



The 5G Infrastructure Public-Private Partnership

5G vision from 5G Infrastructure
Association

Celtic-Plus Event day, 28/04/2015

Economic impact of ICT and 5G



- **5% of European GDP**, corresponding to an annual value of about **€ 660 billion**, is generated today by the ICT sector itself
- Impact of communication sector extends beyond the industrial domain
- Additional investment in ICT in Europe could contribute to rebirth of **GDP growth** in Europe up to (Source: World Bank)
 - about **1.2% points** in high-income economies and
 - about **1.4% points** in low and middle-income economies
- Overall employment level of ICT sector in Europe has been rather stable between 7.2 to 7.5 million employees since 2002 (Source: Digital Agenda Scoreboard)
- Strong industrial base in Europe in research, development, integration and manufacturing of complex systems like communication networks
- Wide spread well-established research community in universities and R&D centres cooperating with industry and SMEs for knowledge and IPR generation
- Novel 5G network requirements, technologies and architectures opens wide range of opportunities for both established and new actors including SMEs

5G new service capabilities



USER EXPERIENCE CONTINUITY

INTERNET OF THINGS

MISSION CRITICAL SERVICES



- User experience continuity in challenging situations such as
 - high mobility (e.g. in trains)
 - very dense or sparsely populated areas and
 - journeys covered by heterogeneous technologies
- Key enabler for Internet of Things by
 - providing a platform to connect a massive number of sensors,
 - rendering devices and actuators with stringent energy and transmission constraints
- Mission critical services thanks to very high reliability, global coverage and/or very low latency
- 5G needs to support efficiently three different types of traffic profiles
 - high throughput for e.g. video services
 - low energy for e.g. long-living sensors
 - low latency for mission critical services

5G key business drivers



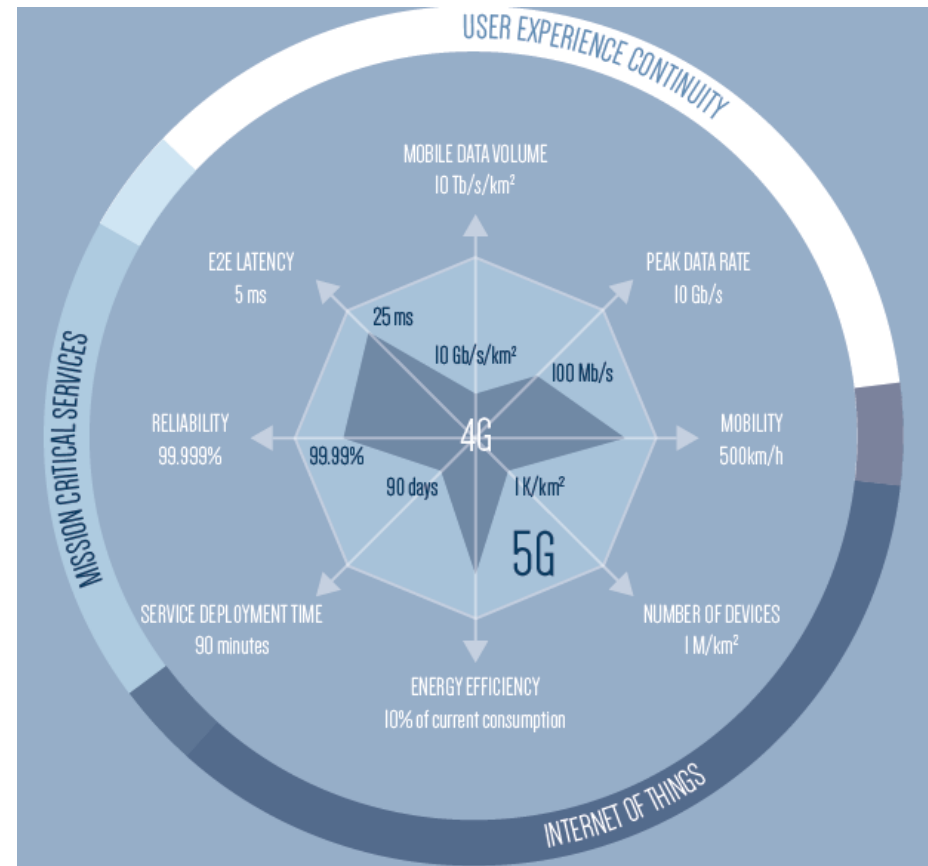
- 5G targets a **unified and programmable infrastructure**
- 5G will support **multi tenancy models**
- 5G will be designed to be a **sustainable and scalable technology**
- 5G will create an **ecosystem for technical and business innovation**
- 5G infrastructures will involve **vertical markets**

New business models will be created thanks to open interfaces (APIs for resources, connectivity and services enablers).

5G will have disruptive capabilities

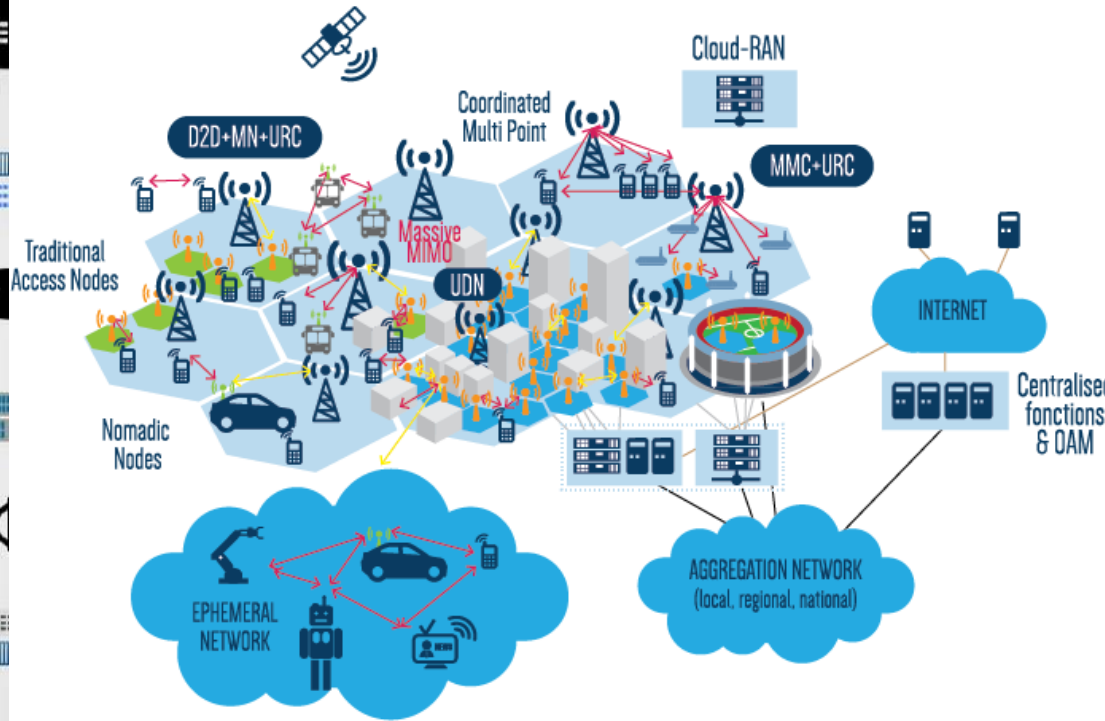


- 5G will provide an order of magnitude improvement in performance in the areas of more capacity, lower latency, more mobility, increased reliability and availability.
- 5G infrastructures will be also much more efficient in terms of
 - energy consumption
 - service creation time
 - hardware flexibility



5G networks and services vision

5G Infrastructure PPP
The European path towards global next generation communication networks



- ↔ Wireless access
- ↔ Wireless fronthaul
- Wired fronthaul
- Wired backhaul
- Macro radio node*
- Small cell radio node*, e.g. micro, (ultra-)pico, femto
- * Only Remote Radio Units (RRUs) assumed

- D2D Device to Device
- MN Moving Networks
- URC Ultra Reliable Communication
- MMC Massive Machine Communication
- UDN Ultra Dense Networks

5G design need to be inspired by modern operating system architectures.

Key technological components

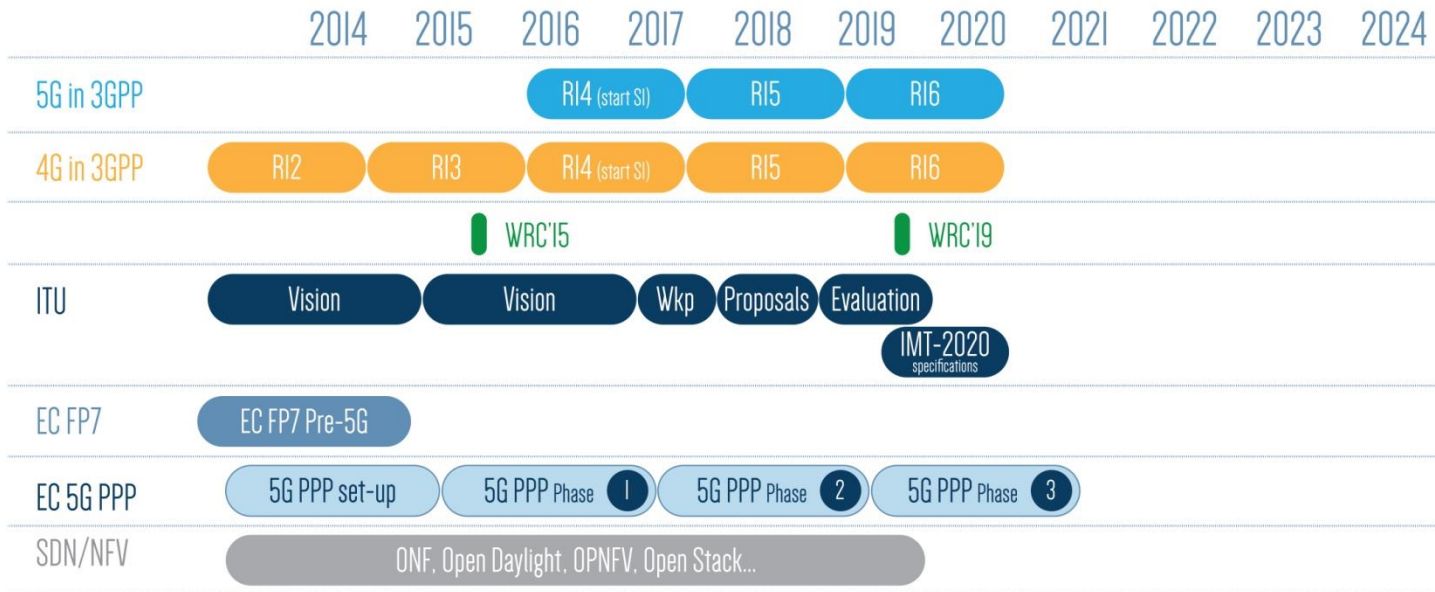


- 5G wireless will support a heterogeneous set of integrated air interfaces
 - from evolutions of current access schemes
 - to brand new technologies
- Seamless handover between heterogeneous wireless access technologies
- Simultaneous radio access technologies to increase reliability and availability
- Deployment of ultra-dense networks with numerous small cells requires new interference mitigation, backhauling and installation techniques
- 5G networks will encompass cellular, satellite and optical solutions
- 5G will be driven by software and will heavily rely on emerging technologies
 - Software Defined Networking (SDN)
 - Network Functions Virtualization (NFV)
 - Mobile Edge Computing (MEC)
 - Fog Computing (FC)to achieve required performance, scalability and agility
- Easier and optimised network management by means of exploitation of Data Analytics and Big Data techniques
 - to monitor users Quality of Experience
 - while guaranteeing privacy

5G roadmap



5G Infrastructure PPP
The European path towards global next generation communication networks



- 1 2 YEARS - Exploratory phase and specification
- 2 2 YEARS- Detailed research and optimization
- 3 2 YEARS - Experimentation and trials





<http://5g-ppp.eu>

**Thank you for your
attention!**

