

Xg Open Network & Edge Testbed
Introducing XONET by Nextworks



NEXTWORKS
HEADING THE FUTURE

Why XONET? Challenges of R&D experiments with 5G

- ◆ Experimental validation is the key for extensive KPIs measurements and assessment, with realistic trials and pilots in 5G scenarios
 - ▶ For validating new architectures, data and control plane technologies, algorithms, software components for control and management plane
 - ▶ For understanding the new opportunities that 5G brings to vertical applications, at technical and business level
 - ▶ For tuning deployments and settings of vertical applications in realistic conditions, identifying bottlenecks, suitable setup and configuration for a variety of target scenarios and environments, easy to customize and replicate
- ◆ Commercial 5G networks are closed, able to provide mobile connectivity with some QoS guarantees but nothing you can play with or extend with your own research
 - ▶ No open interfaces to plug and play new components and technologies
 - ▶ Limited monitoring capabilities to obtain realistic and extensive datasets, as needed today for successful ML model training
 - ▶ Limited customization, no way to reserve and configure connectivity for your own verticals
 - ▶ Missing integration with edge/cloud and IoT resources
- ◆ Deployments with commercial 5G equipment from big players are extremely expensive, closed and integrated solutions suitable for operational roll-outs but much less for experimenting with your own research results
 - ▶ Generalized solutions, poorly flexible, difficult to customize or extend for the requirements of particular verticals
 - ▶ No way to integrate new algorithms, technologies and components
 - ▶ No way to try new deployments, even less to introduce new architecture paradigms

XONET is a self-standing 5G testbed for research and experiments

◆ **Flexible, modular, customizable** and end-to-end testbed that we can design together with our partners to meet specific requirements

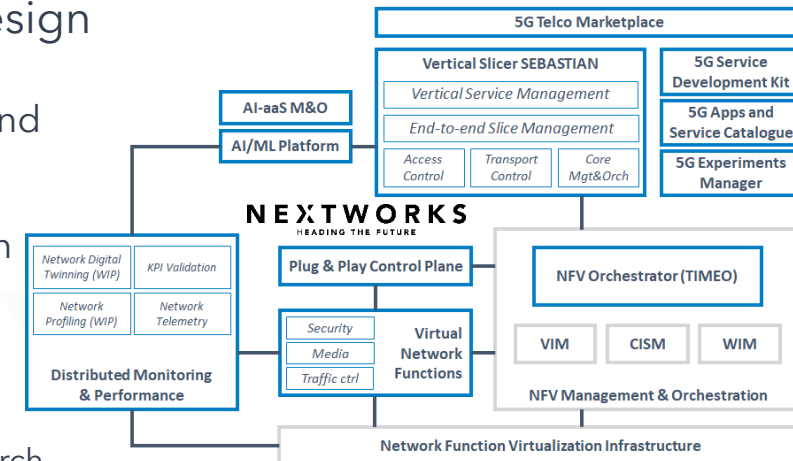
- ▶ Fully virtualized deployments, container- or VM-based, for testing different scenarios and emulating scalable topologies
- ▶ Not only mobile networks, but multi-platform and multi-cluster edge/cloud platforms, programmable transport networks, even IoT platforms, for a truly end-to-end validation over the IoT/edge/cloud continuum

◆ **Fully open** 5G testbed

- ▶ Open and documented interfaces exposed at various layers, mostly via REST APIs
 - Standard interfaces whenever possible, for interoperability and easy integration with other research teams all over Europe
- ▶ Strong adoption of open-source tools, from mainstream projects or recent research projects
- ▶ Integration of simulation tools, e.g., for RAN and UE simulation, for traffic generation, for transport network topologies
- ▶ Easy to develop, integrate and test new components or even modify existing ones

◆ **Tailor-made solution**, easy to extend in the future

- ▶ Open-source or proprietary solutions at each layer and domain, to achieve the right balance of stability/user friendliness/ and openness/flexibility/programmability in every segment, to match the focus of your research
- ▶ HW and SW selected for your own need (GPUs? Extreme-edge nodes? Orchestrators? SDN controllers?), but you can always ask to add new nodes or software components or even integrate your own new ones



XONET includes our know-how, expertise & full assistance

- ◆ An experience of 10+ years on EU research projects in 5G, 6G and satcom:
 - ▶ Development and integration of 5G technologies
 - ▶ Designing, deployment and installation, maintenance, operation and upgrading 5G experimental testbeds
 - ▶ System integration between 5G infrastructures, edge/cloud and IoT platforms
 - ▶ Support of verticals to design and develop 5G-enabled applications, to define and execute their experiments
- ◆ We provide full support from design to training
 - ▶ Identification of technical and verticals' requirements, helping to fill the gap between verticals' application-oriented expertise and networking technicalities
 - ▶ Testbed design, evaluation and selection of baseline technologies, with extensibility in mind
 - ▶ System integration and customization, as needed
 - ▶ Deployment and testing in lab and on-site
 - ▶ Extensive documentation
 - ▶ Practical training on-site and remote assistance
- ◆ Even in the operation phase, in combination with our consulting services
 - ▶ Maintenance and upgrading
 - ▶ Support in experiments with verticals and integration of new technologies





- ◆ **Every brew is customized** according to specific hw and sw requirements
- ◆ Completely **open** and **reconfigurable**
 - ▶ The user can have full access to the platform (root permission, source code)
- ◆ **Available with Wi-Fi** in case of issues with 5G spectrum
- ◆ **Single shop stop** for a fully integrated system, including both hw and sw
- ◆ It is *not* designed to be used for operational services, but it can sustain **experimental services**

XONET example tech specs



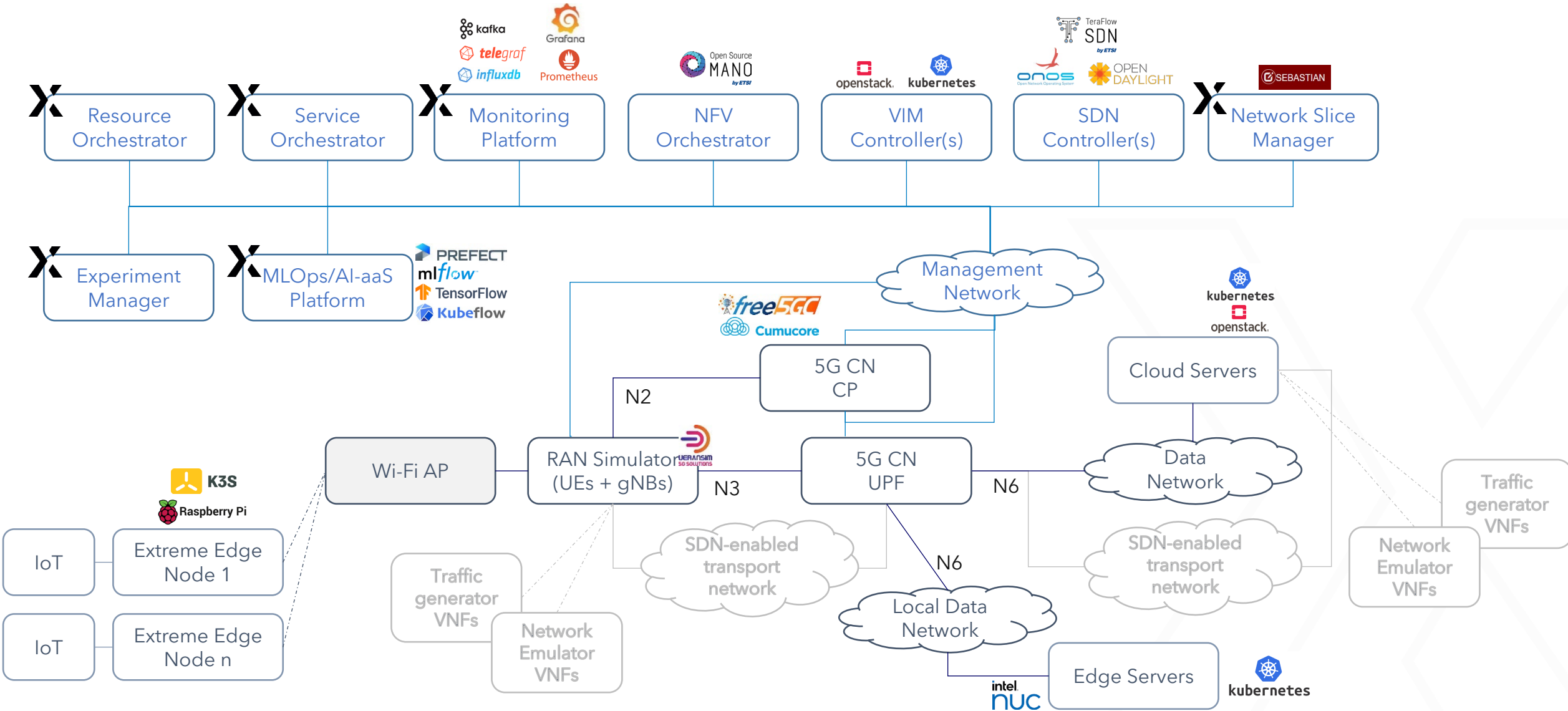
◆ Hardware

- ▶ Server rack PowerEdge R250/R450/R650, with GPU option
- ▶ Switches and mini PCs for OVS-based programmable transport nodes

◆ Software

- ▶ OpenStack, K8S, K3S
- ▶ 5G CN license / OSS
- ▶ ETSI OSM NFVO
- ▶ SDN controllers: OpenDaylight, ONOS, ETSI TeraFlowSDN
- ▶ Simulation/emulation tools: UERANSIM
- ▶ Additional OSS components developed in EU projects for added value services:
 - ▶ Network slice management
 - ▶ Monitoring platform
 - ▶ Service and resource orchestration
 - ▶ Experiment management and testing tools

Major building blocks in XONET



For further info on **XONET**

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