GP4L in GÉANT-5 project

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Agenda

• Few words about GÉANT-5
• Global P4 Lab
  • Current footprint
  • Nodes & links composition
  • NMaaS as monitoring system
• 2 types of GP4L usage
  • Network experimentation
  • Tools conceptions “around” the network
• Automation & Orchestration
• Final words
[TL;DR]
GÉANT-5 in a nutshell
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- GÉANT-5 is under **Horizon Europe**
  « Research and innovation funding programme until 2027 »
- GÉANT-5 encompasses 43 countries
  - is in 1\(^{st}\) iteration ➔ **GN5-1** till end of 2024
- GN5-1 is divided into:
  - **Work packages** that in turns are divided into **Tasks**
  - Tasks can include inter-related **subtask**
  - **Global P4 Lab** is included in WP6-T2 (aka. platform)
Global P4 Lab.
aka “GP4L” in GN5-1
Global P4 lab: “Persistent Programmable testbed” current footprint [2023/09]
Global P4 lab: Extension at Geneva
Global P4 lab: Node types

Available now in GP4L!

3.2/6.4 Tbps
12.8 Tbps
200 Gbps

Under the radar ...

FPGAs

12.8 Tbps
12.8 Tbps
200 Gbps
Global P4 lab: Links

- GCS / OpenNSA
  - Static links
- Autogole
- SENSE
Global P4 lab: Monitoring NMaaS

- **Grafana**: Open source analytics & monitoring solution for every database
- **Prometheus**: Monitoring system & time series database
- **Icinga2**: Scalable and extensible monitoring system
- **SPA Inventory**: Resource and Service Inventory with TMF-compliant API
- **Routinator**: RPKI Validator
- **WebDAV Server**: WebDAV Server with Git versioning
- **Uptime Kuma**: Self-hosted monitoring tool like "Uptime Robot"
- **NetBox**: Infrastructure resource modeling application
- **WiFiMon**: Wireless Crowdsourced Performance Monitoring and...
- **Zabbix**: Enterprise-class monitoring solution for networks and applications
- **SPA**: SPA for the E-Line service
- **Healthchecks**: A cron monitoring tool
GP4L usage: Network experiment ➔ Multicast with rarel !

1- BIER MPLS core
2- AMT-relay
   (AMT=Automatic Multicast Tunnel)
3- Unicast ➔ Multicast translator
4- Can you guess the missing piece of the puzzle?

(S,G) advertisement !
(Application software?)
GP4L usage: Network experiment ➔ Multicast with RARE !

Multicast (S,G) | AMT-relay
GP4L usage: Tools conception “around” the network ecosystem – Digital twin

Via GP4L Automation & Orchestration
GP4L Orchestration: The Goal

Orchestrate different components of the GP4L management environment in a user transparent way

User actions in one management tool trigger automated reactions in other tools/systems/devices

User does not need to do anything other than essential actions
Automation & Orchestration Use Case

User keeps inventory up-to-date = Single Source of Truth

- Essential information for all GP4L devices

Auto devices’ health monitoring

Auto network device configuration backup

Keep track of any subsequent device changes

Retain history whenever possible

Delete / deactivate = pause
Use Case Tools

User Action in Inventory

Orchestration Process(es)

Probes in Monitoring Tool
Configuration backup

Uptime Kuma

netbox

Camunda

GitLab

Oxidized
Relevant device information in NetBox
Tracking User Actions

- Add new device/interface
- Change device/interface properties
- Remove device/interface
**Uptime Kuma information synchronisation**

**Devices**

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**Uptime Kuma**

- **GP4L-AMS-01[25]**: 100%
- **GP4L-PAR-02[16]**: 3.19%
- **GP4L-POZ-02[14]**: 100%
Uptime Kuma information synchronisation – part 2
Oxidized information synchronisation
Oxidized information synchronisation – part 2
Ready, Set, Go!

All tools are available in NMaaS

• NetBox
• Oxidized
• Camunda with Uptime Kuma

Orchestration configuration

• API points
• webhooks
• ssh key
• user credentials
• e-mail notifications

Start using NetBox

synced info in Uptime Kuma and Oxidized
Get the tools to talk to each other...

- NetBox API
- Uptime Kuma GUI & API
- Git & Oxidized
- General Camunda
- E-mail notifications setup
Future work

This use case targets the GP4L admin side

Next: Introduce automation and orchestration for the GP4L users

- Reservation booking process
- Automated monitoring
- Automated configuration handling
Thank You!

Any question or comment? Please contact us at gn5-1-wp6-t2-gp4lab@lists.geant.org