Experience with deploying large scale perfSONAR instances in NREN

Disclaimer: The *views* and opinions expressed in this presentation are those of the speaker and do not necessarily reflect the views or positions of perfSONAR project

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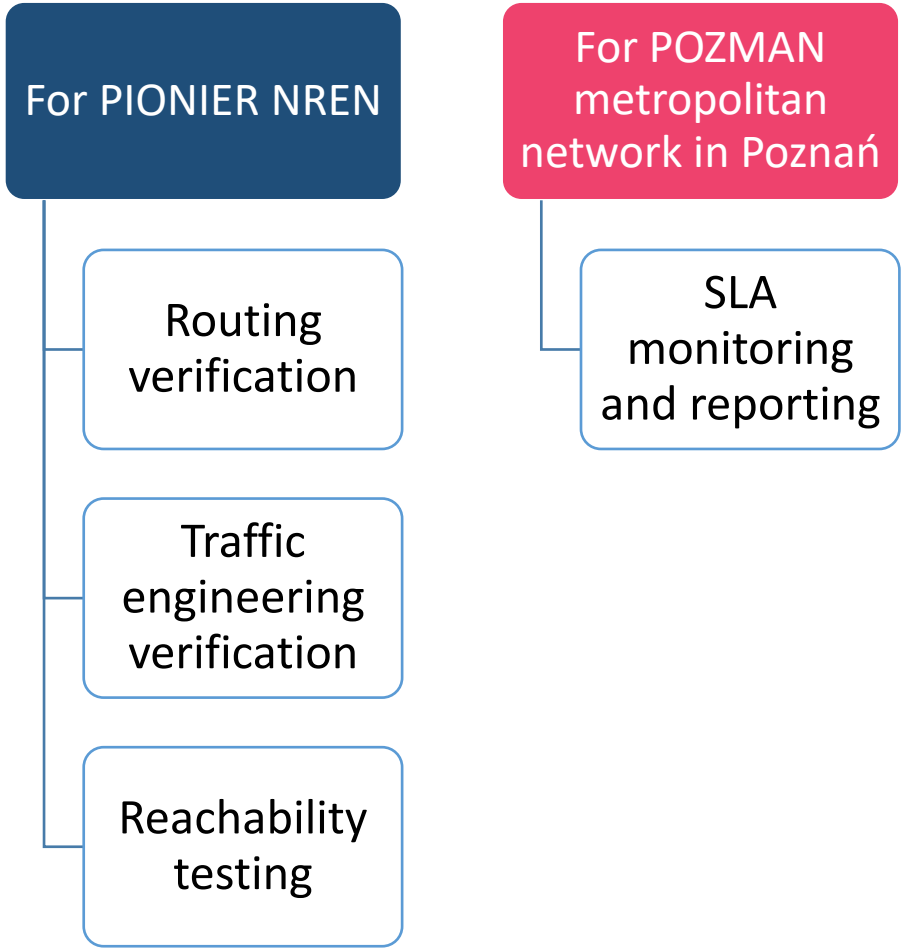
The Use Cases



PIONIER NREN

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PIONIER – the Polish NREN

Rationales

- Routing verification
  - After routing configuration changes
- Traffic engineering verification
  - Input for decisions on making paths shorter for MAN <-> MAN traffic
  - Creating additional traffic exchange points
- Reachability testing
  - After configuration changes
  - After network outages
  - Important websites accessibility

All from **USER** perspective

No rational justification for any throughput tests in 400+ Gb/s network

Assumptions

- At least one perfSONAR instance in each MAN
- Centrally managed
- Central server (archive, Grafana) in PCSS
- Full mesh of regular low-intensity tests
- Tests configured
  - One-way delay/jitter/P95 (OWAMP)
  - One-way packet loss (OWAMP)
  - HTTP request time to selected sites
  - DNS query time of selected hostnames
- Central Grafana server (non-public)
  - Various presentation methods
- Historical data storage time 1Y

Hardware

- GIGABYTE BRIX GB-BRi5H
  - i5-10210U CPU, 1.6GHz (4.2GHz), 4 cores
  - 8GB RAM
  - 120GB SSD
- Size
  - 13 x 13 x 5 cm
- Power
  - 230V / 135W
  - External power supply
- Passive cooling

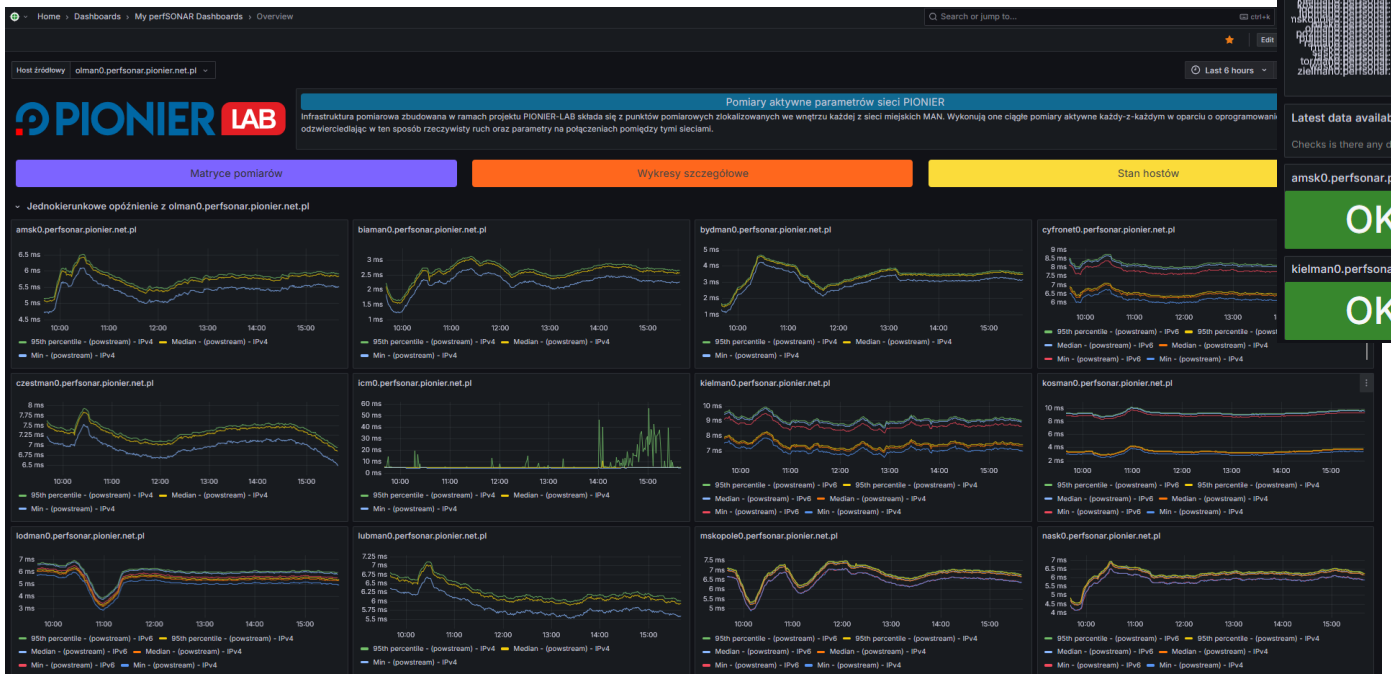
Connecting Site Requirements

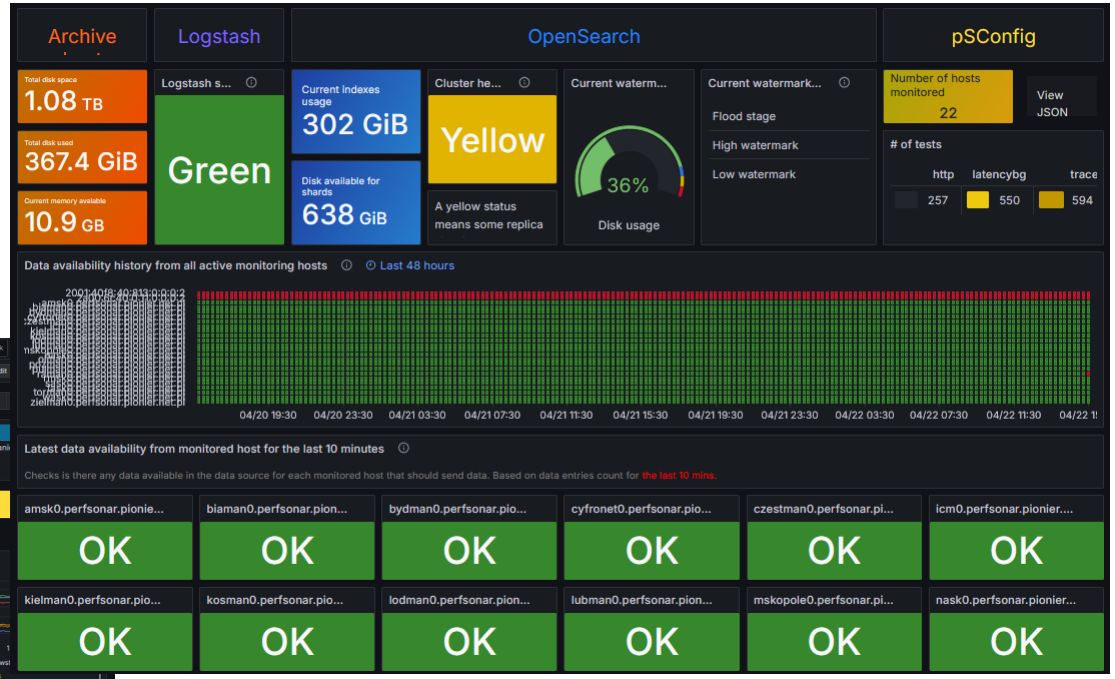
- Network interface: 1Gb/s Ethernet RJ-45
- Static IPv4 address (required). Optional static IPv6 address
- DNS registration
- Local DNS. Optional IPv6 DNS (if exists)
- Local NTP server(s)
- No firewall
- Location of the node: **similar as the internal customer** (within metro network)

perfSONAR Topology

Data visualization

- Default perfSONAR dashboards
- Custom made dashboards





Deployment challenges

- IPv6 connectivity
  - Lack of full IPv6 adoption
- IPv6 DNS resolvers
  - IPv6 accessible DNS resvers not deployed
- Stable time sources
  - Lack of NTP
  - Lack of good NTP

Some perfSONAR findings and improvements

- Matrix view not particularly useful
- Grafana page header with hostname not updated (→ reported, fixed)
- Public vs anonymous Grafana access problem (→ reported)
- Moving from NTP to Chrony
  - Host status dashboard not supporting it (→ tb reported)
- Missing timout visualization for HTTP requests (→ reported)
- HTTP Explorer didn’t show IP version (→ reported, fixed)
- Pscheduler troubleshoot failure when NTP servers not available (→ reported, fixed)
- pscheduler constant load (→ reported)
  - Impacts host’s and clock’s stability

Useful results and next steps

- Node’s preconfiguration make the proces much easier and faster
- Grafana LDAP integration
- Modification of default OpenSearch ISM policies
- Building health dashboard, alerting and emailing
- Implementation of Grafana JWT authentication for secure interation into other systems

- Ritgh choice on focusing on latency and service tests
- Direct peerings configuration for shorter paths
- Optimalization of exchange point traffic for reaching some networks

- Plan to deployment second node for commodity Internet mesh
- Improve choices of http test destinations to reflect interconnecting points

POZMAN metropolitan network

NOTE: This deployment in the middle of migration and presents previous state

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Rationale

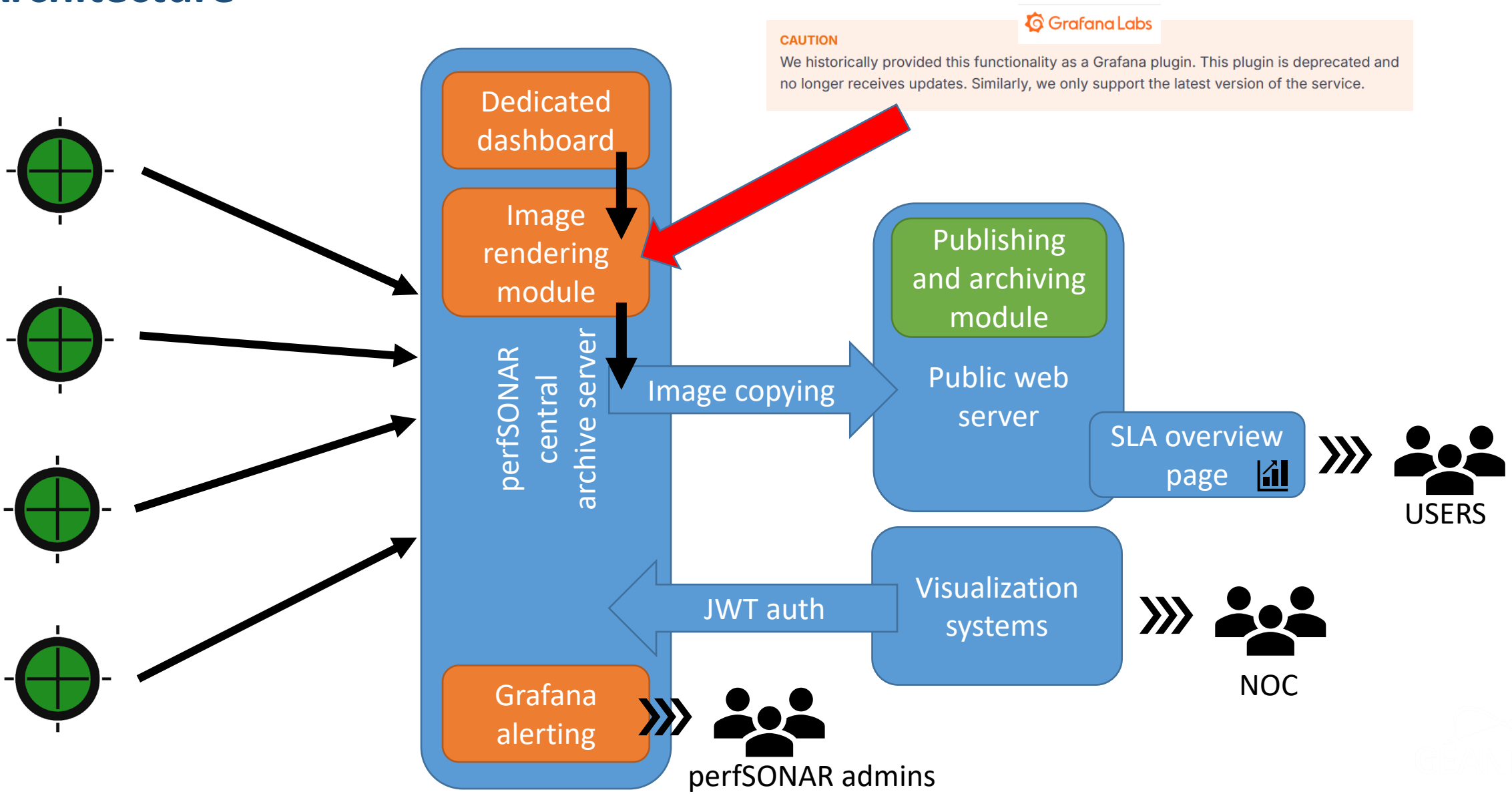
- PSNC is a licenced metropolitan are network operator in Poznań region
- Polish law requires PSNC to provide Regulations for the Provision of Telecommunications that guarantees the minimum service quality levels in the PCSS network within Poland.
- This inlcudes mandatory metrics:
  - average two-way packet transmission delay (RTT)
  - delay variability
  - packet loss
- Threshold values are specified by network operator, should be monitored and reported to users and regulation bodies

What toolset should we use?

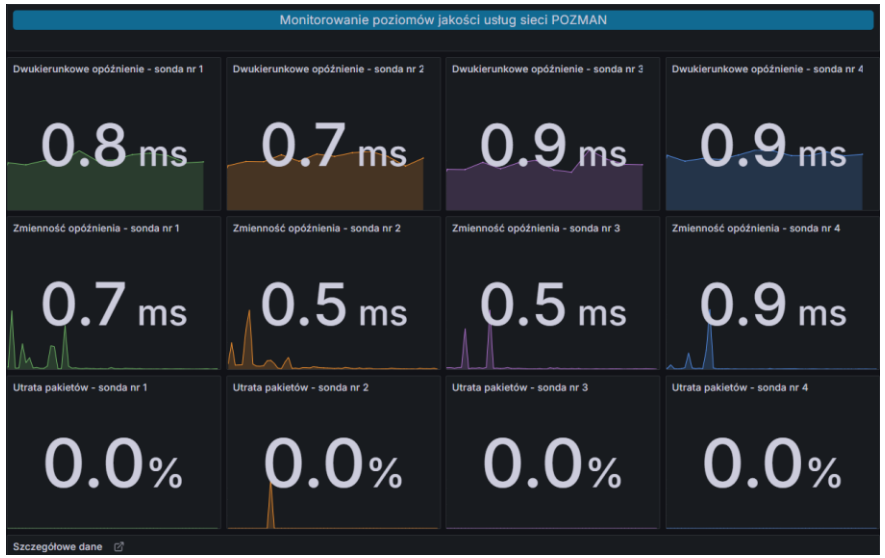
Assumptions

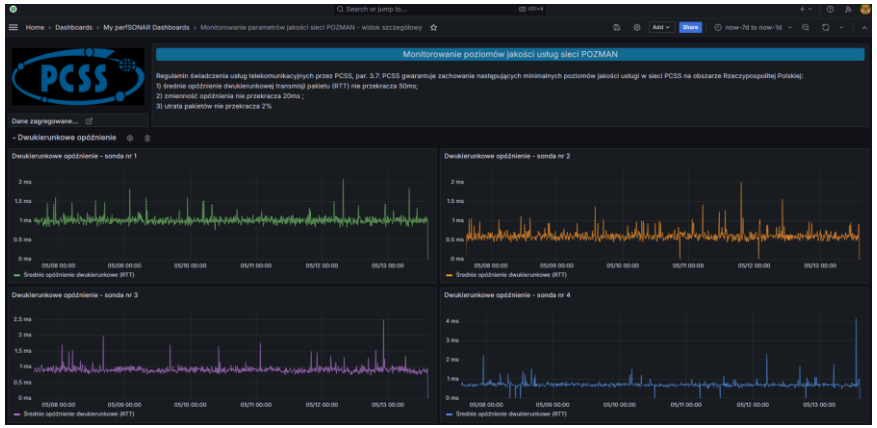
- 4 instances geographically spread
- Central server (archive, Grafana) in PCSS
- Full mesh regular tests
- Test types configured
  - One-way delay/jitter/P95 (OWAMP)
  - One-way packet loss (OWAMP)
  - RTT
  - HTTP request time to selected sites
  - DNS query time of selected hostnames
- Central Grafana server (non-public)
  - Various presentation methods
- Historical data storage time 1Y
- Dedicated module for reporting and presenting public view
- Seamles access for other integrations

Architecture



Visualization portal





- For internal view
- Custom-built dashboards
  - Aggregated view for selected metrics
    - RTT
    - Jitter
    - Packet loss
    - Average values for last 30 days
    - For all 4 nodes
  - Detailed view

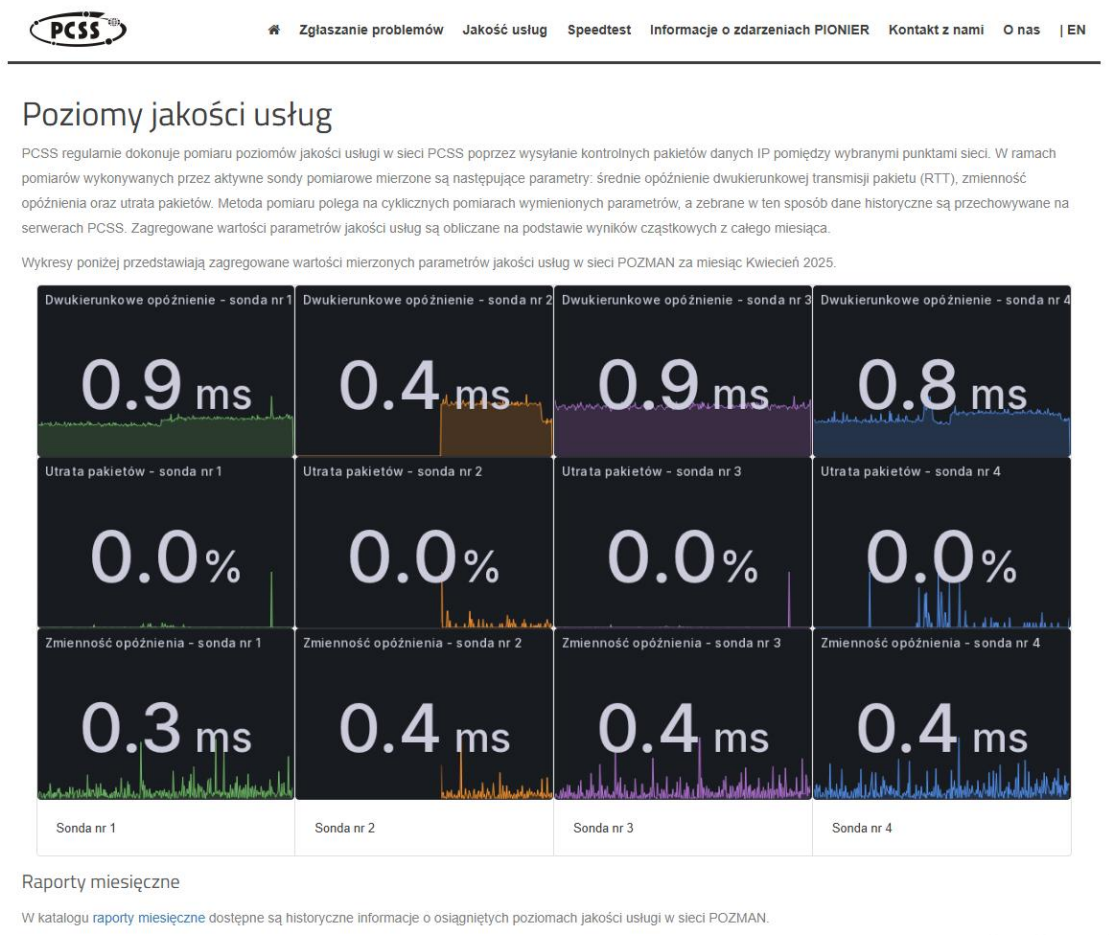
Reporting module

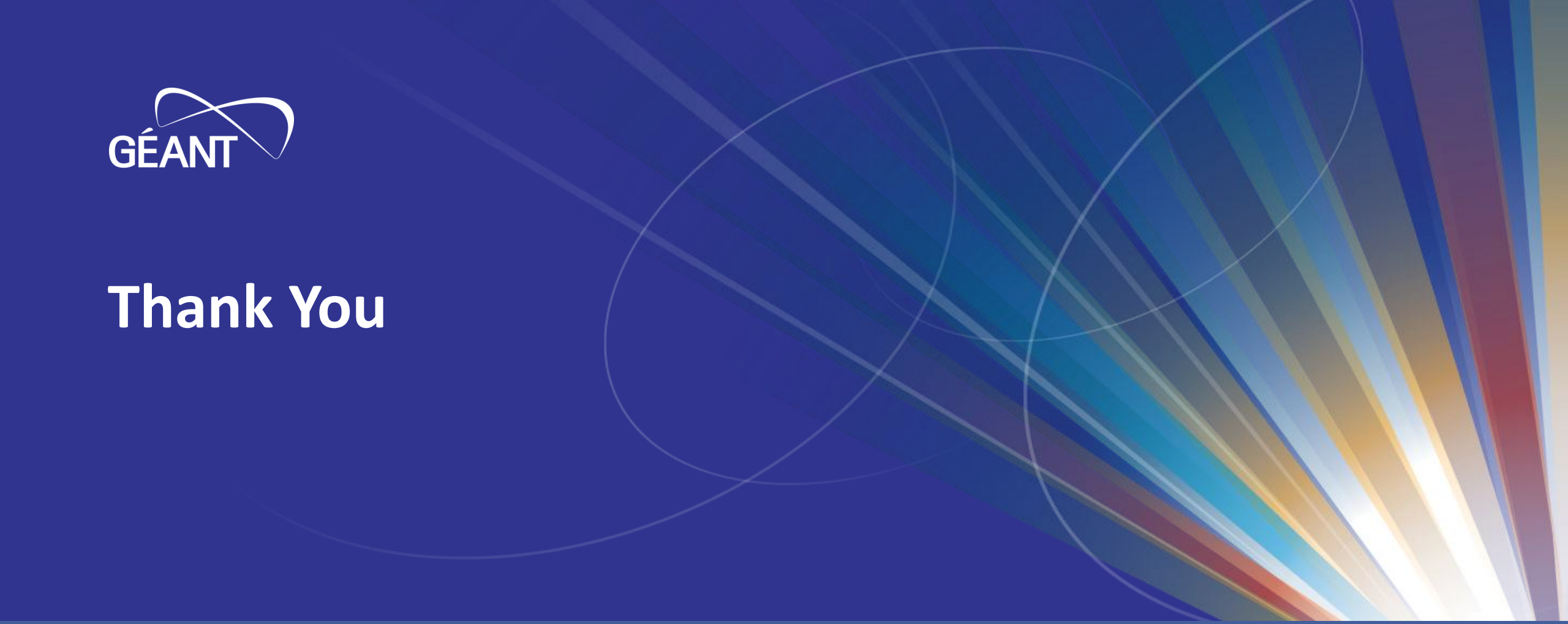
- Uses a dedicted Grafana dashboard
- Selects proper panels from dashboard
- Creates static images based on dashboards using The Grafana Image Renderer service
  - Requires additional package installation
  - Needs additional Grafana account and API key
- Creates static images with proper names
- Transfers image files to remote Web server

In the proces of migration to https://github.com/grafana/grafana-image-renderer/

Public reporting view

- Publicely available
- Static view
- Historical graphs available





Thank You

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