

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
- References



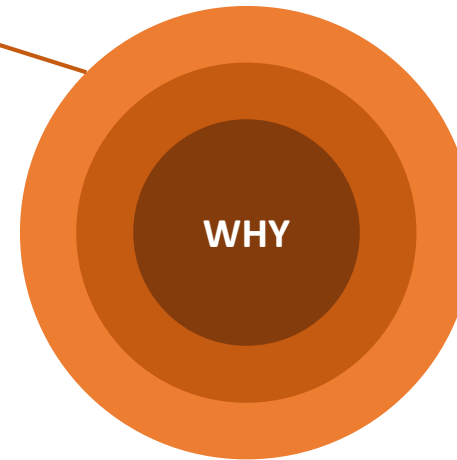
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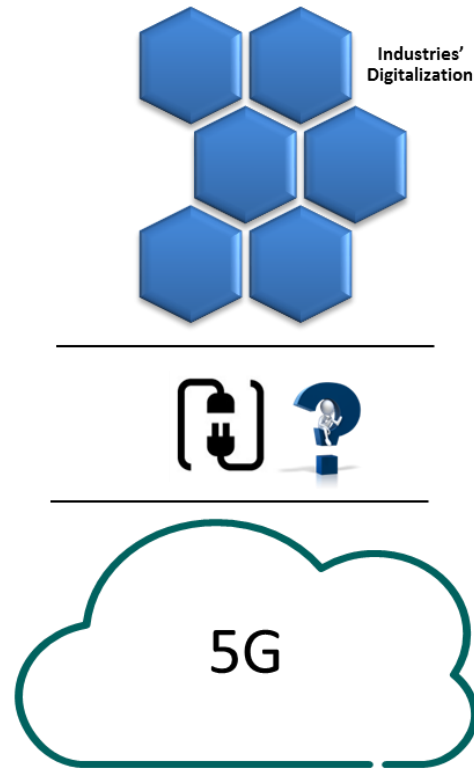
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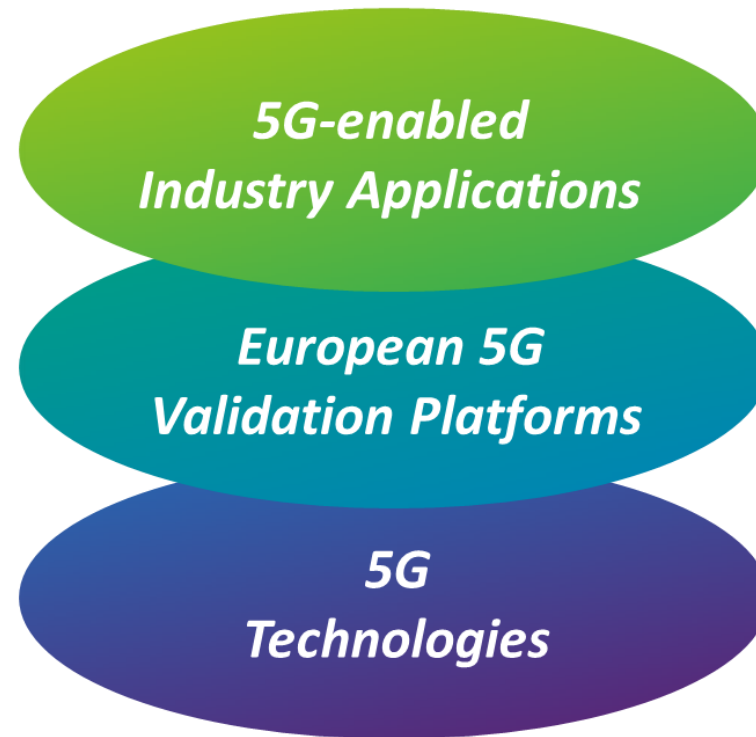
5G EVE

The vision of 5G EVE's E2E Validation Platform

From: Two Worlds



To: One Innovation Ecosystem



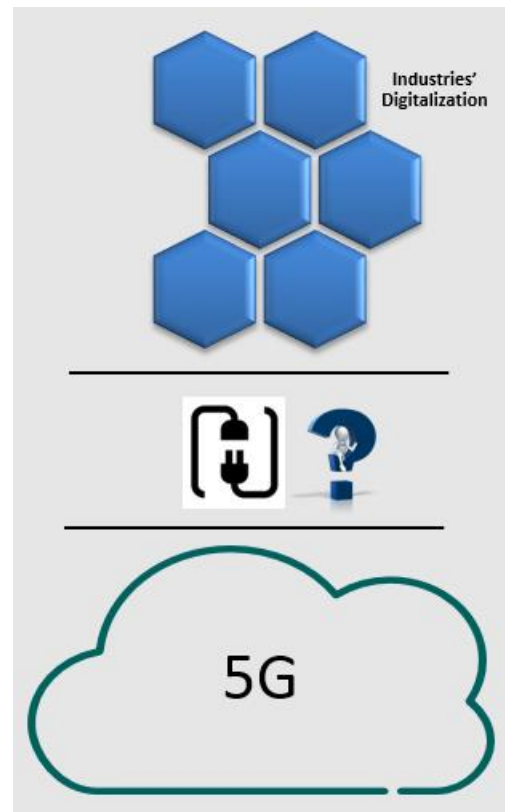
- Agile
- Diverse
- Specialized
- Transformative
- Open
- Ease-to-use
- Trustworthy
- Automated
- Performing
- Scalable
- Standard
- Secure
- Evolving



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How 5G EVE architects that vision



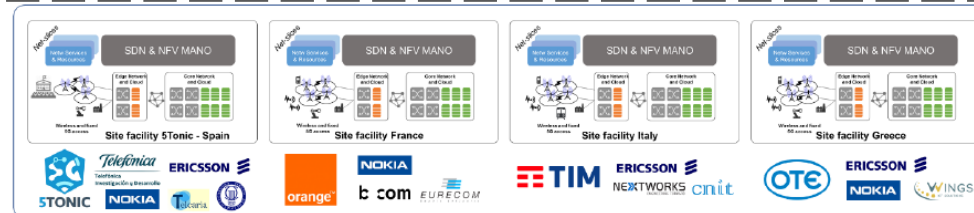
5GEVE Participant Verticals



ICT-19 Projects



5G EVE's Integrated Portal for 5G Experimentation and Validation, with interworking capabilities among trial sites



BACKGROUND



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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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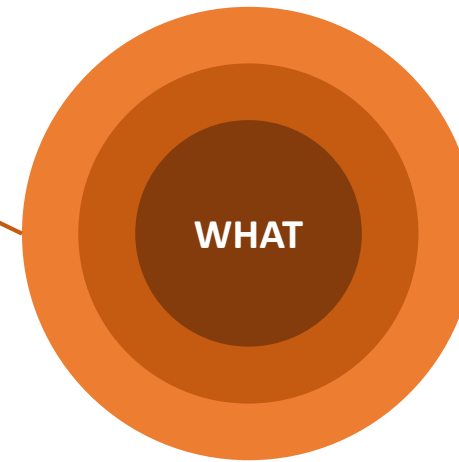


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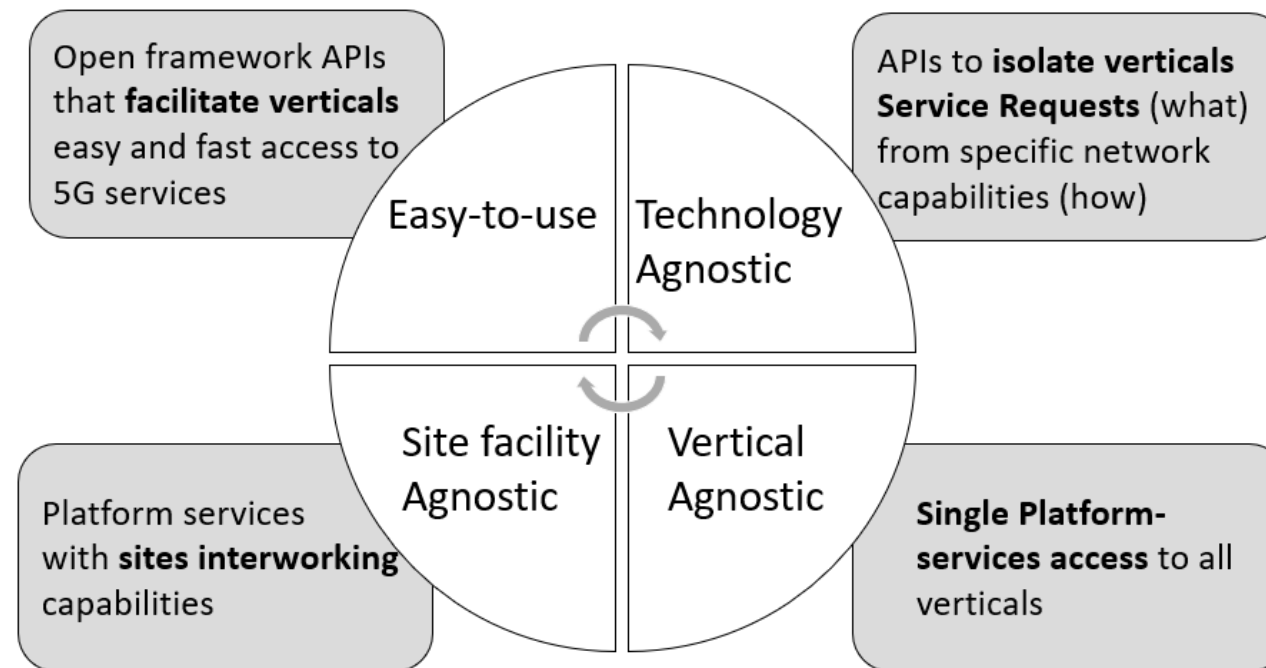
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5G EVE

5G EVE Platform – Driving Requirements

5G EVE platform services are designed considering the following requirements

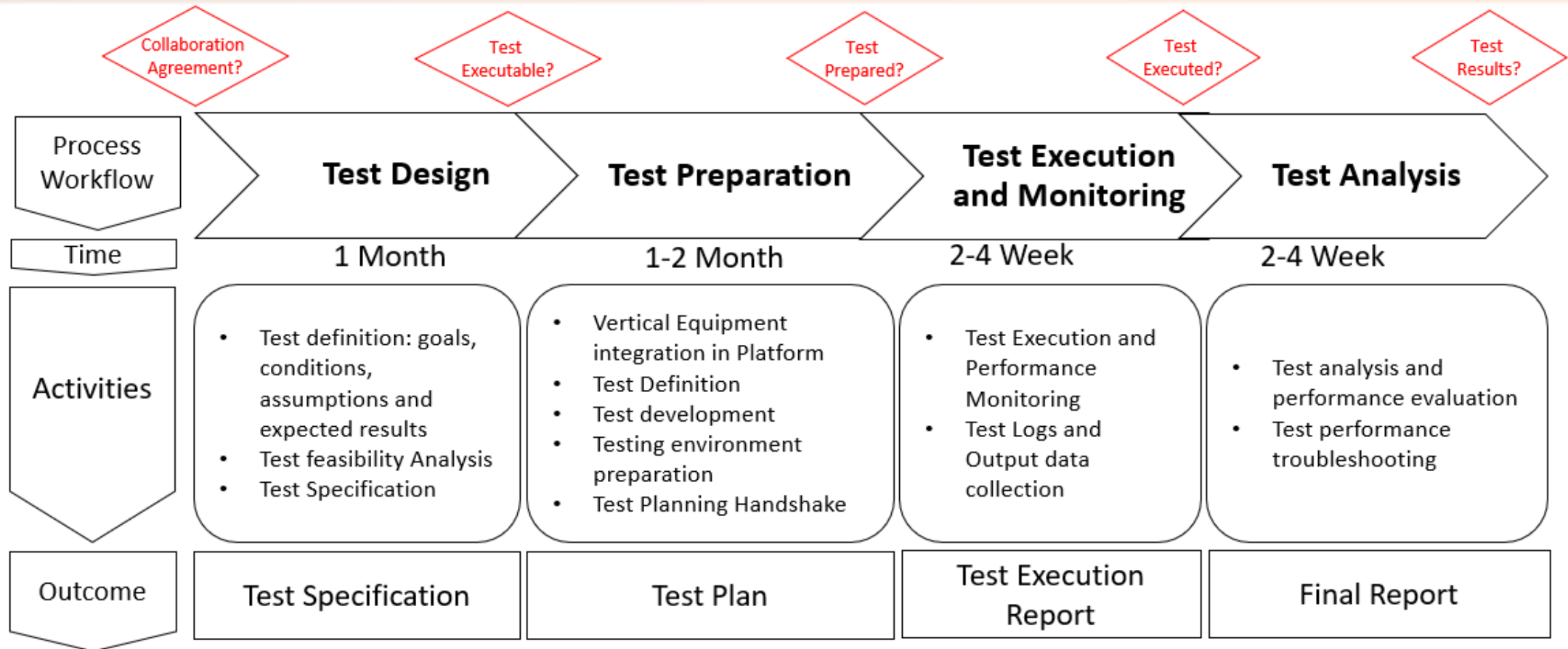


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5G EVE Platform - Validation Test as a Service

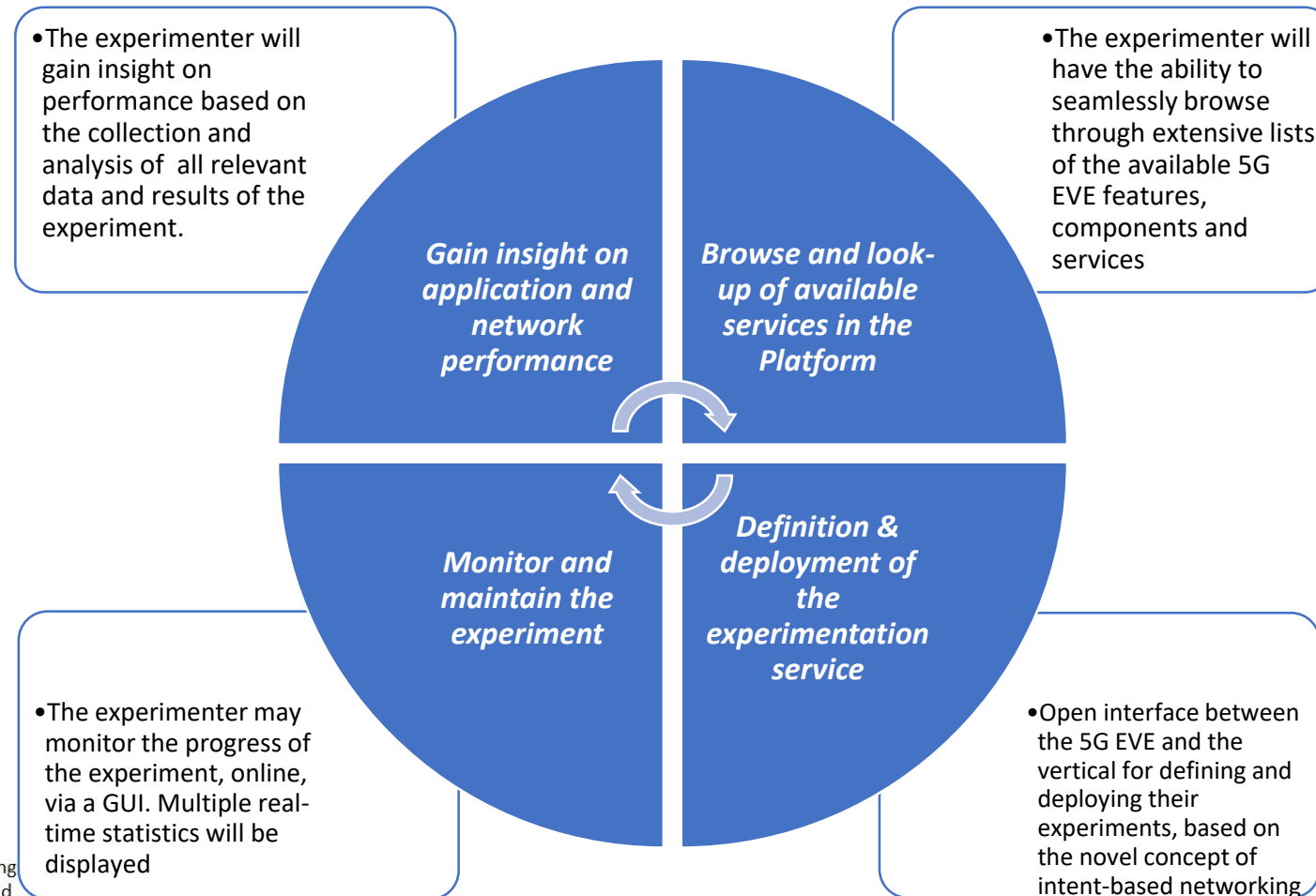


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5G EVE Platform - Validation Test as a Service



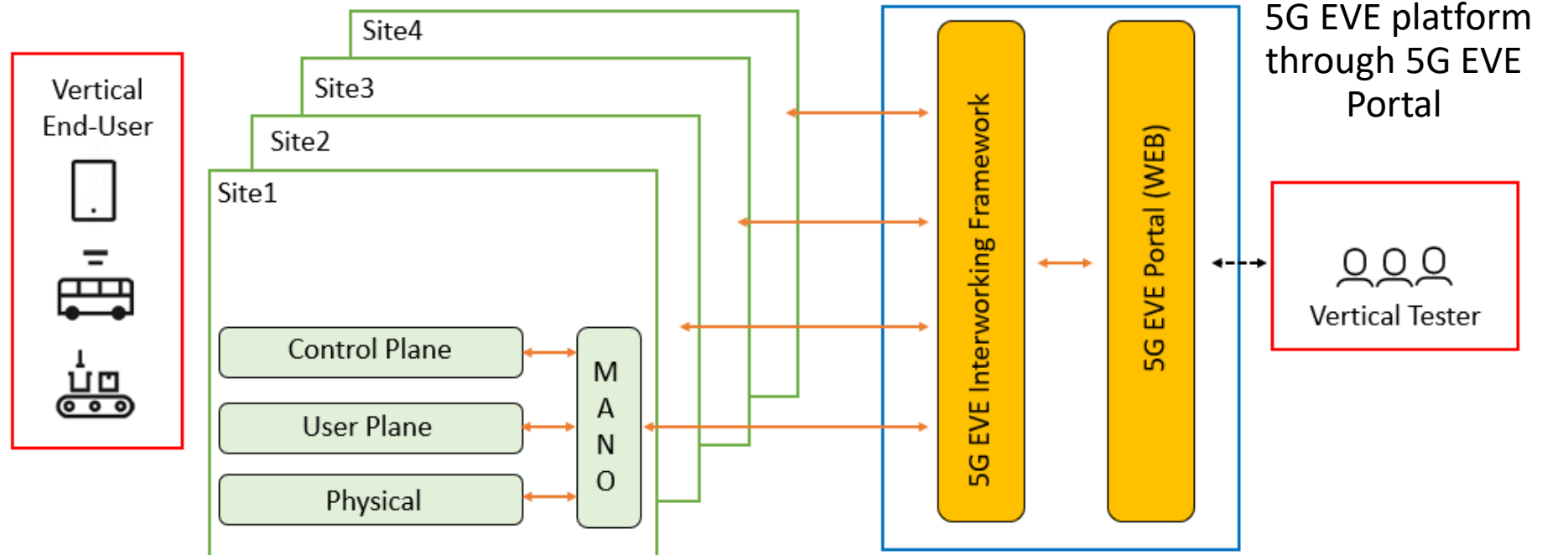
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5G EVE

5G EVE Architecture – Verticals' View

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

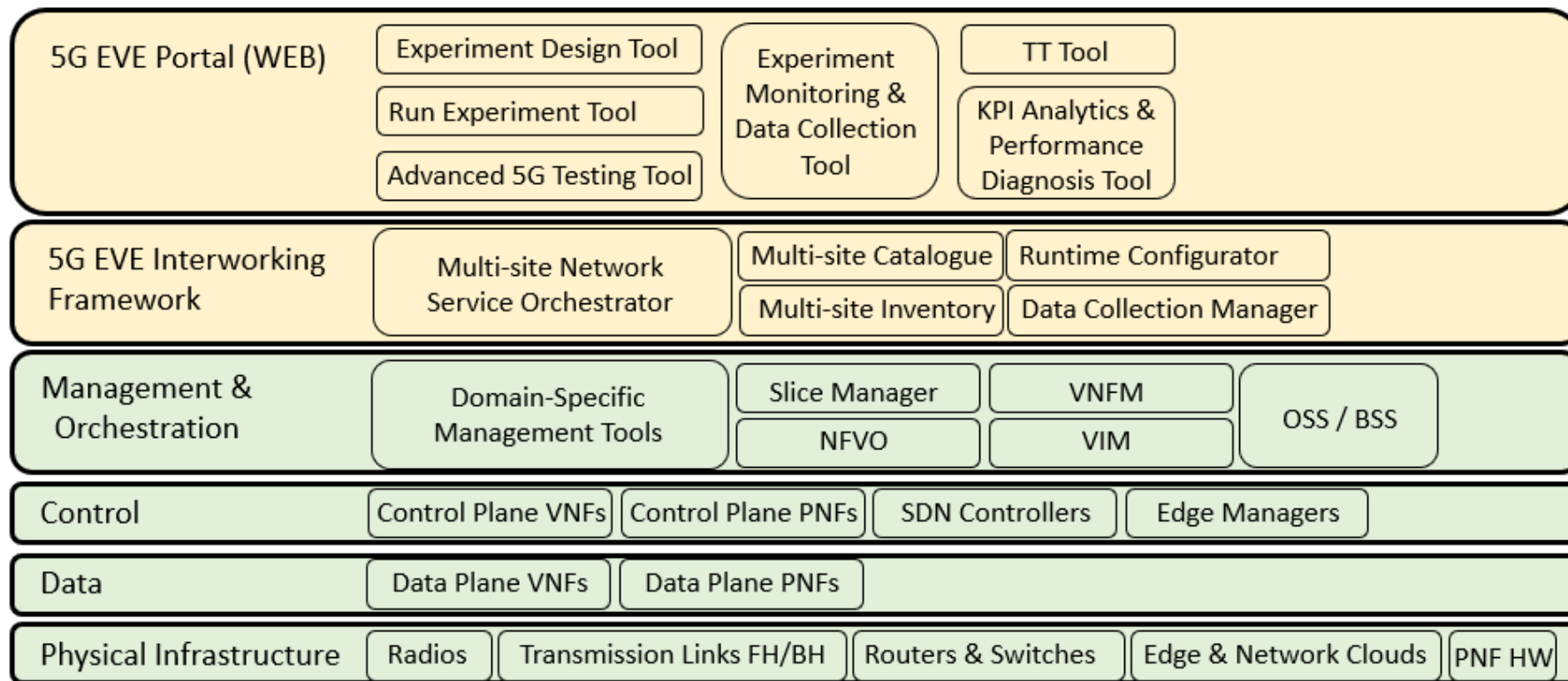


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5G EVE

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

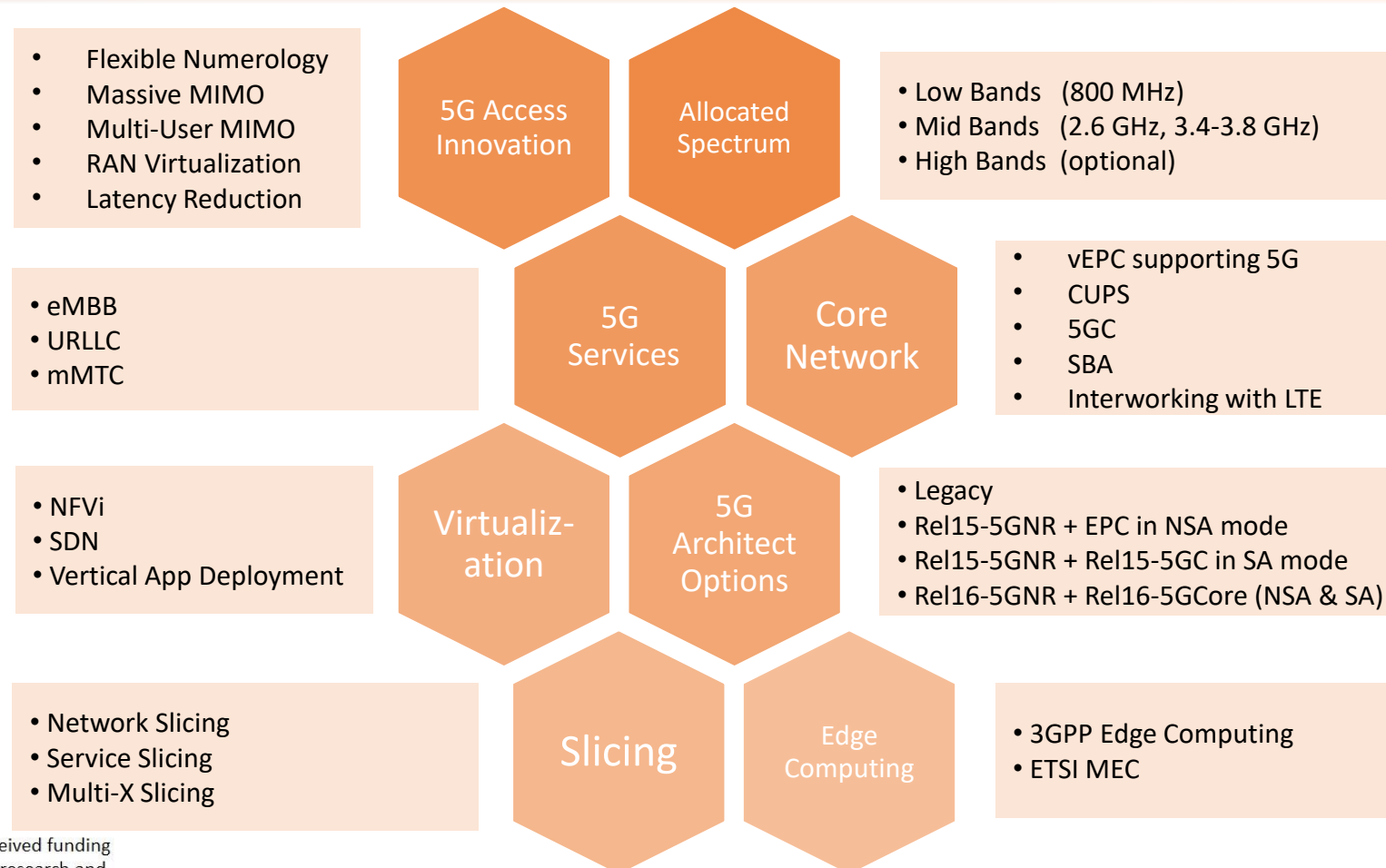


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5G EVE

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)**

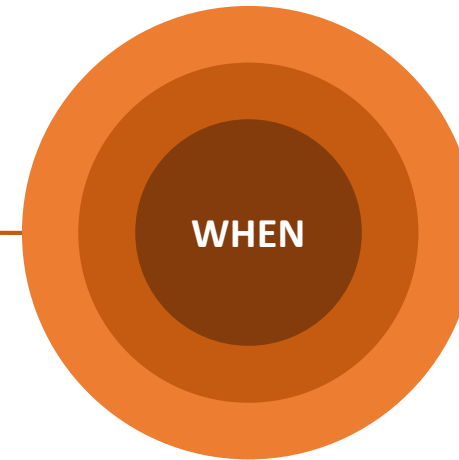
A new framework to provide a modular, reusable set of different SFs enabling the coexistence of proprietary and open source technologies; this will allow the modular replacement and chaining of components implemented with open and novel performance acceleration techniques.



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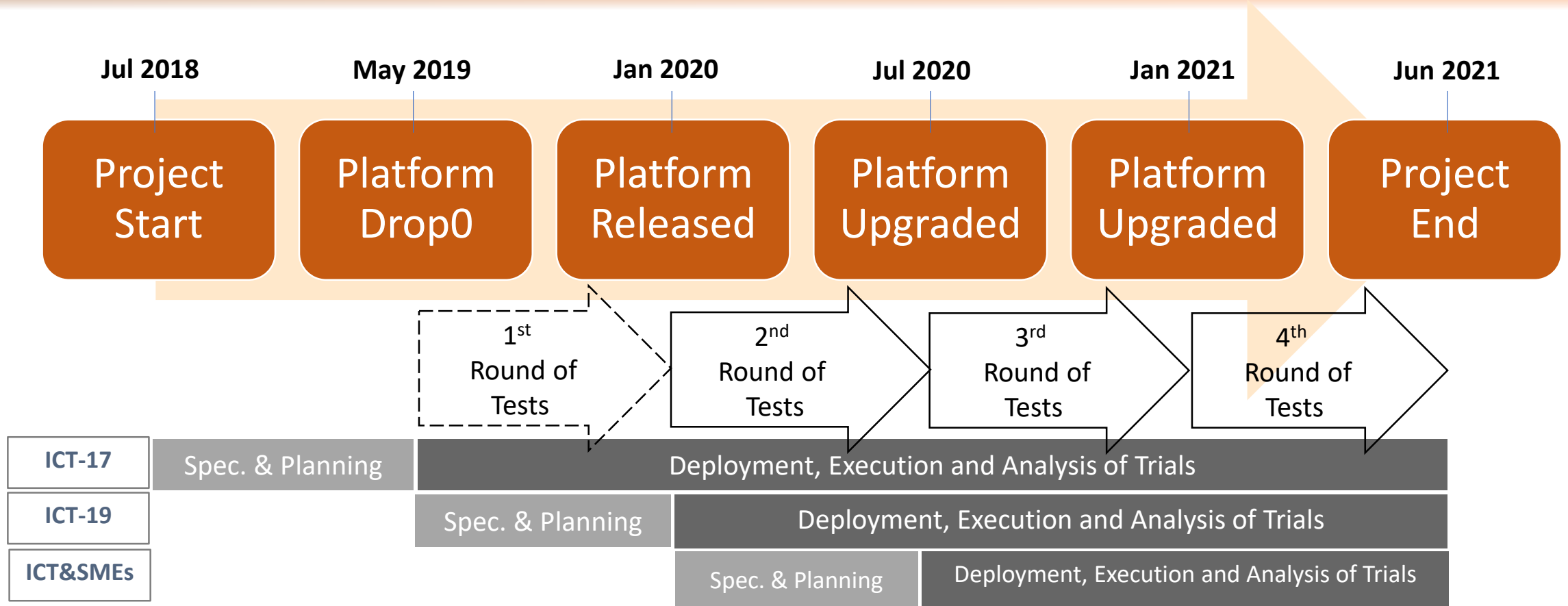


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5G EVE

5G EVE Roadmap – General Time-line

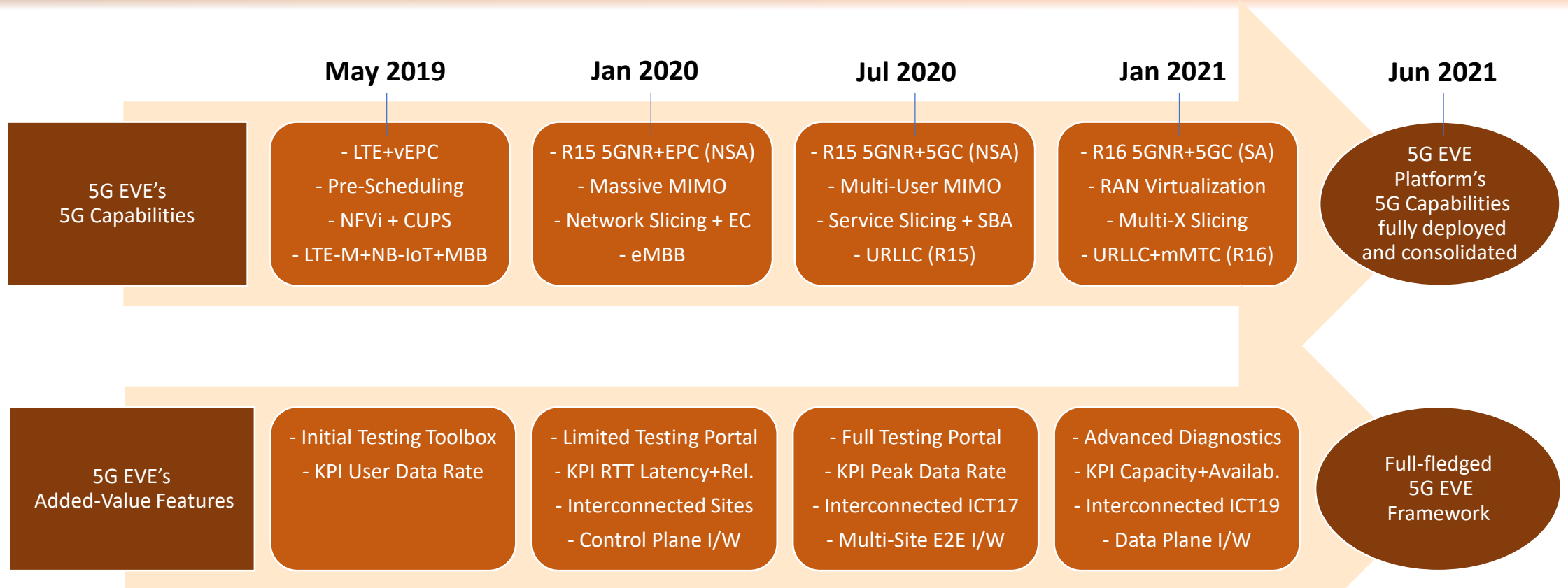


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5G EVE

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
	Rel15-5G NR + EPC in NSA mode		Y	Y	Y
	Rel15-5G NR + Rel15-5GC in SA mode			Y	Y
	Rel16-5G NR + 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	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 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	<ul style="list-style-type: none"> DL User Experienced Data Rate (Mbps): 100 Mbps UL User Experienced Data Rate (Mbps): 50 Mbps 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y
Peak Data Rate	<ul style="list-style-type: none"> DL Peak Data Rate (Gbps): 20 Gbps UL Peak Data Rate (Gbps): 10 Gbps 			<ul style="list-style-type: none"> Y (mmW) Y (mmW) 	<ul style="list-style-type: none"> Y (mmW) Y (mmW)
Capacity	<ul style="list-style-type: none"> Area Traffic Capacity (Mbit/s/m²): 10 Mbit/s/m² 				<ul style="list-style-type: none"> Y
Latency	<ul style="list-style-type: none"> UP Latency (ms): 1ms (URLLC), 4 ms (eMBB) CP Latency (ms): <20 ms 	<ul style="list-style-type: none"> Y(LTE) 	<ul style="list-style-type: none"> Y(4 ms) 	<ul style="list-style-type: none"> Y(4 ms) 	<ul style="list-style-type: none"> Y(1ms) Y
Device Density	<ul style="list-style-type: none"> Connection Density: 1 M devices/km² (mMTC) 				<ul style="list-style-type: none"> Y
Mobility	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y 	<ul style="list-style-type: none"> Y Y Y TBD
Reliability	<ul style="list-style-type: none"> Reliability (%) 		<ul style="list-style-type: none"> Y 	<ul style="list-style-type: none"> Y 	<ul style="list-style-type: none"> Y
Availability	<ul style="list-style-type: none"> Availability (%) 			<ul style="list-style-type: none"> Y 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Available to the verticals • Related to the identifications of problems 			Y	Y
	Advanced Performance Diagnosis Capabilities <ul style="list-style-type: none"> • Available to the verticals • Identification of problems and proposition of solutions. 				Y



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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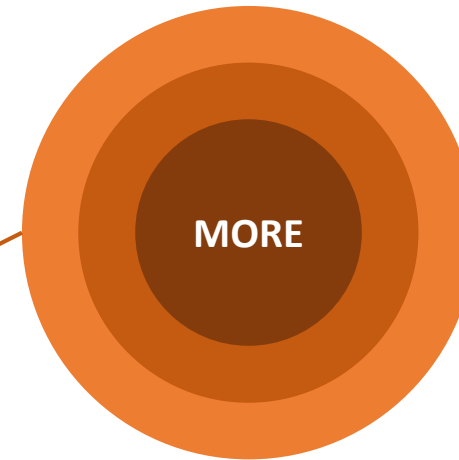


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5G EVE

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/>





Thank you!



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