

# Open Calls – Info day

5G-IANA Offerings



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# Outline



- Overview of 5G-IANA platform
  - ... with focus on end user interfacing perspective
- What 5G-IANA offers
  - Application onboarding and composition GUI
  - Virtualised app and network function repo
  - Available hardware
  - The 5G-IANA experimentation infrastructure
- The expected process for end users
  - ... from technical point of view

# Overview of 5G-IANA platform

# The 5G-IANA platform ... in a nutshell



- The 5G-IANA platform is a complete framework that allows...:
  - **Deployment of applications** over targeted testbed infrastructures, including:
    - Registration and onboarding of application components (micro-services)
    - Reuse of existing application and network functions
    - Pre-testing over dev-ops environment
    - Use of actual HW elements or incorporation of new ones
  - **Runtime configuration of applications**, including:
    - Methods for monitoring and analysing certain parameters
    - Compliance with user defined policies
  - **Validation and demonstration of applications**, through:
    - Access to real testbed infrastructure
    - Comparisons with other use cases and diverse set of deployment scenarios
    - Wider visibility in the 5GPPP/6G-SNS community

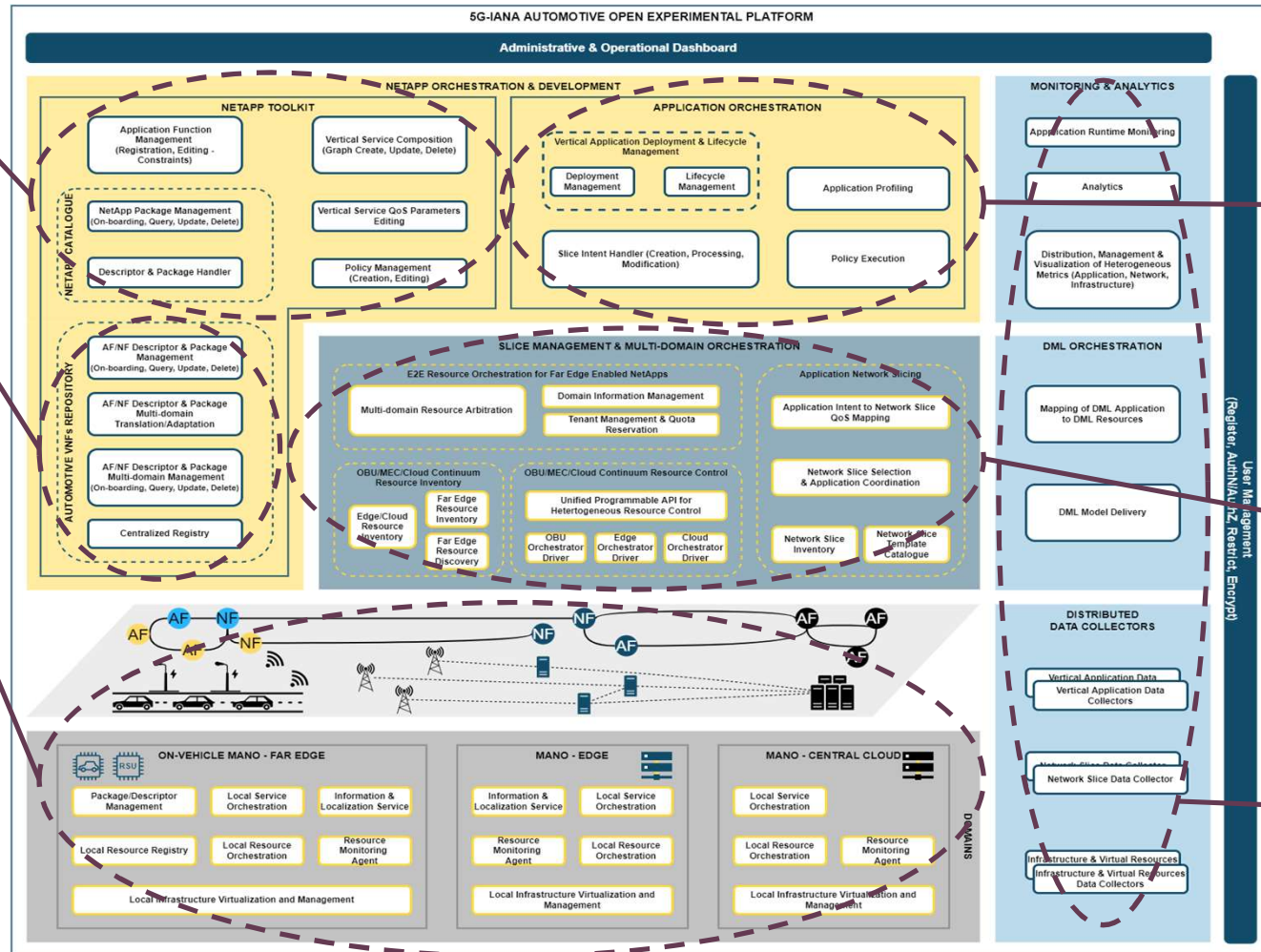
# The 5G-IANA platform architecture



The Entry point for the application onboarding

The reusable automotive repo for service components

The experimentation infrastructure from far edge to edge to core



The application orch. module responsible for creating deployment + runtime requests

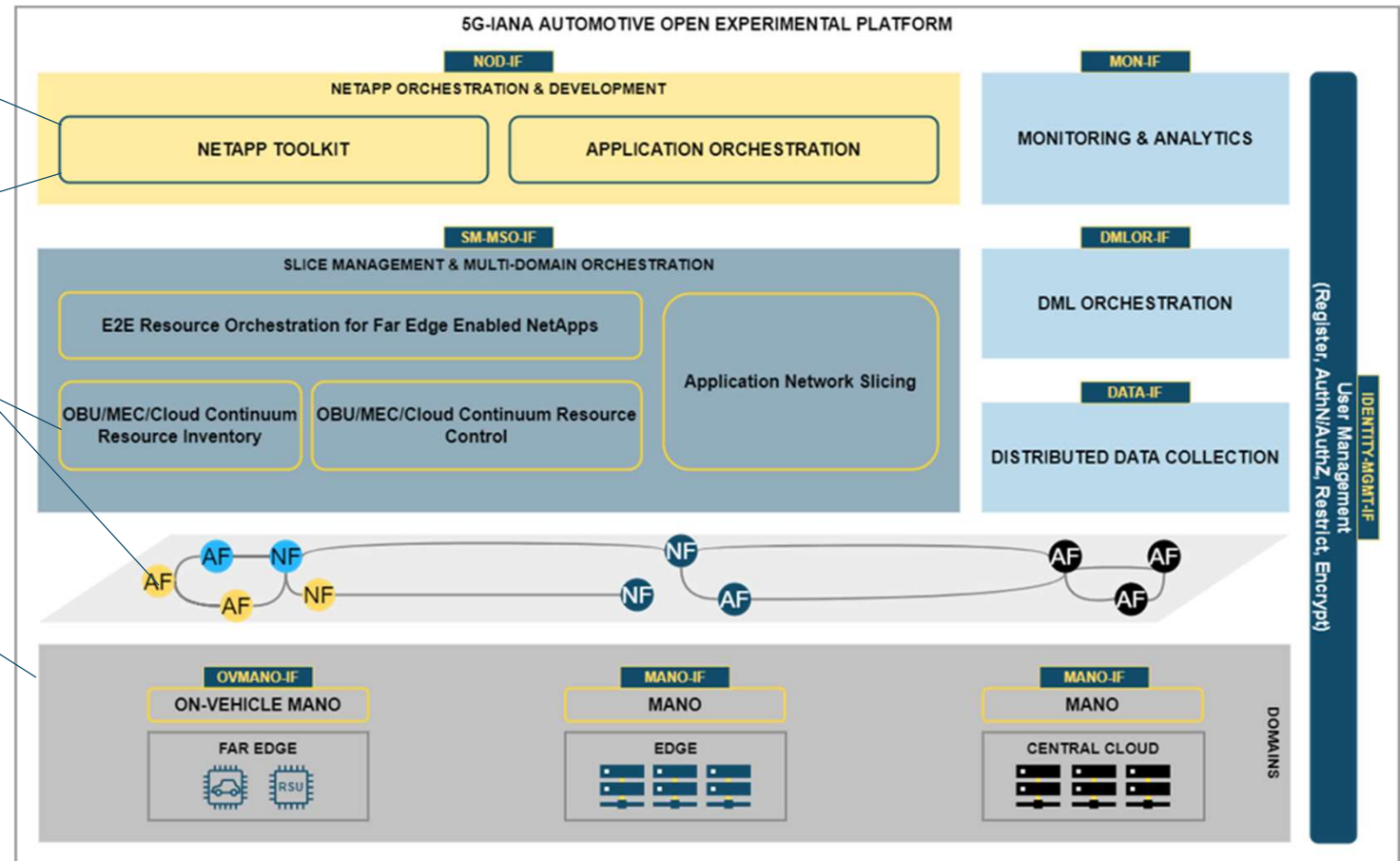
The slice management module (i.e. resource management + interface with infrastructure) in support of multiple domains (OBU-Edge-Core) application orch. module responsible for creating deployment + runtime requests

The data handling (monitoring, analytics) and intelligence processes

# The 5G-IANA platform architecture



- Network application onboarding
- Use of component and nApp repository
- Interfacing with end user HW or/and
- introduction of new HW
- Deployment over the infrastructure



# End users' interactions with platform



- **Network application onboarding**
  - Through: nApp Toolkit GUI
  - Onboarding of nApp docker images, component parameters and definition of nApp and networking parameters
- **Use of VNF repository**
  - Through nApp Toolkit VNF Repo
  - Listing and check of existing virtualized micro-service components (both app and network VNFs) and already structured nApps
- **Interfacing with end user HW or introduction of new HW**
  - Reuse of drivers for existing HW elements and comply with their operational features
  - Provide the drivers and connectivity for newly introduced HW elements
  - Use of emulated devices (in compliance with the platform)
- **Deployment over the infrastructure**

# What 5G-IANA offers



# nApp onboarding GUI

## What it offers

- End user authenticated access
- Registration and onboarding of new nApp components
  - Editing of components related parameters + link to image
- Composition of nApp
  - Selection of nApp components +
  - Connections forming graphs +
  - Editing of connection (networking) requirements
  - (Alternatively) Editing of existing nApps (modification or expansion)
- Instantiation of nApp over selected infrastructure
  - Selection of available (target specific) resources,
  - Addition of deployment parameters
  - Definition of policies
- Selection of monitoring parameters to be visualised
- Live monitoring of NetApp instances



# nApp onboarding GUI

## The front-end environment



VAO

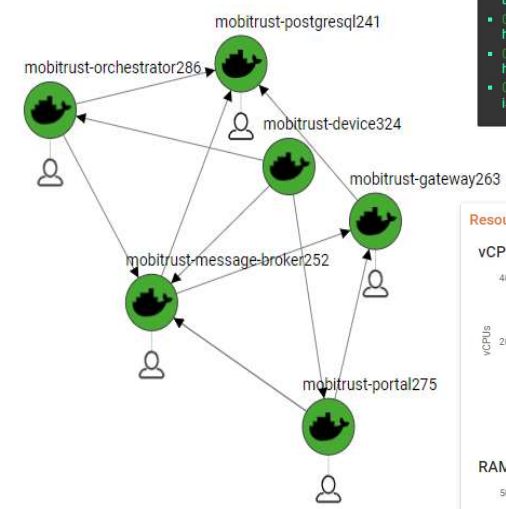
**Components** Create new

Name  
Search by Name

Filter Reset

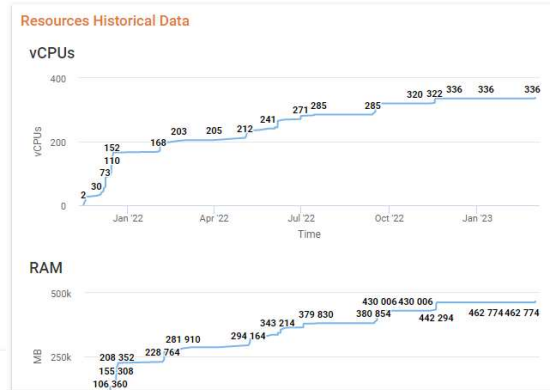
Identifier	Name ^	Organization	Visibility	Date Created
AJHgAimBy5	LambdaProxy	Admin_Organization	Public	11/11/2021 - 14:53
vbnei1ani4	iperf-server-10000	Admin_Organization	Public	06/12/2022 - 12:23
g7natwk4iw	inin-webserver	Admin_Organization	Public	07/12/2022 - 12:02
27ikn7icve	inin-ul-server	Admin_Organization	Public	07/12/2022 - 11:35
vzxwj1jcs7	inin-dl-server	Admin_Organization	Public	07/12/2022 - 11:57

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```

Logs
- 02-12-2022 14:21:39 [SUCCESS] : mobitrust-device324 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : mobitrust-postgresql241 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : mobitrust-gateway263 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : mobitrust-message-broker252 - Component is healthy, up and running
    
```



```

Logs
System IDS
- 02-12-2022 14:21:39 [SUCCESS] : bill/mobitrust-postgresql241 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : bill/mobitrust-orchestrator286 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : bill/mobitrust-message-broker252 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : bill/mobitrust-device324 - Component is healthy, up and running
- 02-12-2022 14:21:39 [SUCCESS] : bill/mobitrust-gateway263 - Component is healthy, up and running
- 02-03-2023 11:08:20 [SUCCESS] : Test/MariaDB - Component is healthy, up and running
- 02-03-2023 11:08:32 [SUCCESS] : Test/PhpMyAdmin - Component is healthy, up and running
- 08-03-2023 11:54:37 [SUCCESS] : TEsts/WordPress - Component is healthy, up and running
- 08-03-2023 11:54:37 [SUCCESS] : TEsts/MariaDB - Component is healthy, up and running
- 08-03-2023 11:54:37 [SUCCESS] : TEsts/PhpMyAdmin - Component is healthy, up and running
    
```

# Virtualised Functions' repository

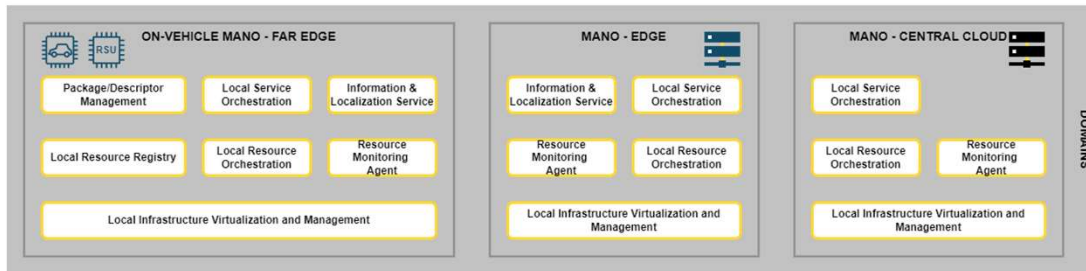
## What it offers



- The repo hosts a quite extensive set of functions that can be used to create new nApps or extend existing ones.
  - Currently:
    - 49 virtualised functions
      - 39 Application Functions
      - 10 Network Functions
  - All components have already docker containers
  - Examples: (AFs) OBU/RSU related AFs (ETSI standards) | Video processing | Video encoding | Monitoring services | Reporting services | (NFs) C-ITS SD comm | C-ITS LD comm | AGV module interface | sensor data interfaces | Free5Gcore

# Interfacing with virtualised infrastructure

## What it offers



- Virtualized environment where nApps run
- vDomains: **Far-edge, Edge and Cloud**
- Far-edge infrastructure: **OBU and RSU**
  - “on-vehicle MANO”, is the lightweight orchestrator tool for OBU and RSU

- OBU and RSU level offerings

- **5G connectivity**
- **short-range communication to provide interoperability with legacy devices**
- **sensors data management**
- **on the OBU positioning service, ADAS and HMI interfaces**

- Edge and Cloud level offerings

- **management of network connected sensors**

# Interfacing with virtualised infrastructure

## Implementation remarks



- Selection of hardware with proper characteristics for implementing OBU and RSU
  - **adequate resource availability**
  - **physical interface and kernel version supporting 5G modem integration**
  - **variety of interfaces to support sensors and communications with vehicle and its occupants**
- Selection of suitable container orchestrator
  - **lightweight orchestration for use in far-edge domain**
- Implementation of baseline and communication functions
  - **definition of connections among functions**

# Interfacing with virtualised infrastructure

## OBU



- Hardware platform based on NVIDIA® Jetson Xavier™ NX board
  - 384-core NVIDIA Volta™ GPU reaching 21 TOPS performance
  - 6-core NVIDIA Carmel ARM®v8.2 64-bit CPU
  - 16 GB 128-bit of memory
  - 16 GB eMMC 5.1 of storage
- 5G connectivity
  - 5G Telit FN980 modem
- RTK GNSS receiver
  - Ublox F9P
- Additional interfaces
  - Ethernet for connecting to the vehicle network
  - WiFi for enabling interaction with smartphones or wireless sensors



# Interfacing with virtualised infrastructure

## VeGA



- **FEATURING:**
  - CARLA Sym digital twin readily available in the 5G-IANA cloud
  - Full Car networks access: CANBus, IP, video streams
  - HMI access: cluster and interactive dashboard
- **SETUP:**
  - IP network: wired/Wi-Fi. LTE Internet access
  - Hi-Res LIDAR
  - GNSS + IMU localization
  - Surrounding hi-speed serial cameras
  - Stereo camera
  - NVIDIA AGX/PX/TX on-board computers
- **CONTROLS:**
  - Brakes by wire CANBus control
  - Steer by wire CANBus control
  - CANBus controlled accelerator
  - Manual emergency takeover

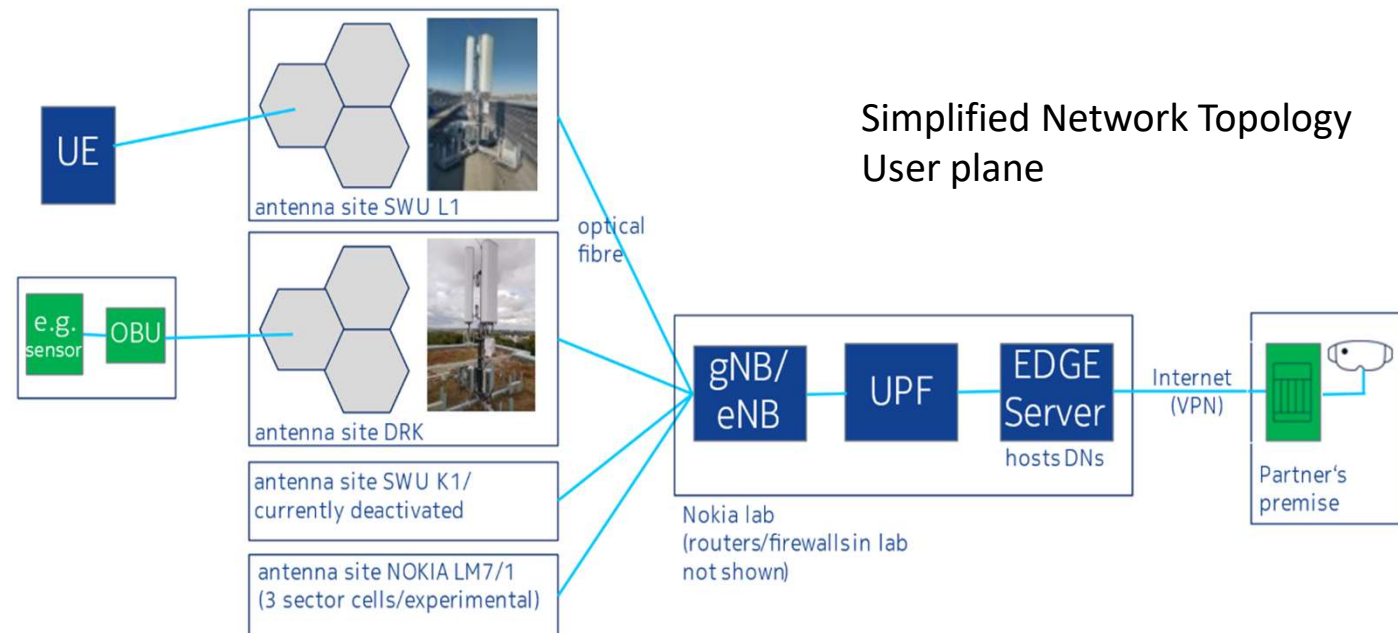
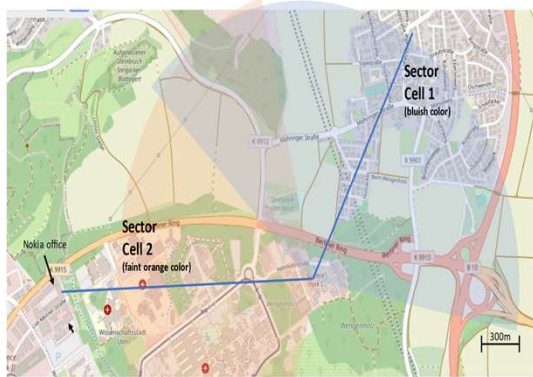


# The 5G-IANA experimentation infrastructure

## What it offers



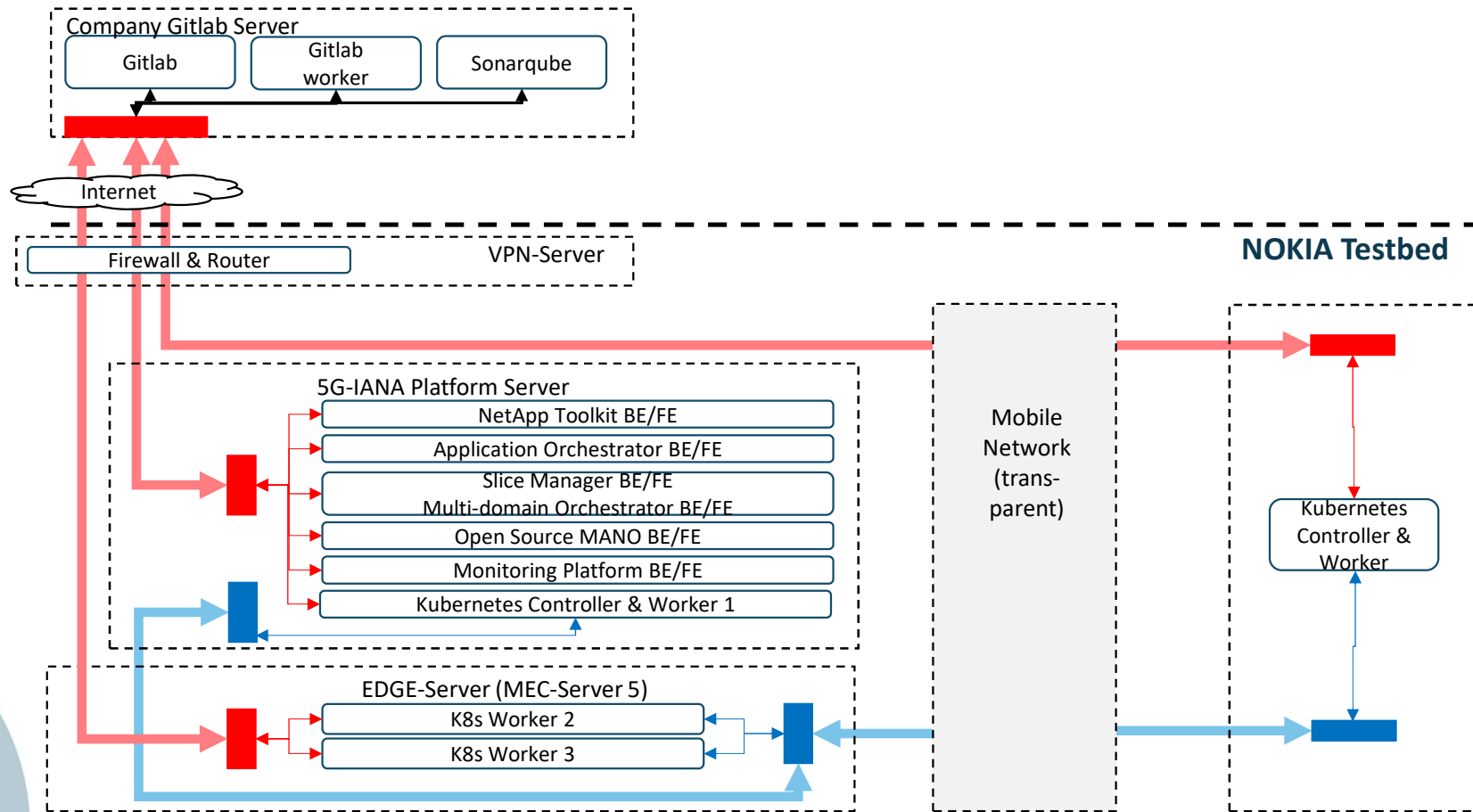
- A 5G network provides one or several “packet tunnels” with specific QoS Characteristics between the subscriber’s mobile phone (aka UE, User Equipment) and the break-out point to external data networks (aka DN).





# The 5G-IANA experimentation infrastructure

## Data flows with Platform in NOKIA



# The expected process for end users ...from technical point of view

# Overall process in steps



- Step 1 – Preparation
  - Check existing AF/NF from repo for reusability
  - Check HW/SW requirements
  - Design the nApp and the required components and interfaces
- Step 2 – Onboarding and nApp composition
  - Onboarding of new components (AF/NF) and parameters
  - nApp composition and parameters
- Step 3 – Deployment and Validation
  - nApp instantiation over pre-testing infrastructure
  - Validation of proper functionality and feedback for correction (if required)
- Step 4 – Testing and Experimentation
  - nApp validation over experimentation infrastructure
  - Measurements and collection of data
  - Reporting

[www.5g-iana.eu](http://www.5g-iana.eu)

**Thank you for your attention!**  
**Any questions?**

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