



Service Provider Architecture

Current state and plans

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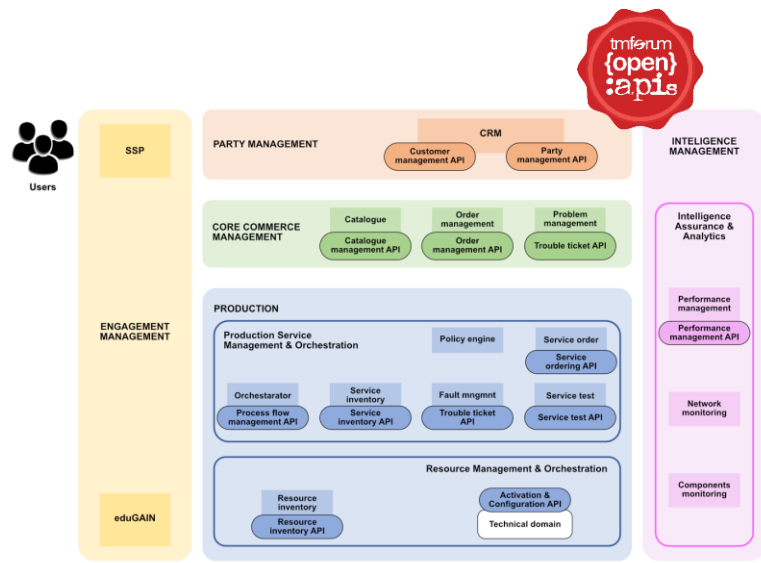
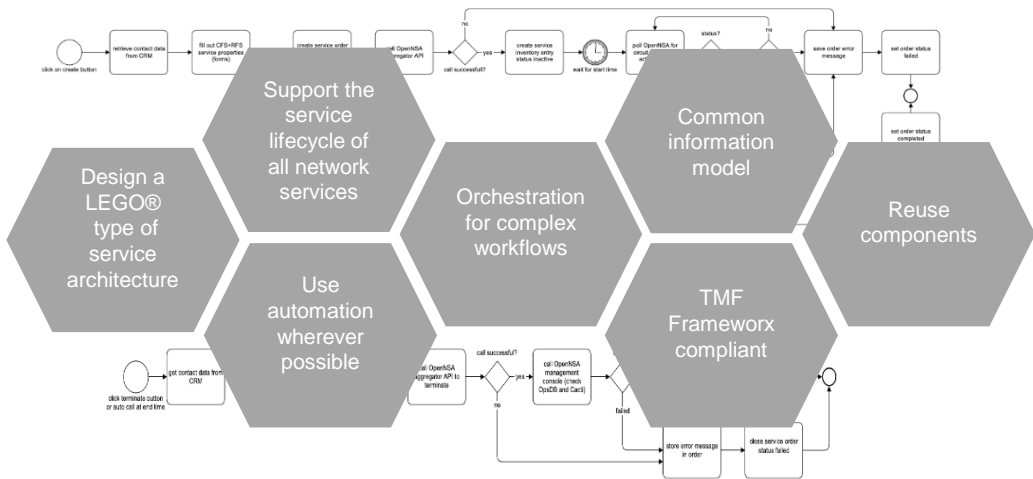
23 May 2023

Agenda

- SPA concept
- GÉANT Connection Service (GCS)
- Inventory 3
- Orchestration for GP4Lab

SPA Service Provider Architecture

SPA is a modular distributed platform to orchestrate and automate network services in the GÉANT and NREN network infrastructures.



GÉANT Connection Service (GCS)

- Point-to-point L2 circuits in the GÉANT infrastructure
- SPA-based production service for GÉANT OC
- OpenNSA as the activation component (topology abstraction, access to the infrastructure)
- Continuous improvements
 - New requirements from the GÉANT OC
 - UAT (User Acceptance Test) environment for pre-production tests

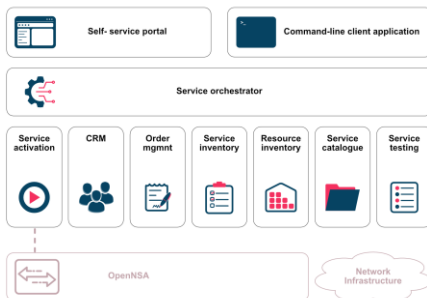
44
routers707
automated
workflows36
STPs24
active
circuits665 terminated
circuits

First ← Prev Page 1 of 1 All ↓ Next → Last Status Start Date From Start Date To Text

| Request Details | | | | Service Details | | | | | | | | | |
|-----------------|-------------------|---------------------|--------|-----------------|------------------------------|---|---------------------|----------|----------|---|-----------|---|------------|
| Service Type | User | Time(UTC) | Status | Conn. ID | Name | 3rd party ID | Start(UTC) | End(UTC) | Capacity | Src. STP | Src. VLAN | Dest. STP | Dest. VLAN |
| Geant E-line | Operations Centre | 2019-12-02 10:31:58 | active | GC-0ff2428874 | BELNET_ExpressRoute_Vlan4080 | SKEY:c34e3b9c-b79f-44ef-958b-b8c0354e1115 | 2019-12-02 10:30:58 | None | 0 | 1-ams-nl.gcs.geant.net_2019_topology:belnet-ap3-expressroutes | 4080 | 1-fra-de.gcs.geant.net_2019_topology:ms_exp_res_route_1 | 2 |
| Geant E-line | Operations Centre | 2019-12-02 10:30:47 | active | GC-7b6b96a6f5 | BELNET_ExpressRoute_Vlan4081 | SKEY:c34e3b9c-b79f-44ef-958b-b8c0354e1115 | 2019-12-02 10:29:11 | None | 0 | 1-lon-uk.gcs.geant.net_2019_topology:belnet-ap2-expressroutes | 4081 | 1-fra-de.gcs.geant.net_2019_topology:ms_exp_res_route_2 | 2 |

GÉANT Connection Service (GCS)

- Maintenance
 - Upgrades (performance, libs)
 - Topology updates (requested by GÉANT OC)
 - Regular automated tests
- Topology management improvement
 - All operations via the portal
- Close collaboration with WP7



Test report

```

Timestamp : 2023-05-17 11:02,
Environment: production,
Mode: proactive,
User : Test E2E-SSP-Test,
Reservation name : Test-20230517-11h00m,
Circuit Type: Microsoft Express Route,
Reservation start time : 2023-05-17 11:00,
Reservation end time : 2023-05-17 12:00,
Source STP : gcs.geant.net:2019:topology-1-ams-nl:amstest,
Source vlan num : 33,
Destination STP : gcs.geant.net:2019:topology-1-lon-uk:lonstest,
Destination vlan num : 22,
Connection Id : GC-cc81a0c603,
Action : creation,
Action status : Success,
Error message :
  
```

The screenshot shows the GCS web interface. At the top, there are navigation links: HOME, SERVICES, INVENTORY, GÉANT IP, HELP, DOCUMENTATION, and DONNA LAPACE. Below the navigation is a search bar with 'Router' selected. The main content area displays two tables: 'ADD INTERFACES' and 'ADD ROUTER'. Both tables have a 'First', 'Prev', 'Page 1 of 1', 'Next', and 'Last' navigation bar.

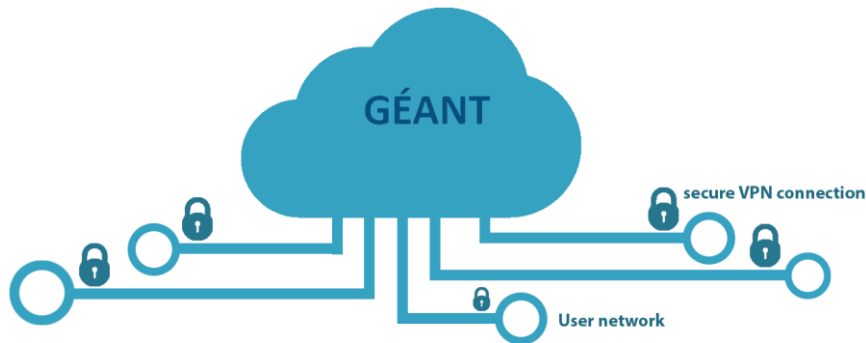
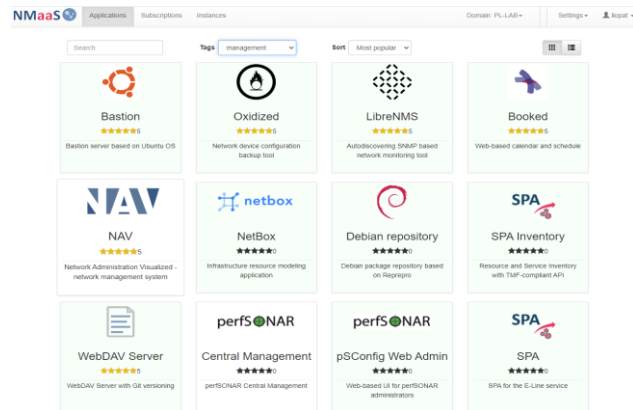
| Router | Interface Name | STP Name | Physical interface | Interface Speed | Range | Action |
|--------------------------------|----------------|--|--------------------|-----------------|--------|---------|
| nsi.new.lab:2019:topology-lab1 | ms1-1-7 | nsi.new.lab:2019:topology-lab1.ms1-1-7 | ge-1/1/7 | 1000 | 2-1000 | [E] [✓] |
| nsi.new.lab:2019:topology-lab2 | ms1-1-7 | nsi.new.lab:2019:topology-lab2.ms1-1-7 | ge-1/1/7 | 1000 | 2-1000 | [E] [✓] |
| nsi.new.lab:2019:topology-lab4 | ms1-1-7 | nsi.new.lab:2019:topology-lab4.ms1-1-7 | ge-1/1/7 | 1000 | 2-1000 | [E] [✓] |
| nsi.new.lab:2019:topology-lab5 | ms1-1-7 | nsi.new.lab:2019:topology-lab5.ms1-1-7 | ge-1/1/7 | 1000 | 2-1000 | [E] [✓] |

| Router | SFP local port name: | SFP remote port name: | Protocol | Port range: | Bandwidth: | Interface: | Attributes: | Action: |
|--------------------------------|----------------------|---|----------|-------------|------------|------------|-------------|---------|
| nsi.new.lab:2019:topology-lab1 | lab2.nsi.new.lab | nsi.new.lab:2019:topology-lab2A1ab1.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac1 | - | [E] [✓] |
| | lab4.nsi.new.lab | nsi.new.lab:2019:topology-lab4A1ab1.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac2 | - | [E] [✓] |
| | lab5.nsi.new.lab | nsi.new.lab:2019:topology-lab5A1ab1.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac3 | - | [E] [✓] |
| nsi.new.lab:2019:topology-lab2 | lab1.nsi.new.lab | nsi.new.lab:2019:topology-lab1A1ab2.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac1 | - | [E] [✓] |
| | lab4.nsi.new.lab | nsi.new.lab:2019:topology-lab4A1ab2.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac2 | - | [E] [✓] |
| | lab5.nsi.new.lab | nsi.new.lab:2019:topology-lab5A1ab2.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac3 | - | [E] [✓] |
| nsi.new.lab:2019:topology-lab4 | lab1.nsi.new.lab | nsi.new.lab:2019:topology-lab1A1ab4.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac1 | - | [E] [✓] |
| | lab2.nsi.new.lab | nsi.new.lab:2019:topology-lab2A1ab4.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac2 | - | [E] [✓] |
| | lab5.nsi.new.lab | nsi.new.lab:2019:topology-lab5A1ab4.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac3 | - | [E] [✓] |
| nsi.new.lab:2019:topology-lab5 | lab1.nsi.new.lab | nsi.new.lab:2019:topology-lab1A1ab5.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac1 | - | [E] [✓] |
| | lab2.nsi.new.lab | nsi.new.lab:2019:topology-lab2A1ab5.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac2 | - | [E] [✓] |
| | lab4.nsi.new.lab | nsi.new.lab:2019:topology-lab4A1ab5.nsi.new.lab | Wan | 1-4000 | 10000 | vfrac3 | - | [E] [✓] |

GCS test service in NMaaS

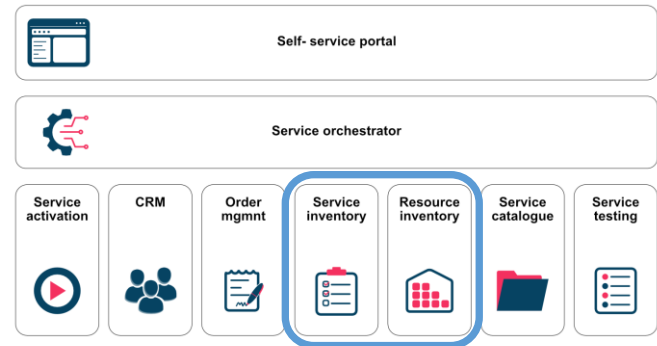


- Sandbox for testing L2 point-to-point connection service
 - All SPA components with default test settings
 - OpenNSA with simple emulated network topology
 - All service lifecycle actions
- No need to deploy the service on your own resources
 - Only an account in NMaaS is needed
 - User creates an instance of the service for testing



Inventory

- Key component of SPA
- Source of Truth for automation
- Storage for the information about resources and service instances (CFS, RFS)
- TMF REST APIs
- Migration from Inventory 2 to Inventory 3
 - Lessons learned



Inventory 3

- Implementation from scratch (Java)
- TMF Open APIs
- Use of NoSQL database to store JSONs (TMF data model)
- Data model can be easily updated and validated (per request to Inventory)
- Performance improved
- Secured API (OAuth2) with Keycloak
- Additional application EventListener has been developed to monitor all the events in Inventory 3
 - listener application (TMF REST API)
 - stores history of all operations like creating, modifying and removing a resource/service in Inventory 3

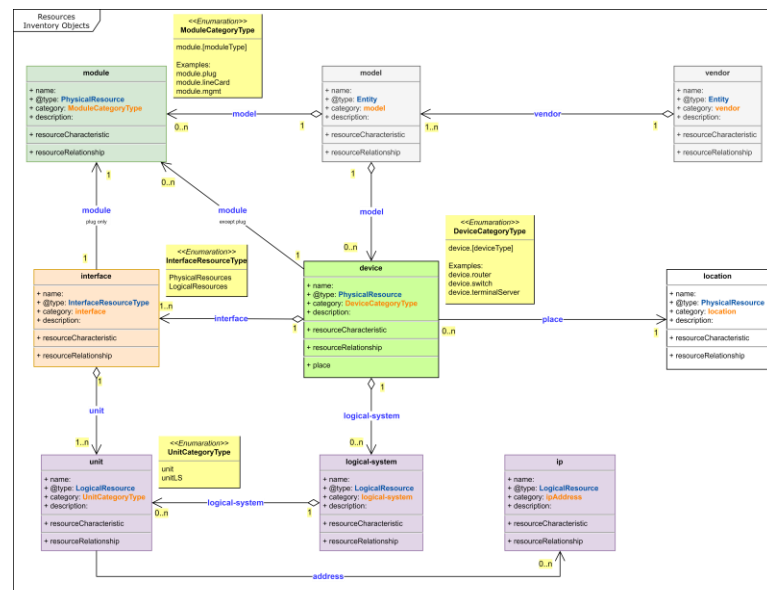
```

{
  "name": "xe-0/0/0",
  "category": "interface",
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    },
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      }
    },
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      }
    }
  ],
  "href": "http://10.250.249.201:8080/resourceInventoryManagement/v4.0.0/resource/cd3eb2bd-3ef3-4c8c-be15-5c2e83d9ca45",
  "resourceCharacteristic": [
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      "value": "sci"
    },
    {
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      "value": "10GE"
    },
    {
      "name": "mediaPhy",
      "value": "10GBASE-LR"
    },
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      "name": "gigether-options/ieee-802.3ad/bundle",
      "value": "ae0"
    }
  ],
  "id": "cd3eb2bd-3ef3-4c8c-be15-5c2e83d9ca45"
},

```


Inventory 3 in action

- The goal is to use Inventory 3 as a Source of Truth for a new infrastructure in PIONIER
 - Automated configuration and monitoring
 - Integration with external systems
- Tests in PSNC/PIONIER
 - Docker containers
 - Work on the models describing resources, services and integrations
 - New feature requests



Orchestration for GP4L



- Orchestration to replace manual management actions
- Definition of use cases and workflows
- Implementation of the first use case
 - Automated execution and updates of monitoring for a P4 node in GP4L
 - Integration of NetBox, Camunda orchestrator and Uptime Kuma
 - NetBox sends an event notification to the orchestrator
 - The orchestrator instructs Uptime Kuma
 - Use of REST APIs
 - Deployment in NMaaS
- More advanced use cases will come



Orchestration for GP4L – demo

Thank You!



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<https://wiki.geant.org/display/NETDEV/SPA>

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