



5G PPP WG Pre-standard Monthly Telco – 31 March 2021

5G-VINNI – SDO Key Achievement

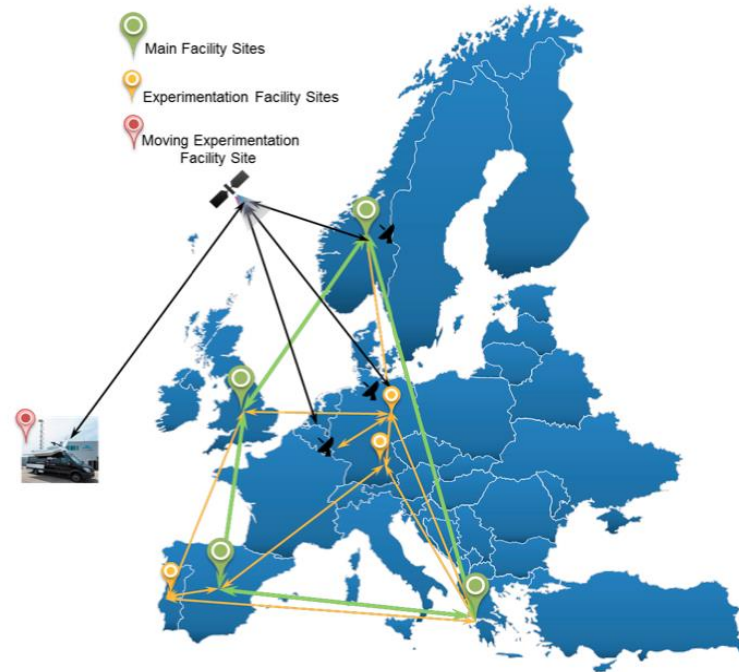
ZSM PoC#2: Automated network slice scaling in multi-site environments

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5G-VINNI - Overview

- **5G-VINNI project's vision:** build an open large-scale 5G End-to-End (E2E) facility that can
 - demonstrate that they 5G network KPIs can be met
 - be validated, accessed and used by vertical industries to test use cases and validate KPIs.
- 5G-VINNI built out of a set of **interworking** facility sites
- **Main facility sites:** offer E2E 5G network capabilities to real-world verticals, with well-defined SLAs
 - Oslo-Kongsberg (Norway); Martlesham (UK); Madrid (Spain); Patras (Greece)
- **5G-VINNI experimentation facility sites:** provide environment for advanced experimentation and testing possibilities on (combination of) elements of the E2E model
 - Aveiro (Portugal); Berlin (Germany); Munich (Germany)
- **Moving experimentation Facility site:** satellite connected vehicle



PoC Summary

Objective: Demonstrate the capacity to automatically scale out a deployed network slice instance across multiple administrative domains

Timeline: 01.01.2021– 31.03-2021 (3 months)

Alignment with ZSM: ZSM001 (Use Cases) and ZSM003 (Network slicing features)

PoC Team: Telefonica, Telenor, University of Patras, openslice, UC3M

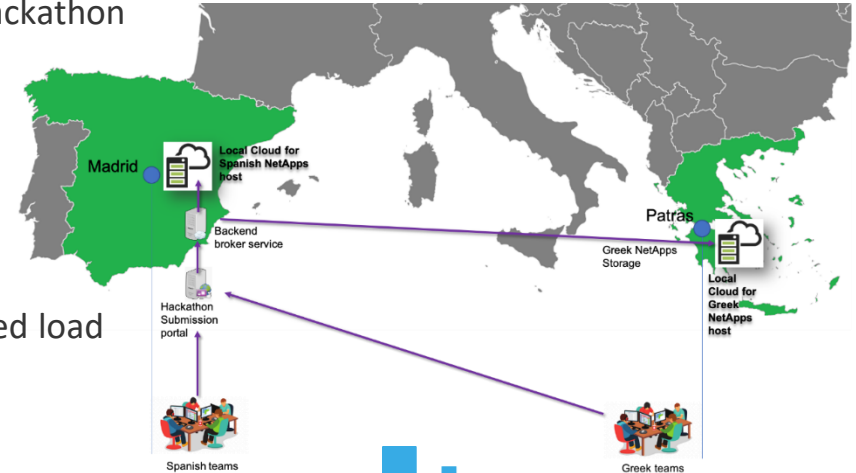
PoC Assets: 5G-VINNI, 5TONIC

Scenario: Vertical industry (e.g., PPDR, e-Health) NetApps hackathon
Involving developers from Spain and Greece

- NetApp submission service hosted in Madrid facility site
- Re: GPDR policy, NetApps binaries and data must be hosted in the home country.

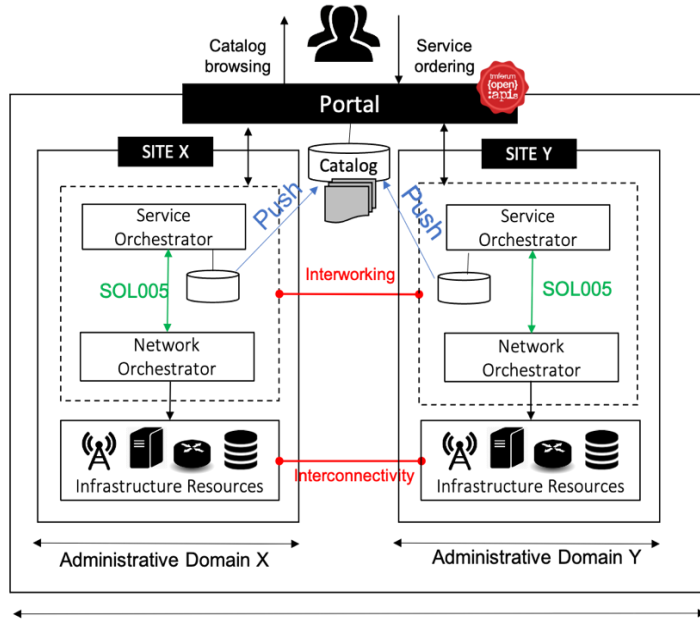
Network slice scaling out operation:

- Automatically triggered in Madrid, because of unexpected load surges -> **reactive correction action**
- Propagated towards Patras, due to forecasting reasons -> **pro-active corrective action**

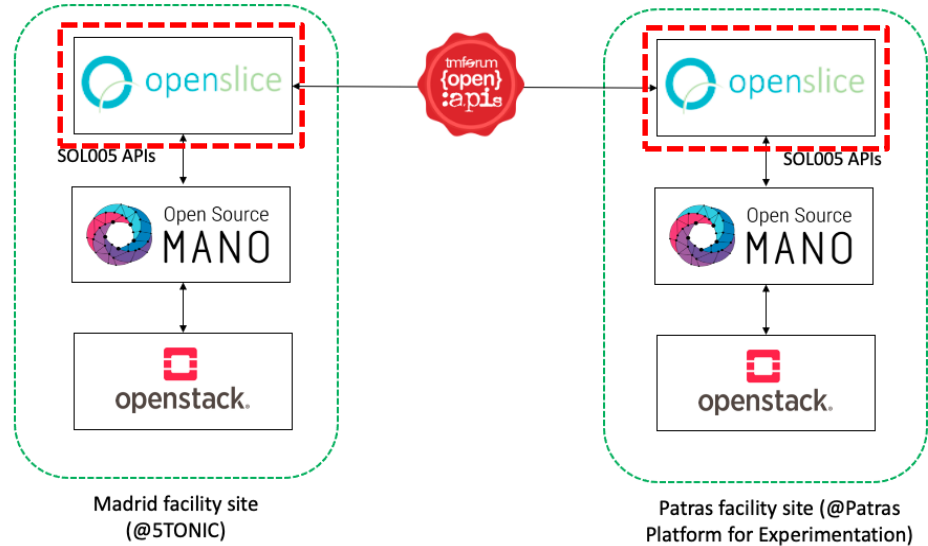


5G-VINNI facility architecture

From a generic 5G-VINNI facility footprint...



.... to a specific 5G-VINNI facility realization



The PoC makes use of the assets from these two 5G-VINNI facility sites

OpenSlice

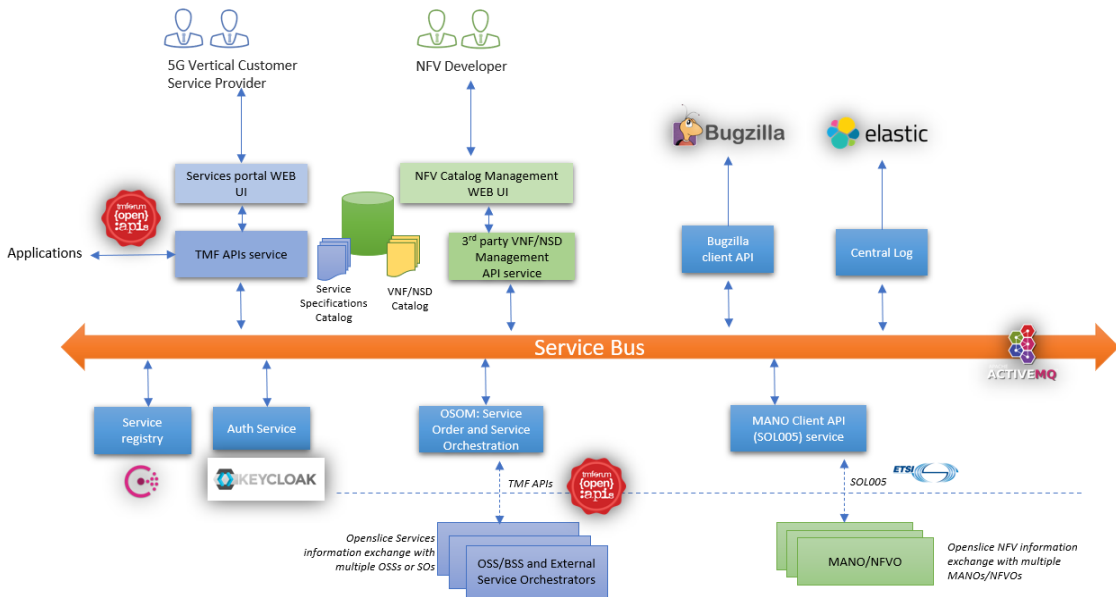
- **Open-source** operations support system (OSS) solution providing **Service Orchestration** functionality

- Including both service fulfillment and assurance lifecycle phases

- **CFS viewpoint:** user-friendly web portal for the interaction with the vertical customers:

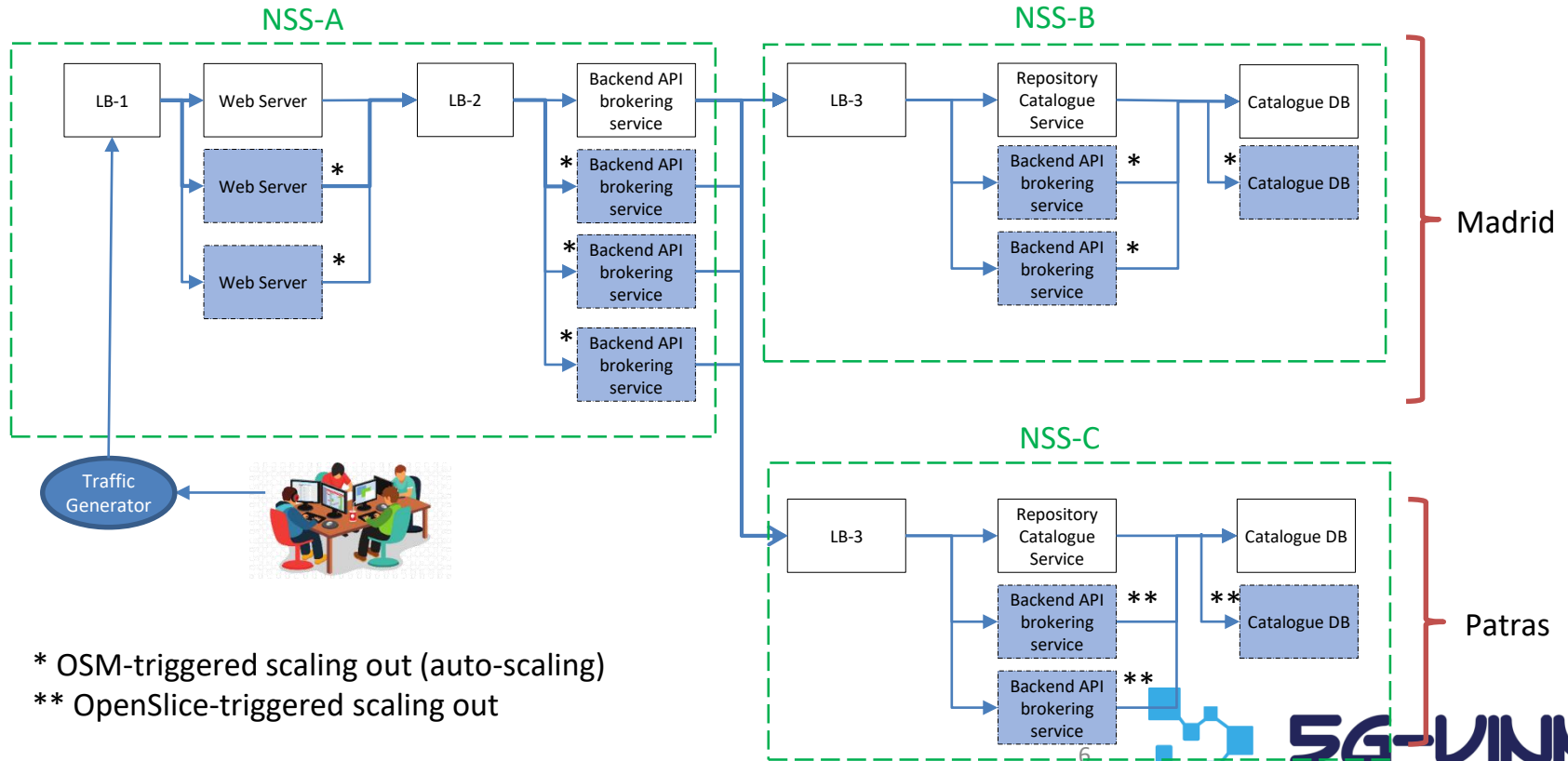
- Browse slice templates (VINNI-SB's) in the Service Catalog.
- Issue and capture service orders
- Retrieve PM/FM data on deployed slices.

- **RFS viewpoint:** consumption of OSM NBI capabilities to deploy and operate the virtualized components of the slices.

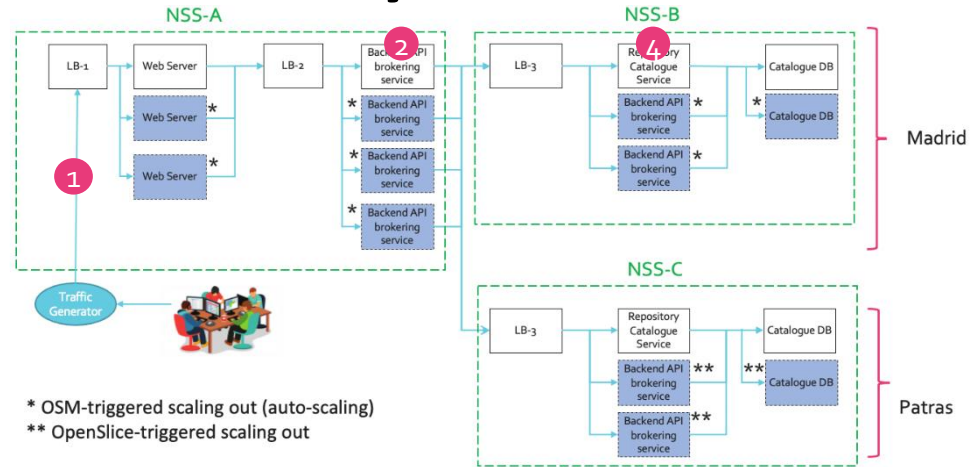
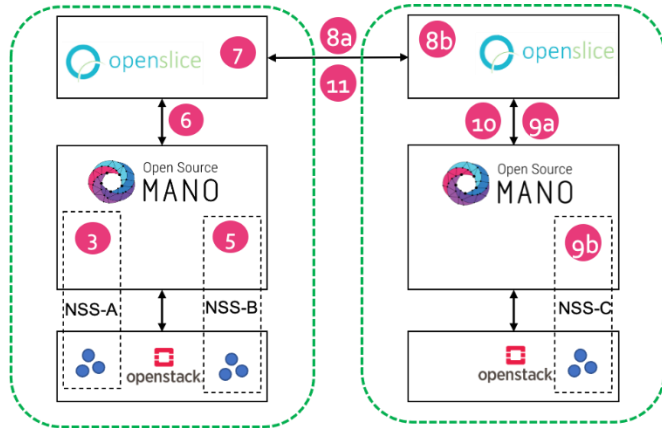


Link: <https://openslice.io>

Multi-site NW slice – operation



PoC user story



- 1 There is a sudden high demand of portal interaction at Madrid facility site (HTTP requests represents a traffic load surge with 3:1 ratio)
- 2 NSS-A's backend API brokering service collapses, being not able to forward traffic to either NSS-B or NSS-C
- 3 Based on day-2 activities, "Madrid-OSM" triggers **NSS-A auto-scaling** -> Web server (2 x scale out), LB-1 (reconfiguration), LB-2 (reconfiguration)
- 4 NSS-A's backend API brokering service back on normal operation, and starts sending traffic to NSS-B through LB-3. NSS-B's VNFs collapse.
- 5 Based on day-2 activities, "Madrid-OSM" triggers **NSS-B auto-scaling** -> Repository catalogue (2x scale out), DB (1 x scale out), LB-3 (reconfiguration)
- 6 "Madrid-OSM" notifies "Madrid-OpenSlice" of successful steps 3 and 5

- 7 "Madrid-OpenSlice" decides that NSS-C needs to be scaled out as NSS-B did, in order to avoid collapse as in Madrid -> OpenSlice is aware of UC semantics
- 8 "Madrid-OpenSlice" issues NSS-C scaling request to "Patras-OpenSlice", using TMF's APIs. "Patras-OpenSlice" checks this request.
- 9 "Patras-OpenSlice" forwards the request to the "Patras-OSM" for enforcement. Unlike step 3 and 5, here **there is no NSS-C auto-scaling**
- 10 "Patras-OSM" notifies "Madrid-OpenSlice" of NSS-C scaling out.
- 11 "Patras-OpenSlice" notifies "Madrid-OpenSlice" of successful NSS-C scaling out.

Golden nuggets

- ZSM poC#2 pipeline, with all ingredients
 - Research + Experimentation + Standardization
 - Open-source communities (OSM and OpenSlice) along the entire path
- ZSM PoC#2 showcasing by April
 - Current status: automated scaling at individual facility sites (steps 1-6)
 - Next steps: Cross-domain orchestration @OpenSlice (steps 7-11)
- PoC#2 wikipage:
[https://zsmwiki.etsi.org/index.php?title=PoC 2 Automated Network Slice Scaling in Multi-Site Environments](https://zsmwiki.etsi.org/index.php?title=PoC_2_Automated_Network_Slice_Scaling_in_Multi-Site_Environments)

Thank You