



The GENESIS of a 5G experimentation Facility

5th Generation End-to-end Network, Experimentation, System Integration, and Showcasing

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5genesis.eu

[@5genesis_h2020](https://twitter.com/5genesis_h2020)

5GENESIS: ICT-17-2018: 5G End-to-end Facility

Project Coordinator:

Dr. Anastasios Kourtis and Dr. Harilaos Koumaras, NCSR Demokritos

Technical Manager:

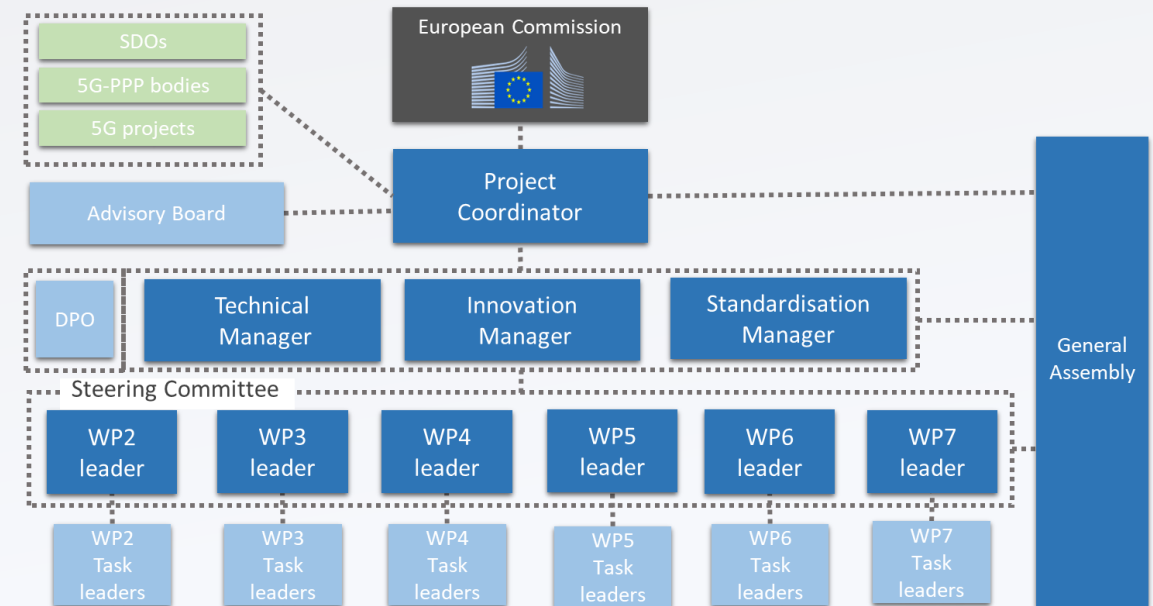
Prof. Pedro Merino Gomez, Universidad de Málaga and Dr. Dimitris Tsolkas, FOGUS

Innovation Manager:

Dr. Valerio Frasca, Intel Deutschland GmbH

Standardization Manager:

Dr. David Artunedo Guillen, Telefónica I+D



Duration:

42 Months

Partners:

29 Partners

Platforms:

5 platforms and 1 portable demonstrator

Integration Phases:

3 phases

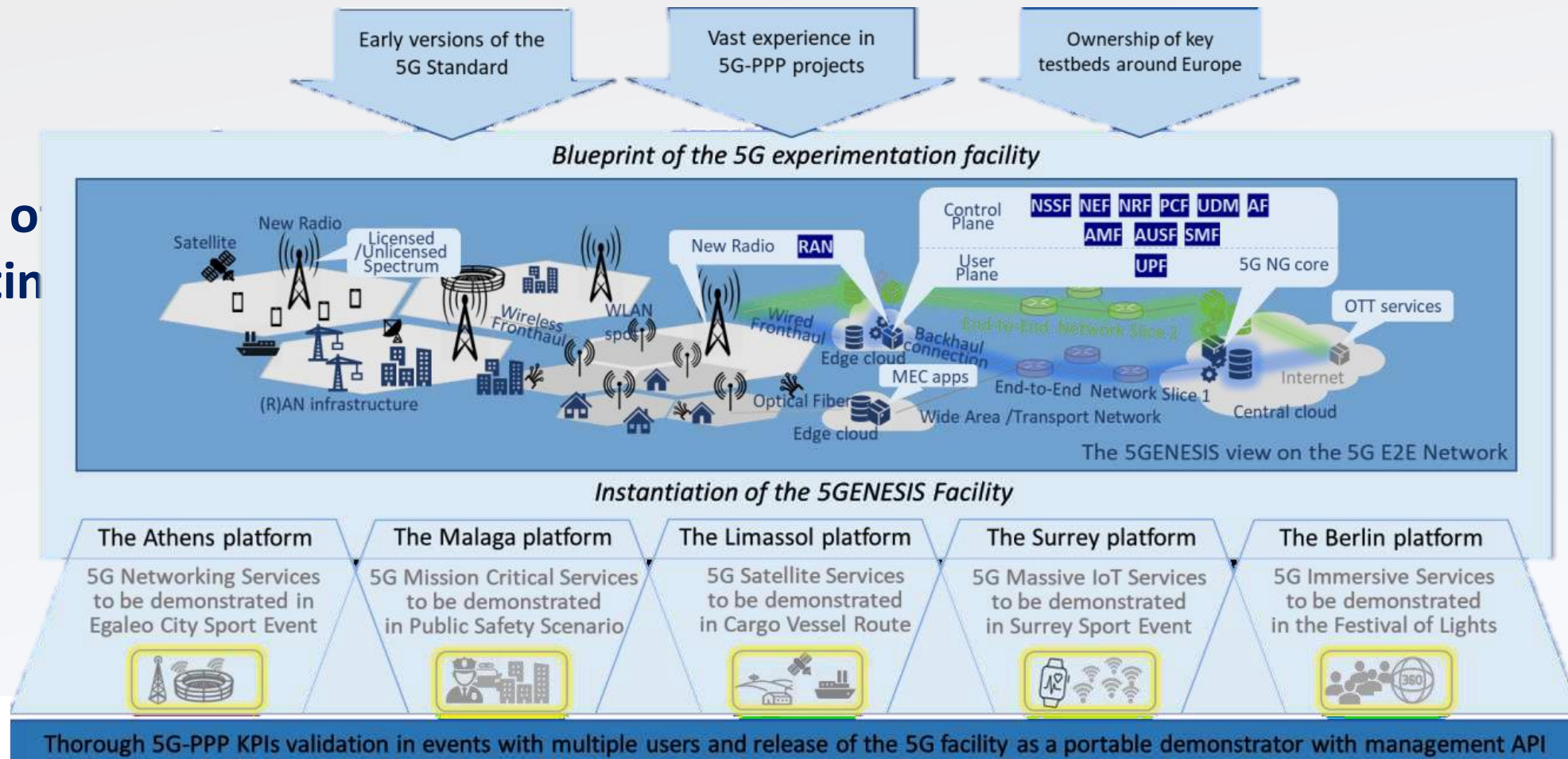
Validation Phase with use cases:

6 Last Months



The 5GENESIS facility is based on an experimentation blueprint, that serves as a common architectural reference.

The main goal of validation



5GENESIS BluePrint – Top to Bottom Approach

Experimenter



Vertical
industry
services

5GENESIS EXPERIMENTER INTERFACE

COORDINATION LAYER

End-to-end platform coordination, experiment lifecycle management, KPI processing

MANAGEMENT & ORCHESTRATION LAYER

Slice Management, NFV & MEC MANO, SDN Controllers, PNF Management

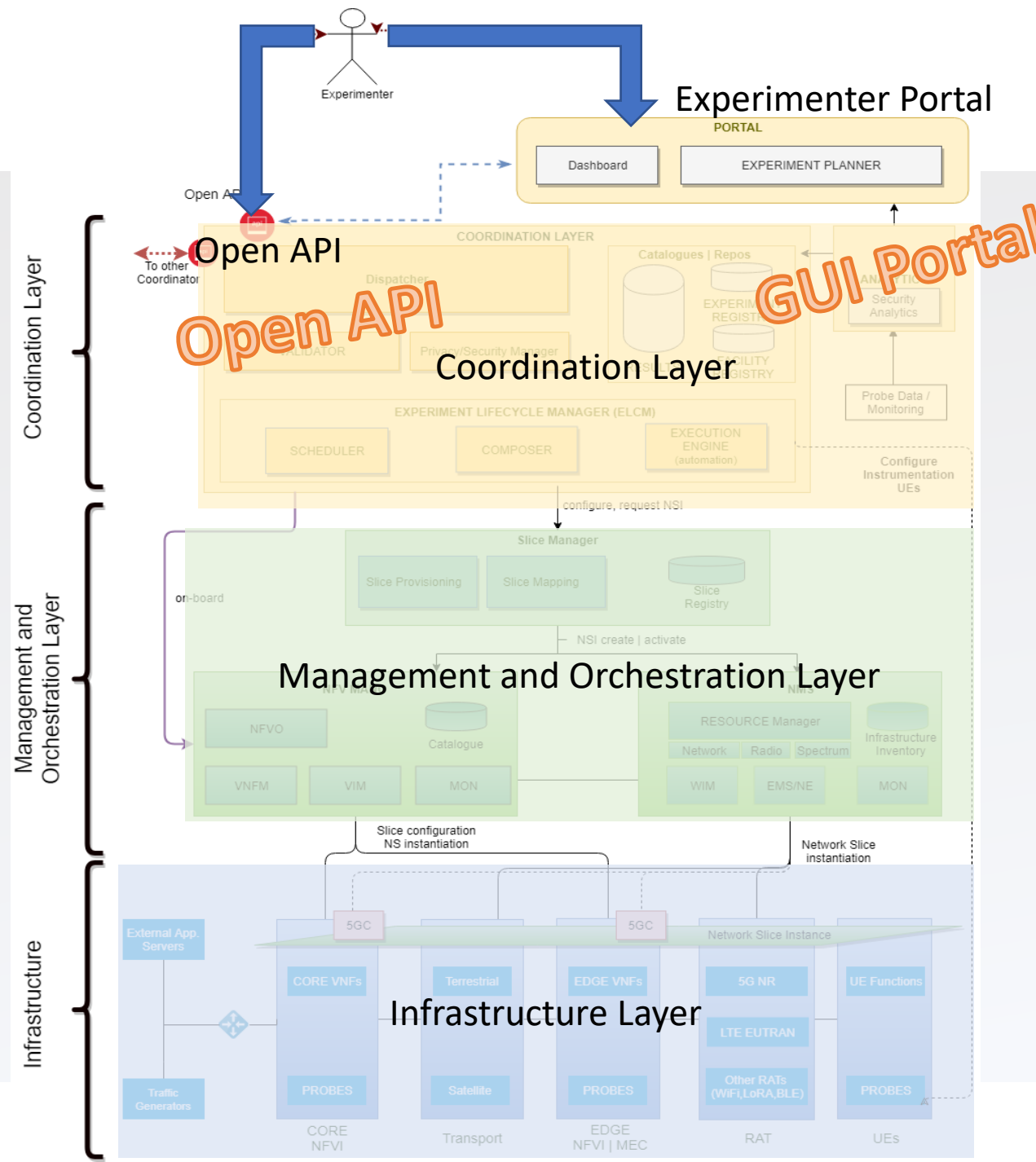
INFRASTRUCTURE LAYER

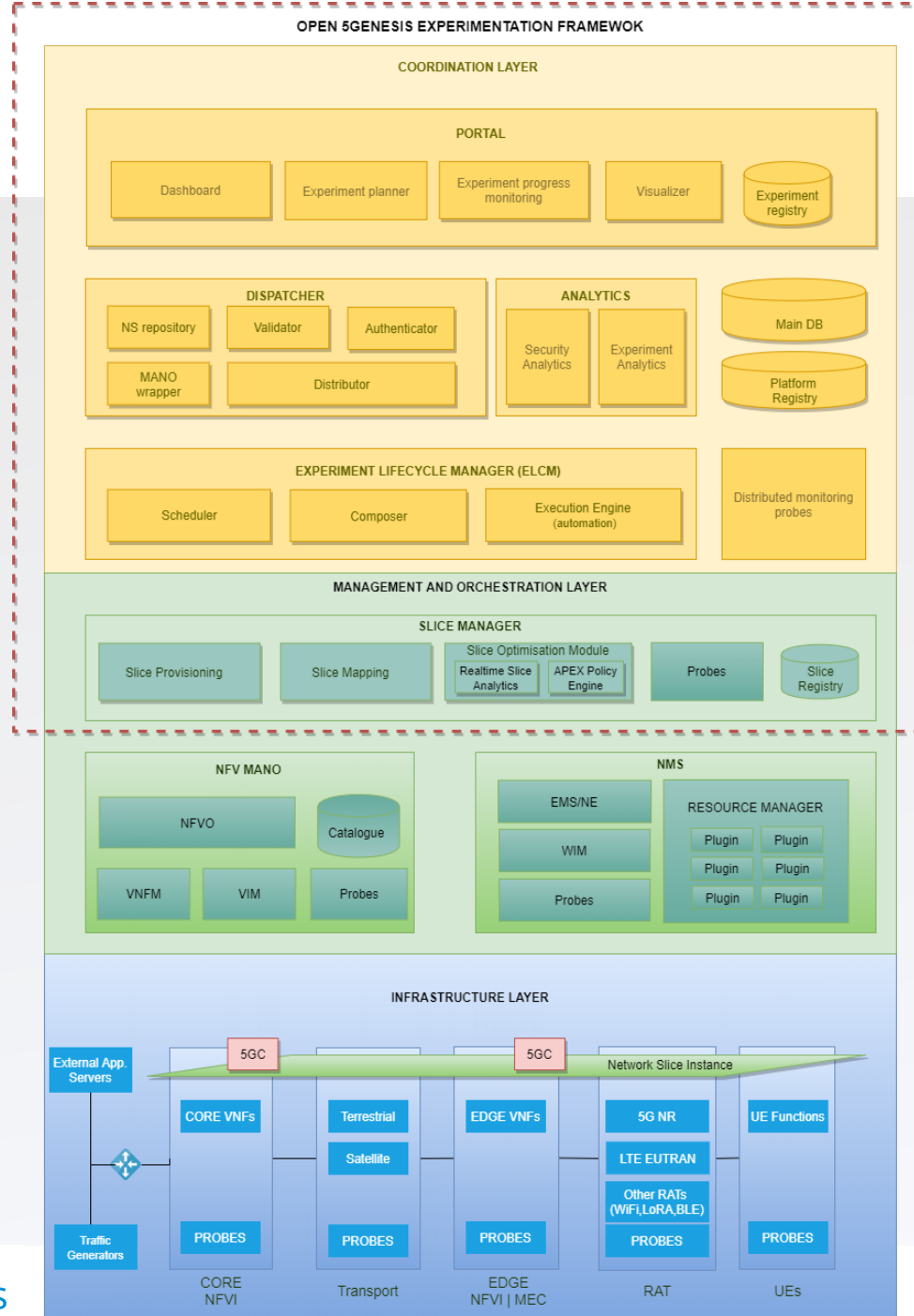
Compute clusters, VNFs, PNFs, Backhaul/Fronthaul networks, MEC platforms, RANs, UEs

Engagement Options

The experimenter/vertical has two options of performing the experiment:

1. Through the **5GENESIS GUI/Portal**, where the experiment descriptor is generated and sent to the dispatcher
2. Directly via the **5GENESIS open API**, allowing the experimenter to use the facility with its own scripts.





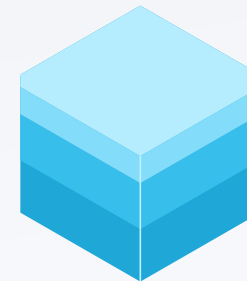
Open 5GENESIS Suite



<https://github.com/5genesis>

5GENESIS has built the Open5GENESIS Suite that provides a common API for testing and experimentation of new services by vertical industries.

his open source suite includes the Release A of the 5GENESIS experimentation tools and components that can be integrated on top of any 5G Platform in order to become an experimentation facility and support 5G trials, **following the 5GENESIS experimentation methodology.**



KATANA



developed by MNL

Experiment Formalization

► Meant to serve as a standardized template for bridging vertical-oriented requirements with network configurations, the form includes at least the following interlinked fields:

- Experiment description
- Target metric definition
- Test case description
- Scenario identification
- Slice configurations

Active contributor in
5GPPP Testing,
Methodology and
Validation (TMV)
Working Group

Experiment Descriptor			-ID number-
#	Description of the fields to be completed	Input Values	Importance
1	Experiment details Information required to uniquely identify the experiment. Note 1: A Security Manager is used for editing with safety and privacy data related to the experimenter) Note 2: Each experiment shall include all the combinations of the target metrics/test cases/scenarios/slice configurations listed in the following fields of this form. (one target metric linked to one test case, for a specific scenario and a slice configuration is the minimum requirement for a complete experiment).	Experiment ID	Mandatory
		Owner ID	
		Organization ID	
		Platform ID	
2	List of the Target Metric(s) Selection of the metrics (identified by IDs) that the experiment targets at. (see the Metric Template)	Metric ID1	Mandatory
		..	
3	List of Test Case(s) to be executed Selection of the test cases (identified by IDs) to be used in the experiment. Note: A test case includes KPI-associated Information (KPI definition, measurement methodology, complementary monitoring needed, etc) linked to a metric from the list in the field above. (see the Test Case Template)	Test Case ID1	Mandatory
		Test Case ID2	
		...	
		Test Case IDi	
4	List of Scenarios to be considered Selection of the Scenarios (identified by IDs) for which the test cases (selected in the previous field) will be executed. Note: A scenario includes information related to all the parameters that affect the values of the KPIs to be measuredNetwork deployment and environment conditions, etc.) (see the Scenario Description Template)	Scenario ID1	Mandatory
		Scenario ID2	
		...	
		Scenario IDi	
5	List of Slice Configurations to be established Definition of the Slice templates (identified by IDs) that are required for the experiment(s). (see the Slice Configuration Template)	Slice Config ID1	Mandatory
		Slice Config ID2	
		...	
		Slice Config IDi	
	Traffic Description Template (at least one traffic source or service type should be specified)	Traffic sources	Optional
		Service Type	Optional
		UEs identification	Mandatory (unattended)

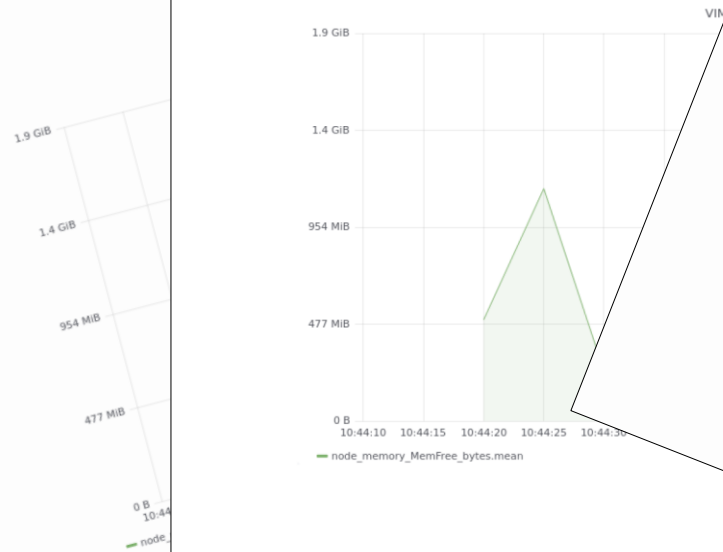
Experiment Report



5 Genesis Experiment

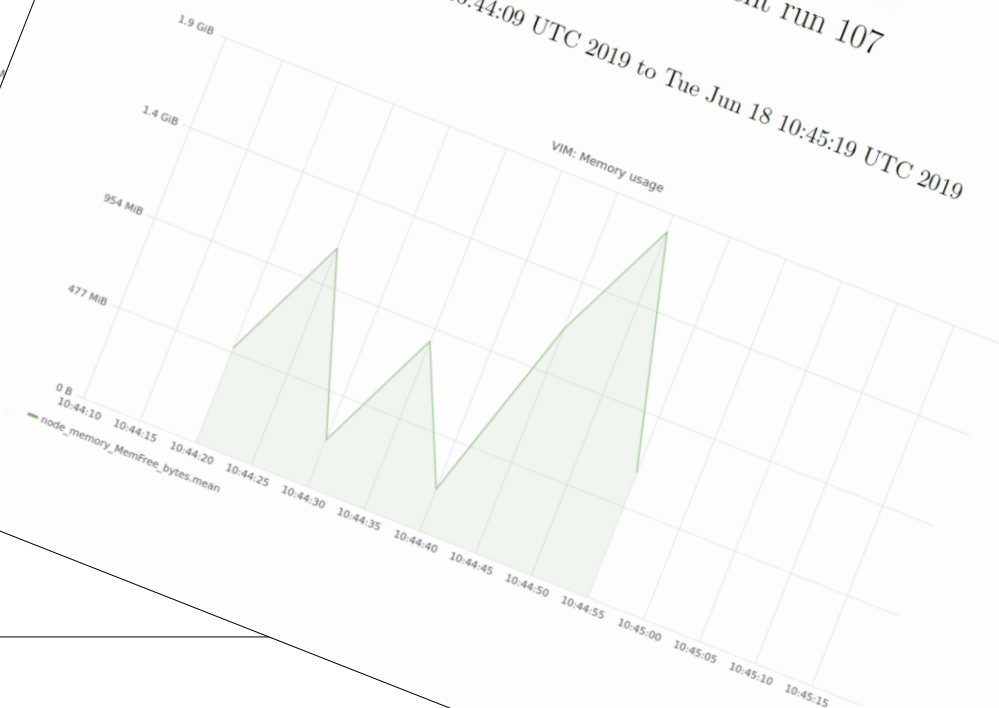
Tue Jun 18 10:44:09 UTC 2019 to

Tue Jun

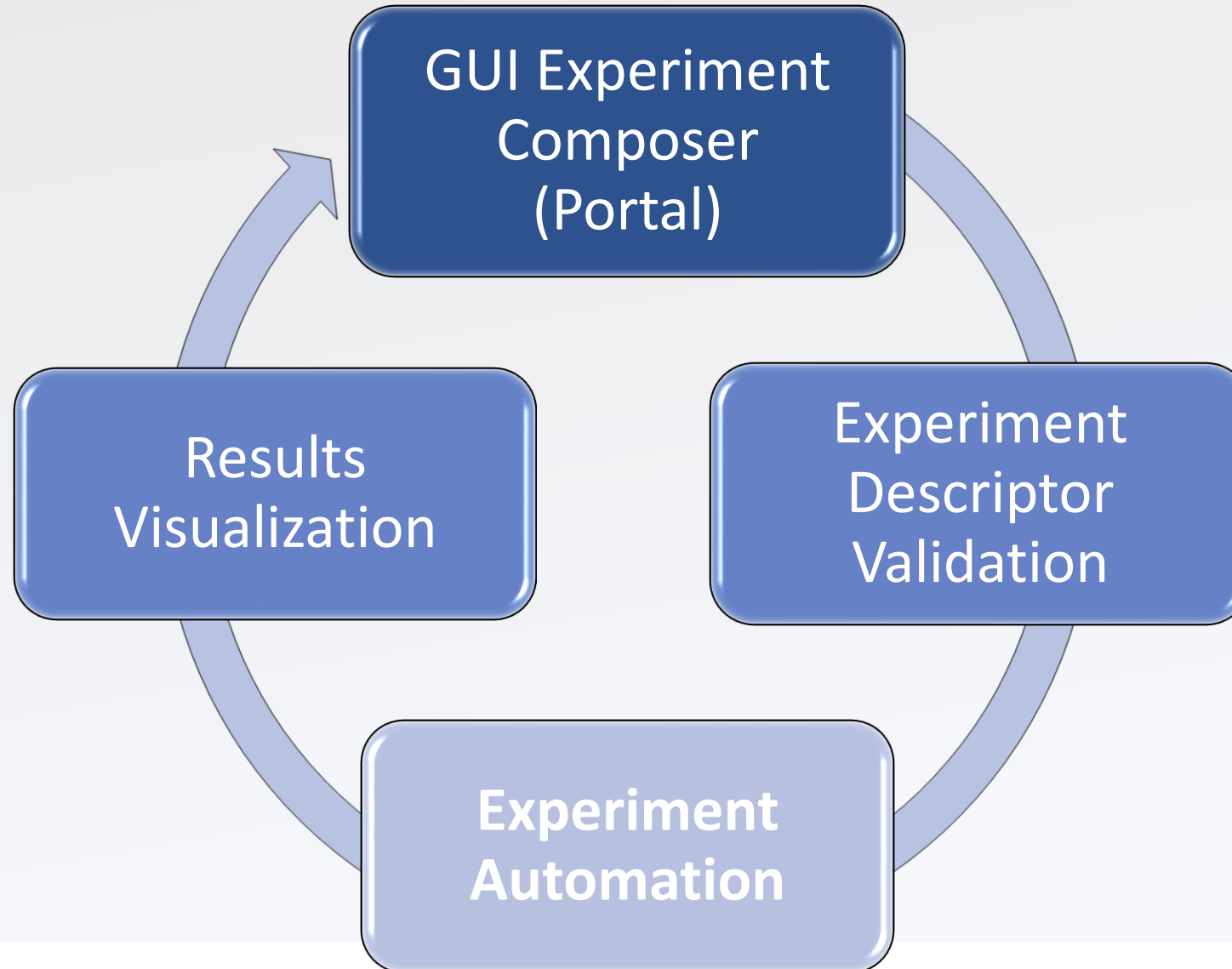


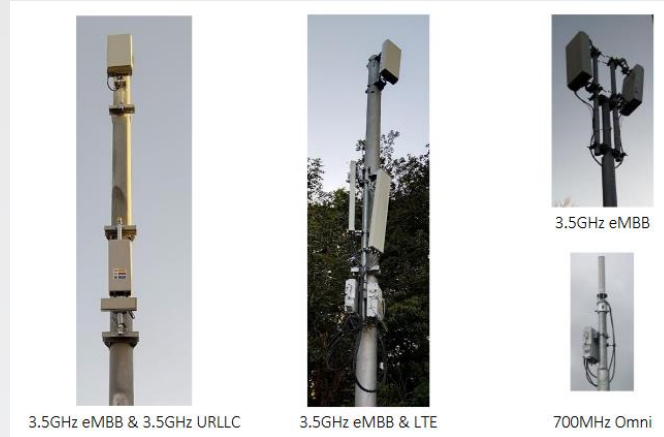
5 Genesis Experiment run 107

Tue Jun 18 10:44:09 UTC 2019 to Tue Jun 18 10:45:19 UTC 2019



Open5GENESIS: The all-in-one 5G experimentation suite





5G NR Coverage at the Surrey Platform



Nokia AirScale 5G BBU, b. AirScale Micro 4T4R at the Athens Platform



Amarisoft Callbox 5G NSA/SA Solution



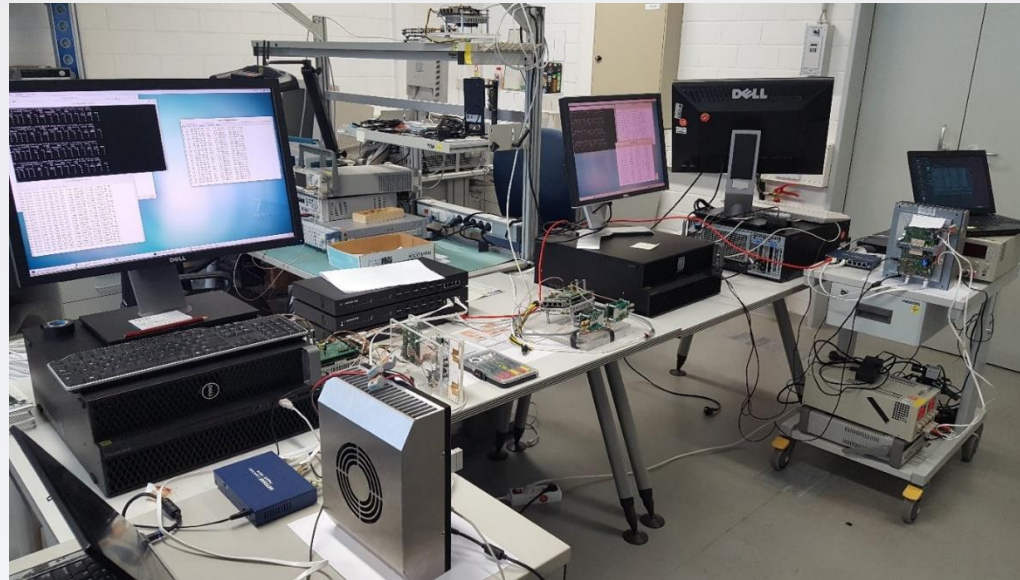
Egaleo Site Cabinets for edge equipment



Huawei 5G SA NR at Berlin Platform



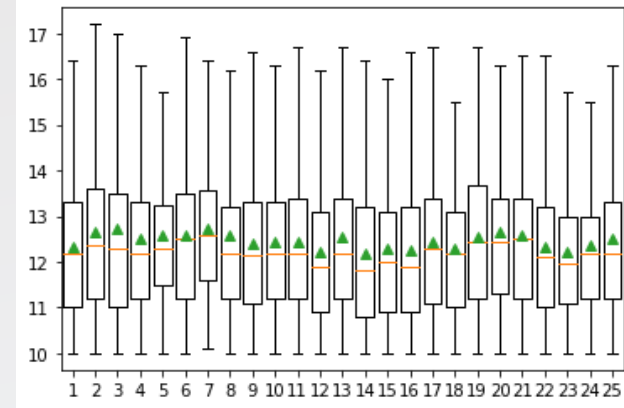
Nokia 5G and 4G micro RRH in Ada Byron building Malaga



mmWave wireless link consisting of two IHP's 60 GHz devices

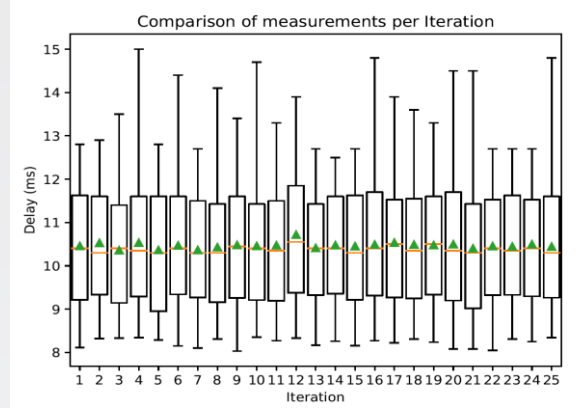
5GENESIS Trials and KPI Achievements

~12.5 msec

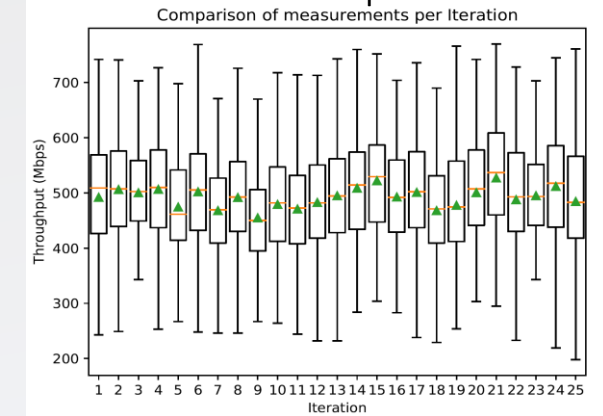


Latency KPI measurements

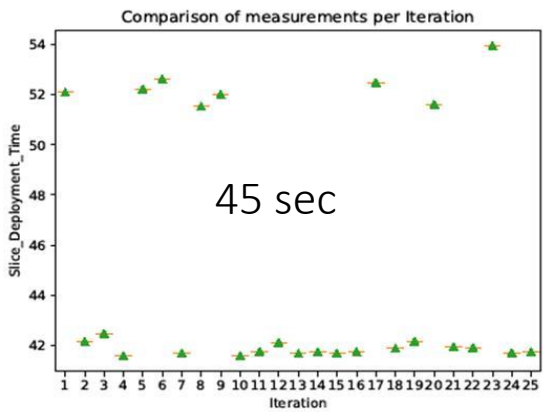
~10.5 msec



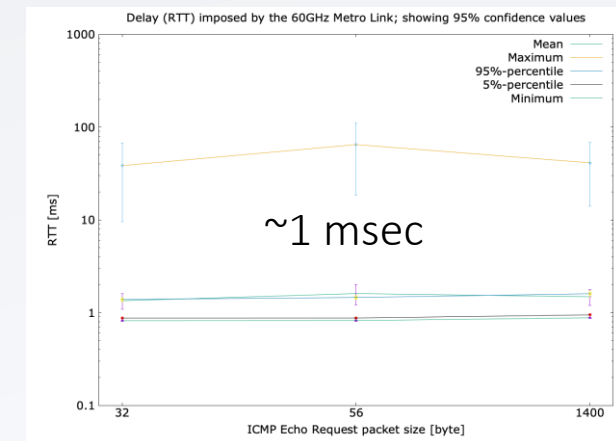
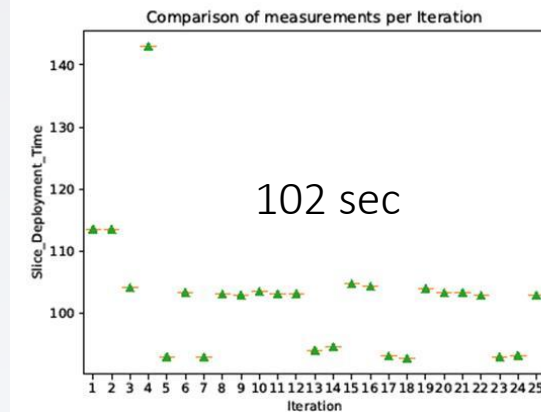
~500 Mbps



Throughput KPI measurements



Slice creation Time (Central DC and Edge Computing Node)



RTT backhaul via mmWave 60 GHz

5GENESIS Trials and KPI Achievements



5GENESIS Showcasing trials



Drone Flight with C2 over 5G in Athens

<https://www.youtube.com/watch?v=zGQ3sw8gTaE>



Festival of Lights Field Trial with the Portable 5GENESIS Deployment

<https://www.youtube.com/watch?v=DBSs96DgWf0>



5G Showcasing activity at the 5GENESIS Malaga Platform with First Responders

<https://www.youtube.com/watch?v=9H6OkjX74iw>



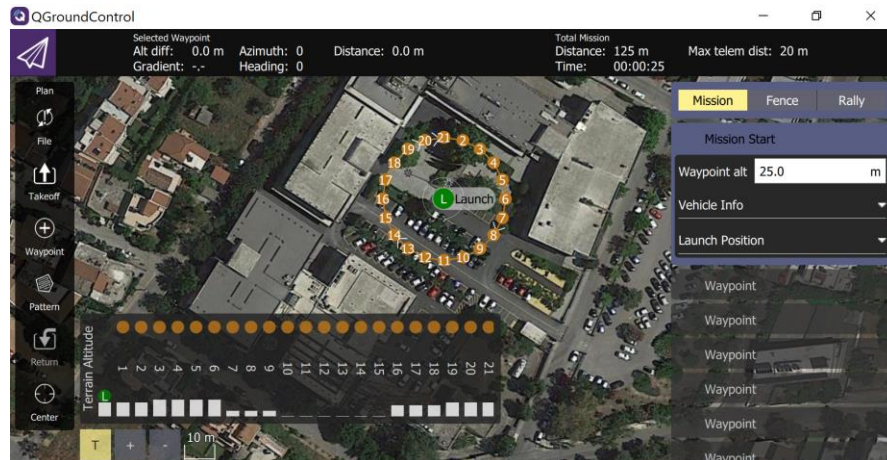
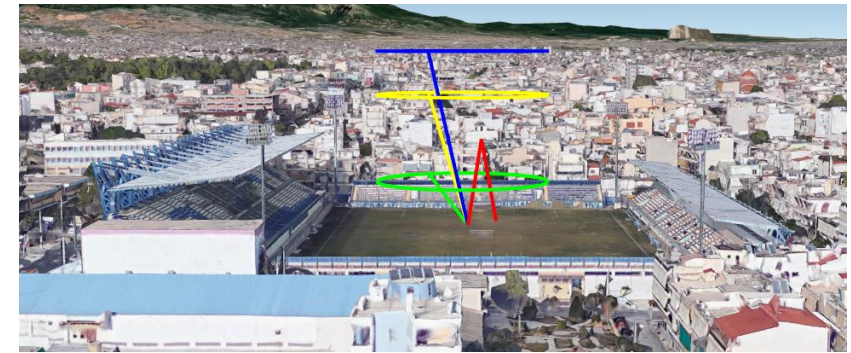
5G Integration with Avanti's HYLAS 2 satellite

Experimenters of 5GENESIS platforms

- Within the framework of ICT-19 the following verticals are already performing experiments on top of 5GENESIS facility
 - **5G!DRONES: Drones Vertical at Athens 5GENESIS facility**
 - **5G-VICTORI: Transportation and Media Vertical at Berlin 5GENESIS facility**
 - **5G-HEART: Healthcare, transport and aquaculture Verticals at Surrey 5GENESIS facility.**



5G!Drones trials on 5GENESIS Athens platform



Engagement Process of Vertical Industries in 5GENESIS

Each platform owner acts as the **single point of contact** for the vertical user/experimenter, **negotiating the terms of use/SLA as well as the compensation for the human and technical resources**, which will be employed for the support of the experiment.

5GENESIS Athens Facility:
athens@5genesis.eu

5GENESIS Malaga Facility:
malaga@5genesis.eu

5GENESIS Limassol Facility:
limassol@5genesis.eu

5GENESIS Berlin Facility:
berlin@5genesis.eu

5GENESIS Surrey Facility:
surrey@5genesis.eu

Thank you
Questions?