

- **Purpose:**

- Monitor link utilisation, input errors, packet drops
- Provide access to historical measurements

- **Strategy:**

- Query router interfaces using SNMP from a perfSONAR server
- Store data into RRD files
 - *made accessible through web-service*

RRD-MA User Interface (web version)



Firefox | perfSONAR web user interface | http://orval.grid.aau.dk:8080/perfsonar-ui/ | Google | Bookmarks

perfSONAR MDM
WEB USER INTERFACE

Navigation: << < > >>

From: 07/Oct/2011 - 14:59
To: 14/Oct/2011 - 14:59

hour 6 day week month

Access

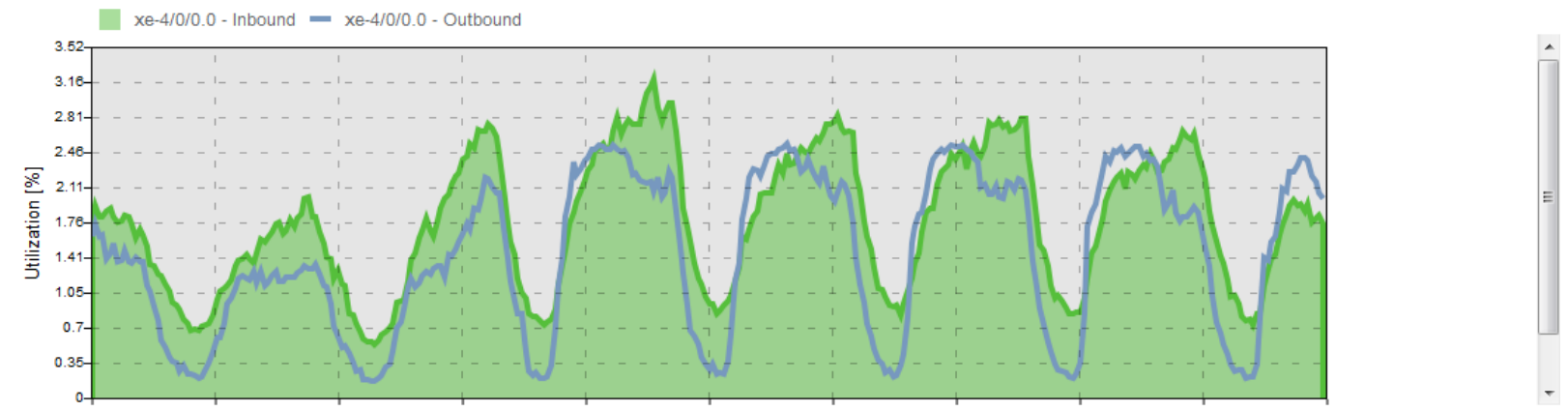
- Access RRD measurements
- Access HADES measurements
- Access BWCTL measurements
- Make BWCTL measurement

Pick service: **GEANT2**

No	Name	Description	Address	Domain	Capacity
1	ge-0/1/0				1 Gbps
2	xe-2/1/0.320	Link to PSNC Backup (Pr:x Id:x)	62.40.124.177		10 Gbps
3	xe-4/0/0.0	Link (L) to LITnet	62.40.125.161		10 Gbps
4	so-7/3/0	Link (DF) to DK-GN2 (Pr:DANTE Id:Cop-Fra)	62.40.112.49		10 Gbps
5	xe-1/1/0.0	Link (L) to GRnet	62.40.124.89		10 Gbps

Interface details for xe-4/0/0.0

Name	xe-4/0/0.0	Status	OK
Description	Link (L) to LITnet	Max inbound utilization	3.2 %
Address	62.40.125.161	Max outbound utilization	2.55 %
Domain		Avg inbound utilization	1.77 %
Capacity	10,000,000,000 bps	Avg outbound utilization	1.44 %



RRD-MA Path analysis using traceroute (web interface)



PerfSONAR UI (Web mock-up)

PerfSONAR UI (Web mock-up) +

http://147.91.4.16:8080/ps/

PerfSONAR

Path source: Discover

Hop	Address	Hostname
1	150.254.162.229	hostname
2	212.191.224.174	hostname
3	212.191.224.234	hostname
4	212.191.224.106	hostname

From:

To:

hour 6 hours day week month

Path destination: Analyze

Analyze path

Analyze path segments

Hop	1	2	3	4	5
Address	150.254.162.229	212.191.224.174	212.191.224.234	212.191.224.106	212.191.224.166
Hostname	hostname	hostname	hostname	hostname	hostname
Interface	ge-1/3/0.10	ge-2/1/0.106	xe-5/1/0.131	ge-2/1/0.102	ge-2/1/0.110
Description	css5 at css10	Radom at poznan-gw1 10GE	Koszalin at poznan-gw1 10GE	Wroclaw at poznan-gw1 10GE	Bydgoszcz at poznan-gw1 10GE
Capacity	1 Gbps	1 Gbps	1 Gbps	10 Gbps	1 Gbps
Inbound utilization (%)	17.76%	43.79%	17.17%	12.6%	17.76%
Outbound utilization (%)	7.71%	47.8%	23.11%	3.38%	7.71%
Input errors	N/A	N/A	0	N/A	N/A
Output drops	N/A	N/A	0	N/A	N/A

Explore

Test

Easy way to track utilisation across a path



- **Purpose:**

- Monitor OWD, jitter, packet loss, traceroute variations
 - *Regularly scheduled*
 - *On demand (to be implemented)*
- Provide access to historical measurements

- **Strategy:**

- Sending 9 packets every minute from pS server (Meas. Point)
 - *Measure OWD, jitter, packet loss and tracking IP route*
- Store data into perfSONAR SQL-MA archive
 - *made accessible through web-service*

HADES User Interface – OWD, jitter packet loss (web version)



HADES User Interface – route comparison (web version)



PerfSONAR UI (Web mock-up)

Service to query: Pick service Fetch data

Pick an endpoint pair to get measurements

FCCN_Lisbon_JRA1 to GEANT_Budapest

Measurement ID : 9559
Packet size : 41
Precedence : 0x0
Interval : 60
Group size : 9

From: FCCN_Aveiro, FCCN_Coimbra, **FCCN_Lisbon_JRA1**, FCCN_Porto, GARR_Bari

To: FCCN_Aveiro, FCCN_Coimbra, FCCN_Porto, **GEANT_Budapest**, GEANT_Geneva

From: 25/May/2011 - 08:13
To: 25/May/2011 - 20:13

hour 6 hours day week month

Analyze path

Explore

- Explore RRD MA service
- Explore HADES MA service
- Explore BWCTL MA service
- Perform BWCTL test

Test

FCCN_Lisbon_JRA1 to GEANT_Budapest

Route 7

1	130.59.35.145	swiEZ2-G4-12.switch.ch
2	130.59.36.205	swiLS2-10GE-1-1.switch.ch
3	130.59.37.1	swiCE2-10GE-1-3.switch.ch
4	62.40.124.21	switch.rt1.gen.ch.geant2.net
5	62.40.122.3	fe1-vlan71.srv3.gen.ch.geant2.net

Route 2

1	212.191.227.33	UNKNOWN
2	62.40.124.181	pioner.rt1.poz.pl.geant2.net
3	62.40.122.61	so-7-1-0.rt1.fra.de.geant2.net
4	62.40.122.162	so-5-0-0.rt1.gen.ch.geant2.net
5	62.40.122.106	switch-lb2-gw.rt1.gen.ch.geant2.net
6	130.59.36.210	swiCE3-10GE-1-4.switch.ch
7	130.59.36.2	swiZH2-10GE-1-1.switch.ch
8	130.59.36.129	swiX1-10GE-1-3.switch.ch
9	130.59.36.170	gn2-bwctl3-eth1.switch.ch

IPDV (ms)

Delay(ms)

Loss/Dups

Simple route comparison

BWCTL-MP/MA (Achievable bandwidth)



- **Purpose:**

- Measure the achievable bandwidth between two MPs
 - *Regularly scheduled and*
 - *on demand (only for NREN NOC/PERT engineers)*
- Provide access to historical measurements

- **Strategy:**

- Run bandwidth test between MPs using a web-service interface to BWCTL
- Display data with graph and store into perfSONAR SQL-MA archive
 - *made accessible through web-service*

Accessing BWCTL Historic Measurements



Each dot is a measurement run. Clicking on the dot a window displays the details

Interval	Transferred	Throughput
0s - 6s	-	86 Mbps (86,047,200 bps)
6s - 12s	-	77.2 Mbps (77,155,200 bps)
12s - 18s	-	103.9 Mbps (103,902,336 bps)

...and getting the results in two clicks from the web interface



perfSONAR web user interface - Mozilla Firefox

http://orval.grid.aau.dk:8080/perfsonar-ui-lhcopn/

perfsONAR MDM
WEB USER INTERFACE

Pick source: CA-TRIUMF
Pick destination: NDGF
Perform test

Protocol: TCP UDP
Address type: IPv4 IPv6
Test duration (s): 30
TCP Window size (bytes):
Reporting interval (s): 6
Type of Service bits:

From: 29/Dec/2011 - 16:33
To: 05/Jan/2012 - 16:33
hour 6 hours day week month

Access
Access RRD measurements
Access HADES measurements
Access BWCTL measurements
Make BWCTL measurement

Interval	Transferred	Throughput
0s - 6s	150.2 MB (157,520,680 B)	210 Mbps (210,027,573 bps)
6s - 12s	673.2 MB (705,879,728 B)	941.2 Mbps (941,172,971 bps)
12s - 18s	673.2 MB (705,901,448 B)	941.2 Mbps (941,201,931 bps)
18s - 24s	673.2 MB (705,875,384 B)	941.2 Mbps (941,167,179 bps)
24s - 30s	673.2 MB (705,901,448 B)	941.2 Mbps (941,201,931 bps)
Average	2.8 GB (3,016,753,152 B)	796.4 Mbps (796,417,452 bps)

GÉANT

rate