

# Deploying an Open 5G infrastructure to support verticals

## *The 5G-VINNI & 5GinFIRE Experience*

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*FITCE Workshop : Technologies and Infrastructures for optimizing the performance of networks in the ICT sector*

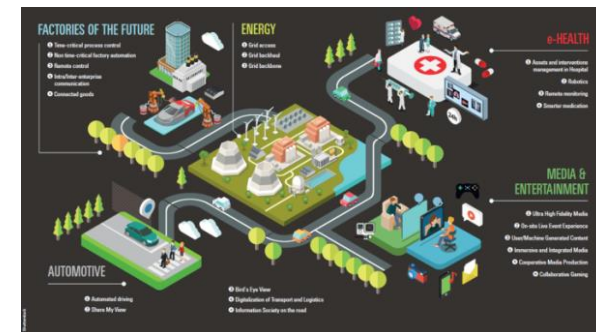
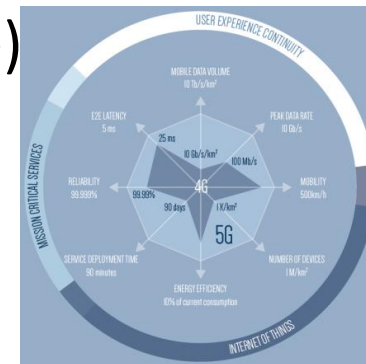
*May 17, 2019 / Conference Centre of University of Patras, Greece*

# Overview

- Deploying an open 5G infrastructure
  - The 5G-VINNI Project
- Deploying verticals & services
  - The 5GinFIRE

# 5G-VINNI (5G Verticals INNOvation Infrastructure)

- Build an open large scale 5G End-to-End facility that can
  - demonstrate that key 5G network KPIs can be met
  - be validated, accessed and used by vertical industries (e.g. in ICT-19 projects) to test use cases and validate 5G KPIs.
- Duration: 3 years, budget: 19,998 M€
- Consortium: 23 partners (operators, vendors, academics, SMEs)
- External Stakeholder Board: Vertical industry
- A 5G-PPP project
- <https://www.5g-vinni.eu/>



# 5G-VINNI Facility Sites

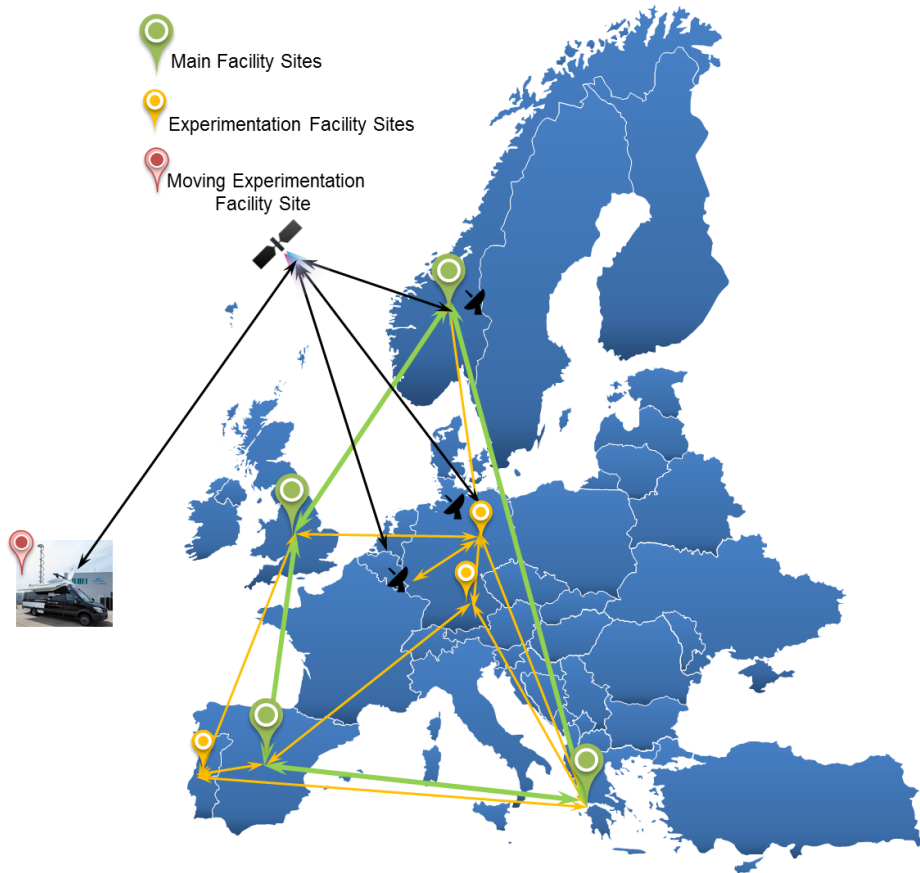
**Main Facility sites:** E2E 5G-VINNI facility that offers services to ICT-18-19-22 projects with well-defined Service Level Agreements.

- Norway (Oslo, Kongsberg)
- UK (Martlesham)
- Spain (Madrid)
- Greece (Patras)

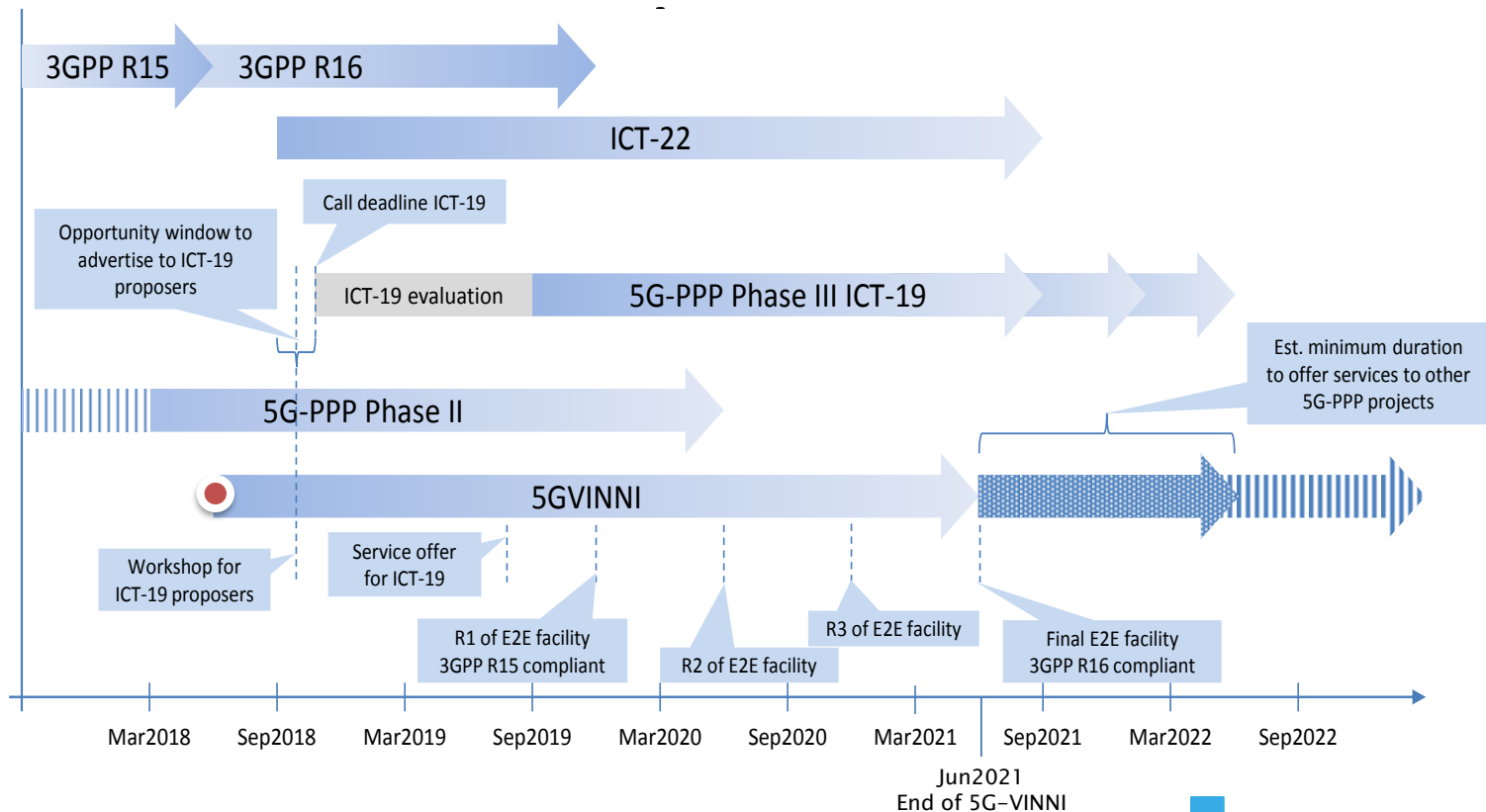
**Experimentation Facility sites:** provide environments for advanced focused experimentation and testing possibilities on elements and combinations of elements of the E2E model.

- Portugal (Aveiro)
- Germany (Berlin)
- Germany (Munich)

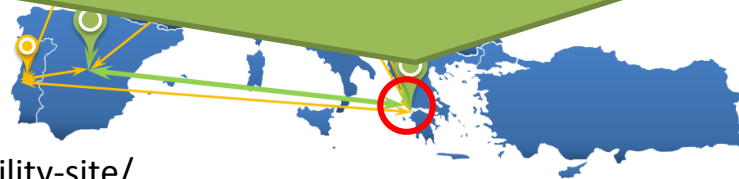
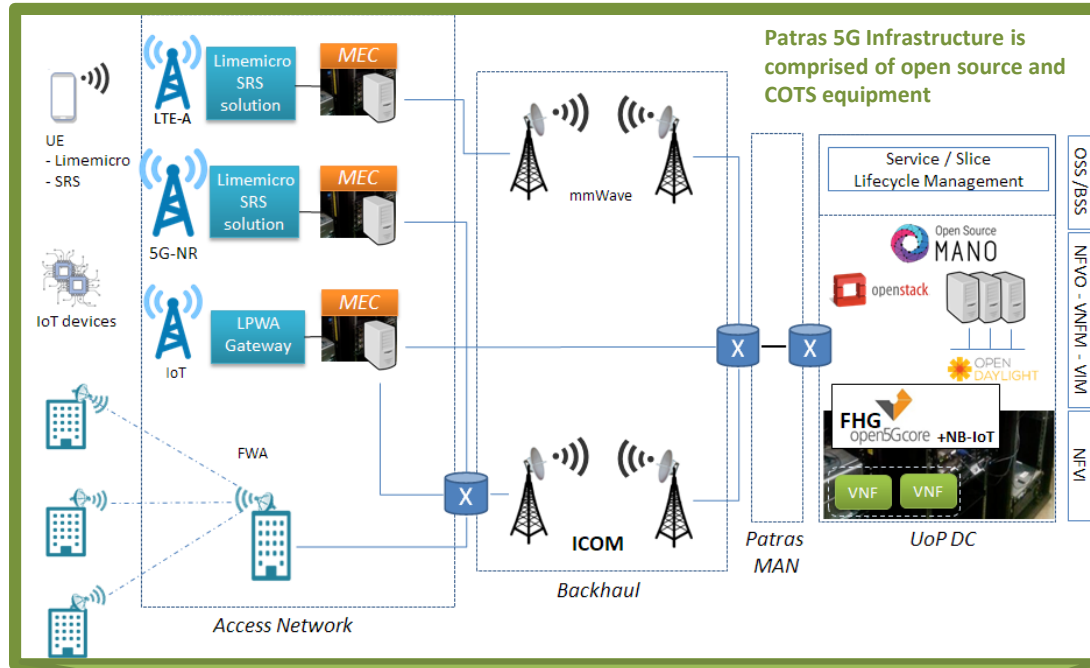
**Moving Experimentation Facility site:** satellite connected vehicle.



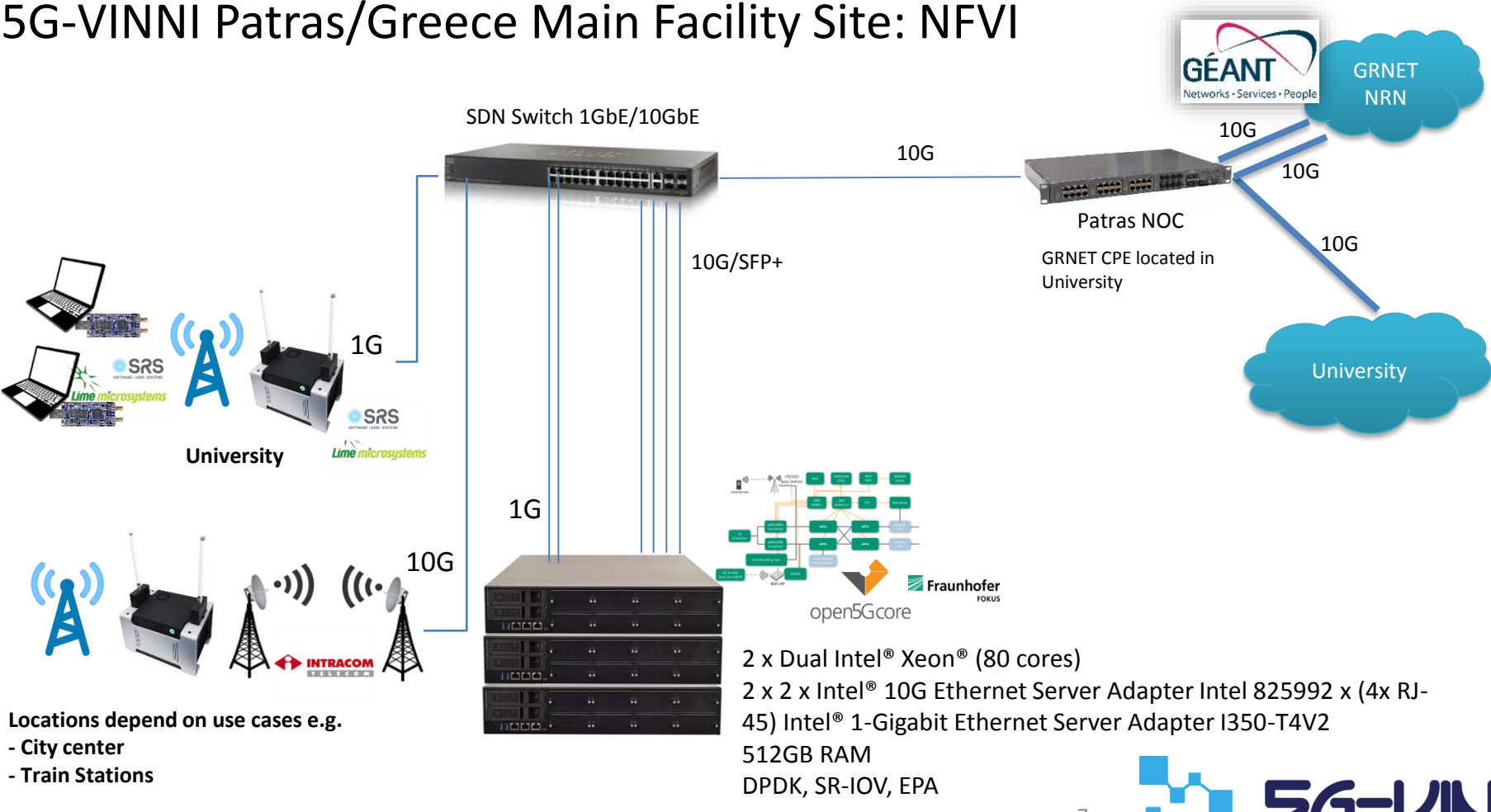
# Global timing alignment with 3GPP



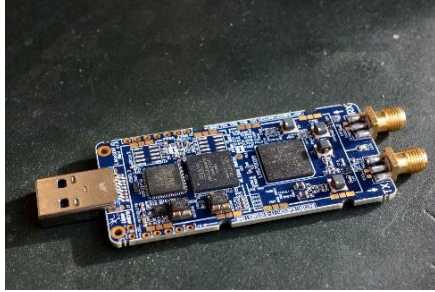
# 5G-VINNI Patras/Greece Main Facility Site



# 5G-VINNI Patras/Greece Main Facility Site: NFVI



# 5G-VINNI Patras/Greece Main Facility Site: NFVI (RAN)



LimeSDR, LimeSDR Mini  
UE on Laptops  
NB-IoT



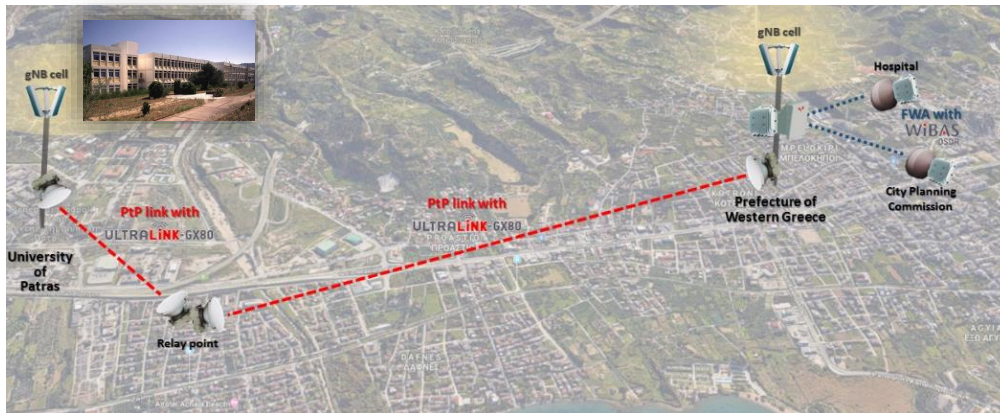
LimeNET Mini  
For Indoor Base Station test  
as “crowdcell”  
and as UE



LimeNET Base Station  
Deployed outdoor



# 5G-VINNI Patras/Greece Main Facility Site: NFVI (Transport network)



## FWA and Backhaul Networks at Patras Facility Site

Location #1: University of Patras, Electrical and Engineering Department Building

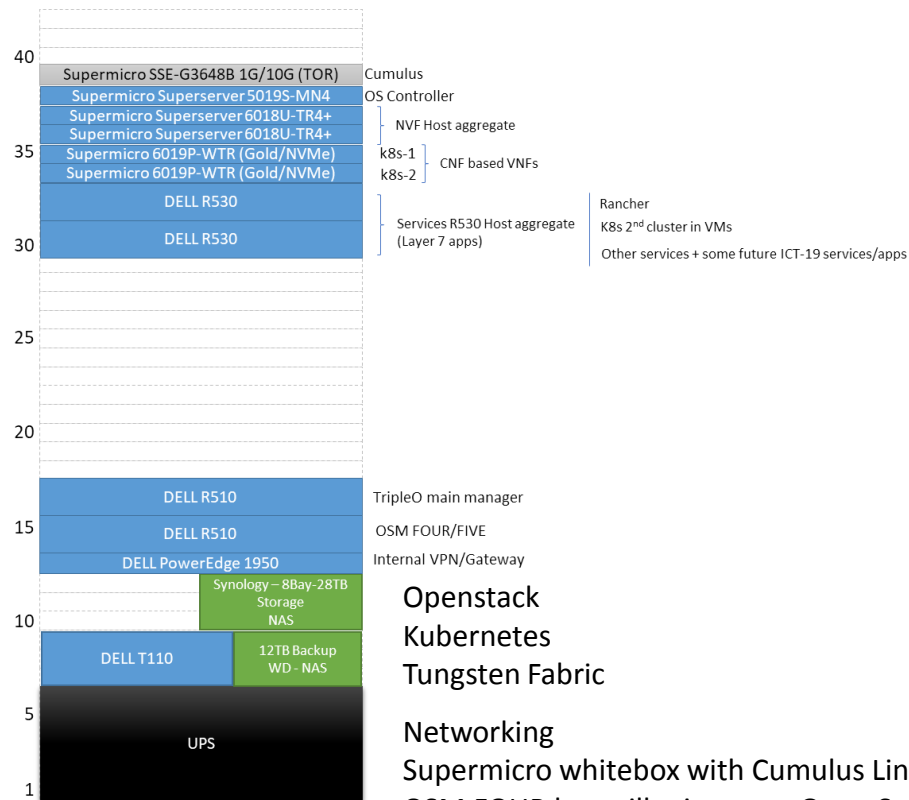
Location #2: City of Patras, Prefecture of Patras

Location #3: To be defined

Illustration from Radio Planning for FWA Network at Patras Facility Site (access to a hospital, school, City Directorate-General for Development Planning, and a park to perform some of the use cases )

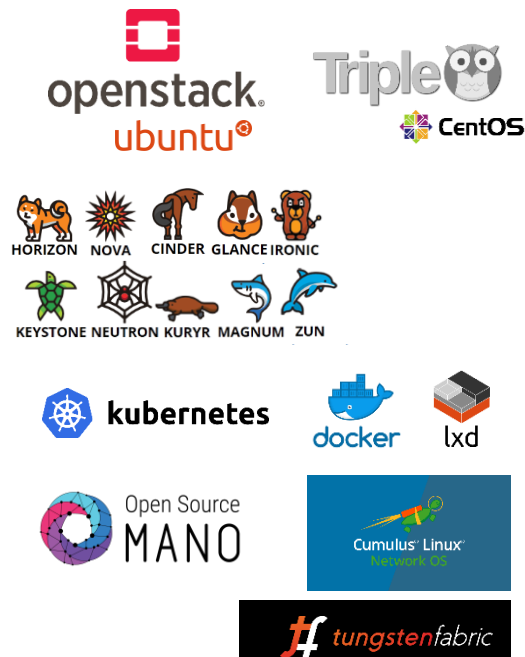


# 5G-VINNI Patras/Greece Main Facility Site: NFVI (Cloud)

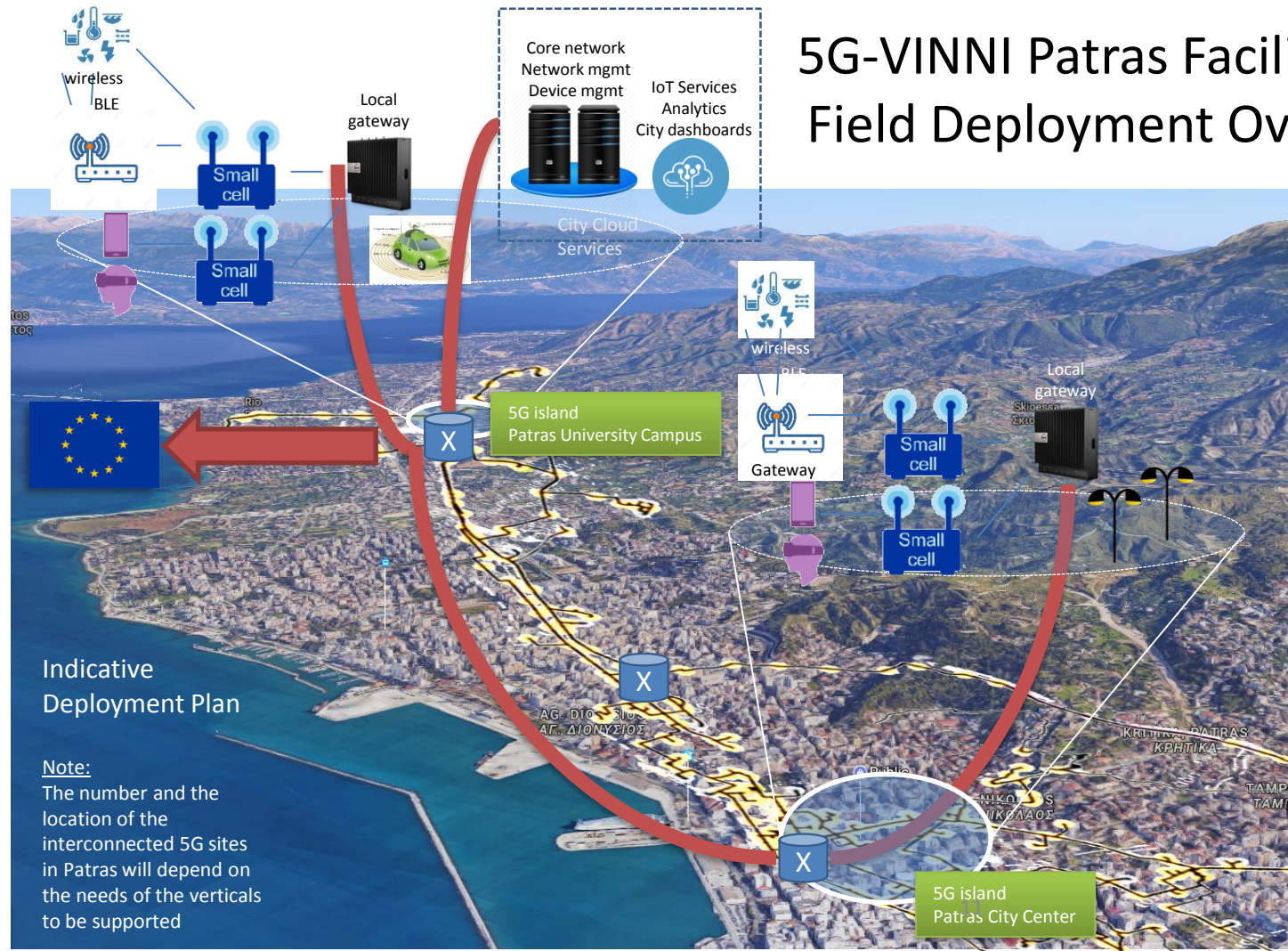


OSM FOUR but will migrate to Open Source MANO version FIVE

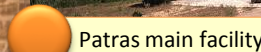
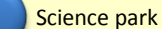
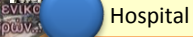
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# 5G-VINNI Patras Facility Site: Field Deployment Overview





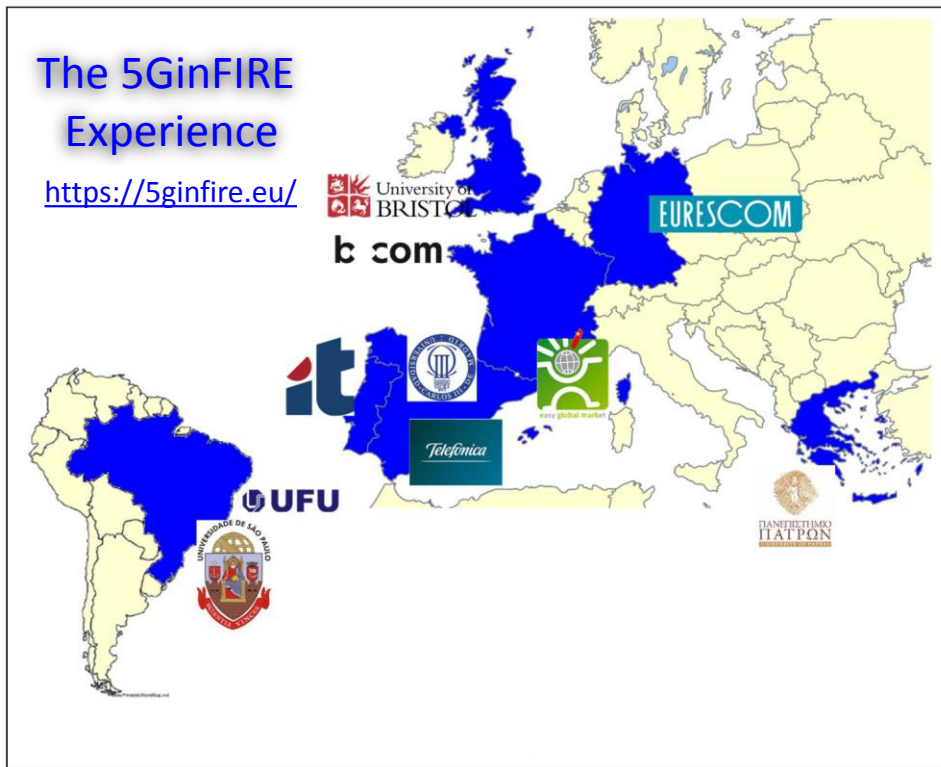
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# Patras Area as a playground for Vertical Industries



# Deploying Verticals & Services



# Entry point: The 5GinFIRE portal

## Supporting Processes and Maintaining Artifacts

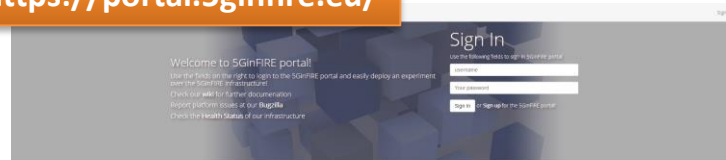
<https://portal.5ginfire.eu/>

### Supporting Processes

- VxF Lifecycle
- NSD/Experiment Lifecycle
- Deployment Requests

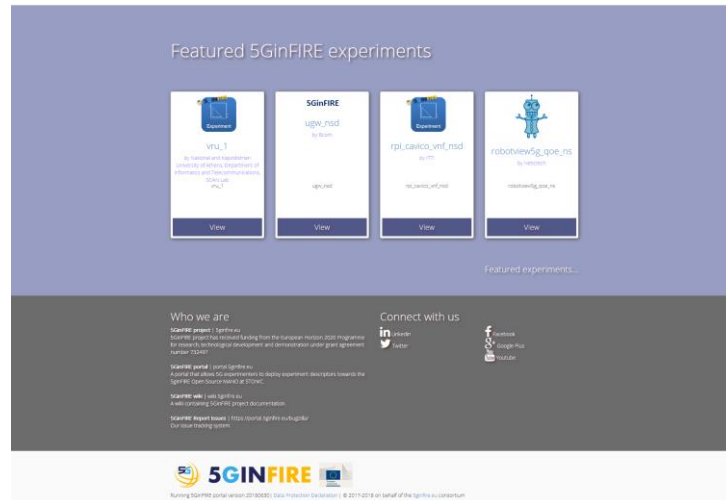
### Managing artifacts

- Users
- VNFs/NSDs and VNF Images
- MANO endpoint
- Deployment requests

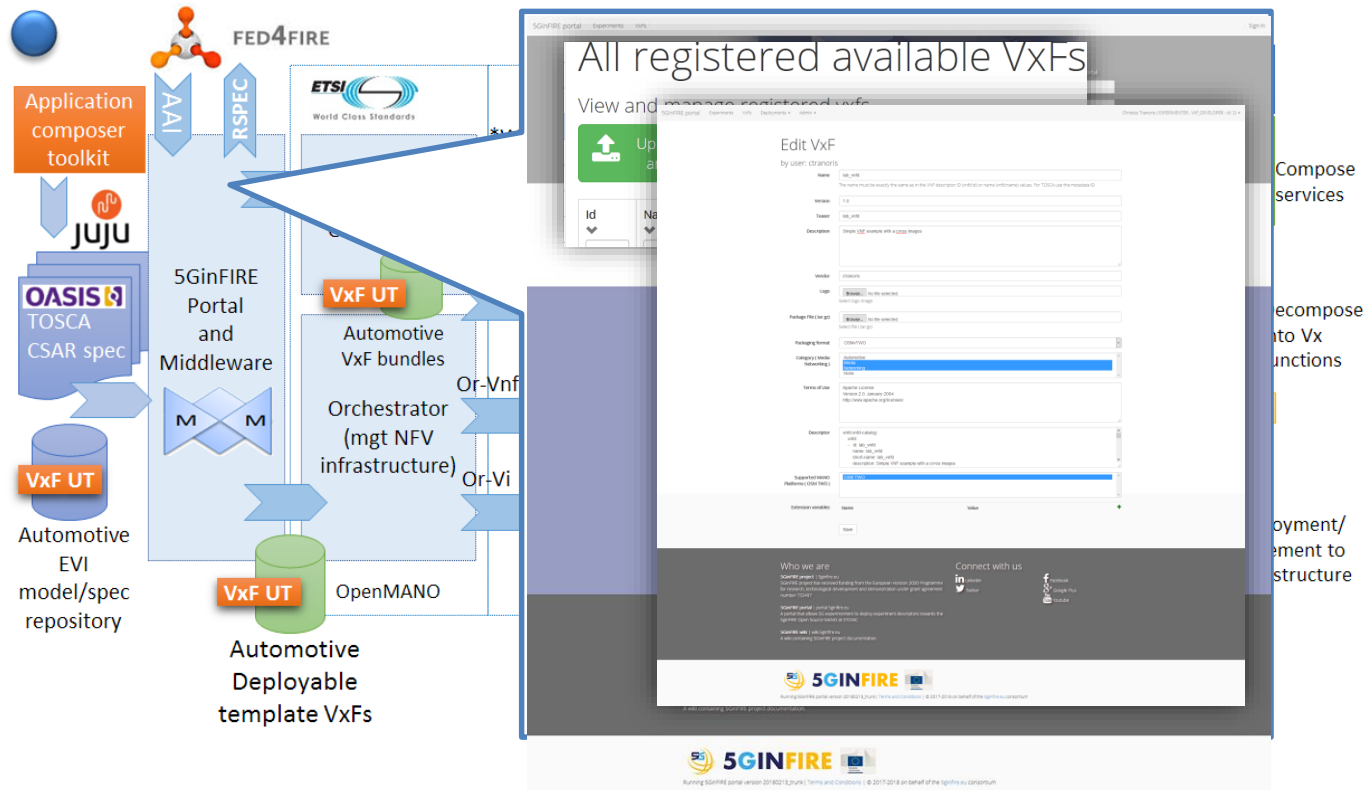


Deploy 5GinFIRE experiments!

Access, create and share experiments over the 5GinFIRE infrastructure



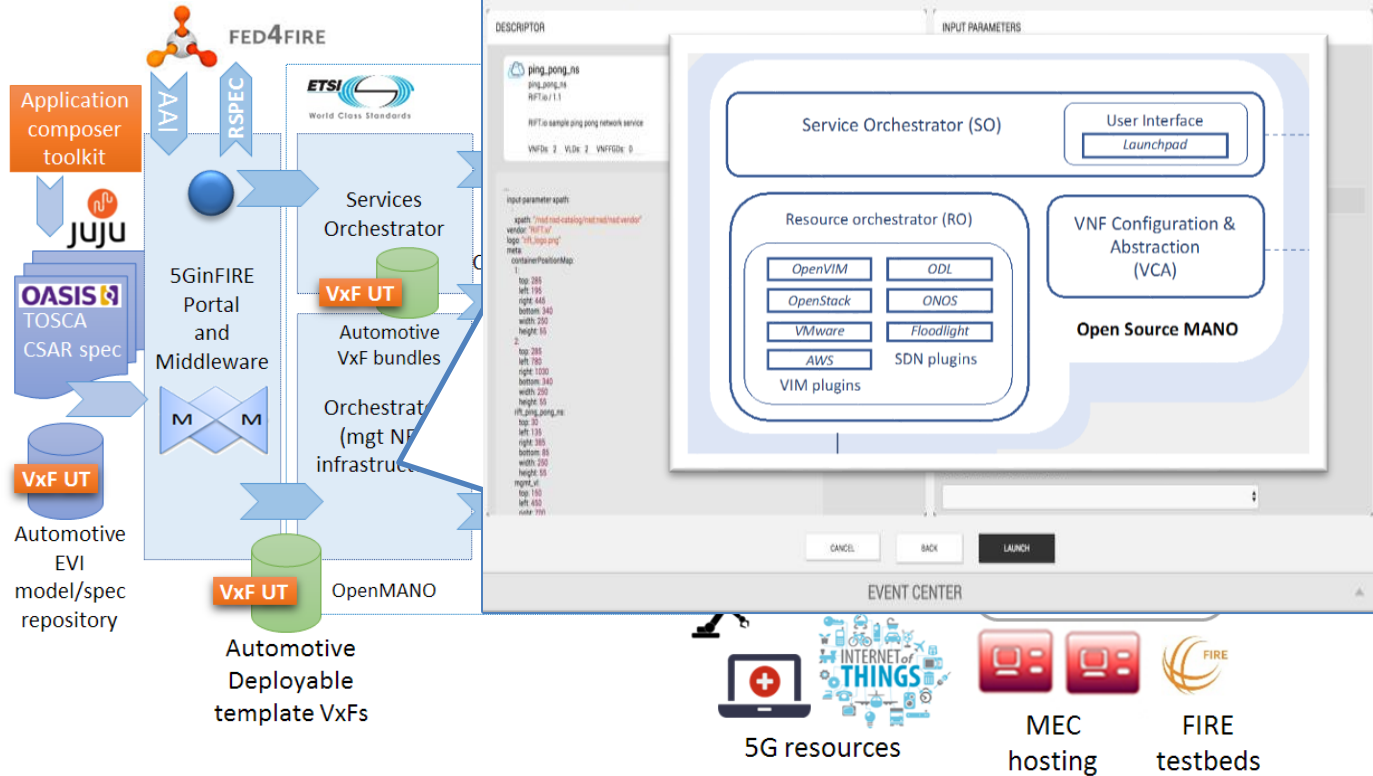
## Technologies, Infrastructures and Verticals





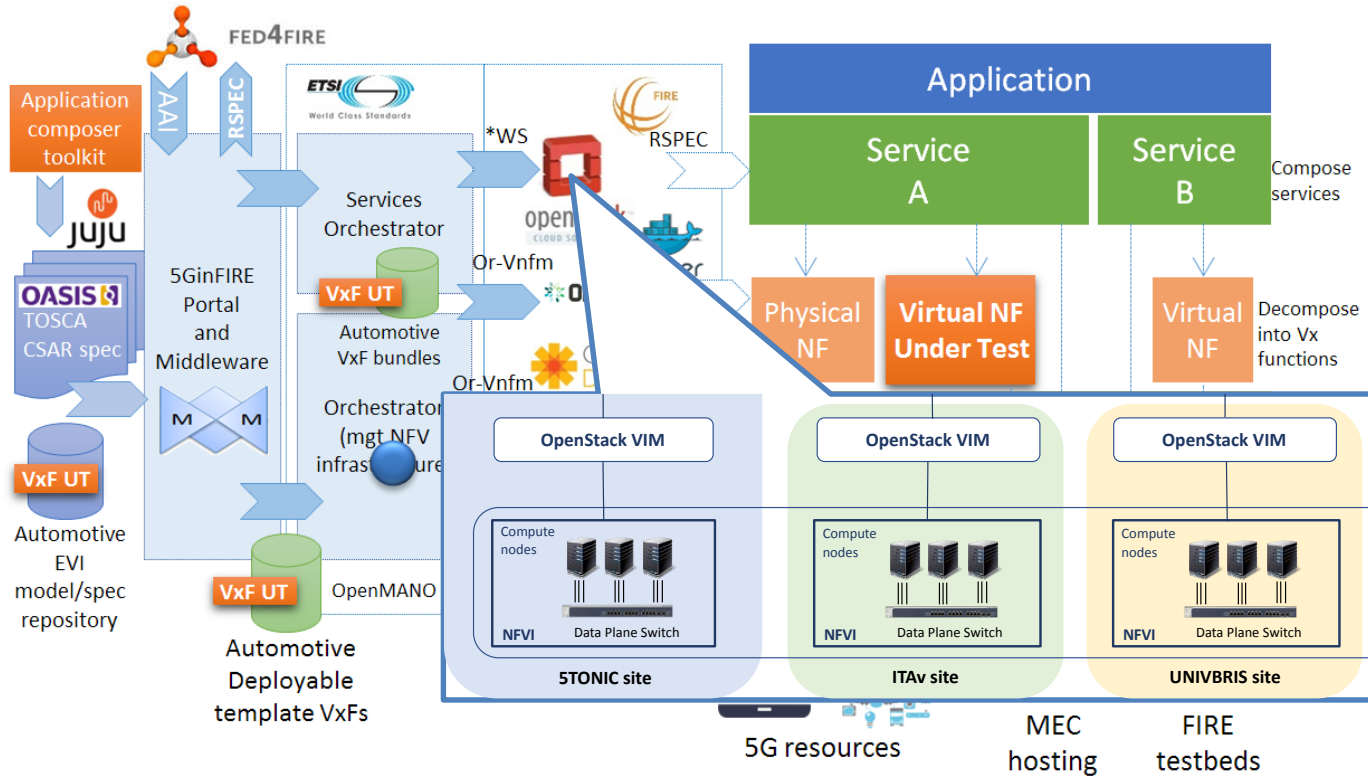
# 5GinFIRE Ex

Technology

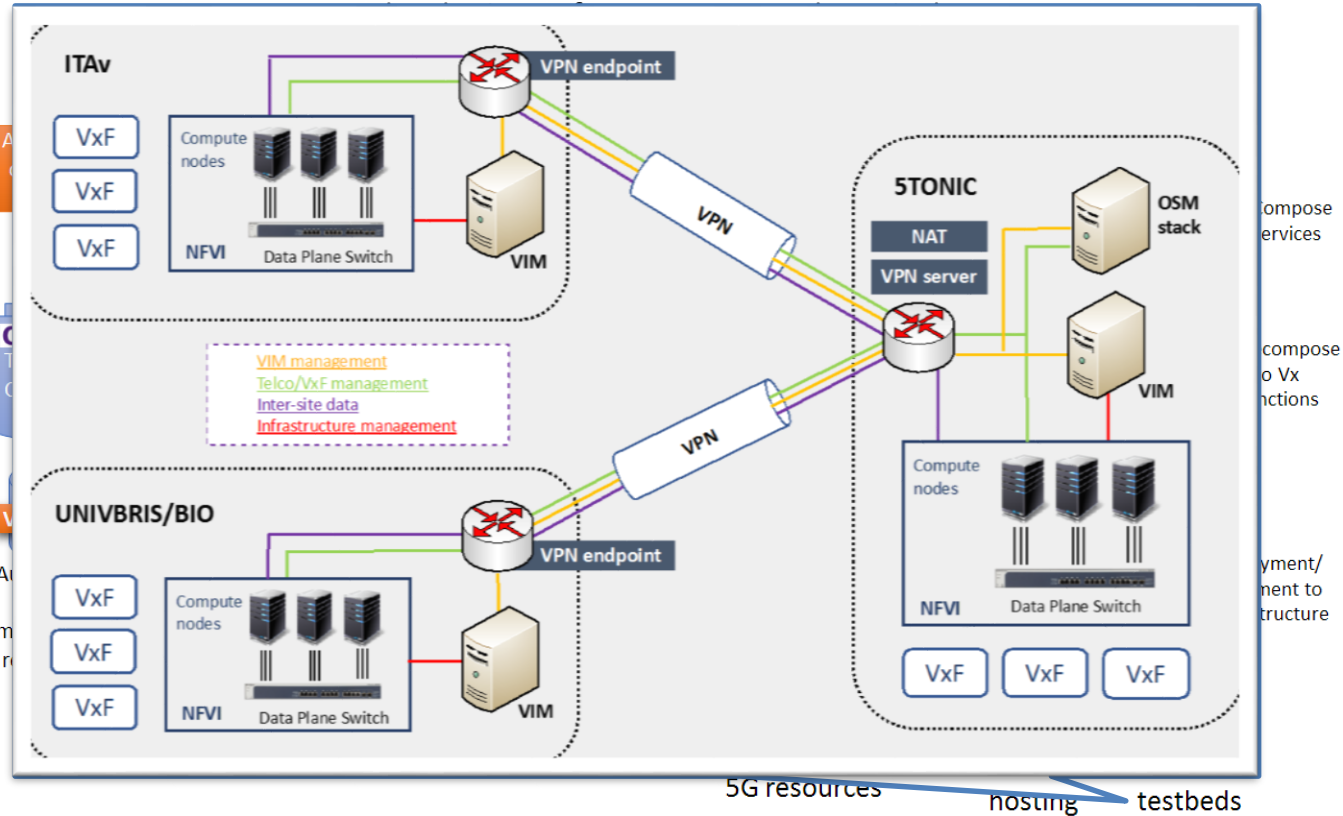


# 5GinFIRE Experimentation Workflow

Technologies, Infrastructures and Verticals

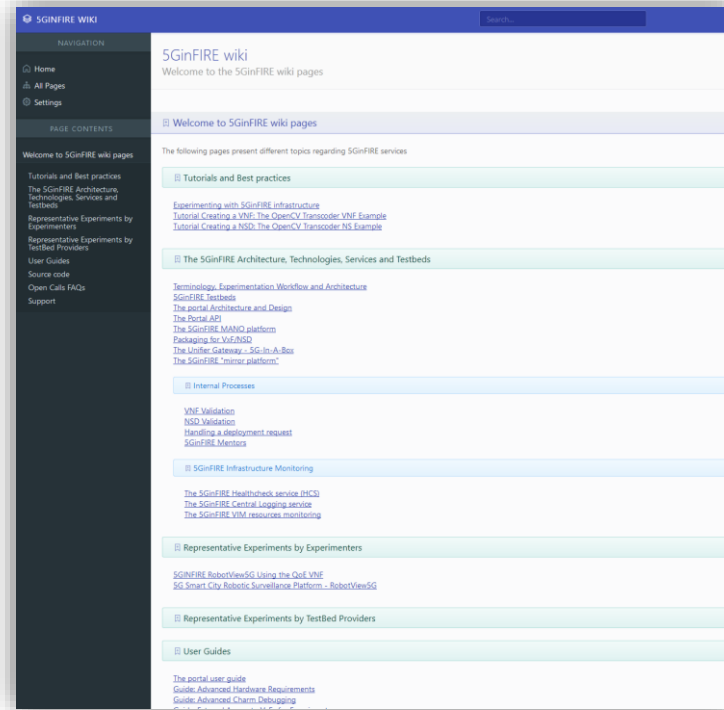


# 5GinFIRE Experimentation Workflow



# Support (<http://wiki.5ginfire.eu/>)

- Tutorials and Best practices
- Examples
  - From Experimenters
  - From Testbed Owners
- User guides
- Architecture and Terminology
- Processes
- APIs Services
- Testbed descriptions and access
- FAQs



# 5G & Verticals

- ICT19 projects are round the corner
  - 5G-VICTORI
  - 5G-SOLUTIONS
- 5G-VINNI will be used and extended
  - Support for eMBB, mMTC and URLLC
- Timeframe at least 4 years
- The investment and research impact will be high

# 5G-VICTORI

## Use Case: Factories of the Future - Digital Utilities

IoT for Infrastructure Real Time  
Protection



Use Case: Transportation  
Enhanced Mobile broadband under  
high speed mobility in Rail  
environments



# 5G-SOLUTIONS



# Challenges & Next Steps

- Host Verticals as network slices across the city/region facilities
- Experiment with new business models
  - Enabled by 5G and Open technologies
- Synergies with national operators
- Expand collaboration with local stakeholders (private or public)
  - Adding technologies
  - Engage in bilateral research & innovation activities
- **Blocking Factors**
  - Provisions of spectrum for a) Private Networks and b) for Research
  - See the Citizens Broadband Radio Service (3.55-3.7 GHz, 150 MHz band) in USA



# ΕΥΧΑΡΙΣΤΩ!

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