5G IA

INFRASTRUCTURE ASSOCIATION

5G PPP

PUBLIC-PRIVATE PARTNERSHIP

5G NETWORK SUPPORT OF VERTICAL INDUSTRIES IN THE 5G PUBLIC-PRIVATE PARTNERSHIP ECOSYSTEM

5 G - P P P . E U

INTRODUCTION

Whilst 5G is being deployed mainly in commercial networks for enhanced Mobile Broadband (eMBB) services, extended pilot trials are being executed to validate 5G also for other vertical use cases. Such trials cover multiple domains, like autonomous driving, smart factories, healthcare, media, energy, etc.

To that end, the three research projects 5G-EVE, 5GENESIS and 5G-VINNI, are working in the context of the 5G Public-Private Partnership (5G PPP) programme. They provide end-to-end testing capabilities to vertical industries to validate a wide variety of use cases on the new 5G network.

CAPABILITIES OF 5G PPP TRIAL PLATFORM PROJECTS

The key capabilities, the provided services, the corresponding locations per project and the timeline for the trials are highlighted in the following tables. Note that the exact support and timing for each individual capability may vary from one site to another.

SUPPORTED CAPABILITIES AND SERVICES			ICT-17 PLATFORMS		
AREA	FEATURES	REF. STANDARDS	5G EVE	5G-VINNI	5GENESIS
ARCHITECTURE	Non Standalone 5G	3GPP Release15&16: - 3GPP TS 23.501	Turin, Madrid, Paris, Athens 2020 (Rel15) 2021 (Rel16)	Oslo, Martlesham, Patras, Madrid, 2020 (Rel15) 2021 (Rel16)	Athens, Berlin, Limassol, Malaga, Surrey 2020 (Rel15) 2021 (Rel16)
	Standalone 5G	3GPP Release15&16: - 3GPP TS 23.501	Turin, Madrid, Paris, Athens 2020 (Rel15) 2021 (Rel16)	Oslo, Martlesham, Patras, Madrid, Aveiro. 2020 (Rel15) 2021 (Rel16)	Athens, Berlin, Malaga, Surrey 2020 (Rel15) 2021 (Rel16)
ACCESS AND SPECTRUM	Sub-6 GHz 5G NR	3GPP Release 15: - 3GPP TS 38.401	Turin, Madrid, Paris, Athens, Rennes and Nice 2020	Oslo, Martlesham, Patras, Madrid, 2020	Athens, Berlin, Limassol, Malaga, Surrey 2020
	mmWave 5G NR	3GPP Release 15: - 3GPP TS 38.401	Paris, Rennes and Nice 2020	Oslo, Martlesham 2020	Malaga 2020
	Virtualized RAN 5G NR	Multiple SDOs	Paris, Rennes and Nice 2020	Patras 2020	
	NBIoT and LTE-M support	3GPP Release 14, 15	Turin, Madrid, Paris, Athens, Rennes and Nice 2019	Oslo, Patras 2020	Surrey 2020
	Ability to integrate additional RAN nodes	3GPP: TS 38.300, TS 23.501, TS 23.502	Turin, Madrid, Paris, Athens, Rennes and Nice 2020	Oslo, Martlesham, Patras, Madrid 2020	Athens, Berlin, Limassol, Malaga, Surrey 2020
SLICING	Slicing for 5G NSA	3GPP Release 15: - 3GPP TS 28.530 - 3GPP TS 28.533 ETSI NFV MANO - ETSI GS NFV-MAN 001	Turin, Madrid, Paris, Athens 2020	Oslo, Martlesham, Patras, Madrid 2020	Athens, Malaga, Surrey 2020

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SLICING	Slicing for 5G SA	3GPP Release 15: - 3GPP TS 28.530 - 3GPP TS 28.533 ITU-T - Y.3100	Turin, Madrid, Paris, Athens 2021	Oslo, Patras, Martlesham, Madrid, Aveiro 2021	Athens, Malaga, Surrey 2021
	Customized Slicing[1]	Multiple SDOs and open source community	Turin, Madrid, Paris, Athens 2020	Oslo, Patras, Martlesham, Madrid, Aveiro 2020	Athens, Berlin, Limassol, Malaga, Surrey 2020
INTERWORKING	Interworking[2] with other Projects	Builds upon ETSI NFV principles	Turin, Madrid, Paris, Athens 2020	Oslo, Martlesham, Patras, Madrid 2020 in phases	Athens, Malaga, Surrey 2020
EDGE COMPUTING	Edge Computing	3GPP Release 16: TS 23.501, TS 23.502	Turin, Madrid, Paris, Athens, Rennes and Nice 2020	Oslo, Patras, Madrid, Aveiro, Martlesham (TBD) 2020	Athens, Berlin, Limassol, Malaga, Surrey 2020
BACKHAUL	Millimeter wave for Backhaul	IEEE 802.11ad or IEEE 802.11ay	TBD	Patras 2020	Berlin, Surrey 2020
	Satellite for Backhaul	3GPP: TS 22.261, TR 22.819, TR 22.822, TR 23.737, TR 28.808, TR 38.811, TR 38.821 / ETSI: TR 103 611 / ECC Report 280 / ITU-R: M.2460-0	N/A	Luxembourg, Nomadic (RRV), Oslo 2020	Surrey 2019, Limassol 2020
VALIDATION	Automatic Testing Framework for KPI Validation	ITU-R M.2083-0 ITU-R M.2410-0 3GPP TS 28.51 5G PPP Test Monitoring and Validation Work Group	Turin, Madrid, Paris, Athens, Rennes and Nice 2020	Oslo, Martlesham, Patras, Madrid 2020	Athens, Berlin, Limassol, Malaga, Surrey 2020

[1] Where the customization refers to different features (e.g. customized service function chaining, security, enhanced cloud access, monitoring as a service, hosting 3rd party VNF, specialized data analytics for IoT, etc.)

[2] Interworking refers to the capability to execute one service E2E, involving at least two different infrastructures or platforms

5G TRIAL PLATFORMS AS VERTICAL VALIDATION ENABLERS

The three platform projects will test a number of vertical use cases in particular coming from the dedicated 5G vertical industries' related projects shown in the figure below.

	5G EVE	5Genesis	5G-VINNI
5G!DRONES	√	√	
5G HEART	√	√	√
5GROWTH	√		√
5G smart	√		
5G Solutions	√		√
5G-TOURS	√		
5G VICTORI	√	√	√

VERTICAL USE CASES ADDRESSED IN THE 5G-PPP

Overall, the abovementioned projects cover all the key vertical industries shown in the table below. The planned tests aim to measure how 5G can impact the performance and the overall operation of vertical industries in the path to full digitization.
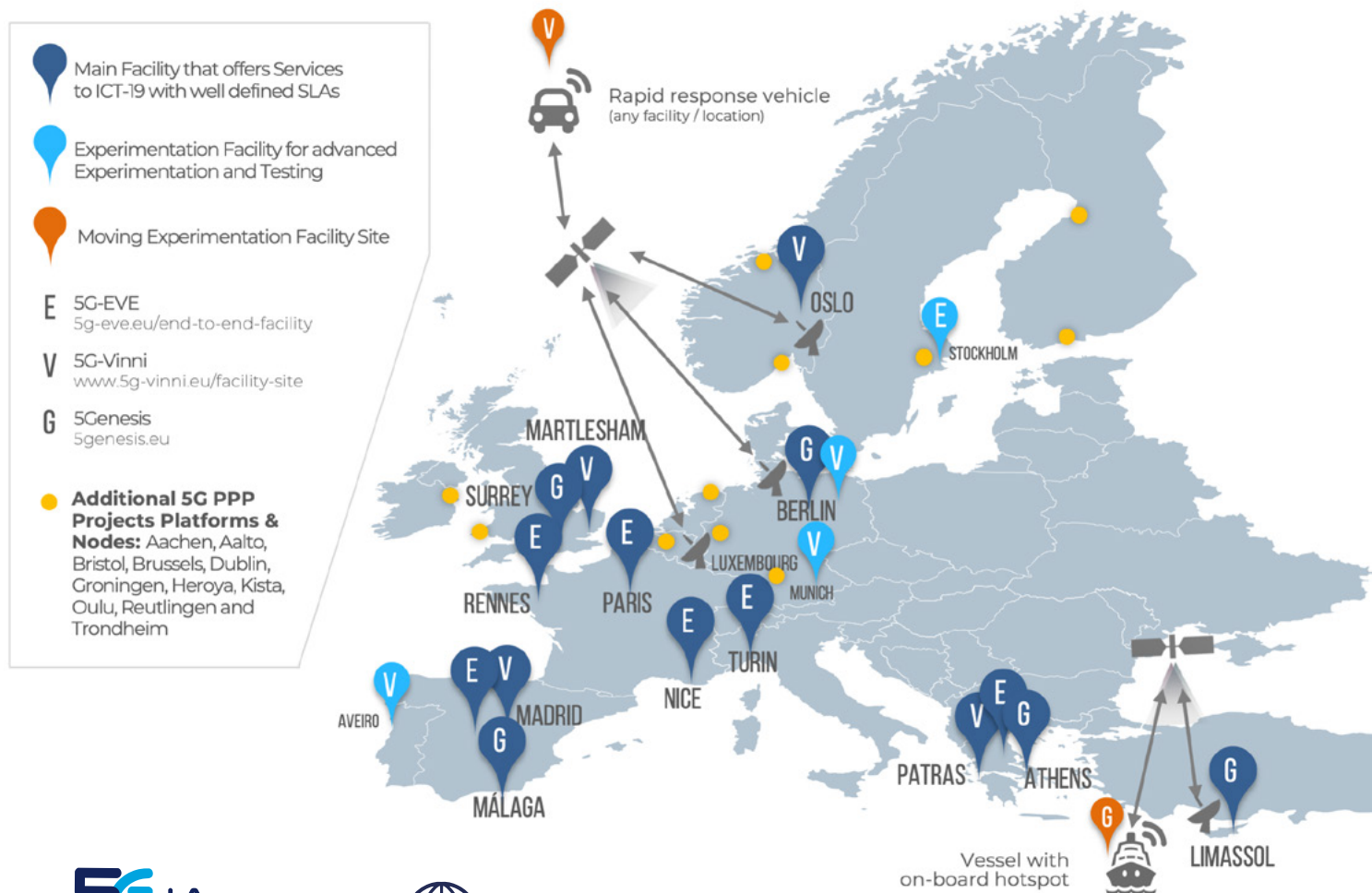
	Industry 4.0	Agriculture & agri-food	Automotive	Transport & logistics	Smart Cities & utilities	Public Safety	Smart (air)ports	Energy	eHealth & wellness	Media & entertain.
5G EVE	√		√		√	√		√	√	√
5GENESIS				√	√	√				√
5G VINNI	√			√		√		√		
5G!DRONES				√		√				√
5G HEART		√	√	√					√	
5GROWTH	√			√				√		
5G SMART	√									
5G SOLUTIONS	√				√		√	√		√
5G TOURS				√	√		√		√	√
5G VICTORI	√			√				√		√

STAKEHOLDERS IN THE 5G PPP PLATFORM PROJECTS

COUNTRY	OPERATORS	VENDORS	VERTICALS	UNIVERSITIES AND RESEARCH INSTITUTES	SMES	PUBLIC ADMIN (CITIES)
FRANCE	- ORANGE	- AIRBUS - CISCO - EKINOPS - NOKIA	-EDF	- EURECOM	- BCOM	
GREECE	- COSMOTE - OTE	- ERICSSON - INTRACOM TEL. - NOKIA	- WINGS	- AUEB - DEMOKRITOS - PATRAS UNIV.	- FOGUS - INFOLYSIS - WINGS	- CITY OF EGALEO
ITALY	- TIM	- ERICSSON - ENGINEERING	- TRENITALIA	- CNIT - IDC - PIIU	- ARES2T - ATHONET - NEXTWORKS	- CITY OF TORINO
SPAIN	- FONTECH - TELEFONICA	- ATOS - ERICSSON - NOKIA	- ASTI - SEGITTUR	- MALAGA UNIV. - UC3M - UPV	- NEMERGENT - TELCARIA	- CITY OF MALAGA
GERMANY		- INTEL - HUAWEI		- EURESCOM - FRAUNHOFER - IHP	- EANTC	
CYPRUS	- AVANTI - PRIMETEL	- SPACE	- MARANUK			
PORTUGAL		- ALTICE LABS		- IT AVEIRO		
SWEDEN				- KARLSTAD UNIV.		
IRELAND		- ERICSSON			- SRS	
UK	- BT	- SAMSUNG		- SURREY UNIV.	- LIME MICROSYS	
NORWAY	- TELENOR	- ERICSSON - HUAWEI		- SIMULAMET		
ISRAEL					- RUNEL	
LUXEMBOURG	- SES					
DENMARK		- KEYSIGHT				
FINLAND		- NOKIA				

PLATFORM CARTOGRAPHY

The 5G PPP trial platform projects provide 5G facilities for pan-European services as illustrated below. Apart from testing on their own a significant number of vertical use cases, the three projects also offer their capabilities to additional 5G-PPP projects to assess 5G networks in the context of advanced digital use cases from a wide range of vertical industries.

Legend:

- Main Facility that offers Services to ICT-19 with well defined SLAs
- Experimentation Facility for advanced Experimentation and Testing
- Moving Experimentation Facility Site

E 5G-EVE
5g-eve.eu/end-to-end-facility

V 5G-Vinni
www.5g-vinni.eu/facility-site

G 5Genesis
5genesis.eu

Additional 5G PPP Projects Platforms & Nodes: Aachen, Aalto, Bristol, Brussels, Dublin, Groningen, Heroya, Kista, Oulu, Reutlingen and Trondheim

Rapid response vehicle (any facility / location)

Vessel with on-board hotspot

Map labels: OSLO, STOCKHOLM, MARTLESHAM, SURREY, BERLIN, LUXEMBOURG, MUNICH, RENNES, PARIS, TURIN, NICE, AVEIRO, MADRID, MÁLAGA, PATRAS, ATHENS, LIMASSOL

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