

Network Automation and Orchestration in the modern network service management platform

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www.geant.org

Why we discuss network automation and orchestration

Number of resources
and services is
growing

Services become
more and more
complex

Service time to
market is shortening

Security

CI/CD

Intelligent and
autonomous
services

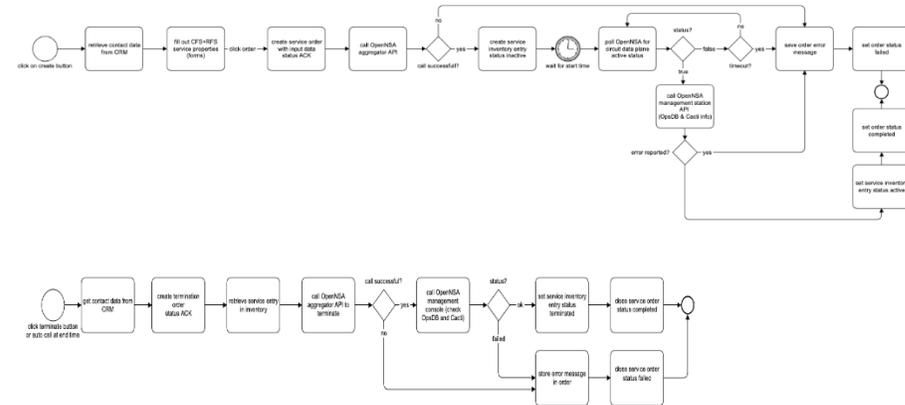
Network automation and orchestration

Network automation

Automated tasks which are executed for network service provisioning and management

Orchestration

Service lifecycle management



Towards digital platforms

Automation and orchestration is a must in the modern digital platforms for flexible and efficient service management.

Towards digital platforms



Decouple functionalities of traditional siloed B/OSS



Composable architecture of functional blocks that expose well-defined interfaces

Separation of duty

REST APIs

High and low level automation and orchestration

Standards to build digital platforms with automation and orchestration

Reference
architecture

Common open
data model

Open APIs

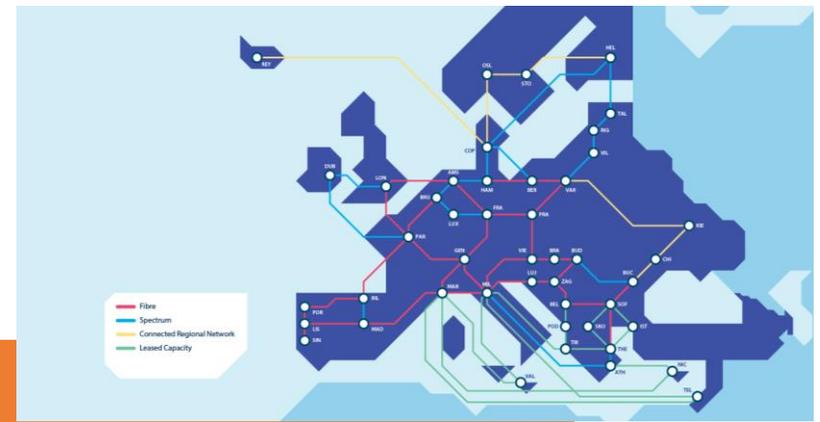
Interoperable
components

No vendor
lock- in

Partner
ecosystem

Automation and orchestration in the GÉANT project

GÉANT network



GÉANT interconnects Europe's national research and education networks (NRENs) with the high bandwidth, high speed and highly resilient pan-European backbone – together connecting Europe's researchers, academics and students to each other, and linking them to over half the countries in the world.

GÉANT Project (GN5-1) - accelerating research, driving innovation and enriching education.

geant.org/projects/

Architecture

Required features and capabilities that need to be supported by an architecture

Support open APIs and open source implementations

Support interoperability with other platforms, products and architectures

Support automation

Support common information

Support flexible composite services

Support service discovery using a service portfolio

Implement security by design

Support organisations and service catalogues

Support hierarchical orchestration

Support implementation of loosely coupled components

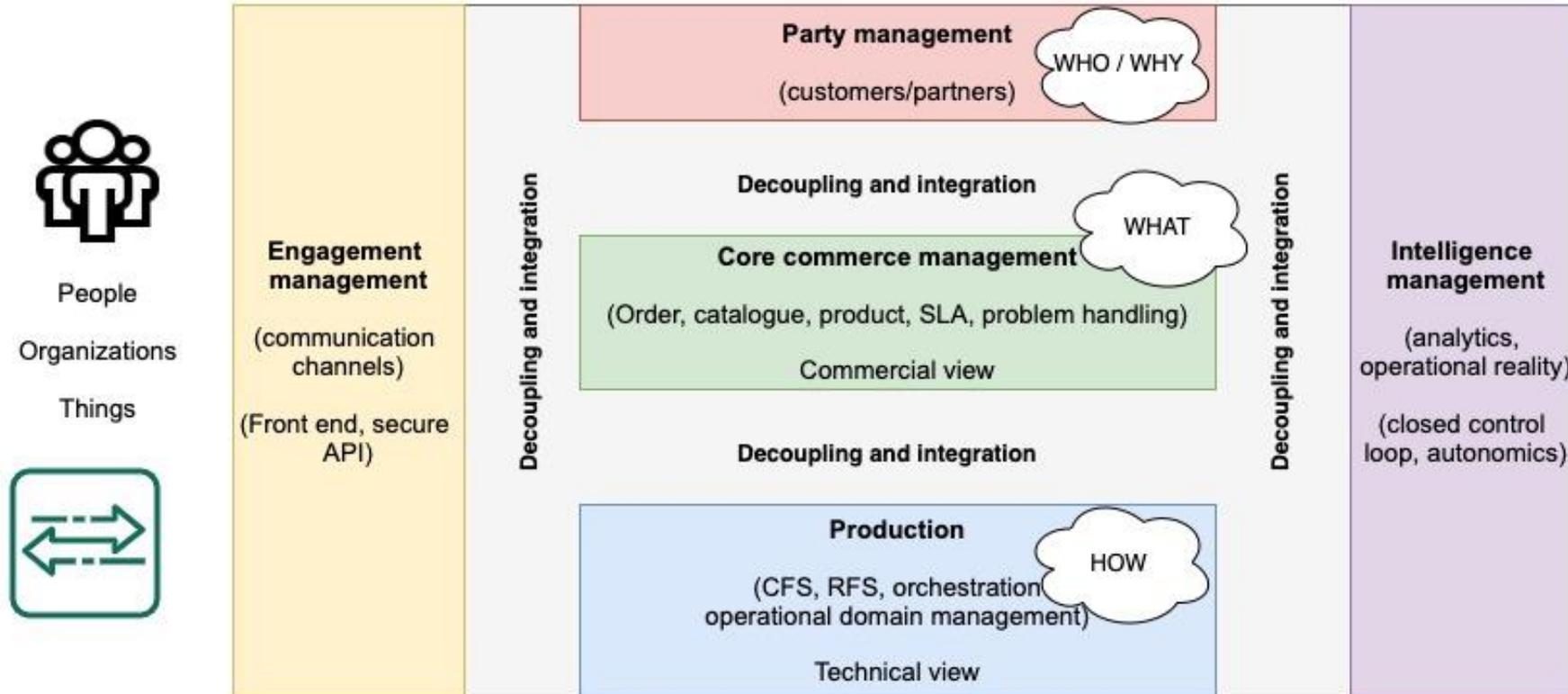
Support integration of components using DevOps or NetDevOps

Support abstraction/virtualisation

Enable flexible scalability

Support innovative future development and research

TM Forum Open Digital Architecture



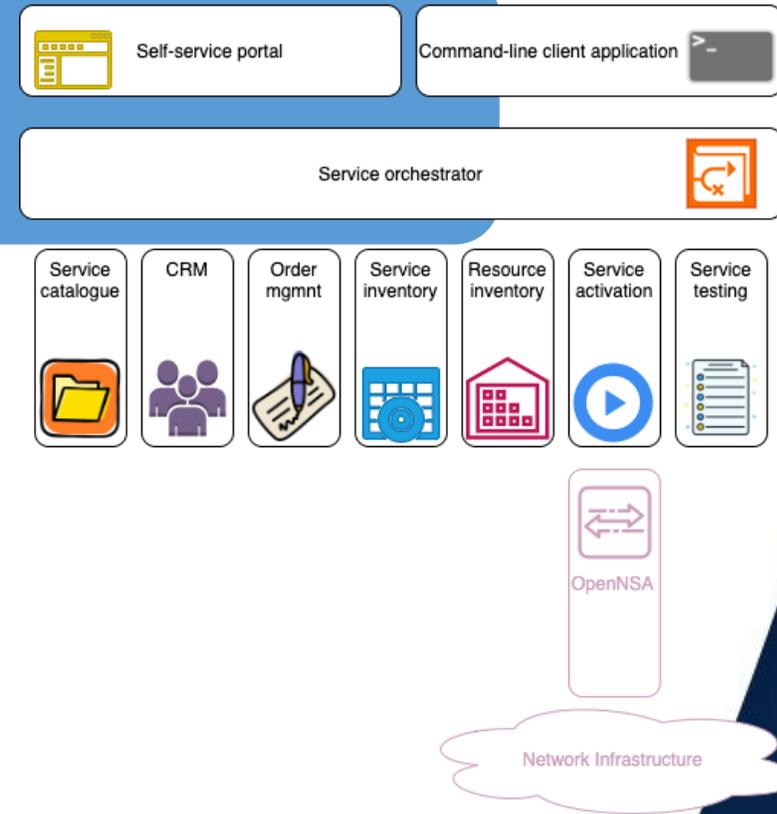
<https://www.tmforum.org/oda/>

Service Provider Architecture



SPA is a modular blueprint guide for designers and developers who want to build a next generation service management platform by integrating functionalities in a flexible and uniform way.

SPA platform is the implementation of the SPA to orchestrate and automate network services in the GÉANT and NREN network infrastructures.

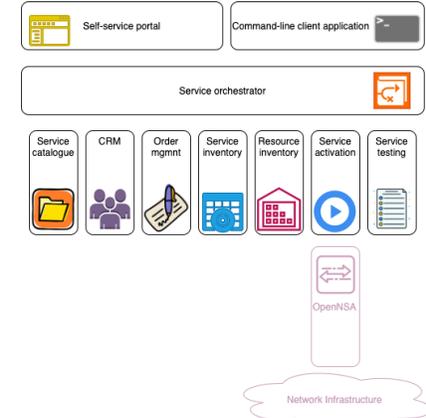


- Customer Management API
- Party Management API
- Service Catalog API
- Service Ordering API
- Trouble Ticket API
- Service Test Management API
- Service Inventory Management API
- Resource Inventory Management API
- Performance Management API
- Process Flow Management API



GÉANT Connection Service (GCS)

Production point-to-point L2 circuits in the GÉANT infrastructure



HOME SERVICES INVENTORY HELP IMPADMIN

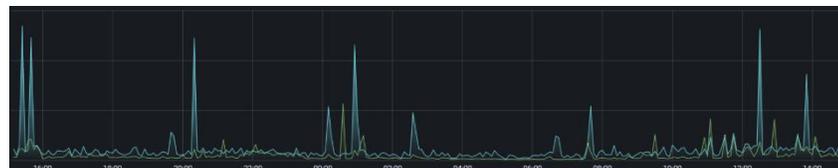
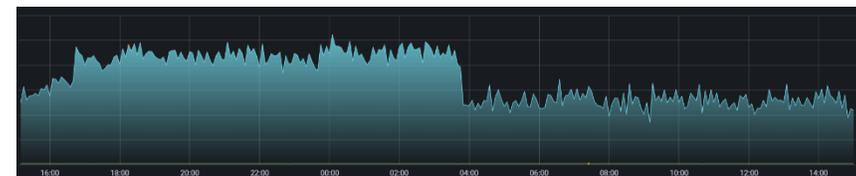
GÉANT SSP Admin Portal

[Create circuit](#)
[List circuits](#)
[Debug Logs](#)

First ← Prev Page 1 of 1 All ↓ Next → Last

Status: Ack+Act+Inact Start Date From: 2018-08-23 Start Date To: 2020-02-26 Text:

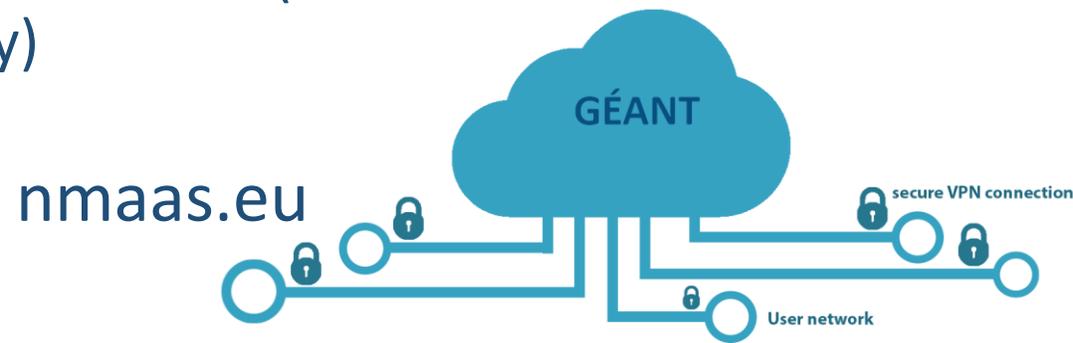
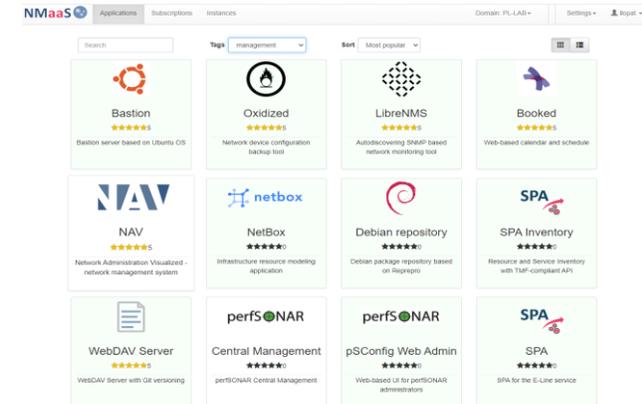
Request Details				Service Details									
Service Type	User	Time(UTC)	Status	Conn. ID	Name	3rd party ID	Start(UTC)	End(UTC)	Capacity	Src. STP	Src. VLAN	Dest. STP	Dest. VLAN
Geant E-line	Operations Centre	2019-12-02 10:31:58	active	GC-0ff2428874	BELNET_ExpressRoute_Vlan4080	SKEY:c34e3b9c-b79f-44ef-958b-b8c0354e1115	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_expres_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_expres_route_2	2



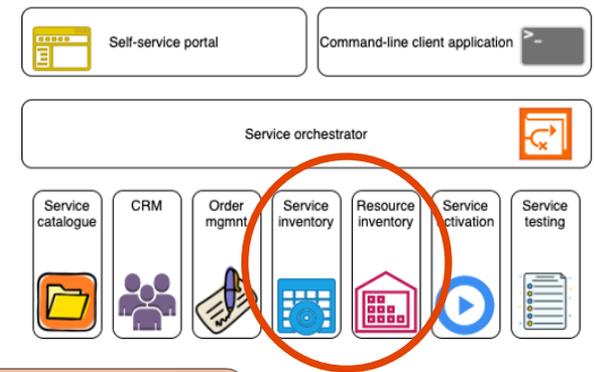
GCS sandbox in NMaaS



- Sandbox for testing L2 point-to-point connection service
 - All SPA components with default test settings
 - OpenNSA with simple test 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
- SPA in NMaaS may help to familiarize with the OAV concept and the available SPA implementation (start of the orchestration and automation journey)



Single Source of Truth (SSoT) for automation



Single Source of Truth defines the current network state

- Any change in the config and SSoT must be reflected in the network

Data source for the automation tools

Single place to link pieces of data

SSoT should be authoritative (no other data repositories can supersede it)

SSoT may have multiple data sources behind (including multiple data types)

Data quality and security are crucial

Takeaway for you

Tips on how to start designing and building network service management platforms with orchestration and automation built-in:

Open Digital Architecture

Open APIs

Workflows definitions

Single Source of Truth

The knowledge and tools to implement orchestration and automation are easily available.



The strategic decision to build well-defined platforms is a challenge.

Thank you

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

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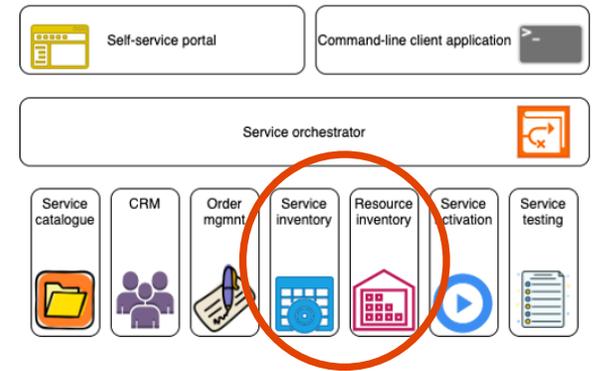


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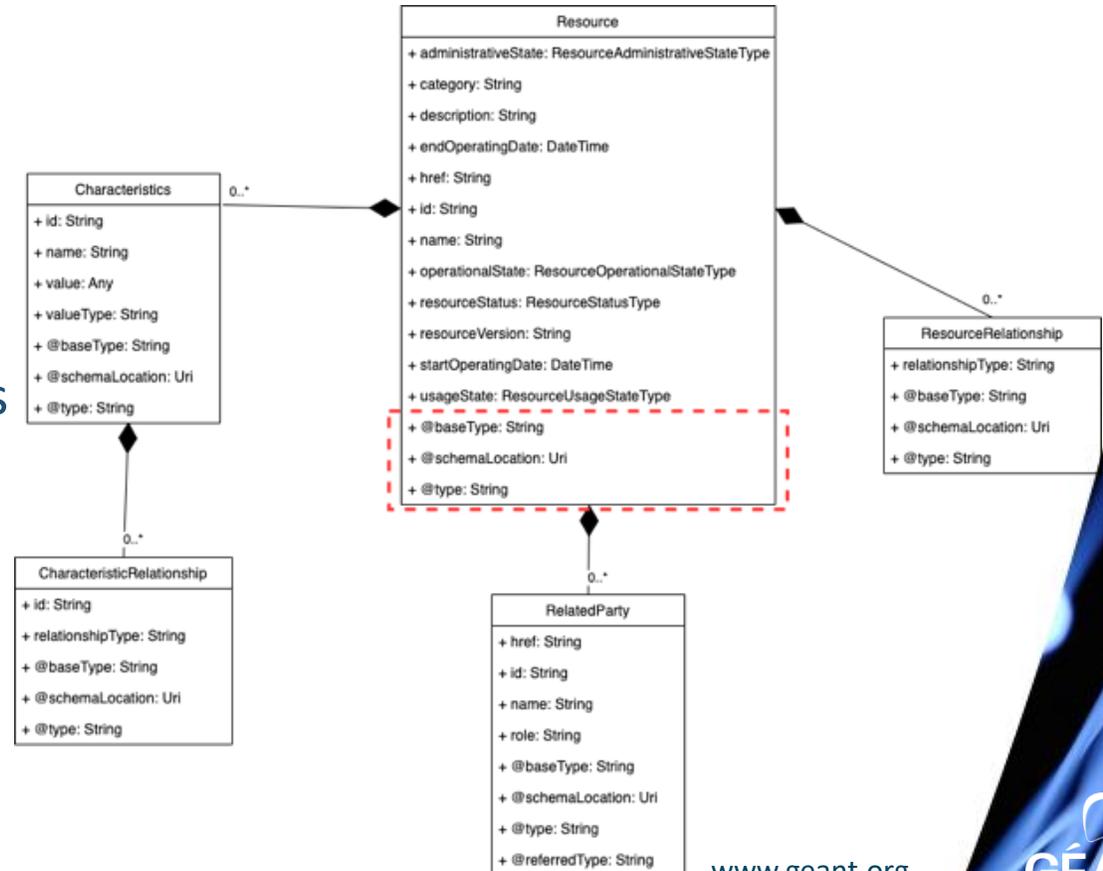
Supporting slides

Single Source of Truth (SSoT)

Single Source of Truth (SSoT) - SPA

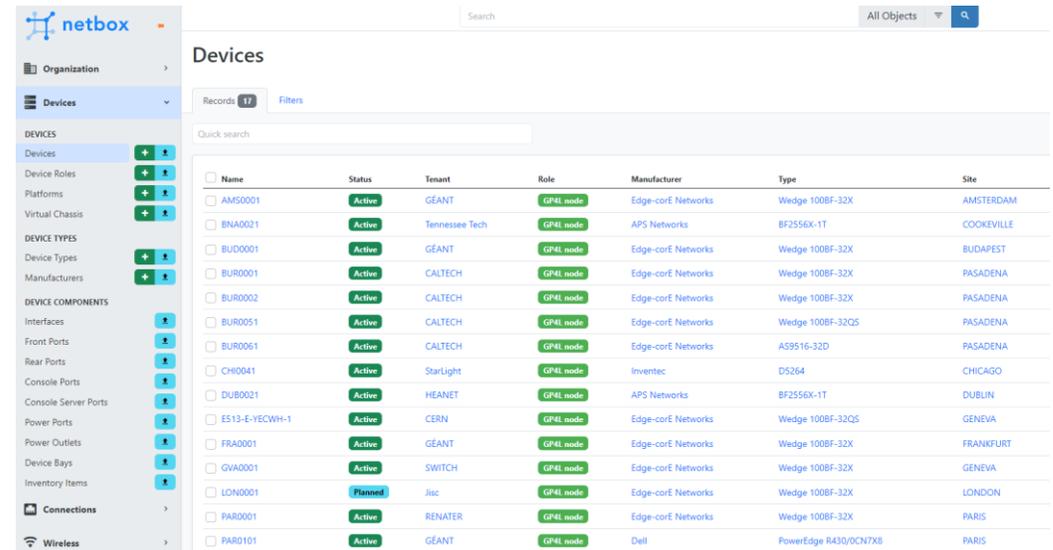


- SPA Inventory as a Single Point of Truth
 - Physical resources
 - Virtual resources
 - Services
- Resource and Service Inventory Management Open APIs
 - polymorphism and extension patterns
- Linked data elements (from/to services, resources, users, orders, ...)



Single Source of Truth (SSoT) – GP4L

- NetBox in GP4L
- Use cases
 - Adding a new P4 switch to the GP4L network
 - Experiment reservation (access to the P4 nodes in GP4L)



The screenshot shows the NetBox interface with a sidebar on the left containing navigation menus for Organization, Devices, DEVICES, DEVICES TYPES, DEVICES COMPONENTS, Connections, and Wireless. The main area displays a table of devices with columns for Name, Status, Tenant, Role, Manufacturer, Type, and Site.

Name	Status	Tenant	Role	Manufacturer	Type	Site
AMS0001	Active	GÉANT	GP4L node	Edge-core Networks	Wedge 100BF-32X	AMSTERDAM
BNA0021	Active	Tennessee Tech	GP4L node	APS Networks	BF2556X-1T	COOKEVILLE
BUD0001	Active	GÉANT	GP4L node	Edge-core Networks	Wedge 100BF-32X	BUDAPEST
BUR0001	Active	CALTECH	GP4L node	Edge-core Networks	Wedge 100BF-32X	PASADENA
BUR0002	Active	CALTECH	GP4L node	Edge-core Networks	Wedge 100BF-32X	PASADENA
BUR0051	Active	CALTECH	GP4L node	Edge-core Networks	Wedge 100BF-32QS	PASADENA
BUR0061	Active	CALTECH	GP4L node	Edge-core Networks	AS9516-32D	PASADENA
CHI0041	Active	StarLight	GP4L node	Inventec	D5264	CHICAGO
DUB0021	Active	HEANET	GP4L node	APS Networks	BF2556X-1T	DUBLIN
E513-E-YECWH-1	Active	CERN	GP4L node	Edge-core Networks	Wedge 100BF-32QS	GENEVA
FRA0001	Active	GÉANT	GP4L node	Edge-core Networks	Wedge 100BF-32X	FRANKFURT
GVA0001	Active	SWITCH	GP4L node	Edge-core Networks	Wedge 100BF-32X	GENEVA
LON0001	Planned	Jisc	GP4L node	Edge-core Networks	Wedge 100BF-32X	LONDON
PAR0001	Active	RENATER	GP4L node	Edge-core Networks	Wedge 100BF-32X	PARIS
PAR0101	Active	GÉANT	GP4L node	Dell	PowerEdge R430/OCN7X8	PARIS

