Network Technologies and Services Development in the GÉANT Project

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SC22 - Asia
3 March 2022

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Agenda

GÉANT Project Overview

Network Technologies and Services Development Work Package
The GÉANT Project

GÉANT’s vision is to ensure equal network access for all scientists across Europe to the research infrastructures and the e-infrastructure resources available to them.

A part of the European Union's Horizon 2020 research and innovation programme - GÉANT 2020 Framework Partnership Agreement (FPA)

500 contributors from 40 partners - European R&E Institutions

50 M users

GN4-3 duration: 1 Jan 2019 – 31 December 2022
The GÉANT Project Structure
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WP Leaders: Tim Chown (Jisc), Ivana Golub (PSNC)
WP6 budget: > 6,2 mil EUR
33 R&E organisations from 23 countries
88 team members
WP6 – structure and work items

Task1: Network Technology Evolution
- Low Latency networking support
  - TimeMap latency/jitter monitoring tool
- Optical Time and Frequency Networking (OTFN)
- Router for Academia, Research and Education (RARE)
  - GÉANT P4 Lab
  - White box performance testing
- Data Plane Programming (DPP)
  - In-band Network Telemetry (INT)
- Quantum Key Distribution (QKD)
- White box networking for R&E use cases (completed)

Task2: Network Services Evolution and Development
- Service Provider Architecture Platform (SPA)
- Orchestration, Automation and Virtualisation (OAV)
  - Architecture and TMForum ODA mapping
  - Network Automation eAcademy learning material
  - NETDEV Wiki with the Community Portal
  - Campus Network Management as a Service - CNaaS
  - OAV maturity mode
  - OAV terminology FG

Task3: Monitoring and Management
- perfSONAR including perfSONAR consultancy
- Performance Measurement Platform (PMP)
- Network Management as a Service (NMaaS)
- WiFiMon
- Argus for alarm aggregation
- Network Telemetry
  - 100G monitoring/measurement
  - P4-based flow monitoring

WP6 umbrella page:
https://wiki.geant.org/display/NETDEV
Task 1 – Network Technology Evolution

Low Latency Networking
TimeMap

- Implemented GÉANT backbone per-segment latency and jitter monitoring
  - Using TWAMP measurements
  - Available at https://timemap.geant.org/
  - Being adopted by the GÉANT Operations team

Optical Time and Frequency Networking
OTFN

- Supporting NRENs in implementing T&F services
  - Testing in progress in GÉANT and around NREN T&F interconnectivity
  - Published SWITCH’s L-band deployment white paper

White Box for R&E networks

- Exploring NREN's white box use cases
  - Planned work completed; several white papers published
  - Concluding infoshare held – “White Boxes in NREN Context”
  - White box performance work in progress
Task 1 – Network Technology Evolution (continued)

### Data Plane Programming (DPP)
- **Implementing In-band Network Telemetry (INT) using Data Plane Programming**
  - Deployed testbed running between 3 organisations, fourth in progress (NTUA)
  - White paper published [INT testbed experience](#) including lessons learned
  - White paper on clock synchronisation – due very soon

### Quantum Key Distribution (QKD)
- **Supporting NRENs in implementing Quantum technologies**
  - Currently evaluating QKD simulators and testbeds options
  - PoC with Toshiba between GÉANT PoPs planned for 2022
  - Running monthly open discussion forum available to all – join the [mail list](#)

### Router for Academia Research and Education (RARE)
- **Providing full-featured open source platform – see the [RARE wiki](#)**
  - Runs FreeRtr control plane with P4 / DPDK data plane
  - Distributed P4 lab setup at 4 GÉANT PoPs with many NRENs/unis joining
  - Growing use cases: RENATER private peering, PolKA, DMC21, bier/AMT, ...
Task 2 – Network Services Evolution and Development

Providing Service Provider Architecture Platform for connectivity services
- Development and support to the production GCS service
- Provides TMForum ODA-compliant software tools
- Exploring possibilities to extend to other GÉANT services
- Work in progress to containerise components and provide via NMaaS

Raising the bar for OAV in the NREN community
- New training modules being released regularly through GÉANT e-Academy
- NREN architectures mapping to the TMForum ODA reference architecture 
  (examples: PIONEER, NMaaS and GRNET) – more wanted!
- Wiki including OAV community portal – please contribute!
- OAV Maturity Model focus group started
- Upcoming workshop on CNaaS on May 4th
Task 3 – Monitoring and Management

Well established toolkit for active network performance monitoring
- International collaboration with ESnet, GÉANT, IU, I2, RNP, UoM
- Latest version v4.4.3, with v5.0 underway
- Provides consultancy advice and guidance to the GÉANT community
- Planning 3rd European perfSONAR User Workshop for May 2022

Runs perfSONAR mesh from participating NRENs to GÉANT backbone
- Providing maintenance and support; node replacements
- New intercontinental mesh – includes SA, ESnet, TEIN3, BELLA, SINET

Crowdsourced and/or RPi-based WiFi performance monitoring solution
- A production GÉANT service since July 2020
- Supports eduroam monitoring
- EaP NREN workshop held in November 2021
Task 3 – Monitoring and Management (continued)

**Network Management as a Service**
- Provides a portfolio of applications run via a secure, virtual platform
  - Dockerised images implemented through a Kubernetes cluster
  - User base is growing, both within GN4-3 and R&E networks worldwide

**Argus**
- Alarm aggregation tool developed by SIKT
  - Integrates alarms from NAV, Nagios, ZABIX, ArubaCloud, Zino,...
  - Moving towards production, looking for users

**Network Telemetry**
- Moving existing network monitoring boundaries
  - Defining / running tests for 100G network monitoring and performance measurement (software transfer tools, RARE, and perfSONAR)
  - P4-based flow monitoring
  - Two upcoming workshops:
    - 2nd Performance Management Workshop (March 8th)
    - 2nd Telemetry and Data Workshop (April 6th)
Continuation of the GÉANT project – GN5-1

- Planning is underway – smooth transition expected in January 2023
- Continuing existing + new work
- Leaders: Ivana Golub (PSNC), Pavle Vuletić (UoB)
Upcoming events (co)organised by WP6

- 8 March 2\textsuperscript{nd} Performance Management Workshop
- 6 April 2\textsuperscript{nd} Telemetry and Data Workshop
- 4 May Campus Network Management as a Service
- 10-11 May SIG-NOC
- 24-25 May 3\textsuperscript{rd} European perfSONAR User Workshop

For more events see: https://events.geant.org/
Find out more about the WP6 work

https://wiki.geant.org/display/NETDEV

Contact:
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Thank you

Any questions?

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