



# European 5G Developments

## 5G India 2019

**Mumbai, 26 June 2019**

*B. Sauveroche  
Delegation of the European Union to India*

## 5G European approach, opportunities for the next decade

	« Digital Industries »	« Physical Industries »
Share of GDP	30%	70%
Digital Investment	70%	30%
Annual Productivity Growth (15 Years avg)	3%	0,7 %

Automation and Industry: 3,5 to 10 Trillion € by 2025 (Mc Kinsey)

Source, Nokia quote from: The coming productivity boom, Michael Mandel, Brett Swanson

Network investment, doubling current broadband revenues.

➔ Industrial/Vertical applications: a strong innovation driver for next decade

# 5G opportunities

## Factories of the Future

- 1 Time-critical process control
- 2 Non time-critical factory automation
- 3 Remote control
- 4 Intra/Inter-enterprise communication
- 5 Connected goods



## Energy

- 1 Grid access
- 2 Grid backhaul
- 3 Grid backbone



## Automotive

- 1 Automated driving
- 2 Share My View



- 3 Bird's Eye View
- 4 Digitalization of Transport and Logistics
- 5 Information Society on the road



5G empowering vertical industries

5G VERTICAL SECTORS

With 5G, networks will be transformed into intelligent orchestration platforms.

By connecting strong relationships between vendors, operators and verticals, 5G will open the field to new business value propositions.

Use-cases originating from verticals should be considered as drivers of 5G requirements from the onset with high priority and covered in the early phases of the standardisation process.

## e-HEALTH

- 1 Assets and interventions management in Hospital
- 2 Robotics
- 3 Remote monitoring
- 4 Smarter medication

## MEDIA & ENTERTAINMENT

- 1 Ultra High Fidelity Media
- 2 On-site Live Event Experience
- 3 User/Machine Generated Content
- 4 Immersive and Integrated Media
- 5 Cooperative Media Production
- 6 Collaborative Gaming

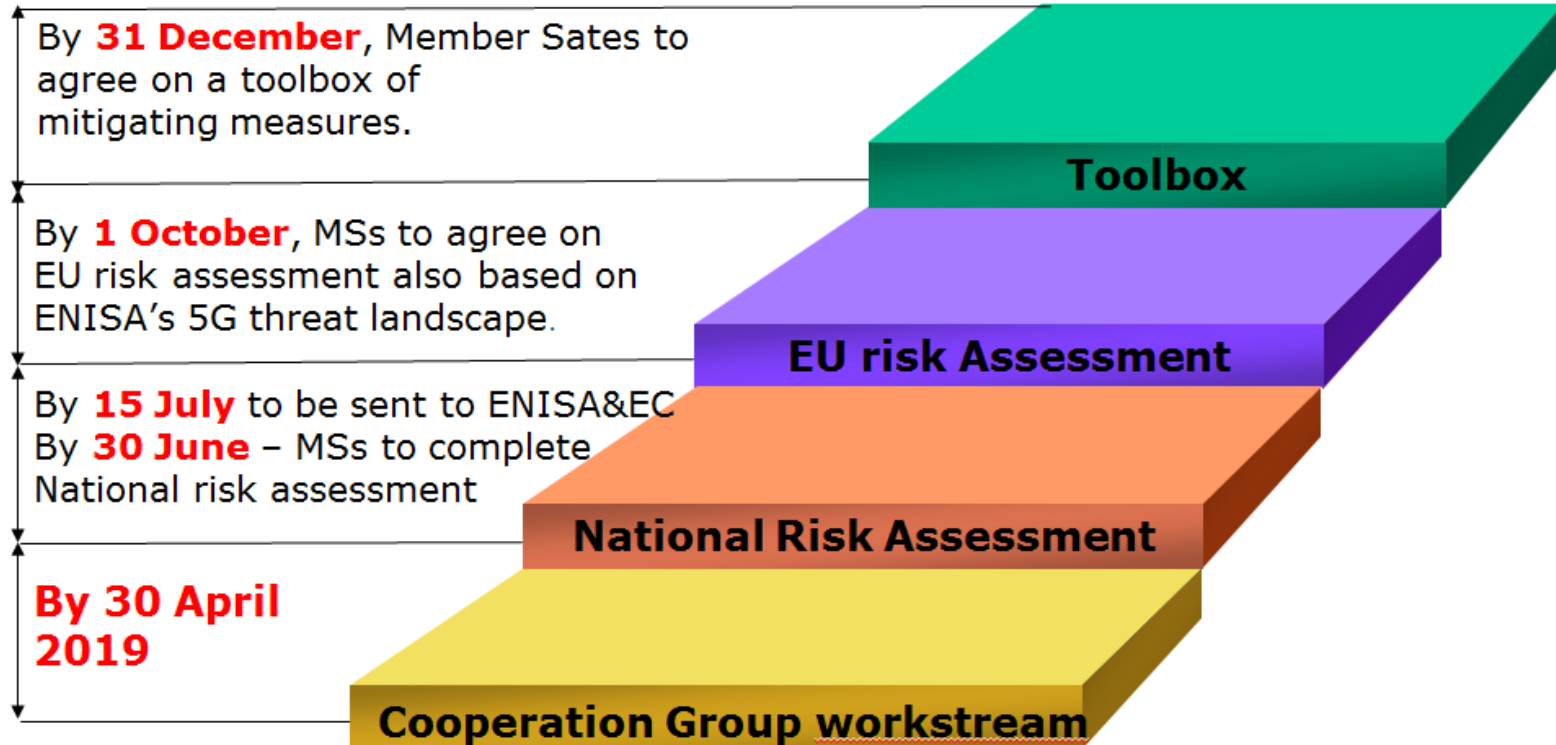
## Regulatory Framework

### *The **European Electronic Communication Code - Directive 2018/1972***

Harmonisation - 5G and spectrum management

- **Harmonised principles** and criteria for authorisation regimes and sharing conditions
- A **reference framework** on conditions and fees for rights of use and design of assignment processes
- A **peer review** for internal market **consistency** on spectrum authorisation using best practice
- Promotion of spectrum **trading and leasing**
- **Coordinated timing** of 5G spectrum assignment - **deadline** for **5G Pioneer Bands: December 2020**
- **Sufficiently long duration of rights** for 5G spectrum: **20 years** of regulatory predictability
- **Two years** for Member States to implement in their national legislation
- **Preparation of an implementing act**, which will specify the physical and technical characteristics of small cells that will allow their exemption from individual prior permits
- *Recommendation on **Cybersecurity**, 26 March 2019*

# Cybersecurity of 5G networks\*



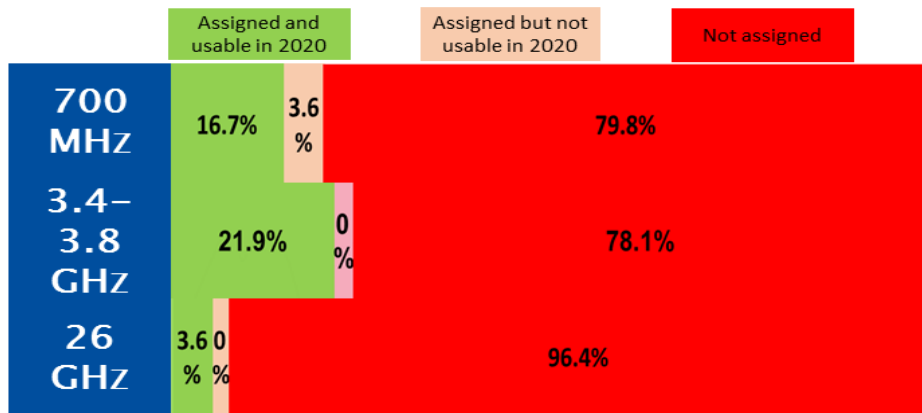
# 5G Observatory - progress towards 5G market introduction

5G roadmaps and national plans **10**

10 published national 5G roadmaps:

- Austria
- Estonia
- Finland
- France
- Germany
- Luxembourg
- Netherlands
- Spain
- Sweden
- UK

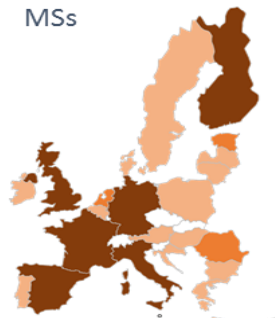
5G PIONEER SPECTRUM **13.9%**



**147**

5G TRIALS

147 5G trials in the 28 MSs



Number of trials (November 2018)

- More than 10
- Between 5 and 10
- Between 1 and 5
- Unknown # of trials

**35**

5G CITIES

35 5G-enabled Cities identified



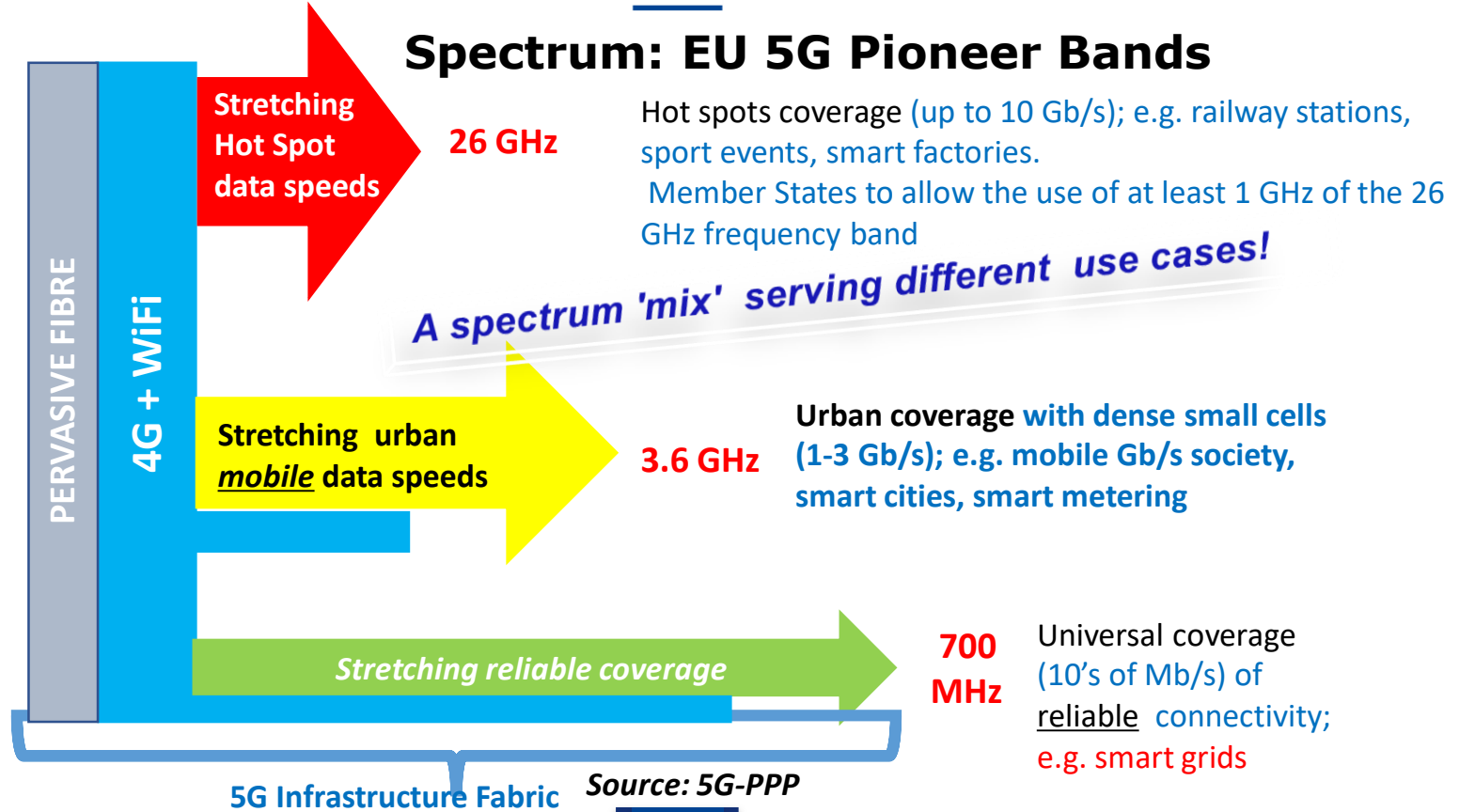
**10**

5G CORRIDORS

10 "digital cross-border corridors" established



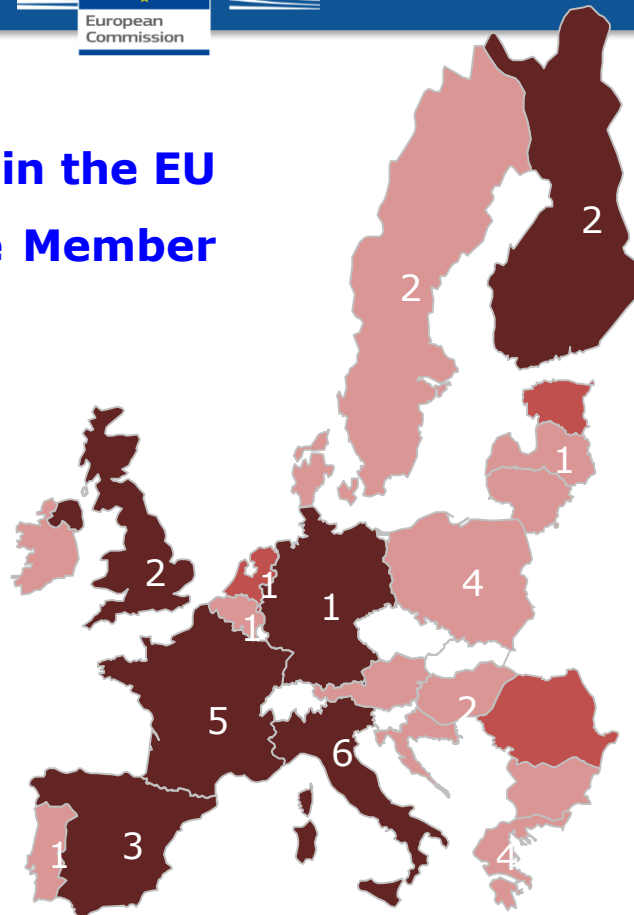
## Spectrum: EU 5G Pioneer Bands



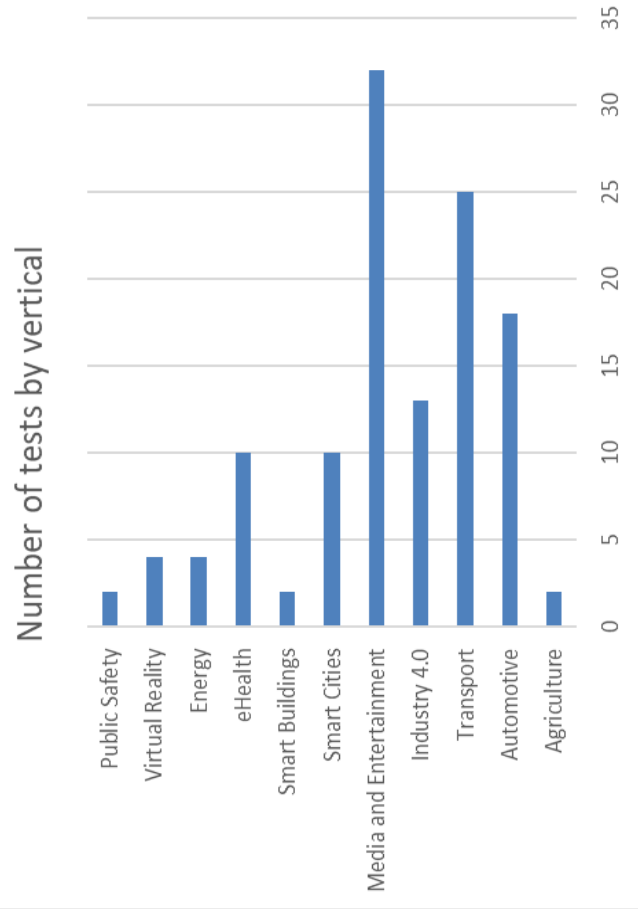
- Number of reported **5G trials** in the EU  
and **5G cities** identified by the Member  
States shown in this map

### 5G cities

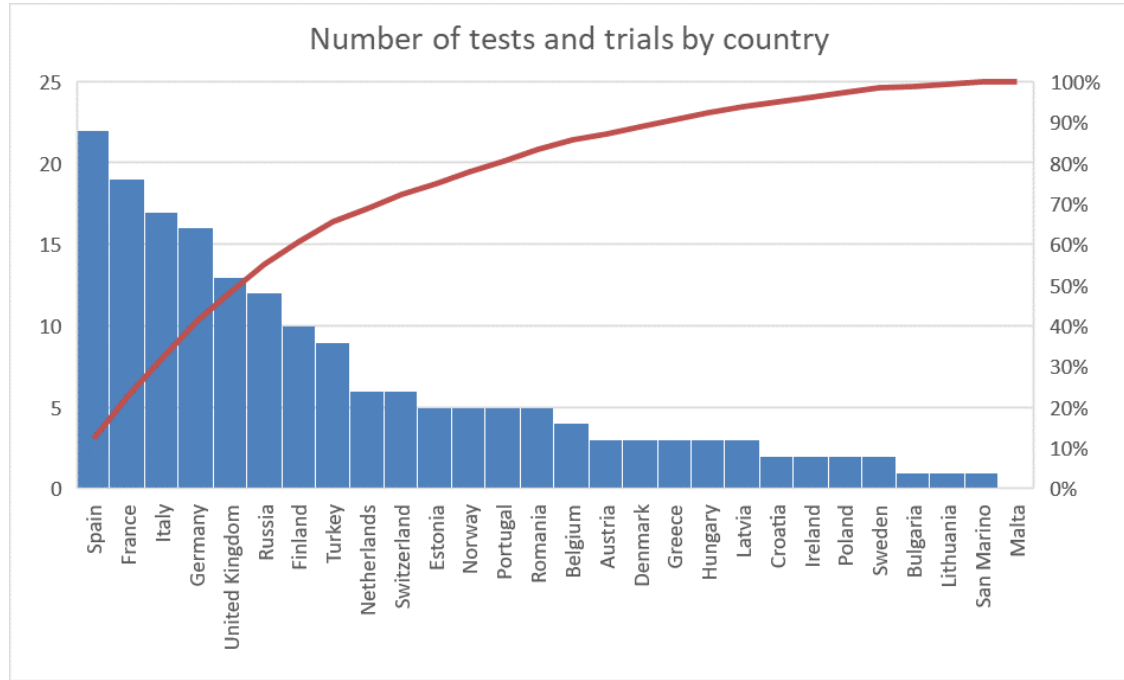
- European cities, where commercial 5G services have been concretely announced by operators or where major 5G city pilots in view of a commercial service launch are taking place;
- Source: information provided by the Communication Committee.







**Trials:** > 180 trials in 28 countries: 147 in 23 of the 28 MSs of the European Union



- 1.4 Billion Euro joint initiative of European ICT industry (5G- IA) and European Commission
- objective: to rethink the infrastructure and create Next generation of communication networks and services
- Projects : currently in third phase since June 2018; 40 projects undertaken in Phase 1 (19) and Phase 2 (20) under Horizon 2020
- Industry-drive, competitiveness across value chain ; motivation :

**Global consensus and standards;**

**Interoperability, spectrum**

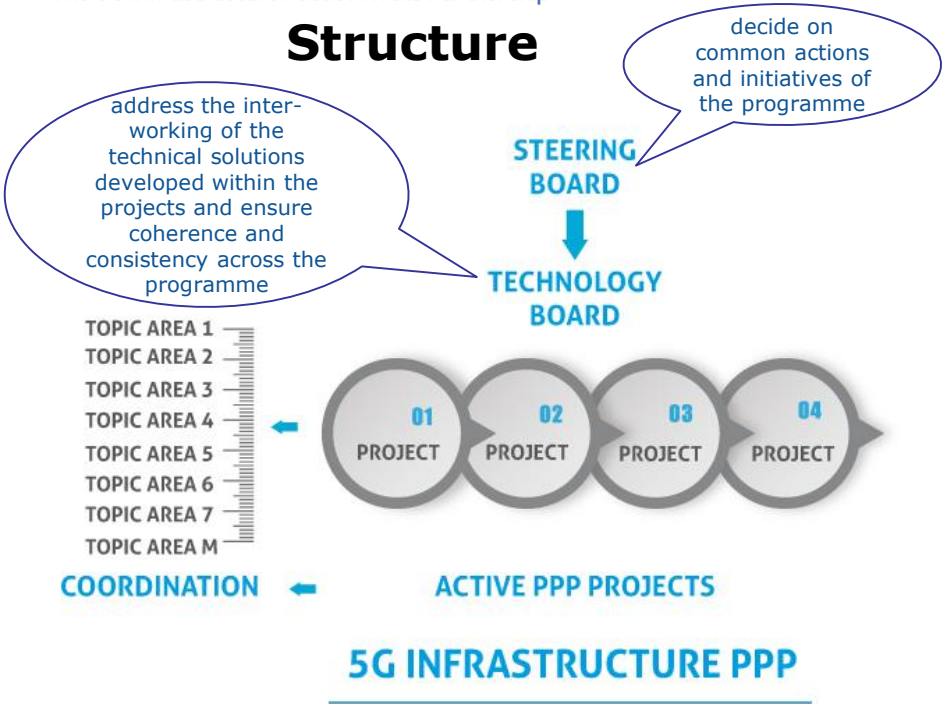
**Use case best practices**

**Addressing global societal challenges**

# 5G PPP

The 5G Infrastructure Public Private Partnership

## Structure





## Work Group


Pre-standardisation	Spectrum	5G Architecture
Software Network	Network Management and QoS	Vision and Societal Challenges
Security	SME	Trials
5G Automotive	IMT-2020 Evaluation Group	Test, Measurement and KPIs Validation

- **Infrastructure projects**
  - [5G EVE](#): 5G European Validation platform for Extensive trials,
  - [5G-VINNI](#): 5G Verticals INNOvation Infrastructure
  - [5GENESIS](#): 5G End-to-end Network, Experimentation, System Integration, and Showcasing
- **Advanced 5G validation trials across multiple vertical industries**
  - [5G-HEART](#): use cases of **healthcare**, **transport** and **aquaculture**,
  - [5G-SMART](#): smart manufacturing, **robotics**
  - [5G-TOURS](#): SmarT mObility, **media** and e-**health** for toURists and citizenS
  - [5G !Drones](#): use cases – public safety monitoring – **disaster relief** operations
  - [5G-VICTORI](#): Large scale field Trials for **Rail**, **energy** and **media** Industries
  - [5GROWTH](#): Industry 4.0, Transportation and **Energy** - AI-driven Automated and Sharable 5G E2E solution
  - [5G-SOLUTIONS](#):Factories, energy, **cities**, **ports**, Media and entertainment
- **Automotive projects**
  - [5G-MOBIX](#), [5G-CROCO](#), [5G-CARMEN](#): 5G Cross-Border Control; 5G for Connected cooperative and Automated **Road Mobility** in EU
- **Complementary project**
  - [5G-DRIVE](#) : focused on **EU-China** 5G Collaboration – interoperability eMBB - V2X

# 5G PPP Support to Vertical Pilots: E2E Infrastructure

 Main Facility that offers 5G pan European Services (e.g. to ICT-19) with well defined SLAs

 Experimentation Facility for advanced Experimentation and Testing

 Moving Experimentation Facility Site


5G-Vinni

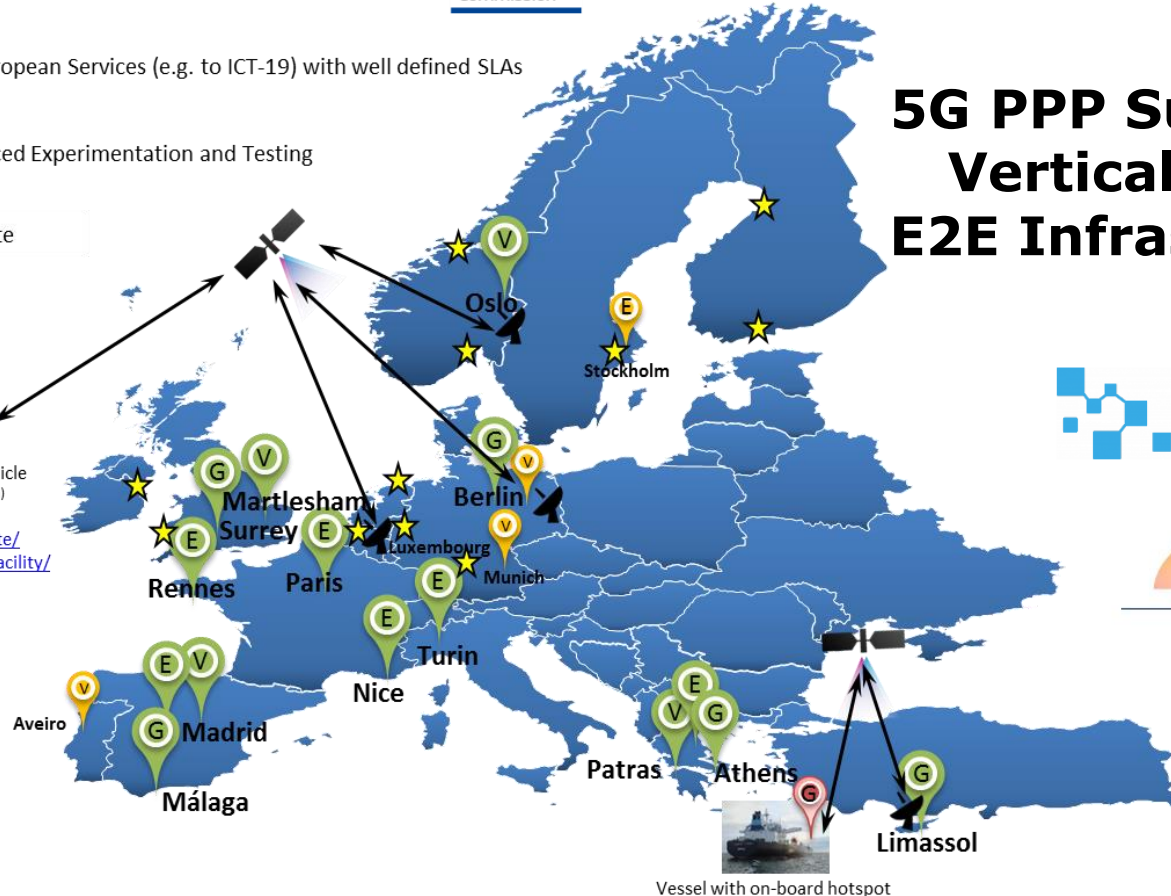
5G-EVE

5Genesis



5G-VINNI : <https://www.5g-vinni.eu/facility-site/>  
 5G-EVE : <https://www.5g-eve.eu/end-to-end-facility/>  
 5GENESIS: [www.5genesis.eu](http://www.5genesis.eu)

 Additional ICT-19 Projects  
 Platforms & Nodes: Aachen,  
 Aalto, Bristol, Brussels, Dublin,  
 Groningen, Heroya, Kista,  
 Oulu, Reutlingen and  
 Trondheim



5G EVE



5Genesis

Vessel with on-board hotspot

# Connected & automated Mobility over cross border corridors

Note: List of corridors is non exhaustive and subject to extensions



## 3 Supporting Projects, to be expanded:

- 5G CARMEN, Bologna to Munich
- 5G CROCO, Metz Merzig Corridor
- 5G MOBIX, PT-ES, EL-TK, urban sites

## 10 Cross Border Corridors

**Next MFF:** proposal towards operational deployment

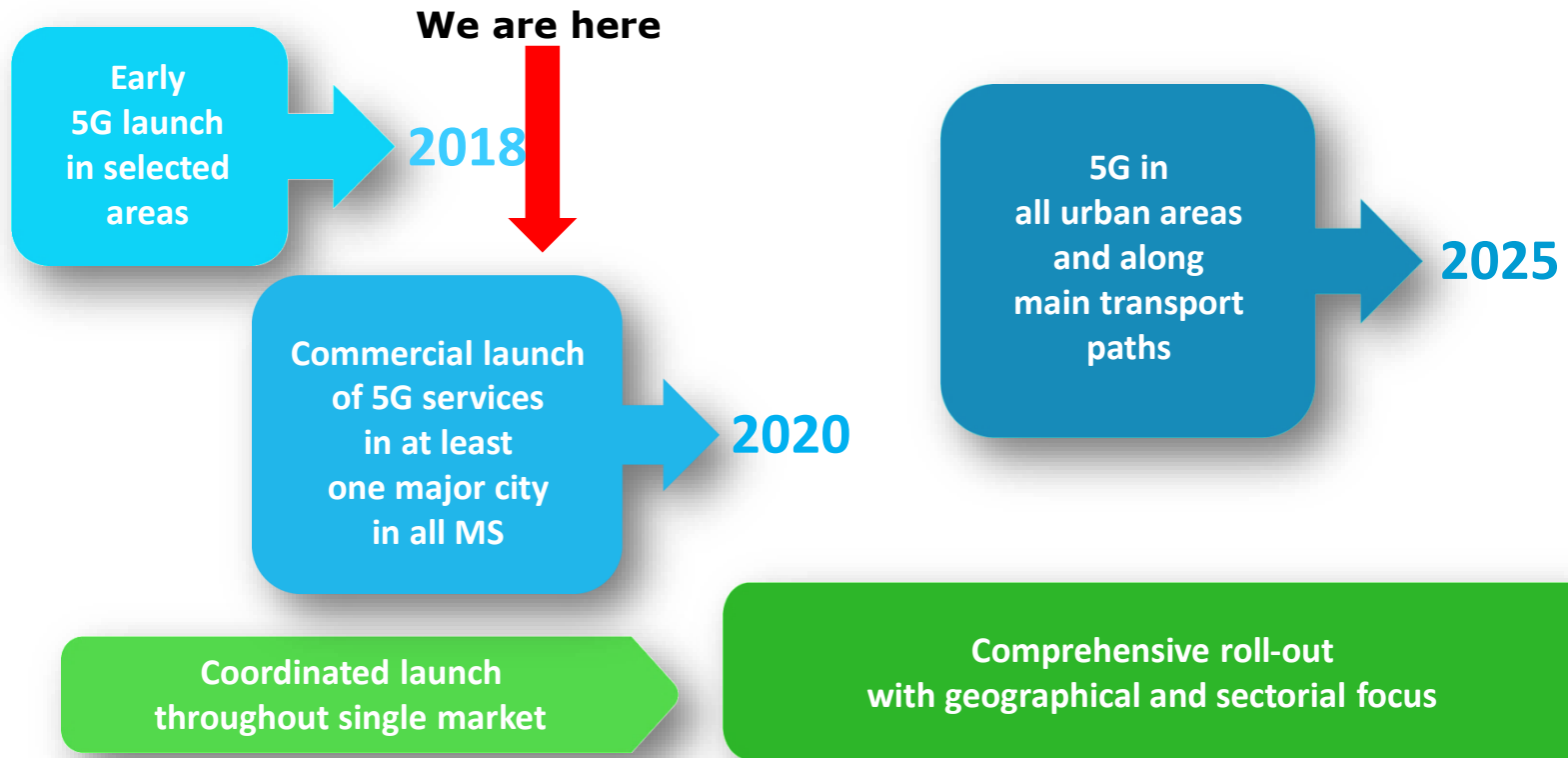


## Target corridors under CEF2 programme

(Connecting Europe Facility)

« Strategic Deployment Agenda » under development

# 5G Action Plan: European targets for 5G introduction





## Main Stakeholders

**tsdsi**

**ETSI**  
The Standards People



**INDIA-EU ICT  
STANDARDISATION  
COLLABORATION**  
(EU-funded project)  
(2016-2019)

## Focus Areas



## Objectives

adding  
additional  
weight to  
European and  
Indian ICT  
standardisation  
efforts at the  
global  
level

promote  
closer  
alignment of  
standards  
between  
India and  
Europe,  
interoperability  
and the  
ease of doing  
business

## Activities undertaken

2k+  
engage  
ments

18  
Webinars

5 tutorials  
and  
hackathons

Several  
workshops  
and event  
partnerships

**SECURITY**



\*above images for representation purpose only

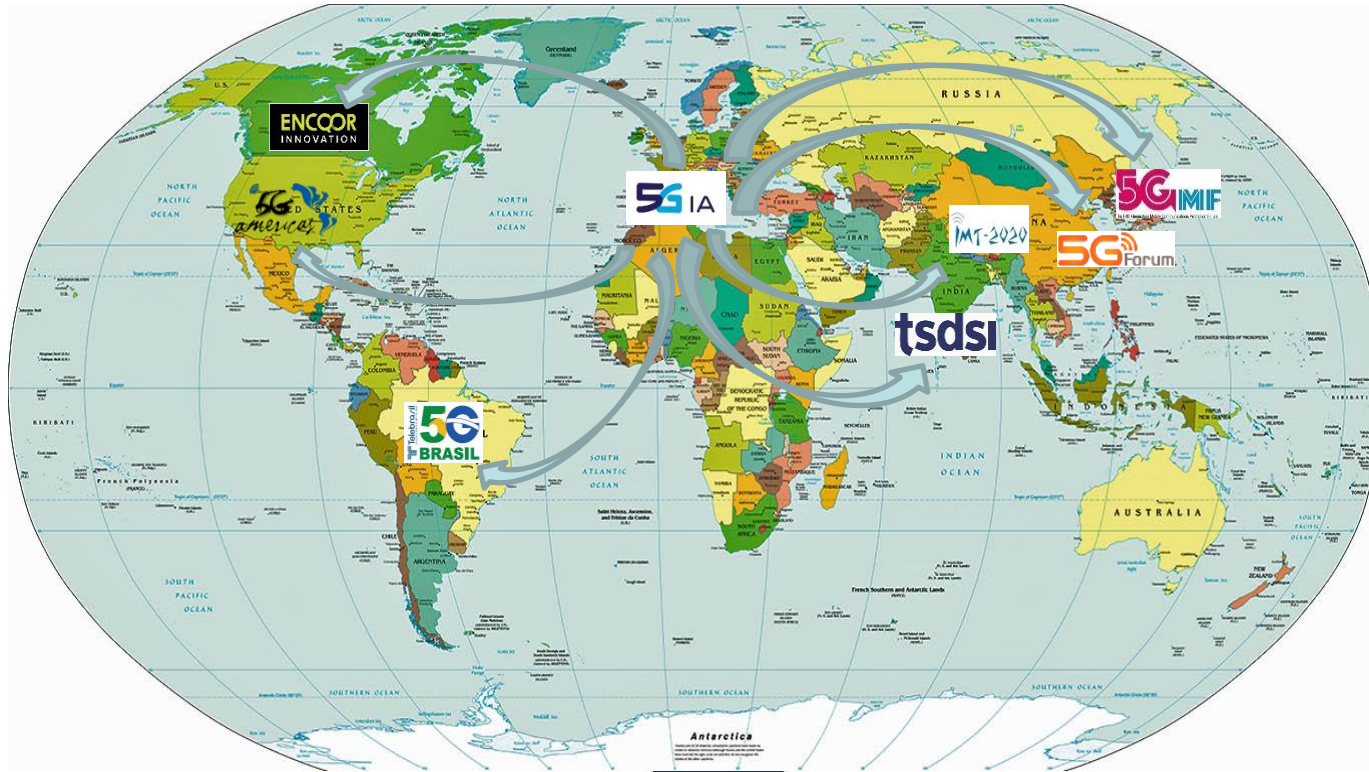


# India-EU 5G Workshop on 5G Technology Landscape, February 2019

## Some conclusions:

- ETSI and TSDSI will work jointly in 3GPP to achieve harmonization of 5G standards
- The possibility of conducting hackathons and Interoperability events leveraging the multi-institute 5G Test Beds programme of India may be explored.
- Continuous dialog among experts, sharing of experiences from trials and implementations, and alignments to ensure globally harmonized standards is crucial for 5G. It was decided to organize similar workshops at regular intervals, to continue this dialog.
- As follow up, India (TSDSI) to join the regional 5G Multilateral MoU existing between Europe (5G-IA), China (IMT2020 PG), Japan (5GMF), Americas (5G Americas), Korea (5G Forum) and Brazil (5G Brasil)

# 5G Public Private Partnership Industrial cooperation cartography



## Conclusion

- Europe moving towards **5G deployment by 2020**
- First 5G version will not fulfill the vision of 5G for **vertical industries**
- Progress are needed with the industrial ecosystems and **standards are needed**
- **International common approaches** needed to avoid standard fragmentation
- Next standardization will offer opportunity to introduce new Work Items
- Similarly, joint agreement at WRC 2019 on **spectrum** will be key