

A detailed illustration of a smart city and connected infrastructure. It shows various buildings, houses, and people, all interconnected by a network of lines and wireless signals. Labels like 'CONNECTED CITY', 'CONNECTED HOUSE', 'CONNECTED HEALTH', 'CONNECTED PEOPLE', and 'CONNECTED TRANSPORTATION' are scattered throughout the scene. The overall color palette is light blue and white.

# The 5G Infrastructure Public-Private Partnership

**Werner Mohr**

**Chair of the board of 5G Infrastructure Association**

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

# Outline

- 5G PPP overview
- Call 1 project portfolio
- Relation to vertical sectors
- Call 2 objectives
- Time plan and exploitation
- Networking opportunities

# 5G PPP in Horizon 2020 of the EU

- 5G PPP is a research program in Horizon 2020 of the EU dedicated to 5G system research
- Budget for 2014 – 2020 time frame
  - Up to 700 million € public funding
  - Matched by private side including leveraging factor 5 of additional private investment results in private value of about 3.5 billion €
- Research program is addressing all building blocks of a future communication network and a huge number of huge cases from vertical sectors
- 5G Infrastructure Association vision paper published at Mobile World Congress 2015 in Barcelona  
<http://5g-ppp.eu/wp-content/uploads/2015/02/5G-Vision-Brochure-v1.pdf>
- First set of projects started on July 1, 2015



# 5G PPP Vision and Requirements

## 5G new service capabilities

USER EXPERIENCE CONTINUITY

INTERNET OF THINGS

MISSION CRITICAL SERVICES



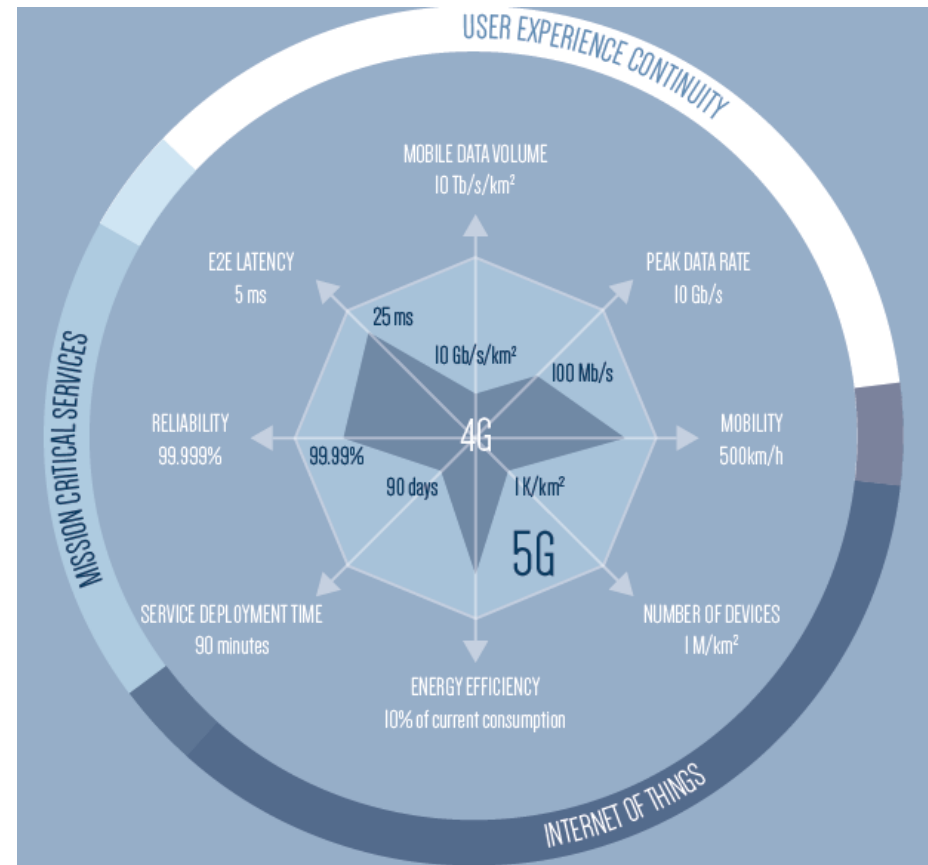
- 5G needs to support efficiently three different types of traffic profiles
  - high throughput for e.g. video services
  - low energy for e.g. long-living sensors
  - low latency for mission critical services
- 5G covers network needs and contributes to digitalization of vertical markets
  - automotive, transportation, manufacturing, banking, finance, insurance, food and agriculture
  - education, media
  - city management, energy, utilities, real estate, retail
  - government
  - healthcare
- Sustainable and scalable technology to handle
  - anticipated dramatic growth in number of terminal devices
  - continuous growth of traffic (at a 50-60% CAGR)
  - heterogeneous network layouts
  - without causing dramatic increase of power consumption and management complexity within networks

# 5G PPP Vision and Requirements

## 5G will have disruptive capabilities

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

- 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 PPP Contractual Arrangement

## KPIs for Monitoring

- Business-related KPIs:
  - Leverage effect of EU research and innovation funding in terms of private investment in R&D for 5G systems in the order of 5 to 10 times;
  - Target SME participation under this initiative commensurate with an allocation of 20% of the total public funding;
  - Reach a global market share for 5G equipment & services delivered by European headquartered ICT companies at, or above, the reported 2011 level of 43 % global market share in communication infrastructure.
- Performance KPIs:
  - Providing 1000 times higher wireless area capacity and more varied service capabilities compared to 2010;
  - Reducing the average service creation time cycle from 90 hours to 90 minutes (as compared to the equivalent time cycle in 2010);
  - Very dense deployments to connect over 7 trillion wireless devices serving over 7 billion people;
  - Secure, reliable and dependable Internet with a “zero perceived” downtime for services provision.
- Societal KPIs:
  - Enabling advanced User controlled privacy;
  - Reduction of energy consumption per service up to 90 % (as compared to 2010);
  - European availability of a competitive industrial offer for 5G systems and technologies;
  - New economically-viable services of high societal value like U-HDTV and M2M applications;
  - Establishment and availability of 5G skills development curricula in partnership with the EIT.



# International activities on 5G getting momentum



## ITU-R Visions Group



### EU

- Framework Program 7, e.g. METIS and 5GNow projects
- 5G PPP in Horizon 2020



Germany – 5G Lab Germany at TU Dresden



UK – 5G Innovation Centre (5GIC) at University of Surrey



### US

- Intel Strategic Research Alliance (ISRA)
- NYU Wireless Research Center
- 5G Americas, MoU  -  signed



### China

- 863 Research Program
- Future Forum
- IMT-2020 (5G) Promotion Group, MoU  -  signed



Japan – The 5G Mobile Communications Promotion Forum, MoU  -  signed



Korea – 5G Forum, MoU  -  signed



Taiwan – TAICS, Ministry of Science and Technology, Ministry of Economic Affairs



Russia – 5GRUS by Russia's Icom-Invest

CJK White Paper



NGMN – White paper on future requirements

- Company internal research
- Multilateral MoU on a series of Global 5G Event signed on October 20, 2015 in Lisbon
- Two events per year, rotation between continents     

30/06/2016

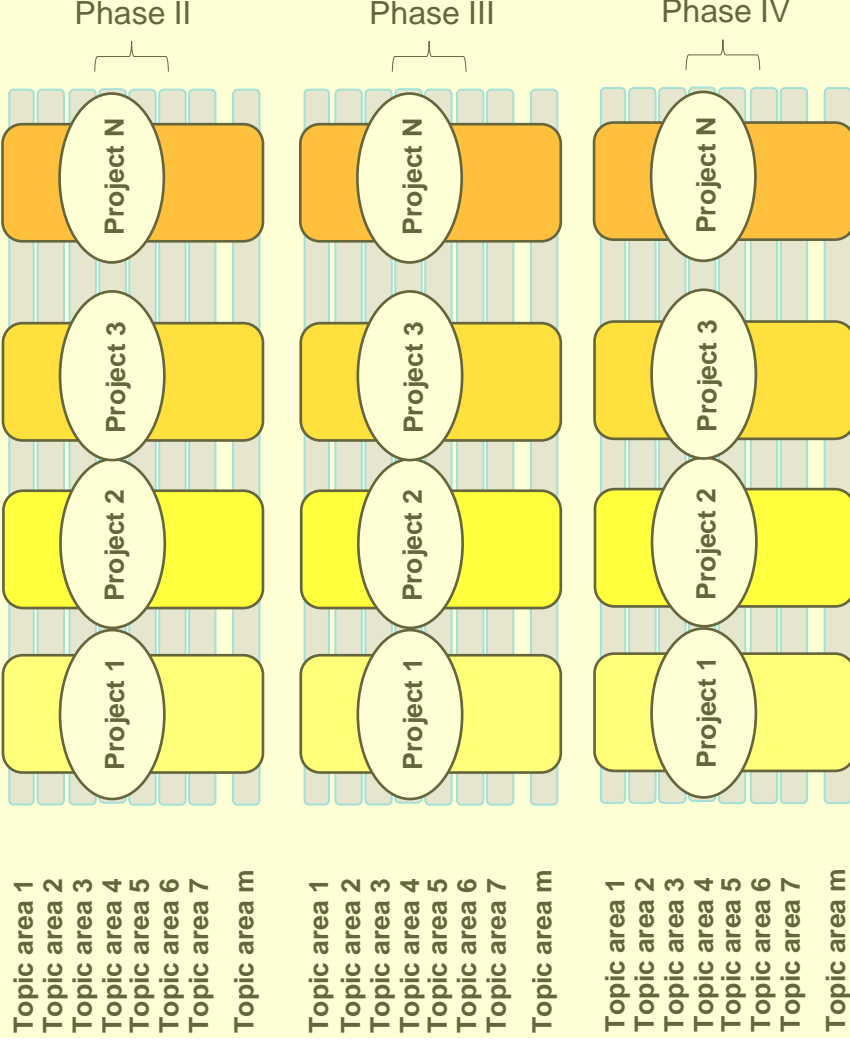
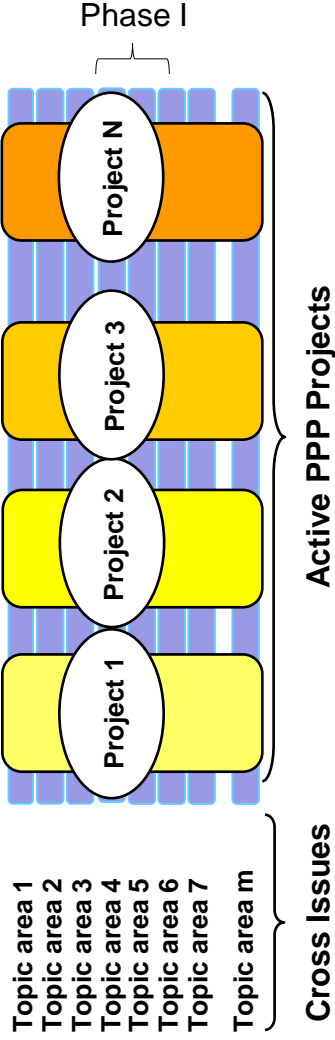
Source: 5G Infrastructure Association.



Industry Advisory Group

Steering Board

Technology Board



# Governance model – Basic approach

## Project Implementation

- Consortium Agreement per project signed by all project partners
- 5G Infrastructure Collaboration Agreement across all projects in all Phases and signed by all partners



# Working Groups

Pre-standards

Spectrum

Vision and Societal Challenges

Architecture

Use cases and performance evaluation models

Software Networks (SDN and NFV)

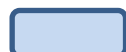
Activity 5G PPP Contractual Arrangement, KPIs

Activity 5G International cooperation

Network Management, QoS and Security

Activity Community building and Public Relations

SME support



Policy oriented Working Group under responsibility of Association

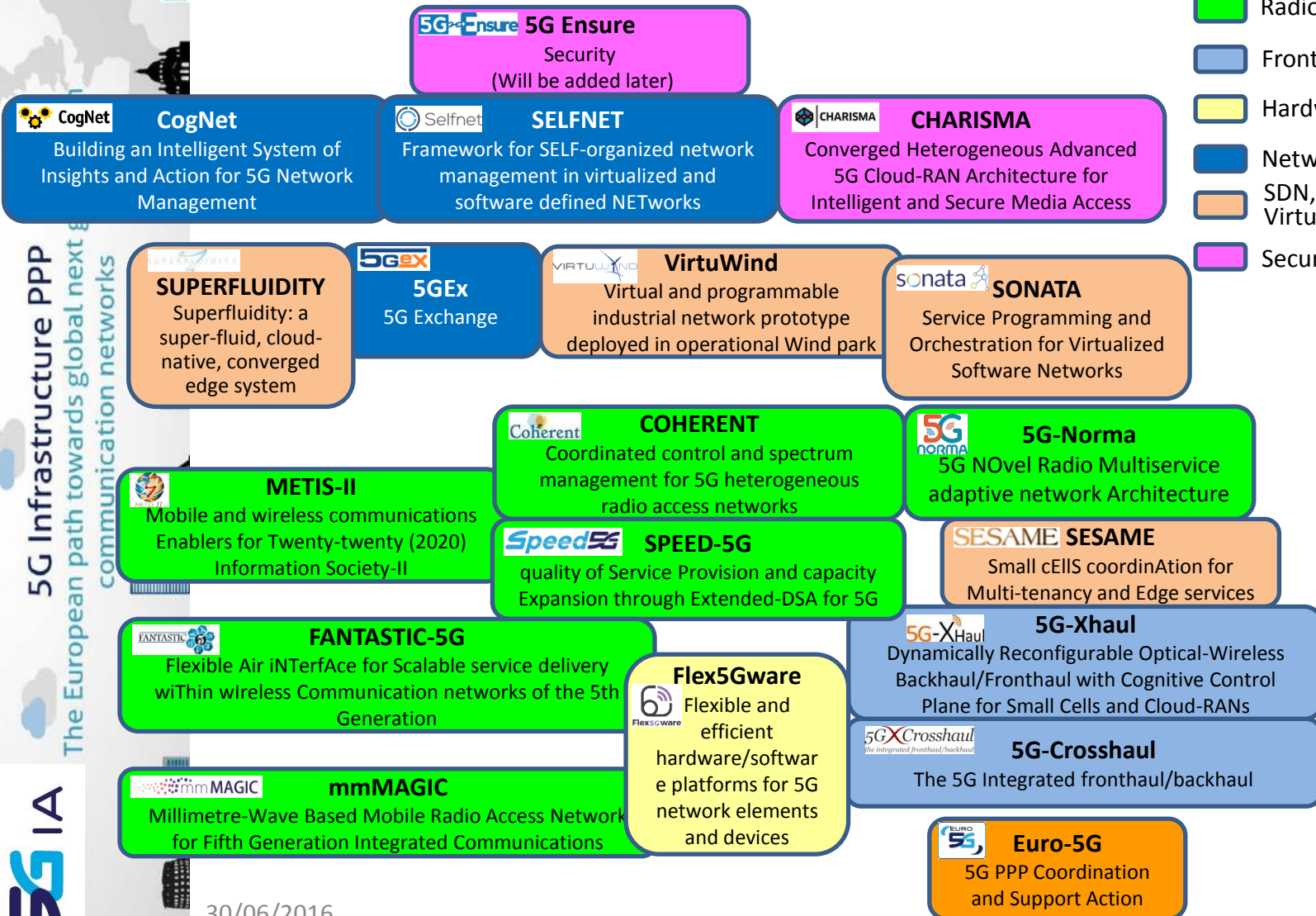


Technology oriented Working Group under responsibility of 5G PPP projects



# Horizon 2020 5G PPP Call 1 selected projects

- Radio-related cluster
- Fronthaul/Backhaul
- Hardware implementation
- Network automation
- SDN, NFV, Cloud and Virtualisation
- Security



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

- White papers on
  - 5G and Factories of the Future
  - 5G and Healthcare
  - 5G and Energy
  - 5G and Media
  - 5G and Automotive
- Identification of
  - main use cases
  - requirements and
  - areas for research and innovation
- Vertical workshops
  - June 18, 2015
  - November 9, 2015

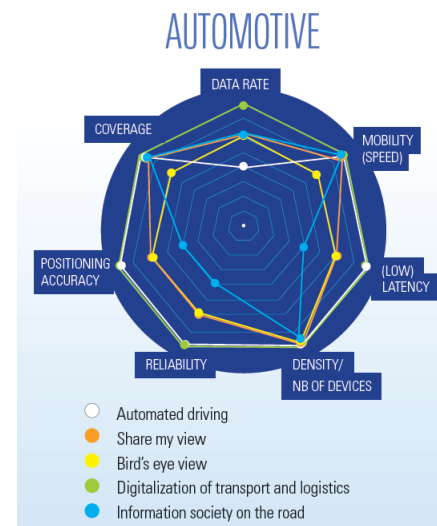
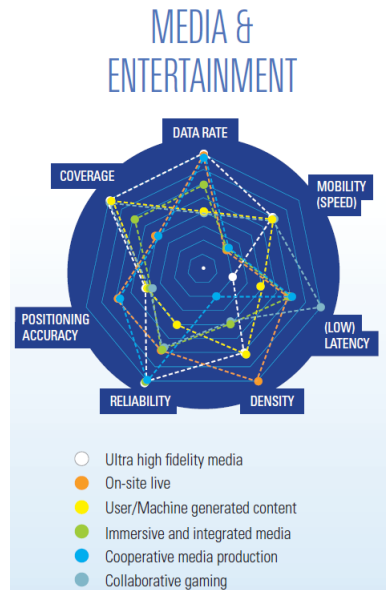
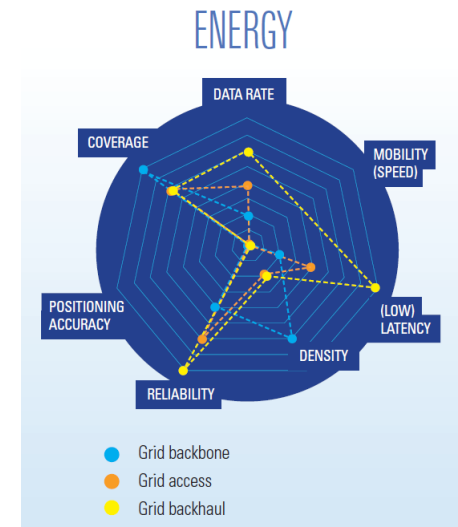
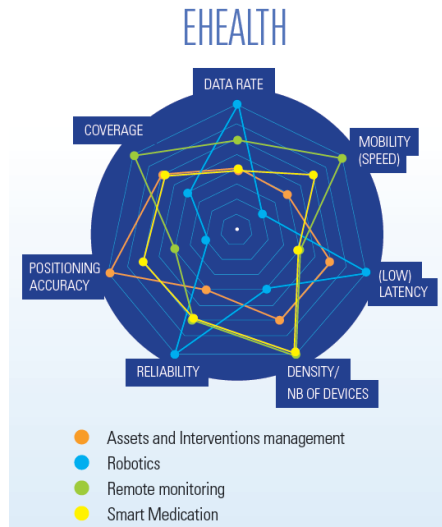
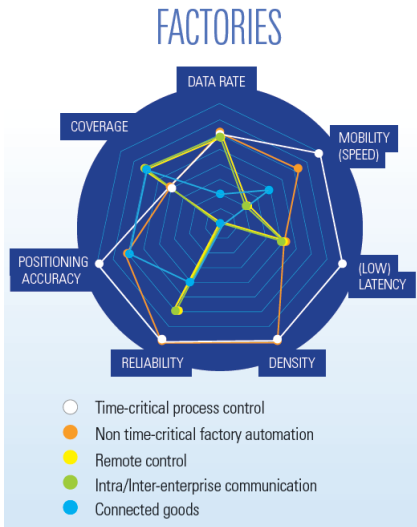


- White Paper published at Mobile World Congress 2016  
[https://5g-ppp.eu/wp-content/uploads/2016/02/BROCHURE\\_5PPP\\_BAT2\\_PL.pdf](https://5g-ppp.eu/wp-content/uploads/2016/02/BROCHURE_5PPP_BAT2_PL.pdf)

Source: 5G Infrastructure Association.

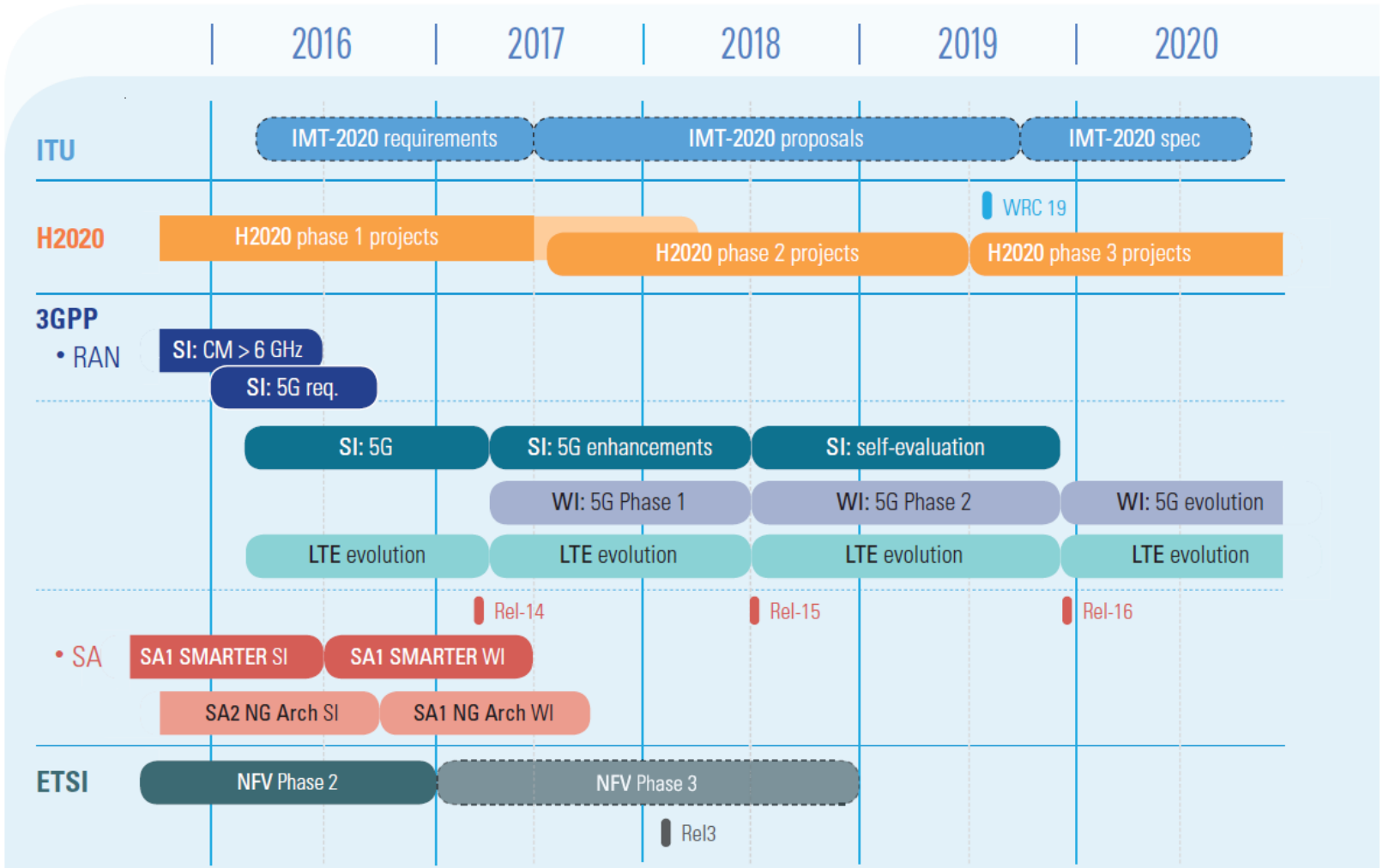
# Vertical sectors

## Main technical requirements



# 5G PPP Vision and Requirements

## 5G roadmap



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



# Exploitation of results

5G research in FP7 and in the private sector

Results from FP7 Projects contributed to ITU-R on 5G vision and requirements

5G PPP Phase I

5G PPP Phase II

5G PPP Phase III

3GPP Work Items and 3GPP Releases

3GPP Study Items

ONF, Open Daylight, OPNFV, Open Stack, ...

ITU-R Vision and Recommendation



WRC preparatory process



Trials

Contributions to standardisation and regulatory process via member organisations in respective bodies

Prototype and product development

Winter Olympics, Korea

FIFA World Cup, Russia 2018

Summer Olympics, Japan

2012	2013	2014	2015	2016	2017	2018	2019	2020
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3GPP Release 12

3GPP Release 13

3GPP Release 14

3GPP Release 15

FIFA World Cup, Qatar 2022



# Networking opportunities

- Networld2020 website: <http://www.networld2020.org/>
- 5G PPP website: <https://5g-ppp.eu/>
- Participation in Networld2020 and 5G PPP activities like working groups
- Preparation of a Pre-Structuring Model
  - as recommendation to the community
  - as a mapping of the Call for Proposals
  - to Target Research Areas
- Information days are planned in 2016
  - first meeting on January 21, 2015 in Brussels
  - second meeting on March 17, 2016 in Bologna
  - third meeting on May 18, 2016 in Warsaw
  - fourth meeting on June 30, 2016 in Athens after EuCNC 2016
  - fifth meeting on September 26, 2016 in Bratislava in the afternoon
- Brokerage Platform on 5G PPP website: <https://5g-ppp.eu/brokerage-platform-new/>



**Thank you for your attention!**