

**perfSONAR MDM for LHCOPN/LHCONE:  
partnership, collaboration, interoperability,  
openness**

**Domenico Vicinanza**  
perfSONAR MDM Product Manager

**DANTE**  
*domenico.vicinanza@dante.net*

# A new perfSONAR MDM



- Major restructuring of perfSONAR MDM
- Endorsed by EU NRENs
- Working with NREN NOCs which are actively using it
- Using **direct user** (as LHCOPN) **feedback** and realigning perfSONAR to meet their expectation
  - in a way that is compatible, open, interoperable
- perfSONAR **User Panel** to gather requirements and constantly listen to the user community
- Re-writing components which needed performance optimisation
- **Simplifying** installation procedure
  - The new packages are already in the perfSONAR repos
- Re-writing documentation
- **Interoperable with perfSONAR-PS**
  - With successful use-cases: <http://bit.ly/pdJJlf>, <http://bit.ly/pc5sZO>.

- **Simplicity:**

- Revised list of metrics to meet network engineers requirement
- No hardware-dependent software
- No need for GPS antenna
- Running on any standard Debian or RHEL, 32 or 64 bits server
  - *Even on a virtual machine if required*

- **Support:**

- LHCOPN deployment was offered as a supported service
- GEANT SA2 has continued to support LHCOPN community:
  - *Filling in and searching for appropriately qualified manpower*
  - *Seeking for a sustainable development effort for third parties, so that support can be carried out too*

- **Cooperation:**
  - Collaboration is a key point
  - Provided info and support on how to integrate custom visualisation
    - *As the user community evolved their ideas and needs*
  - **We would like to continue actively collaborating with the user community**

# perfSONAR MDM adoption: NREN Service Pilot



- Service pilot phase
- 8 NRENs (+GEANT Backbone) implementing the perfSONAR MDM service for their NOC/PERT engineers.
- More NRENs will join the pilot



- A user panel has been created
  - To ensure perfSONAR MDM is constantly developed to meet user requirements
- Representative group of NREN NOC and PERT network engineers
- Regular phone/VC meetings to discuss the quality of the service
- First face-to-face meeting organised during the 2011 TNC in Prague



# A perfSONAR Panel for LHCOPN and LHCONE?

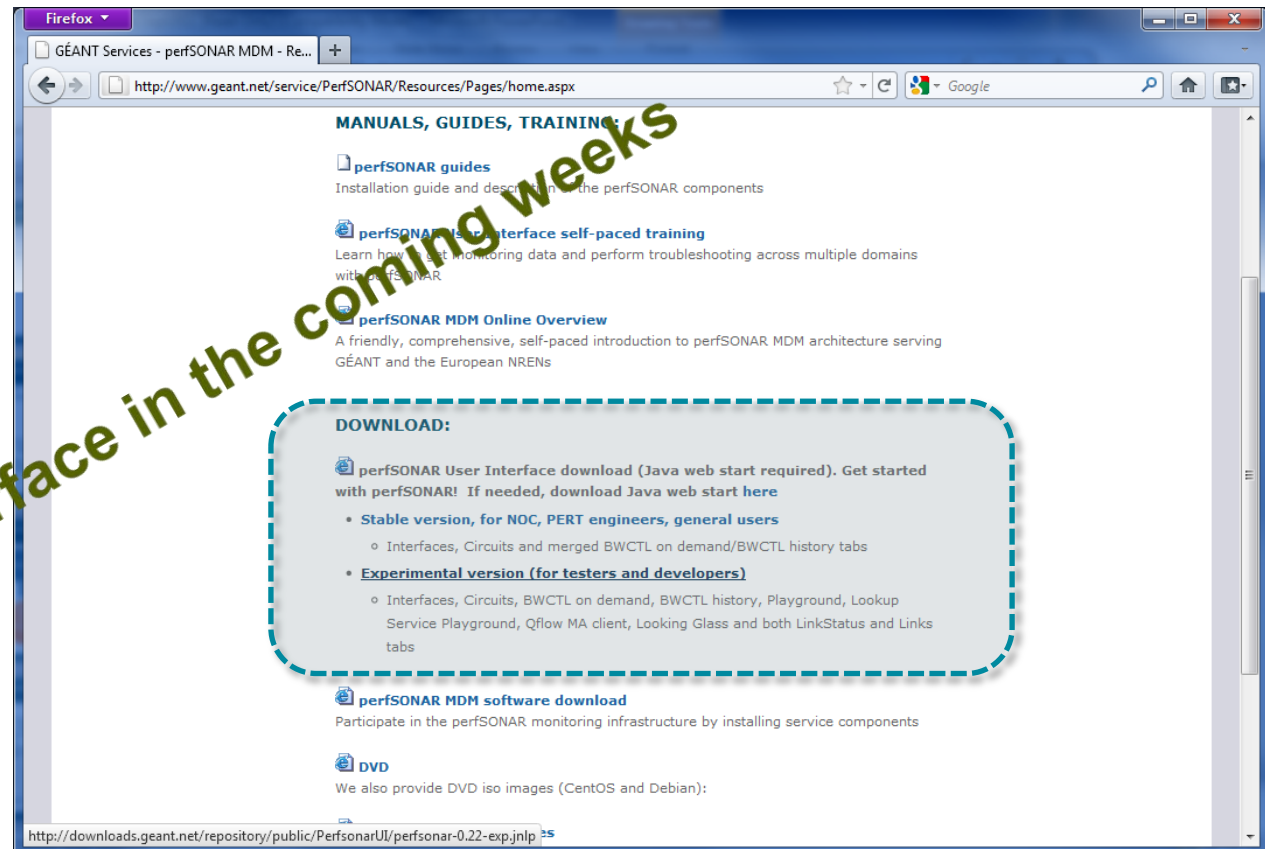


- A dedicated perfSONAR User Panel to LHCOPN/LHCONE community could be set up
  - With representatives from T0 and T1 and T2
  - More effective requirement gathering
  - Closer feedback loop
  - Regular occasion to:
    - *Discuss needs (including training)*
    - *Steer the development*
    - *Feel the gap between users and developers/service designers*

# Simplified user interface



- Current (java based):
  - Simplified version downloadable from <http://perfsonar.geant.net>
- Future
  - Web-based interface (Including on-demand measurements)



perfSONAR



# RRD-MA User Interface (web version)



PerfSONAR UI (Web mock-up)

PerfSONAR UI (Web mock-up) +

http://147.91.4.16:8080/ps/

Service to query:  Pick service Fetch data

List of available interfaces

No	Name	Description	Address	Domain	Capacity
1	ge-2/1/0.100	NASK at poznan-gw1 10GE	212.191.224.74	PIONER-RRD	1 Gbps
2	xe-5/1/0.131	Koszalin at poznan-gw1 10GE	212.191.224.234	PIONER-RRD	1 Gbps
3	xe-5/1/0.128	Szczecin at poznan-gw1 10GE	212.191.224.170	PIONER-RRD	1 Gbps
4	ge-2/1/0.123	Rzeszow at poznan-gw1 10GE	212.191.224.186	PIONER-RRD	1 Gbps
5	xe-5/1/0.122	Olsztyn at poznan-gw1 10GE	212.191.224.42	PIONER-RRD	1 Gbps
6	ge-2/1/0.120	Lublin at poznan-gw1 10GE	212.191.224.82	PIONER-RRD	1 Gbps

From:  To:

hour 6 hours day week month

Analyze path

Explore

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

Comparing xe-5/1/0.131 and xe-5/1/0.122

Name	xe-5/1/0.131	xe-5/1/0.122	Status	OK	OK
Description	Koszalin at poznan-gw1 10GE	Olsztyn at poznan-gw1 10GE	Inbound utilization	437.9 Mbps (43.79%)	177.6 Mbps (17.76%)
Address	212.191.224.234	212.191.224.42	Outbound utilization	478 Mbps (47.8%)	77.1 Mbps (7.71%)
Domain	PIONER-RRD	PIONER-RRD	Input errors	N/A	N/A

Test

# 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



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



# HADES User Interface – route comparison (web version)



PerfSONAR UI (Web mock-up)

PerfSONAR UI (Web mock-up) +

http://147.91.4.16:8080/ps/

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

**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

Analyze path

Explore

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

Test

Simple route comparison

# BWCTL-MA User Interface (web interface)



PerfSONAR UI (Web mock-up)

Service to query:  Pick service Fetch data

Pick an endpoint pair to get measurements

Source:	Destination:
FCCN_Aveiro	FCCN_Aveiro
FCCN_Coimbra	FCCN_Coimbra
FCCN_Lisbon_JRA1	FCCN_Porto
FCCN_Porto	GEANT_Budapest
GARR_Bari	GEANT_Geneva

From:  To:

hour 6 hours day week month

Analyze path

Explore

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

Historical measurements from Source 1 to Destination 1

Showing measurement for TIME - average throughput is 850.7 Mbps (850,669,008 bps)

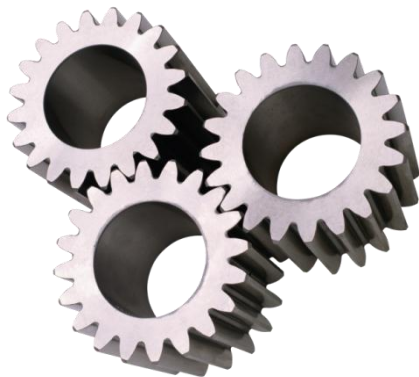
Interval	Transferred	Throughput
0s - 4s	371 MB (389,024,656 B)	778 Mbps (778,049,312 bps)
4s - 8s	415.4 MB (435,532,088 B)	871.8 Mbps (871,841,808 bps)
8s - 12s	415.7 MB (435,920,904 B)	871.8 Mbps (871,841,808 bps)

Run bandwidth tests from your smartphone!

# Interoperability with North America



- 43 measurement points in the **GÉANT** service area
- 8 measurement points in **ESnet**
- 9 measurement points in **Internet2**
- Measurements between T0, T1s and T2s from the same interface
  - **Towards a full interoperability with ps-ps**



Select Measurement point to be queried

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



# Example: From Tromsøe (Uninett) ... Running perfSONAR-MDM



The screenshot shows the perfSONAR web interface. The main window is titled 'PerfsonarUI-v' and has a menu bar with 'File', 'Interfaces', 'Circuits', 'BWCTL', 'LookingGlass', 'FlowSA', 'Playground', 'Lookup service playground', and 'Help'. The 'BWCTL' tab is active. The interface is divided into several sections:

- Parameters:** Includes fields for Address type (IPv4 selected), Transport layer (TCP selected), Test Duration (s) (30), Source Address, TCP Window Size (bytes), Reporting Interval (s) (6), Destination Address, RTT (ms), and Type of Service bits. There are also fields for BWCTL Login and Password.
- Measurement:** A section for the current measurement, currently empty.
- History:** A section for measurement history, currently empty.

A dialog box titled 'Select Measurement point to be queried' is open in the center. It contains a table of measurement points:

Use	Measurement archive	URL	Schema	Status	Statu...
<input type="checkbox"/>	GRNET_Thessaloniki	http://195.251.213.131:8090/services...	bwctl	?	?
<input type="checkbox"/>	Hungarnet_Budapest	http://152.66.116.81:8090/services/M...	bwctl	?	?
<input type="checkbox"/>	ISTF_Sofia	http://194.141.0.13:8090/services/MP...	bwctl	?	?
<input type="checkbox"/>	RENATER_Paris	http://193.51.181.9:8090/services/MP...	bwctl	?	?
<input type="checkbox"/>	SURFNet_Amsterdam	http://192.87.102.210:8090/services/...	bwctl	?	?
<input type="checkbox"/>	PSNC_Poznan	http://212.191.227.58:8090/services/...	bwctl	?	?
<input checked="" type="checkbox"/>	UNINet_Tromsøe	http://129.242.2.142:8090/services/M...	bwctl	?	?
<input type="checkbox"/>	ESnet_Upton_NY_USA	http://bnl-pt1.es.net:4823	bwctl	?	?
<input type="checkbox"/>	ESnet-Batavia_IL_USA	http://fnal-pt1.es.net:4823	bwctl	?	?
<input type="checkbox"/>	ESnet-Palo_Alto_CA_USA	http://slac-pt1.es.net:4823	bwctl	?	?

Below the table, there are input fields for URL (http://129.242.2.142:8090/services/MP/BWCTL), Name (UNINet\_Tromsøe), Schema (bwctl), Event type (bwctl), and Supported event types (bwctl). There are also buttons for 'Service status', 'Load', 'Save', 'New', and 'Remove', and a '.conf file' button.

# ...to Houston (ESnet) Running perfSONAR-PS



The screenshot shows the perfSONAR-PS web interface. The main window is titled "PerfsonarUI-v" and has a menu bar with "File", "Interfaces", "Circuits", "BWCTL", "LookingGlass", "FlowSA", "Playground", "Lookup service playground", and "Help". Below the menu bar are tabs for "Interfaces", "Circuits", "BWCTL", "LookingGlass", "FlowSA", "Playground", and "Lookup service playground".

The interface is divided into several sections:

- Parameters:** Includes fields for "Address type" (IPv4 selected), "Transport layer" (TCP selected), "Test Duration (s)" (90), "Source Address" (192.87.102.210), "Destination Address" (wash-pt1.es.net), "TCP Window Size (bytes)", "Reporting Interval (s)" (6), "BWCTL Login", "Password", "RTT (ms)" (0), and "Type of Service bits".
- Measurement:** Shows a table of measurement points. A dialog box titled "Select Measurement point to be queried" is open, displaying a list of measurement points with columns for "Use", "Measurement archive", "URL", "Sch...", "Status", and "Statu...". The "ESnet-Houston\_TX\_USA" entry is selected. Below the table, there are input fields for "URL" (http://hous-pt1.es.net:4823), "Name" (ESnet-Houston\_TX\_USA), "Event type" (bwctl), and "Supported event types" (bwctl). There are also buttons for "Service status", "Load", "Save", "New", and "Remove".
- History:** Includes radio buttons for "Line chart" (selected) and "Bar chart", and checkboxes for "Show detailed" and "Show average". Below this is a "History" section with a graph area.

The status bar at the bottom left shows "Completed."



# Results in just two clicks: Tromsøe - Houston



PerfsonarUI-v

File Interfaces Circuits BWCTL LookingGlass FlowSA Playground Lookup service playground Help

Interfaces Circuits BWCTL LookingGlass FlowSA Playground Lookup service playground

### perfSONAR

**Parameters**

Address type:  IPv4  IPv6    Transport layer:  TCP  UDP    Test Duration (s): 60    BWCTL Login:

Source Address: 129.242.2.142    TCP Window Size (bytes):     Reporting Interval (s): 6    Password:

Destination Address: hous-pt1.es.net    RTT (ms): 0    Type of Service bits:

Note: TCP window size and RTT parameters are automatically determined by BWCTL. Manual entries are only useful for specific tests

**Measurement**

Interval 0.0-6.0; Transferred 171 MB (179248968 Bytes); Throughput 239 Mbps (238998624 bits/sec)  
Interval 6.0-12.0; Transferred 432 MB (452670504 Bytes); Throughput 604 Mbps (603560672 bits/sec)  
Interval 12.0-18.0; Transferred 426 MB (446909864 Bytes); Throughput 596 Mbps (595879819 bits/sec)  
Interval 18.0-24.0; Transferred 430 MB (450805480 Bytes); Throughput 601 Mbps (601073973 bits/sec)  
Interval 24.0-30.0; Transferred 428 MB (448693800 Bytes); Throughput 598 Mbps (598258400 bits/sec)  
Interval 30.0-36.0; Transferred 428 MB (448821720 Bytes); Throughput 598 Mbps (598428960 bits/sec)  
Interval 36.0-42.0; Transferred 429 MB (449503232 Bytes); Throughput 599 Mbps (599337643 bits/sec)  
Interval 42.0-48.0; Transferred 427 MB (448012288 Bytes); Throughput 597 Mbps (597349717 bits/sec)  
Interval 48.0-54.0; Transferred 430 MB (451236488 Bytes); Throughput 602 Mbps (601648651 bits/sec)  
Interval 54.0-60.0; Transferred 426 MB (446604336 Bytes); Throughput 595 Mbps (595472448 bits/sec)  
Average throughput 563 Mbps (563011072 bits/sec)

**Current Measurement**

The graph displays two data series: 'TCP throughput per reporting interval' (green line with diamond markers) and 'Average TCP throughput over test duration' (blue dashed line with diamond markers). The average throughput is constant at approximately 563 Mbps. The per-interval throughput starts at 239 Mbps at 5 seconds, rises sharply to 604 Mbps at 12 seconds, and then fluctuates between 595 and 602 Mbps for the remainder of the test.

Time (s)	TCP throughput per reporting interval (Mbps)	Average TCP throughput over test duration (Mbps)
5	239	563
12	604	563
18	596	563
24	601	563
30	598	563
36	598	563
42	599	563
48	597	563
54	602	563
60	595	563

Completed.

# Example: Washington-Frankfurt



PerfsonarUI-v

File Interfaces Circuits BWCTL LookingGlass FlowSA Playground Lookup service playground Help

Interfaces Circuits BWCTL LookingGlass FlowSA Playground Lookup service playground

### perfSONAR

**Query options**

- BWCTL MP source
- BWCTL MP destination
- BWCTL MA service
- Options

**Execute query**

- Estimate RTT
- Clear
- Query
- Query history
- Query history endpoints

**Parameters**

Address type:  IPv4  IPv6    Transport layer:  TCP  UDP    Test Duration (s):     BWCTL Login:

Source Address:     TCP Window Size (bytes):     Reporting Interval (s):     Password:

Destination Address:     RTT (ms):     Type of Service bits:

Note: TCP window size and RTT parameters are automatically determined by BWCTL. Manual entries are only useful for specific tests

**Measurement**

Interval 0.0-6.0; Transferred 319 MB (334612972 Bytes); Throughput 446 Mbps (446150629 bits/sec)  
Interval 6.0-12.0; Transferred 468 MB (491149440 Bytes); Throughput 655 Mbps (654865920 bits/sec)  
Interval 12.0-18.0; Transferred 481 MB (503938144 Bytes); Throughput 672 Mbps (671917525 bits/sec)  
Interval 18.0-24.0; Transferred 467 MB (489600568 Bytes); Throughput 653 Mbps (652800757 bits/sec)  
Interval 24.0-30.0; Transferred 479 MB (501834056 Bytes); Throughput 669 Mbps (669112075 bits/sec)  
Interval 30.0-36.0; Transferred 468 MB (490408760 Bytes); Throughput 654 Mbps (653878347 bits/sec)  
Interval 36.0-42.0; Transferred 468 MB (490253000 Bytes); Throughput 654 Mbps (653670667 bits/sec)  
Interval 42.0-48.0; Transferred 477 MB (499835752 Bytes); Throughput 666 Mbps (666447669 bits/sec)  
Interval 48.0-54.0; Transferred 465 MB (488024336 Bytes); Throughput 651 Mbps (650699115 bits/sec)  
Interval 54.0-60.0; Transferred 474 MB (497147664 Bytes); Throughput 663 Mbps (662863552 bits/sec)  
Average throughput 639 Mbps (638934090 bits/sec)

**Current Measurement**

Legend: TCP throughput per reporting interval (green line with dots), Average TCP throughput over test duration (blue dashed line with dots)

Interval (s)	Transferred (MB)	Throughput (Mbps)
0.0-6.0	319	446
6.0-12.0	468	655
12.0-18.0	481	672
18.0-24.0	467	653
24.0-30.0	479	669
30.0-36.0	468	654
36.0-42.0	468	654
42.0-48.0	477	666
48.0-54.0	465	651
54.0-60.0	474	663
Average	-	639

Completed.

# perfSONAR MDM website



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

per**SONAR** MDM  
PART OF THE GÉANT SERVICES PORTFOLIO

ABOUT per**SONAR** | 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 perfSONAR can make your life easier.

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

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

**per**SONAR** 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 perfSONAR MDM - the only tool for network monitoring across multiple domains!** perfSONAR 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 perfSONAR MDM service for their NOCs. More NRENS are invited to join the pilot - find out how by contacting the perfSONAR team.

**per**SONAR** Resources**  
| Manuals | Guides | Training | Downloads | Bug Tracking |  
click here to find out more

Deployment Status : March 2011

Legend: ■ In trial ■ Deployed

per**SONAR** Updates

Follow perfSONAR on Twitter!

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

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

per**SONAR** 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

• communicate • collaborate

# perfSONAR Twitter



perfSONAR MDM (perfSONARMDM) on Twitter - Windows Internet Explorer

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

File Edit View Favorites Tools Help

perfSONAR MDM (perfSONARMDM) on Twitter

twitter Search Have an account? Sign in

**perfSONAR MDM**  
**@perfSONARMDM** Cambridge  
*perfSONAR MDM (Multi-Domain-Monitoring) is the multi-domain monitoring service for the GÉANT Service Area (GSA)*  
<http://perfsonar.geant.net>

+ Follow Text follow perfSONARMDM to 40404 in the United States

Tweets Favorites Following Followers Lists

**perfSONARMDM** perfSONAR MDM  
#perfSONARMDM Correlation of existing measurements and new web-based user interface discussed with user representatives in Prague.  
39 minutes ago

**perfSONARMDM** perfSONAR MDM  
#perfSONARMDM First User Panel concluded: 18 participants from 9 NRENs discussed the future direction of perfSONAR.  
41 minutes ago

**perfSONARMDM** perfSONAR MDM  
#perfSONARMDM First perfSONAR User Panel next week in Prague. Visualisation tools and circuit mon. among the topics  
<http://bit.ly/knukeQ>  
11 May

**perfSONARMDM** perfSONAR MDM  
New perfSONAR website was announced in GÉANT newsletter "Connect": <http://bit.ly/eks0VL> #perfSONARMDM  
7 Apr

**perfSONARMDM** perfSONAR MDM

About @perfSONARMDM

7 Tweets 1 Following 18 Followers 0 Listed

**Follow perfSONAR MDM on Twitter**  
Don't miss any updates from perfSONAR MDM . Sign up today and follow your interests!

**Sign up & follow perfSONAR MDM »**

**Curious how perfSONAR MDM uses Twitter?**  
Discover who @perfSONARMDM follows

About Help Blog Mobile Status Jobs Terms Privacy Advertisers Businesses Media Developers Resources © 2011 Twitter

Internet 100%

ct • communicate • collaborate

- Partnership, collaboration, interoperability, openness are our key points
- perfSONAR MDM service pilot 7 NRENs + GEANT
- Possibility to build a LHCOPN/LHCONE dedicated User Panel
- perfSONAR web UI almost ready for deployment
- Interoperability
  - *17 measurement points from Internet2/ESNet in perfSONAR UI*
- New website and twitter



**Follow perfSONAR at:**

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



Thank you!!



perfSONAR

connect • communicate • collaborate