The 5G EVE End-to-End Facility
Webinar for Vertical Industries involved in 5G EU Projects

Technical Overview

9 May 2019

Twitter hashtag: # 5GEveWebinar

Website: www.5g-eve.eu

This Project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 815074

Manuel Lorenzo (ERI-ES)

5G EVE

5G EVE Technical Overview
Outline

- Vision
- Services and Architecture
- Roadmap
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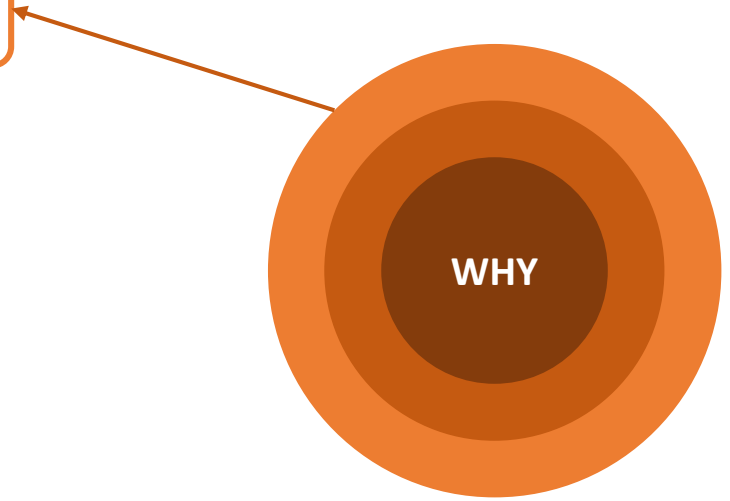

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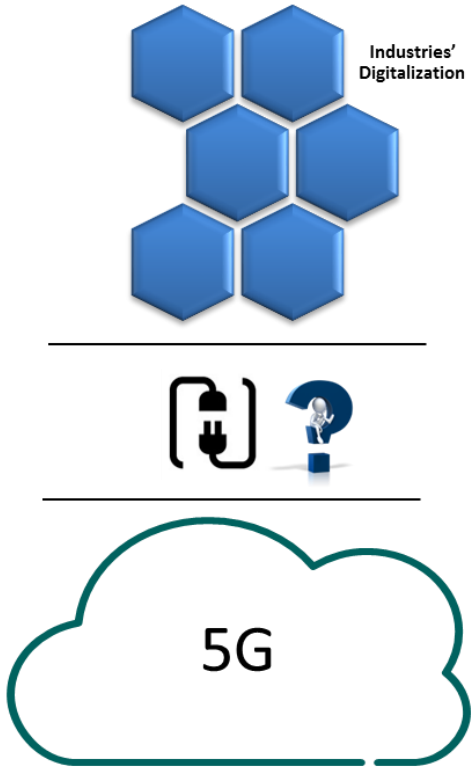
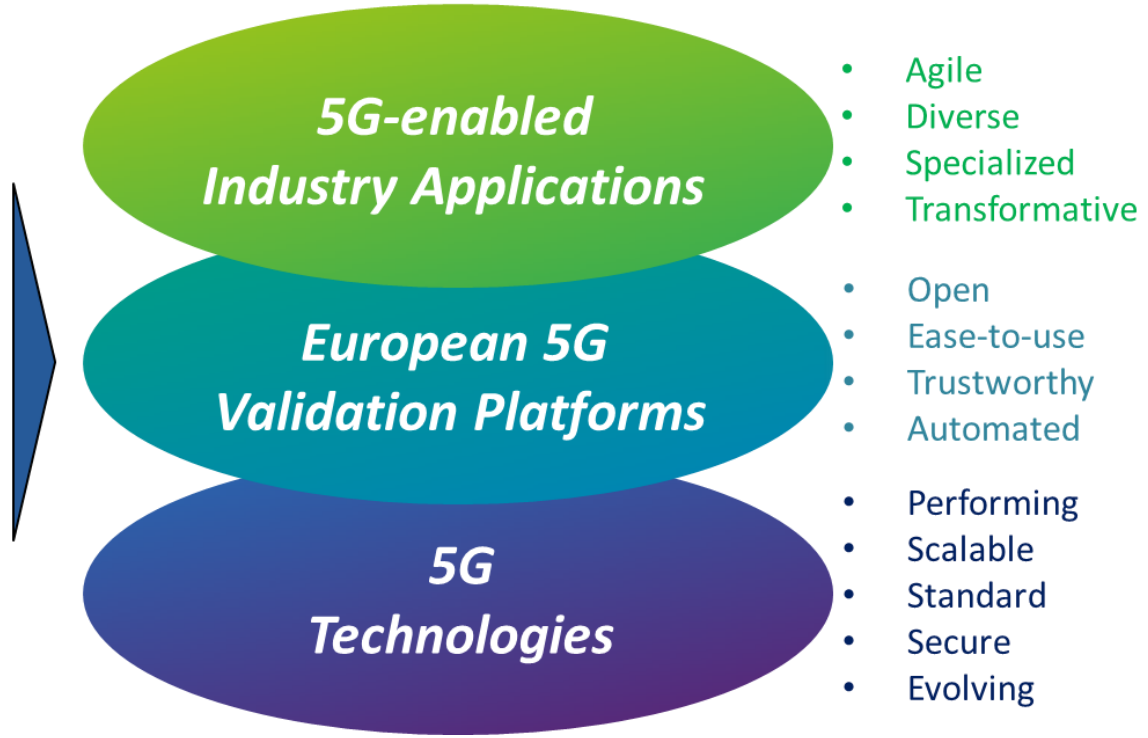
5G EVE

The vision of 5G EVE's E2E Validation Platform

From: Two Worlds



To: One Innovation Ecosystem



- Agile
- Diverse
- Specialized
- Transformative

- Open
- Ease-to-use
- Trustworthy
- Automated

- Performing
- Scalable
- Standard
- Secure
- Evolving

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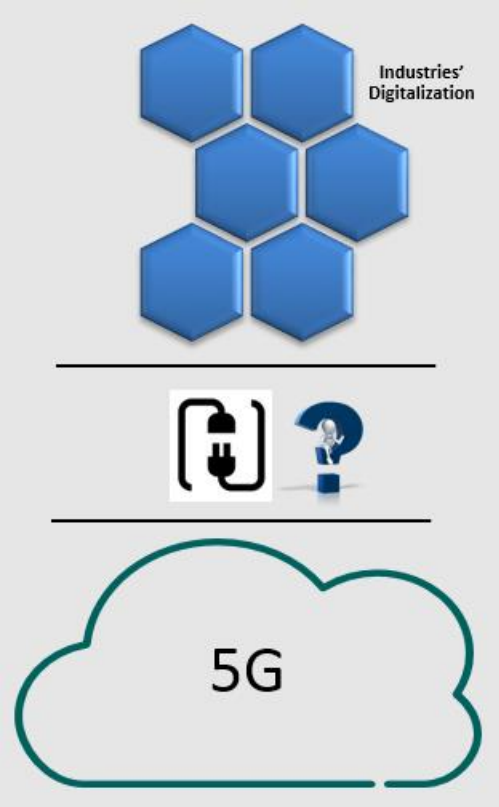
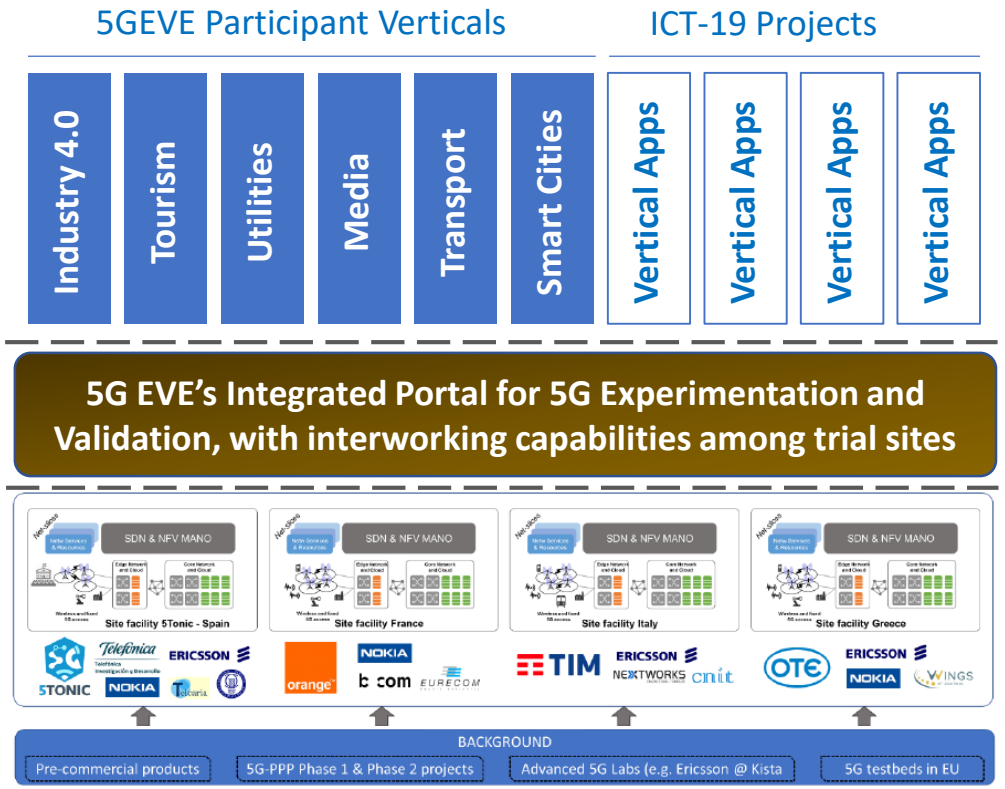
5G EVE

How 5G EVE architects that vision





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5G EVE

What 5G EVE offers to Vertical experimenters

5G Technologies

Smooth
Execution and Testing of
your 5G ready applications
over a State-of-the-art
5G Technology Platform

+

5G EVE Innovations

Increased
effectiveness, efficiency
and confidence of your
5G Validation activities

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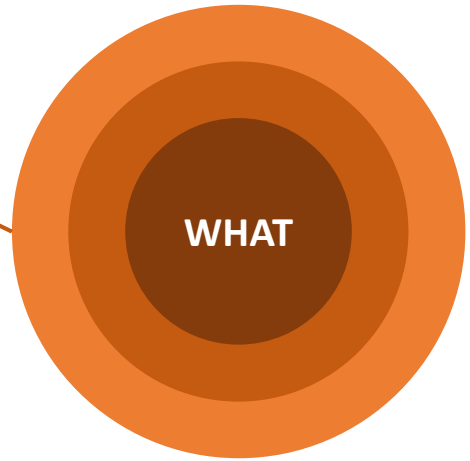

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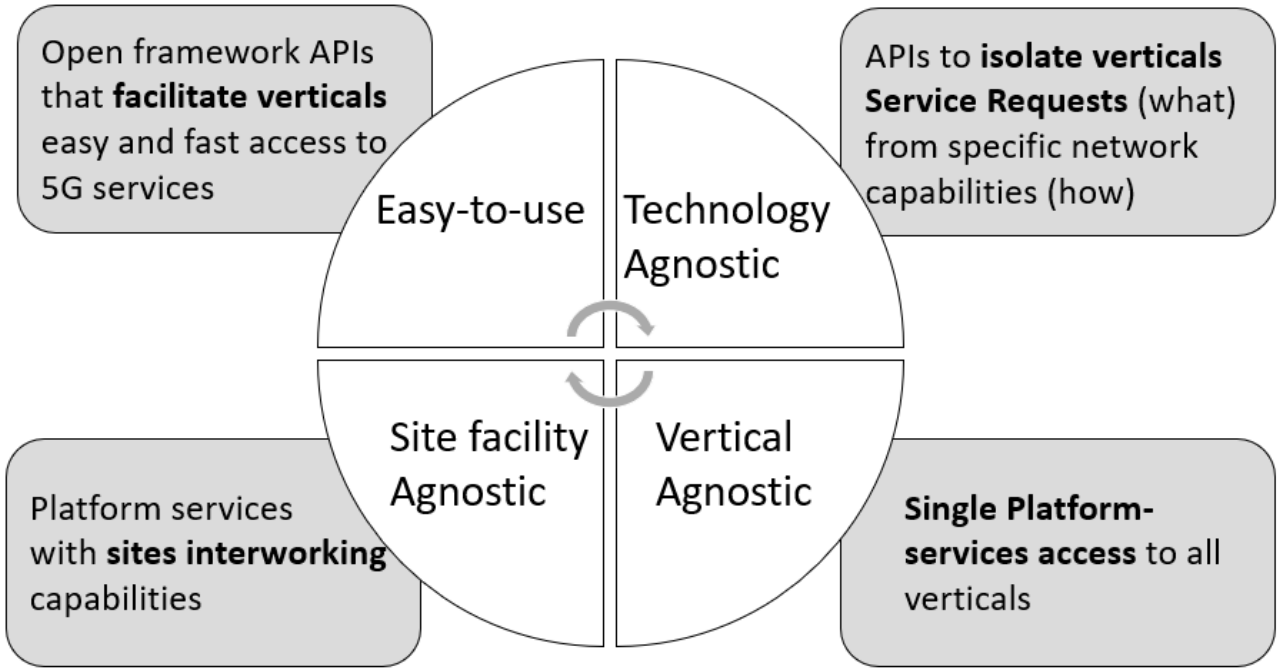
5G EVE Platform – Driving Requirements

5G EVE platform services are designed considering the following requirements



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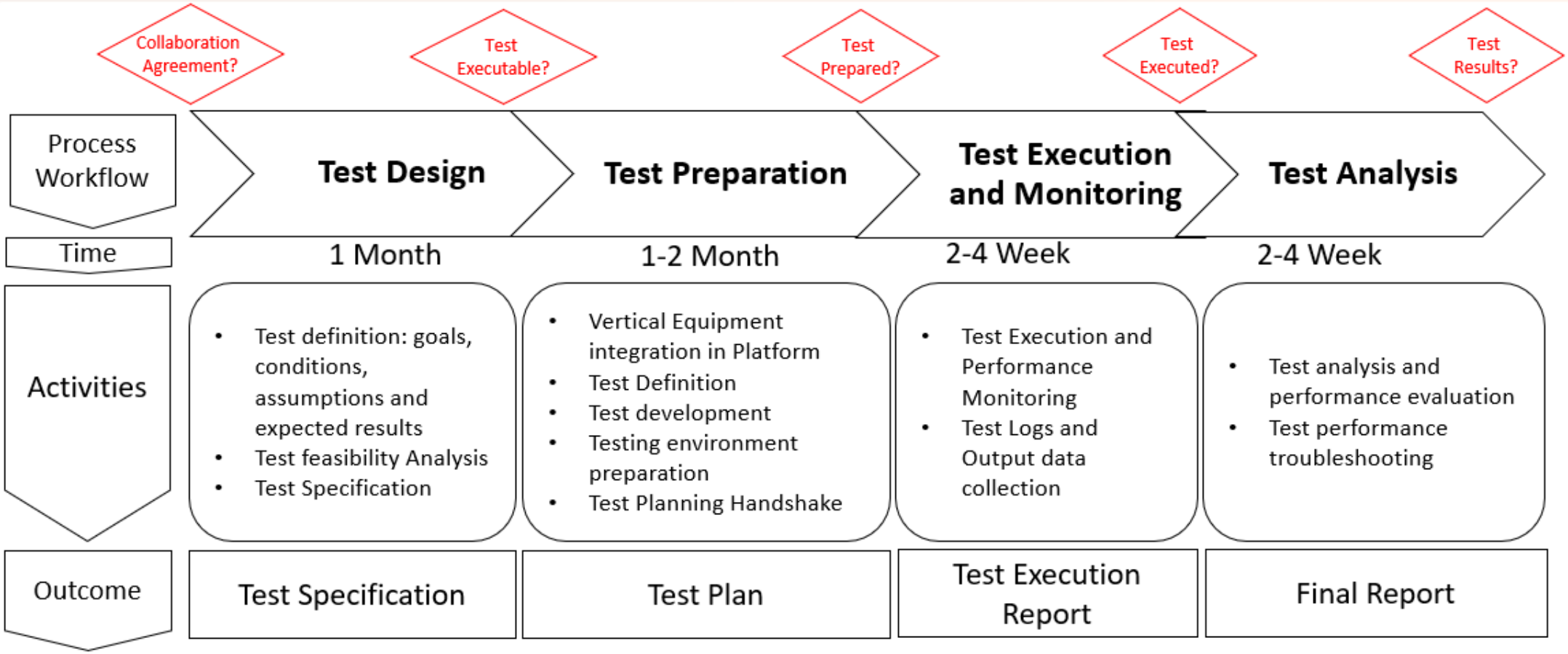
5G EVE Platform - Validation Test as a Service



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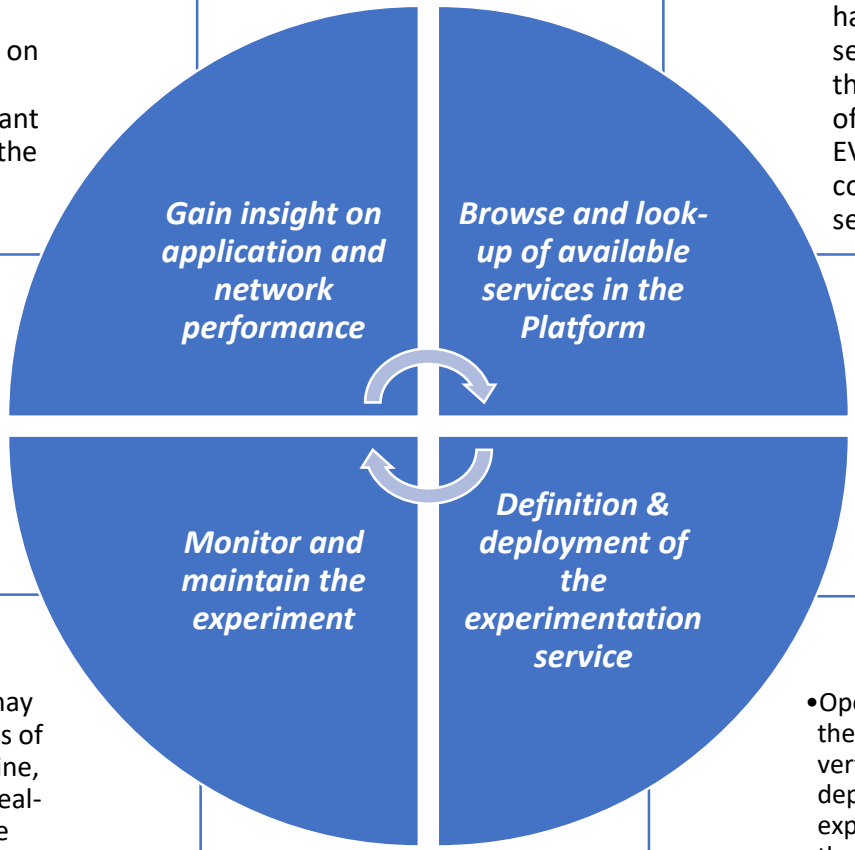
5G EVE Platform - Validation Test as a Service

- The experimenter will gain insight on performance based on the collection and analysis of all relevant data and results of the experiment.

- The experimenter will have the ability to seamlessly browse through extensive lists of the available 5G EVE features, components and services



- The experimenter may monitor the progress of the experiment, online, via a GUI. Multiple real-time statistics will be displayed

- Open interface between the 5G EVE and the vertical for defining and deploying their experiments, based on the novel concept of intent-based networking

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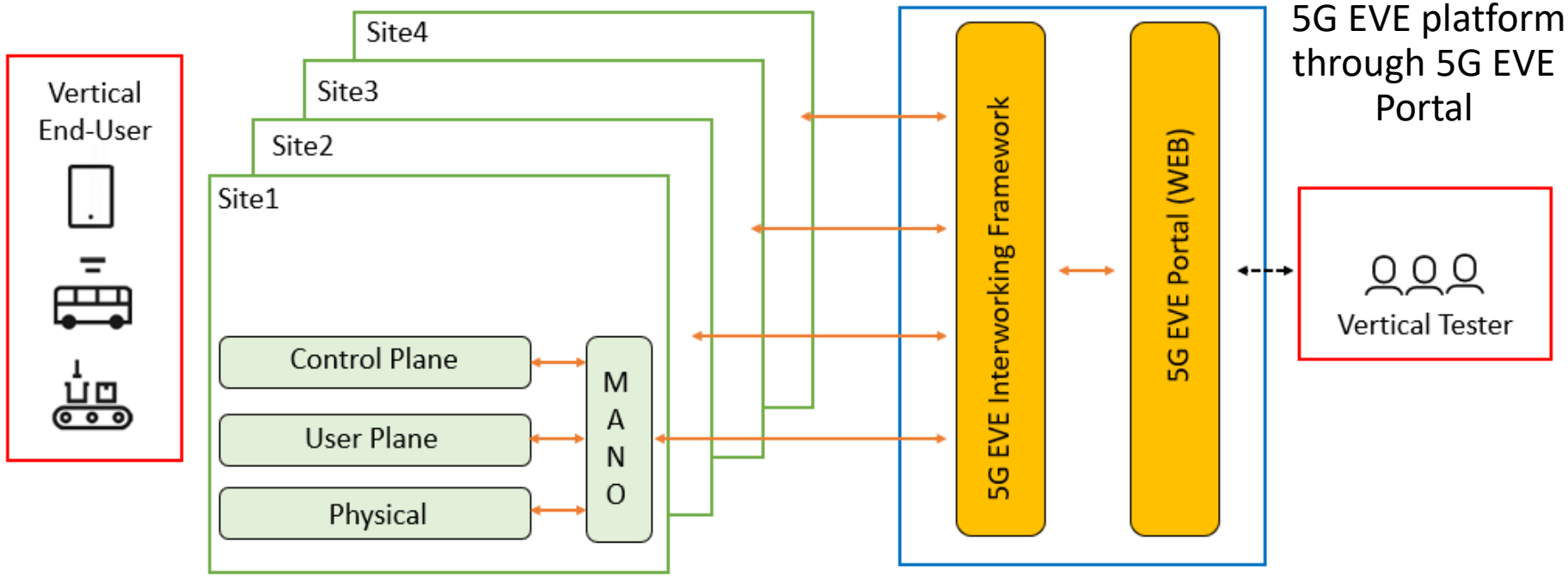
5G EVE Architecture – Verticals' View

Vertical End-User Service is delivered at one or more sites.

Vertical Tester/Experimenter interacts with 5G EVE platform through 5G EVE Portal



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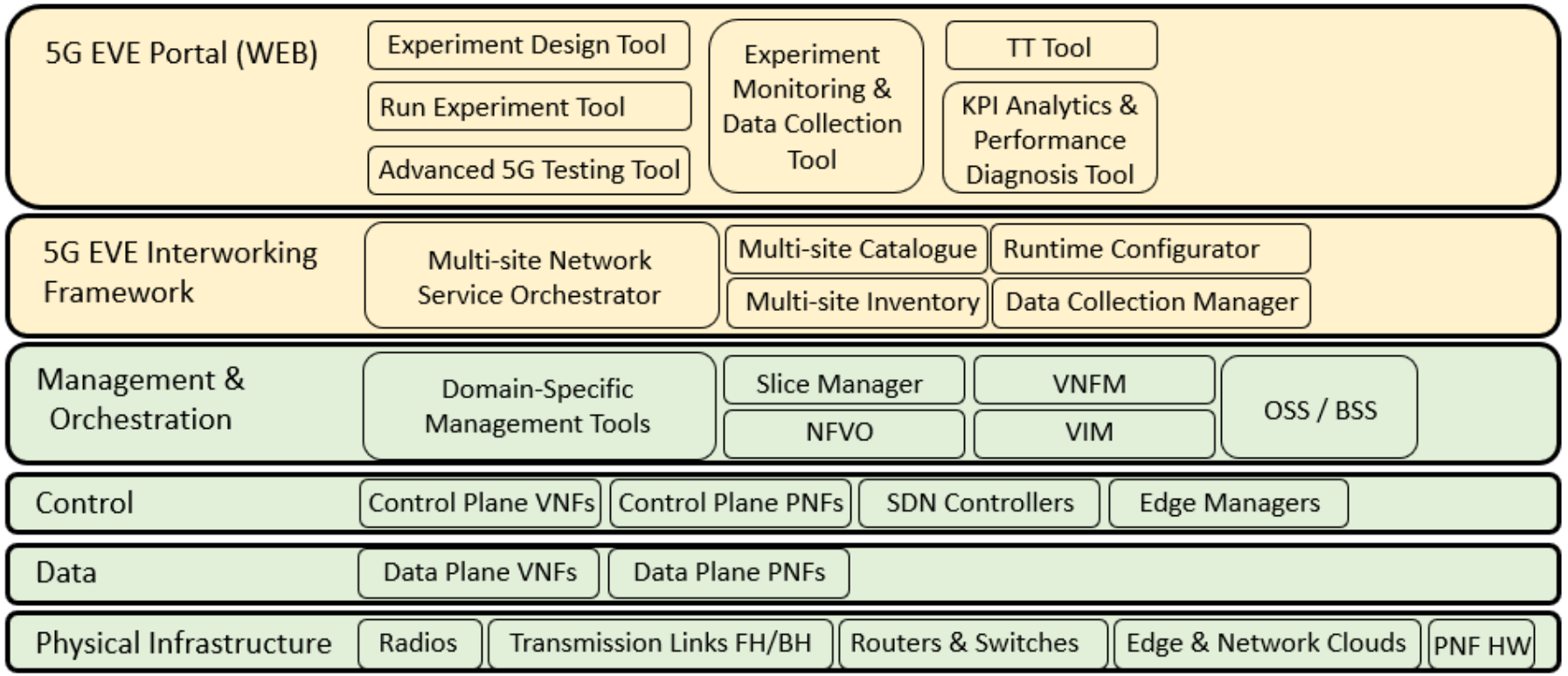
5G EVE Architecture – Implementation View



Common 5G EVE functional blocks
Common to all sites; secure homogeneous platform services to Verticals

5G EVE Site functional blocks
Based on different technologies and implementations for different sites; enable richer tests

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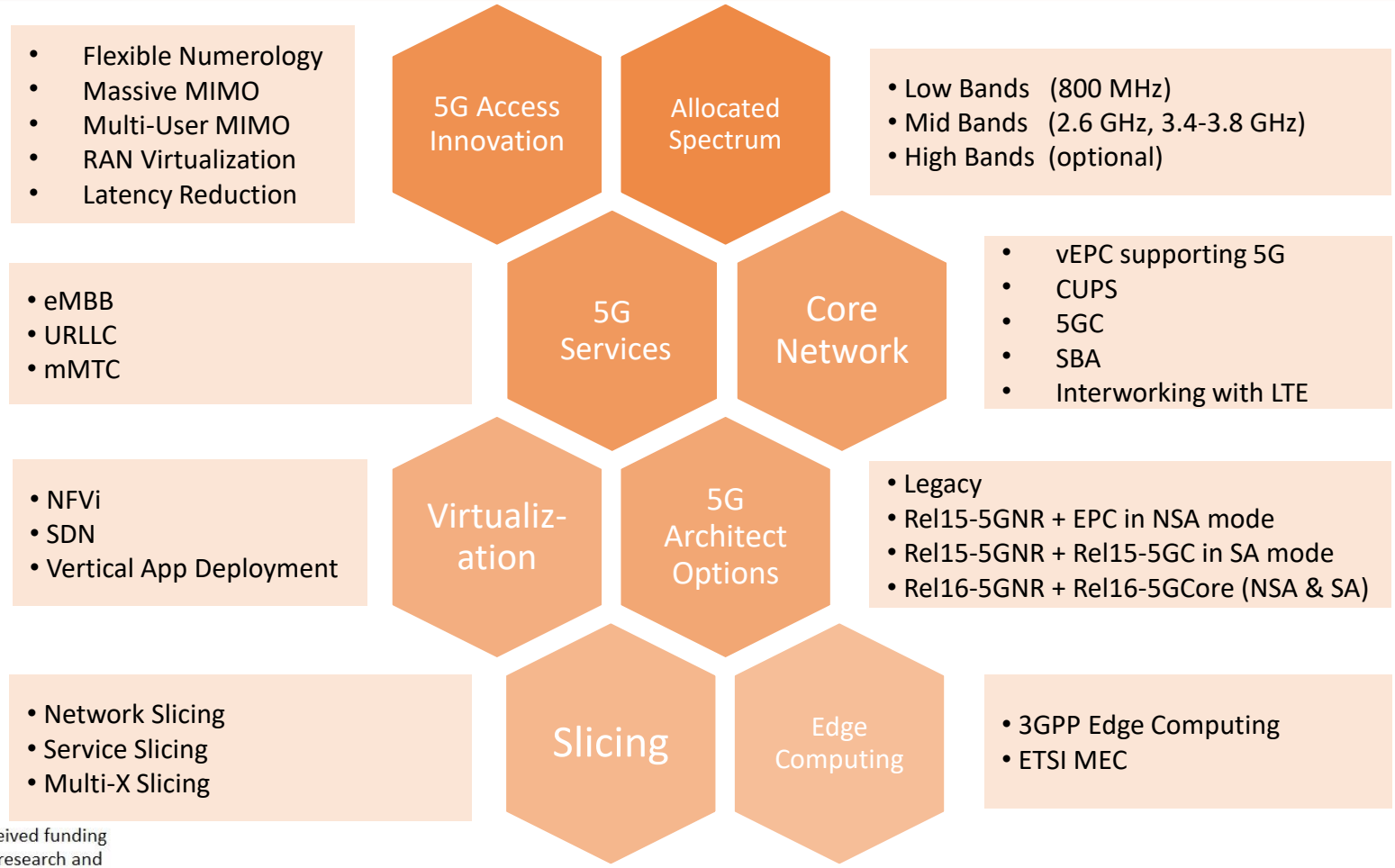
5G EVE Architecture - Technologies & Standards



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5G EVE Architecture - Key 5G EVE innovations

1	Intent-based interface towards verticals	A disruptive intent-based interface to simplify the access to the 5G end to end facility, specifying "what" is asked without details on "how" it is provided.
2	Multi-domain slicing and orchestration	A new orchestration framework with the necessary features able to manage effectively multiple site facilities, dramatically improve efficiency, prevent overload, and easily manage migration of networks components, while meeting performance requirements.
3	Performance Diagnostics (KPI Framework)	A completely new performance diagnosis mechanism and a new monitoring framework enabling the capturing of service and slice performance indicators, providing insight on performance.
4	5G VNF's (Openness Framework)	A new framework to provide a modular, reusable set of different SFs enabling the coexistence of proprietary and open source technologies; this will allow the modular replacement and chaining of components implemented with open and novel performance acceleration techniques.

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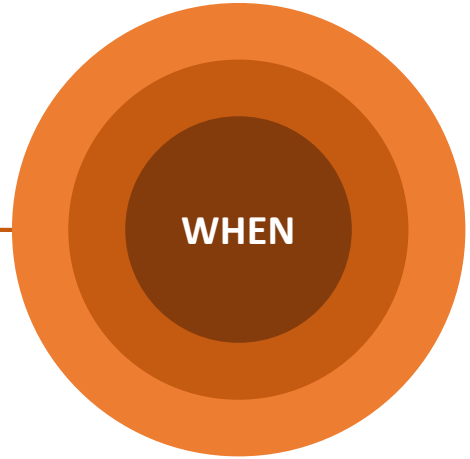

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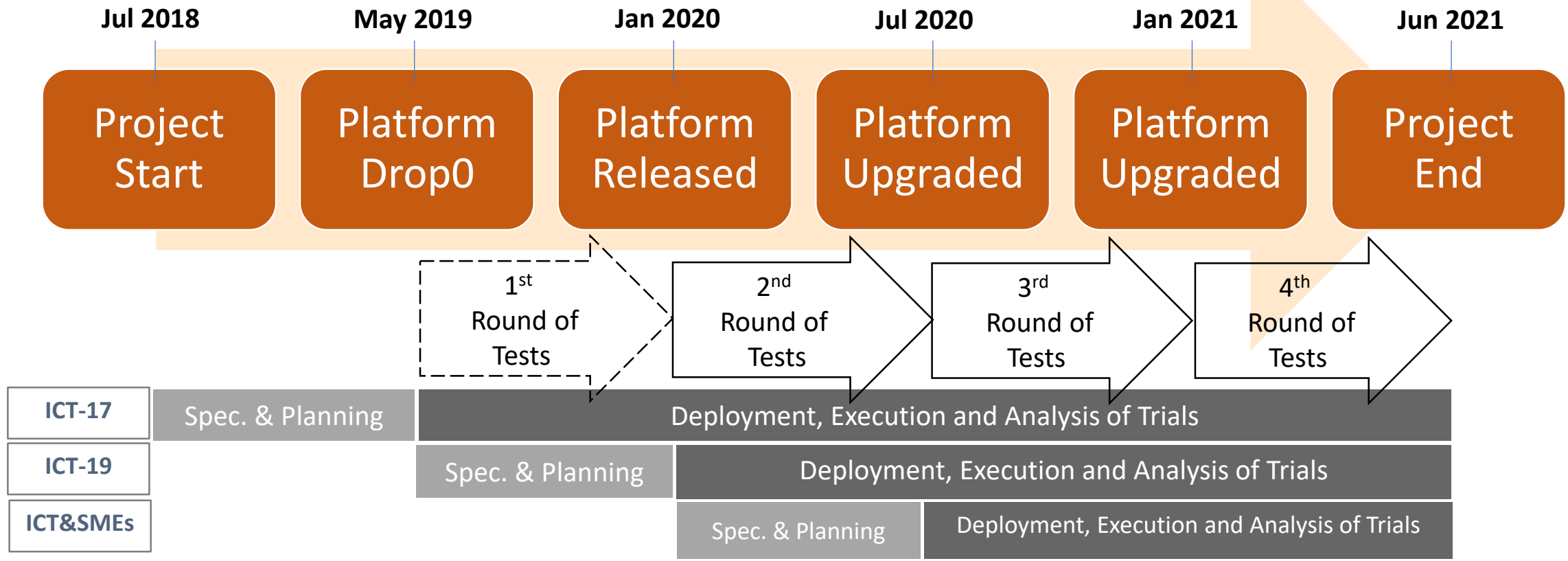
5G EVE Roadmap – General Time-line



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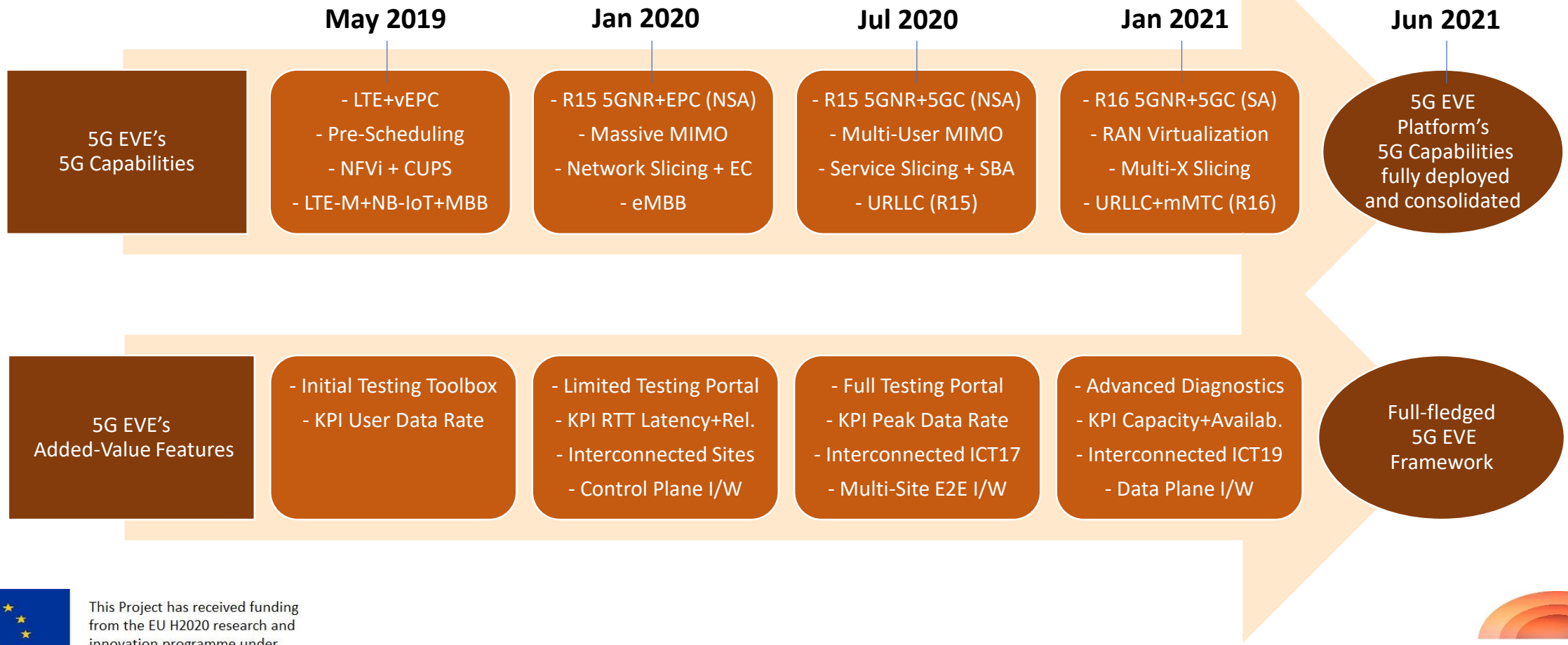
5G EVE Roadmap - Highlights



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5G EVE 5G Capabilities Roadmap (1 of 2)

Capabilities	Features	2019/MAY	2020/JAN	2020/JUL	2021/JAN
Allocated Spectrum	Low Bands (800 MHz)	Y (10MHz)	Y (10MHz)	Y (10MHz)	Y (10MHz)
	Mid Bands (2.6 GHz, 3.4-3.8 GHz)	Y (20 MHz)	Y (40MHz)	Y (40 MHz)	Y (100MHz)
	High Bands (26 GHz)			(optional)	(optional)
5G Services	Enhanced MBB (eMBB)	Y	Y	Y	Y
	URLLC (URLLC)	(Pre-sched)	Y(Rel-15)	Y(Rel15)	Y(Rel-16)
	Massive IoT (mMTC)	Y (LTE-M+NB-IoT)	Y (LTE-M+NB-IoT)	Y (LTE-M+NB-IoT)	Y(Rel-16)
5G Architecture Options	Option-1 (Legacy)	Y	Y	Y	Y
	Rel15-5GNR + EPC in NSA mode		Y	Y	Y
	Rel15-5GNR + Rel15-5GC in SA mode			Y	Y
	Rel16-5GNR + Rel16-5GCore (in NSA & SA modes)				Y
5G Access Features	Flexible Numerology		Y	Y	Y
	Massive MIMO	Y	Y	Y	Y
	Multi-User MIMO		Y	Y	Y
	RAN Virtualization			Y	Y
	Latency Reduction	Y (pre-scheduling)	Y(Rel-15)	Y(Rel15)	Y(Rel-16)
	Optional(Multi-RAT Spectrum Aggregation, New		optional	optional	optional

5G EVE 5G Capabilities Roadmap (2 of 2)

Capabilities	Features	2019/MAY	2020/JAN	2020/JUL	2021/JAN
Core Network	vEPC supporting 5G	Y	Y	Y	Y
	5GC			Y	Y
	CUPS	Y	Y	Y	Y
	SBA			Y	Y
	Interworking with LTE			Y	Y
Slicing	Network Slicing (std 5G Services: eMBB, URLLC, mMTC)		Y	Y	Y
	Service Slicing (cloud orchestration level)			Y	Y
	Multi-site Slicing			Y	Y
Virtualization	NFVi support	Y	Y	Y	Y
	SDN control		TBD	Y	Y
	Vertical Virtualized Application deployment support	Y	Y	Y	Y
Edge Computing	3GPP Edge Computing		Y	Y	Y
	ETSI MEC		(optional)	(optional)	(optional)
Interconnection	Interconnection among 5G EVE Sites		Y (*)	Y	Y
	Interconnection with other ICT17 platforms			TBD	TBD
	Interconnection with other ICT19 projects' infra			TBD	TBD

5G EVE

5G EVE KPI Roadmap

5G-EVE KPIs (D1.1)	ITU-R M.2410-0 (11/2017)	2019/MAY	2020/JAN	2020/JUL	2021/JAN
User Data Rate	• DL User Experienced Data Rate (Mbps): 100 Mbps • UL User Experienced Data Rate (Mbps): 50 Mbps	• Y • Y	• Y • Y	• Y • Y	• Y • Y
Peak Data Rate	• DL Peak Data Rate (Gbps): 20 Gbps • UL Peak Data Rate (Gbps): 10 Gbps			• Y (mmW) • Y (mmW)	• Y (mmW) • Y (mmW)
Capacity	• Area Traffic Capacity (Mbit/s/m2): 10 Mbit/s/m2				• Y
Latency	• UP Latency (ms): 1ms (URLLC), 4 ms (eMBB) • CP Latency (ms): <20 ms	• Y(LTE)	• Y(4 ms)	• Y(4 ms)	• Y(1ms) • Y
Device Density	• Connection Density: 1 M devices/km2 (mMTC)				• Y
Mobility	• Stationary: 0 km/h • Pedestrian: 0 km/h to 10 km/h • Vehicular: 10 km/h to 120 km/h • High speed vehicular: 120 km/h to 500 km/h	• Y • Y	• Y • Y	• Y • Y	• Y • Y • Y • TBD
Reliability	• Reliability (%)		• Y	• Y	• Y
Availability	• Availability (%)			• Y	• Y

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5G EVE Testing Framework Roadmap

Key Features	Brief Description	2019/MAY	2020/JAN	2020/JUL	2021/JAN
Testing/Validation toolbox	Initial set of standalone testing/validation tools meant to be used by the site owners	Y	Y	Y	Y
Limited Testing Portal	The 1st version of the Portal available with limited functionalities: • Blueprints for ASTI and Trenitalia, • Deploy a network service in a single trial site • Capacity to show some metrics • Capacity to show information about the VNFs and PNFs available in a single site.		Y	Y	Y
Full-fledged Testing Portal	• browse and look-up tool • intent-based • monitoring and result data collection • trouble-ticketing system • Execution of the experiments • Scheduling of experiments. • Testing/validation methodology integrated			Y	Y
KPI Support	• Basic Initial KPI Support (data rate and E2E latency)		Y	Y	Y
	• Advanced KPI Support			Y	Y
Performance Diagnosis Capabilities	Basic Performance Diagnosis Capabilities • Available to the verticals • Related to the identifications of problems			Y	Y
	Advanced Performance Diagnosis Capabilities • Available to the verticals • Identification of problems and proposition of solutions.				Y

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5G EVE Interworking Framework Roadmap

Key Features	Brief Description	2019/MAY	2020/JAN	2020/JUL	2021/JAN
Features for single-site scenarios					
WP2 feature: Local Resources	Site implication to support Verticals and Experiments	Y	Y	Y	Y
Control Plane Interworking	Control Plane constructed using best effort VPNs over Internet		Y	Y	Y
Single-Site Experiment Monitoring Support	Centralized capability to define and access Network and Service KPIs at specific sites		Y	Y	Y
	Centralized capability to define and access Network and Service KPIs at any site			Y	Y
Single-Site Applications Deployment Support	Centralized capability to extract (Catalogue) and deploy VNFs automatically at specific sites		Y	Y	Y
	Centralized capability to extract (Catalogue) and deploy VNFs automatically at any site			Y	Y
Single-Site Network Automation Support	Centralized capability to automatically set up SDN-based Connectivity Services at specific sites		Y	Y	Y
	Centralized capability to automatically set up SDN-based Connectivity Services and Slices at any site			Y	Y
Additional features for multi-site scenarios					
Multi-Site Experiment Monitoring Support	Centralized capability to define, access and correlate Network and Service KPIs at multiple sites			Y	Y
Multi-Site E2E Orchestration Support	Centralized capability to automatically deploy multi-site Slices, and Applications running on top of them			Y	Y
Data Plane Interworking	Data Plane constructed using best effort VPNs over Internet			Y	Y
	Data Plane constructed on top of a multi-gigabit low latency network				Y

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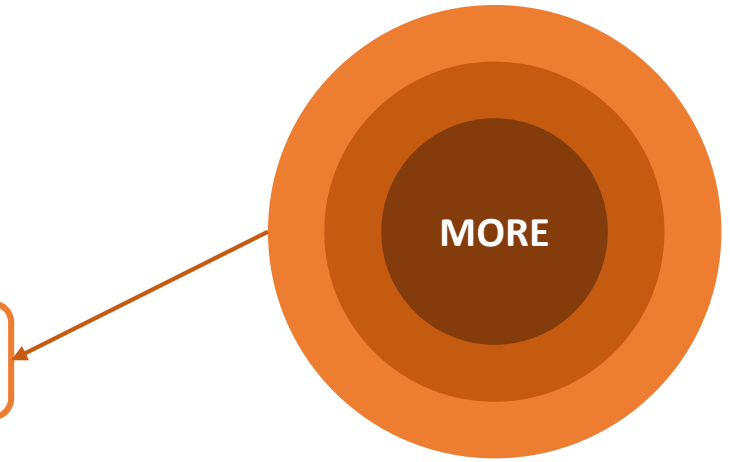

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5G EVE

Useful information

General information on methodologies and solutions

→https://www.5g-eve.eu/

Information on available facilities in the different sites

→https://www.5g-eve.eu/end-to-end-facility

→https://www.5g-eve.eu/videos/

Specific requests

→https://www.5g-eve.eu/contact/

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