

and Latency

A tale of tests and tools

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Latency BoF • TNC 2026

perfSONAR is developed by a partnership of

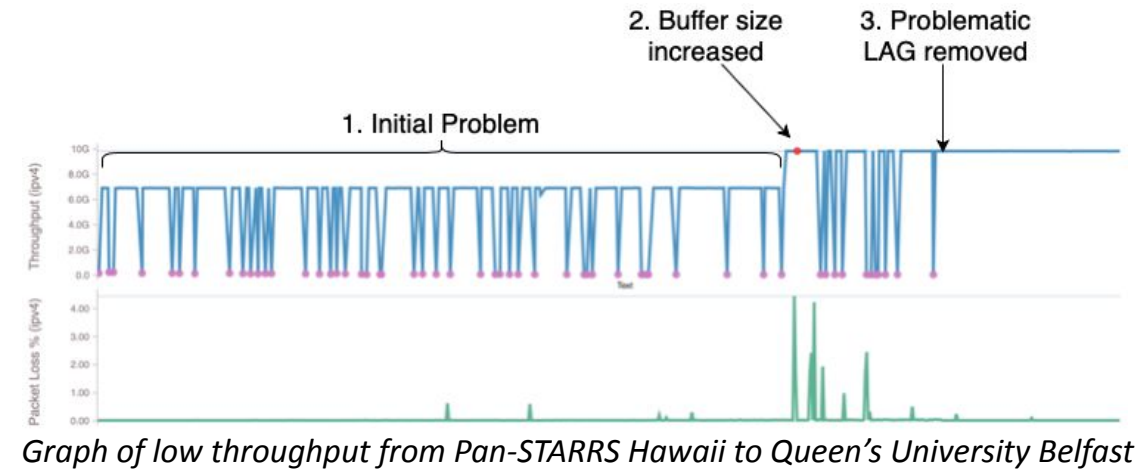


perfSONAR

- perfSONAR is an **open source software suite** that runs, stores and displays **active measurements** such as **throughput, packet loss, latency and traceroute**
- Primarily maintained by consortium of **ESnet, GEANT, Indiana University, Internet2, RNP** and the **University of Michigan**
- **Over 2000 registered public deployments** around the world across hundreds of institutions



Map of perfSONAR deployments around the globe



Graph of low throughput from Pan-STARRS Hawaii to Queen's University Belfast

Example perfSONAR use cases:

- Solving global network performance issues for researchers transmitting data from **Pan-STARRS Hawaii to Queen's University Belfast** (see above graph)
- Identifying packet loss issues at **UT Arlington**
- Identifying performance bottlenecks as **Large Hadron Collider (LHC)** prepares for the “high luminosity” era
- <https://www.perfsonar.net>

Once upon a time, in the pScheduler land...

- Every tale (**task**), in the **pScheduler** world, begins with requesting a test which in turn will be carried-out by a tool.
- A **test**: measure or do something, examples:
 - latency
 - throughput
 - service response time
 - mtu
- A **tool**: something that run a test, examples:
 - ping
 - trace
 - (O|T)WAMP based tools

pScheduler: test plugins

```
geantadmin@psmall:~$ pscheduler plugins tests
```

clock	Measure the clock difference between hosts
disk-to-disk	Network testing of throughput and Read/Write speeds
dns	Measure DNS transaction time
http	Measure HTTP Response Time
idle	Consume time in the background
idlebgm	Consume time in the background - NOT FOR PRODUCTION
idleex	Consume time exclusively - NOT FOR PRODUCTION
latency	Measure network latency between hosts
latencybg	Run one-way latency tests in the background
mtu	Measure Maximum Transmission Unit (MTU)
noop	Do nothing
psresponse	Measure pScheduler Response Time
rtt	Measure the round trip time between hosts
s3throughput	Test throughput of S3 web service storage
simplestream	Test communication between two hosts using TCP
throughput	Measure network throughput between hosts
trace	Trace the path between IP hosts
wifibssid	Outputs a list of BSSIDs in json format with the given SSID

pScheduler: tool plugins

```
geantadmin@psmall:~$ pscheduler plugins tools
```

curl	cURL-based tool for HTTP tests
dnspy	Measure DNS transaction time
ethr	Measure network throughput with ethr
fwmtu	Measure Maximum Transmission Unit (MTU)
halfping	halfping tool for approximate latency
iperf2	Measure network throughput with iperf2
iperf3	Measure network throughput with iperf3
nuttcp	Measure network throughput with nuttcp
owping	Determine one-way latency with OWAMP
paris-traceroute	Determine the route between hosts with Paris Traceroute
ping	Measure the round-trip time to another host with ping
powstream	Repeatedly measure latency with OWAMP's powstream
psclock	Compare the clocks on two pScheduler nodes
pstimer	Measure pScheduler response time
s3-benchmark	Tool for measuring performance of an S3 web server
simplestreamer	Stream data from one node to another with TCP
sleep	Sleep for periods longer than 15 seconds
sleepbgm	Consume time in the background multiple times
snooze	Sleep for periods of 60 seconds or less
tcpping	Measure the round-trip time to another host with tcpping
tracemtu	Measure Maximum Transmission Unit (MTU) using traceroute
tracepath	Map the route between hosts with tracepath
traceroute	Map the route between hosts with traceroute
twping	Determine latency with TWAMP

RTT tests

- Measure the round trip time and related statistics between hosts
 - Default tool: **ping**
 - Alternatives: twping, tcpping

1	psmp-gn-owd-poz-pl.geant.org (62.40.114.99)	64 Bytes	TTL 54	RTT 45.8000 ms
2	psmp-gn-owd-poz-pl.geant.org (62.40.114.99)	64 Bytes	TTL 54	RTT 46.2000 ms
3	psmp-gn-owd-poz-pl.geant.org (62.40.114.99)	64 Bytes	TTL 54	RTT 46.1000 ms
4	psmp-gn-owd-poz-pl.geant.org (62.40.114.99)	64 Bytes	TTL 54	RTT 46.1000 ms
5	psmp-gn-owd-poz-pl.geant.org (62.40.114.99)	64 Bytes	TTL 54	RTT 46.1000 ms

0% Packet Loss RTT Min/Mean/Max/StdDev = 45.8040/46.0640/46.2250/0.1400 ms

Latency tests

- Measure one-way latency and associated statistics between hosts
 - Default tool: **owping**
 - Alternatives: twping, halfping

Packet Statistics

```
-----
Packets Sent ..... 100 packets
Packets Received ..... 100 packets
Packets Lost ..... 0 packets
Packets Duplicated ... 0 packets
Packets Reordered .... 0 packets
```

One-way Latency Statistics

```
-----
Delay Median ..... 25.05 ms
Delay Minimum ..... 24.91 ms
Delay Maximum ..... 25.14 ms
Delay Mean ..... 25.05 ms
Delay Mode ..... 25.02 ms
25.06 ms
Delay 25th Percentile ... 25.02 ms
Delay 75th Percentile ... 25.08 ms
Delay 95th Percentile ... 25.11 ms
```

Latencybg (background) tests

- Continuously measure one-way latency and associated statistics between hosts and report back results periodically
 - Default tool: **powstream (OWAMP)**
 - Alternatives: none

```
geantadmin@bob:(~$ pscheduler task latencybg --dest psmg-gn-owd-poz-pl.geant.org  
Submitting task...
```

```
Task URL:
```

```
https://bob/pscheduler/tasks/27ce6adb-4913-48e2-bca5-18e1dc437172
```

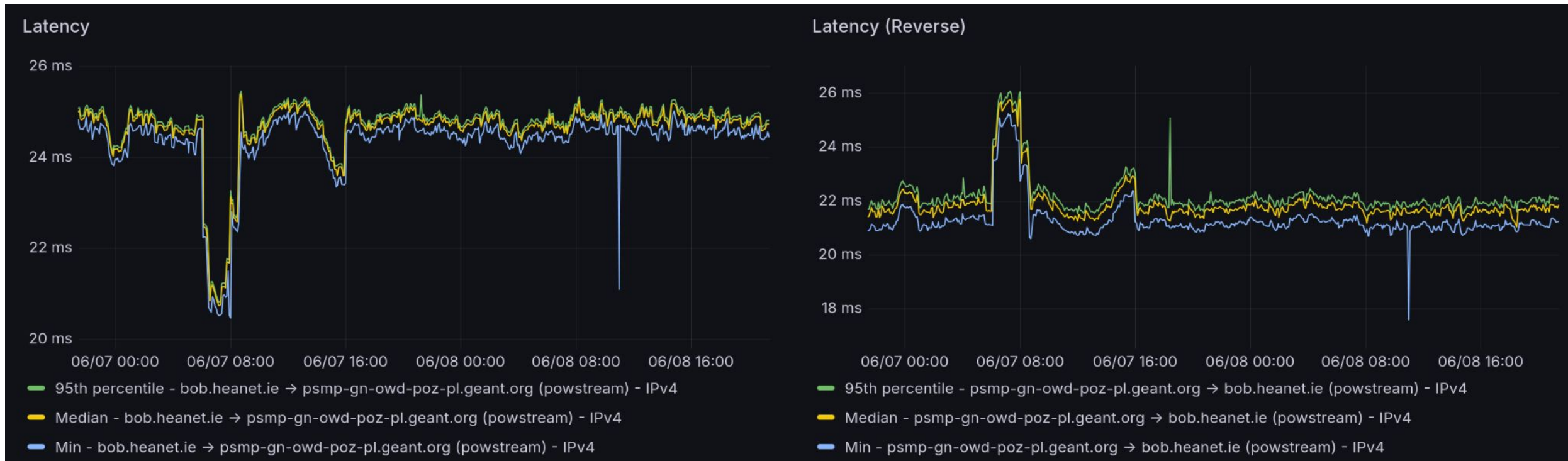
```
Running with tool 'powstream'
```

```
Fetching first run...
```

```
This task produces results asynchronously and cannot be watched. The results it has  
produced since it started running and now can be retrieved by running the  
following command:
```

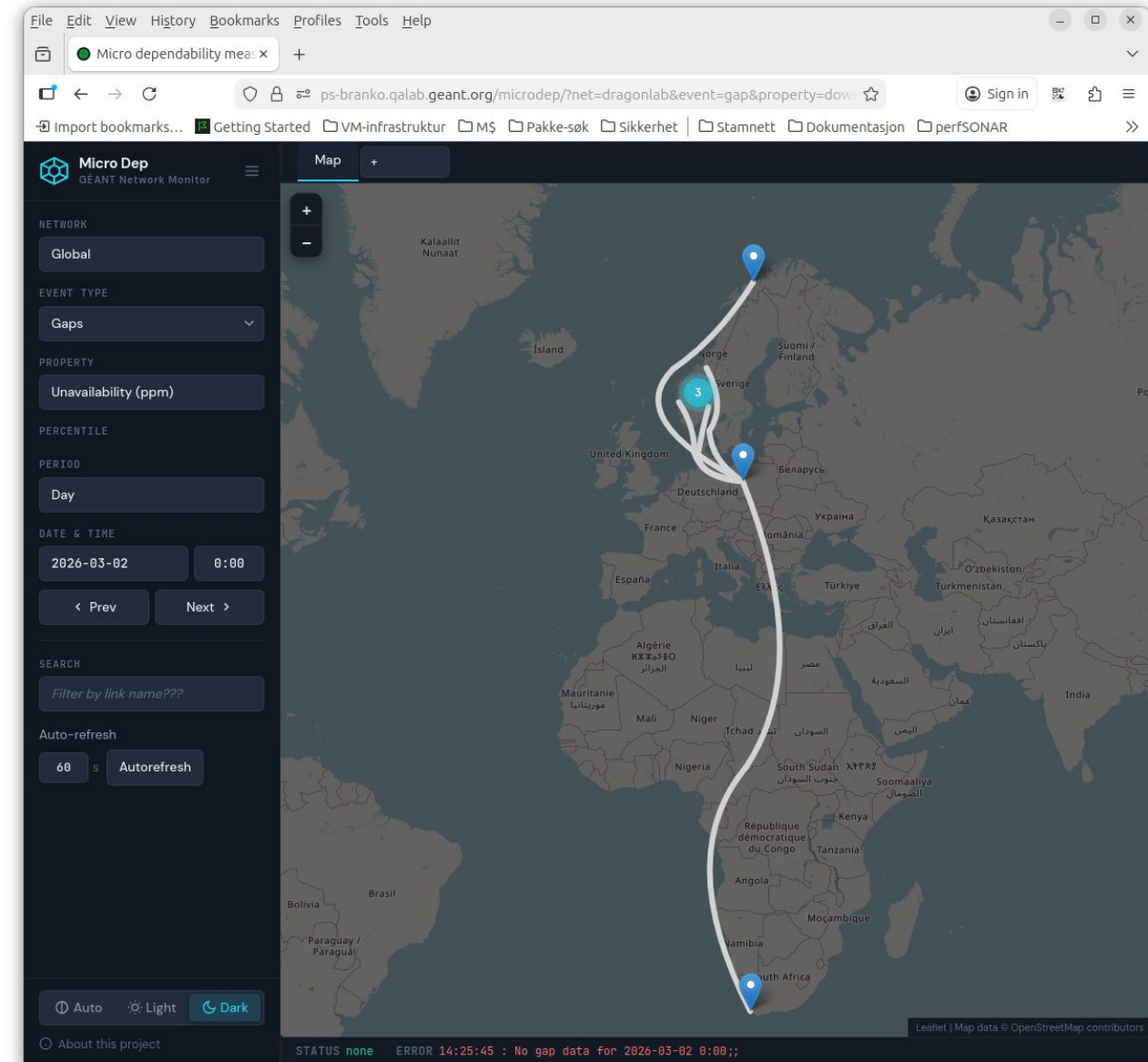
```
pscheduler result https://bob/pscheduler/tasks/27ce6adb-4913-48e2-bca5-18e1dc437172
```

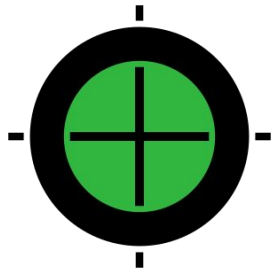
Latencybg plotted in Grafana



Microdep

- Latency bg tests to spot packet gaps, latency and jitter changes
 - Packet traces to spot routing changes
 - And some analysis
-
- Will be distributed with perfSONAR 5.3
 - More info at <https://sikt.no/en/micro-dependability>





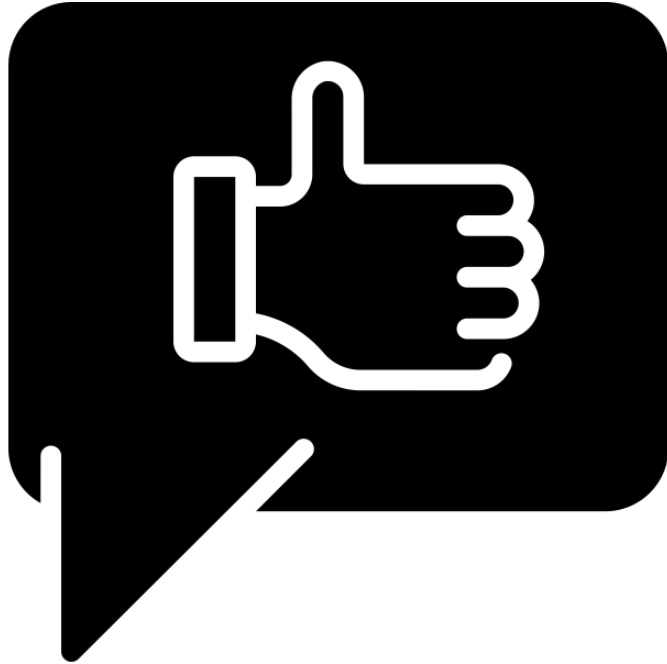
Questions and Answers

Question and answer icon by iconosphere from The Noun Project

Resources

- **pScheduler** doc: https://docs.perfsonar.net/pscheduler_intro.html
- perfSONAR hosts in **GÉANT network**:
<https://network.geant.org/perfsonar>
- perfSONAR team in **GÉANT project**: perfsonar@lists.geant.org
- **perfSONAR global users list**:
<https://lists.internet2.edu/sympa/info/perfsonar-user>

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Thanks icon by priyanka from The Noun Project

Thanks!

For more information,
please visit our web site:
<https://www.perfsonar.net>

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