



http://5g-ppp.eu/

Horizon 2020 5G PPP 19 Call 1 selected projects on-going





global next

path towards

The European

cation networks

5G Infrastructure PPP

CogNet

Building an Intelligent System of Insights and Action for 5G Network Management

5G Ensure 5G Ensure

Security (Will be added later)

(C) Selfnet

SELFNET

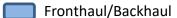
Framework for SELF-organized network management in virtualized and software defined NETworks

CHARISMA

CHARISMA

Converged Heterogeneous Advanced 5G Cloud-RAN Architecture for **Intelligent and Secure Media Access**





Hardware implementation

Network automation

SDN, NFV, Cloud and Virtualisation

SUPERFLUIDITY

Superfluidity: a super-fluid, cloudnative, converged edge system

METIS-II

Mobile and wireless communications

Enablers for Twenty-twenty (2020)

Information Society-II

5_{Gex} 5GE_x

5G Exchange

VirtuWind

Virtual and programmable industrial network prototype deployed in operational Wind park

sonata SONATA

Service Programming and Orchestration for Virtualized Software Networks



Security

Coherent

COHERENT

Coordinated control and spectrum management for 5G heterogeneous radio access networks

Speed55 SPEED-5G

quality of Service Provision and capacity Expansion through Extended-DSA for 5G

norma 5G-Norma

5G NOvel Radio Multiservice adaptive network Architecture

SESAME SESAME

Small cEllS coordinAtion for Multi-tenancy and Edge services

FANTASTIC 6

9

FANTASTIC-5G

Flexible Air iNTerfAce for Scalable service delivery wiThin wireless Communication networks of the 5th Generation

Flex5Gware

Flexible and efficient hardware/softwar e platforms for 5G network elements

and devices

5G-Xhaul G-XHaul

Dynamically Reconfigurable Optical-Wireless Backhaul/Fronthaul with Cognitive Control Plane for Small Cells and Cloud-RANs

5GXCrosshaul

5G-Crosshaul

The 5G Integrated fronthaul/backhaul

55,

Euro-5G

5G PPP Coordination and Support Action

mm MAGIC

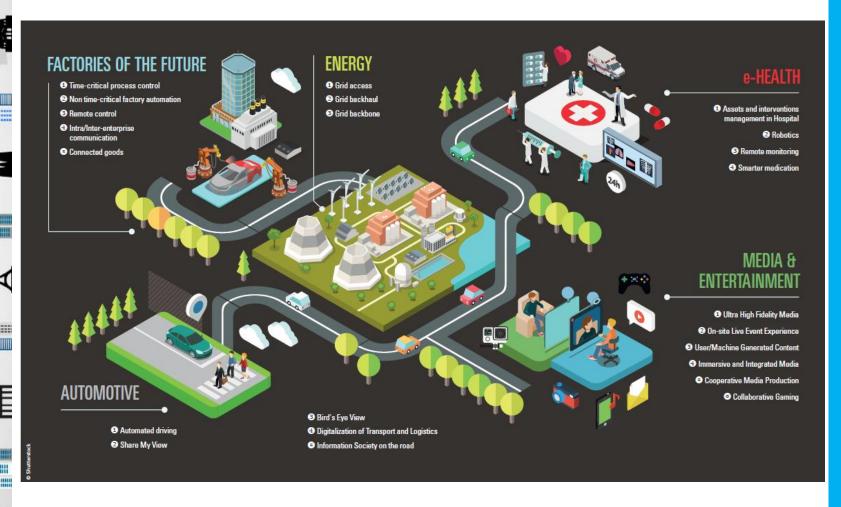
mmMAGIC

Millimetre-Wave Based Mobile Radio Access Networl for Fifth Generation Integrated Communications



Source: 5G PPP, https://5g-ppp.eu/5g-ppp-phase-1-projects/.

5G network infrastructures will be a key asset to support a societal transformation, leading to the fourth industrial revolution impacting vertical sectors.

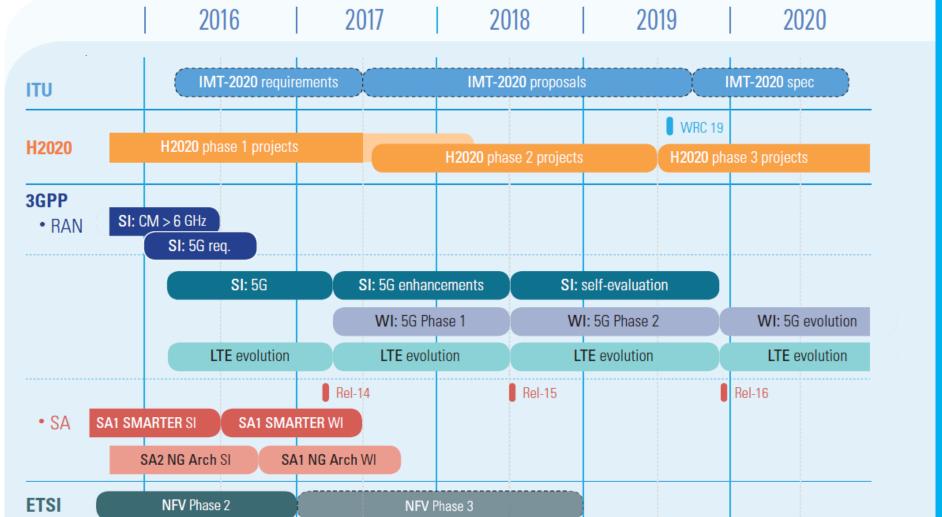


Source: 5G Infrastructure Association: 5G Empowering vertical industries. White Paper, 2016, https://5g-ppp.eu/wpcontent/uploads/2016/02/BROCHURE 5PPP BAT2 PL.pdf. 10/11/2016



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

51A





5G-IA supporting the 5G Standardization roadmap

5G-IA new Market Representation Member (MRP) of 3GPP as of 21st October 2016









































10/11/2016

J Infrastructure



Why a new 5G Architecture?



5G Architecture enables

- new business opportunities meeting the requirements of large variety of use cases
- 5G to be future proof

by means of

- implementing network slicing in cost efficient way
- addressing both end user and operational services
- supporting natively softwarization
- integrating communication and computation
- integrating heterogeneous technologies (incl. fixed and wireless technologies)

Source: 5G PPP Architecture Working Group.



PPP



Coherent







5GPPP Architecture Work Group White paper published June 1, 2016

Launched within the 5GPPP Initiative with participation of 5GPPP projects but input also from non-5GPPP projects





























https://5g-ppp.eu/white-papers/ https://5g-ppp.eu/5g-architecture-paper/

Source: 5G PPP Architecture Working Group.



10/11/2016

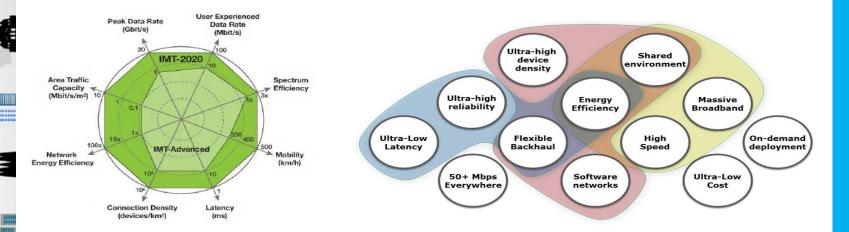
55 PPP

munication networks

∀



5G expectations: Combine the strength of satellite and terrestrial networks (source: ESA)



- **5G** a network of networks responds to diverse use cases. Not all of them will be served by a single network.
- Combination of terrestrial and satellite networks to provide timely requested system functionality at lowest costs while maintaining expected level of end-to-end quality for given network coverage
- ➤ Pressure for faster convergence: Combine the strength of satellite and terrestrial networks to deploy 5G
- Fostering complementarity
- Enabling seamless connectivity
- Provisioning collaborative hybrid services to fulfill cost, technically efficient and timely manner the 5G expectations

Satellite complementary capabilities (source: ESA)

- Ubiquity
 - Across-borders

 - Pan-European / Global Deployment speed Remote areas / geography
- Resilience
 - Overlay to terrestrial

 - BackupScalability
- Multicast/Broadcast (1:many, 1:all vs unicast)
- Global Mobility/Fully flexible space segment
- **Public safety & emergency**
- Serve Smart combined use cases: (automotive/transportation + energy + smart city) + public safety & emergency



Spectrum for 5G: towards WRC-19



- WRC-15 discussed on several frequency bands above 6GHz to be studied within ITU for 5G in the period leading up to WRC-19. ITU-R agreed to conduct sharing and compatibility studies by end March 2017 for a number of SHF and EHF portions in 24-86 GHz ranges the highest frequencies yet to be evaluated for mobile broadband. But in a first phase, sub-6GHz spectrum will be promoted (700MHz, 3.4-3.8GHz,...).
- Spectrum for 5G will enable many new highly advanced services that will improve the life of people, especially those living in large cities of the world with a pressing need for advanced communications.
 - → RSPG vision: "5G will drive industrial and societal transformation, and economic growth in Europe from 2020 and beyond".









- 3.4 3.8 GHz
 - → eMBB for single digit Gbit/s urban mobile coverage
- 24.25 27.5 GHz ("26 GHz") &
 31.8 33.4 GHz ("32 GHz")
 - → eMBB for up to double digit Gbit/s
- 700 MHz
 - → mMTC/URLLC universal coverage

Source: 5G - IA WG Spectrum



Members of 5G Infrastructure Association



Industry

- **ADVA Optical Networking SE**
- Alcatel-Lucent
- Airbus
- Atos
- **Deutsche Telekom**
- DOCOMO Communications Laboratories Europe GmbH Fundacion IMDEA Networks
- Ericsson
- Huawei Technologies Düsseldorf GmbH
- IBM Research
- Intel Mobile Communications
- NEC Europe Ltd., NEC Laboratories Europe
- Nokia
- Orange
- Samsung Electronics Research Institute Ltd.
- SES
- Telecom Italia
- Telefónica I+D
- Telenor ASA
- Telespazio

10/11/2016

- Thales Alenia Space
- Turk Telekomünikasyon A.Ş.

Source: 5G Infrastructure Association.

Research

- CEA-LETI
- Centre Tecnologic de Telecomunicacions de Catalunya (CTTC)
- Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT)
- Instituto de Telecomunicações.
- IST University of Lisbon
- TNO
- University of Bologna DEI

SMEs

- Integrasys SA
- INTERINNOV
- M.B.I. S.R.L.
- Nextworks s.r.l.
- Quobis
- Seguans Communications



5G PPP International cooperation



- China 🦣 2020
 - Mod signed with IMT-2020 (5G) Promotion Group on September 29, 2015 in Beijing
- Japan
 - March 25, 2015 at NGMN Industry Conference in Frankfurt, Germany
- Korea
 - Mousigned with 5G Forum on June 17, 2014 after signature of Joint Declaration between EU Commission and Korean government in Seoul, Korea
- USA
 - Mou signed with 5G Americas on March 2, 2015 at Mobile World Congress 2015 in Barcelona, Spain
- Multilateral MoU on a series of Global 5G Event
 - Two events per year
 - Rotation between continents

- MT-2020 SGMF SGFORM americal
- MoU signed between IMT-2020 (5G) Promotion Group, 5GMF, 5G Forum, 5G
 Americas and 5G Infrastructure Association on October 20, 2015 in Lisbon

Source: 5G Infrastructure Association.

EC 5G Action Plan (Sept 2016)



The Commission has identified the following key elements for the plan:

- Align roadmaps and priorities for a **coordinated 5G deployment across all EU** Member States, targeting early network introduction by 2018, and moving towards commercial large scale introduction by the end of 2020 at the latest.
- Make provisional **spectrum bands available for 5G ahead of WRC-19**, to be complemented by additional bands as quickly as possible, and work towards a recommended approach for the authorisation of the specific 5G spectrum bands above 6 GHz.
- Promote **early deployment in major urban areas** and along major transport paths.
- Promote **pan-European multi-stakeholder trials** as catalysts to turn technological innovation into full business solutions.
- Facilitate the **implementation of an industry-led venture fund** in support of 5G-based innovation.
- Unite leading actors in working towards the **promotion of global standards**.





Towards a smooth and committed 5G roadmap...

- Avoid fragmentation, and respect all the standardization steps towards full 5G globally harmonized standard (« Short-term solutions will not solve long-term issues... » Giuseppe Recchi, TIM):
 - 3GPP roadmap (Rel. 15 & 16)
 - ITU-R IMT-2020 standard completion
 - Spectrum bands identification & harmonization
 - Avoid premature « 5G » announcements
- **Be quick and business-oriented**: Plan 5G trials now, including the verticals, and not delay the standardization process:
 - Pan-European 5G technology trials as of 2017
 - Pre-commercial trials as of 2018
 - Push International cooperation, including in trials



10/11/2016



http://5g-ppp.eu

