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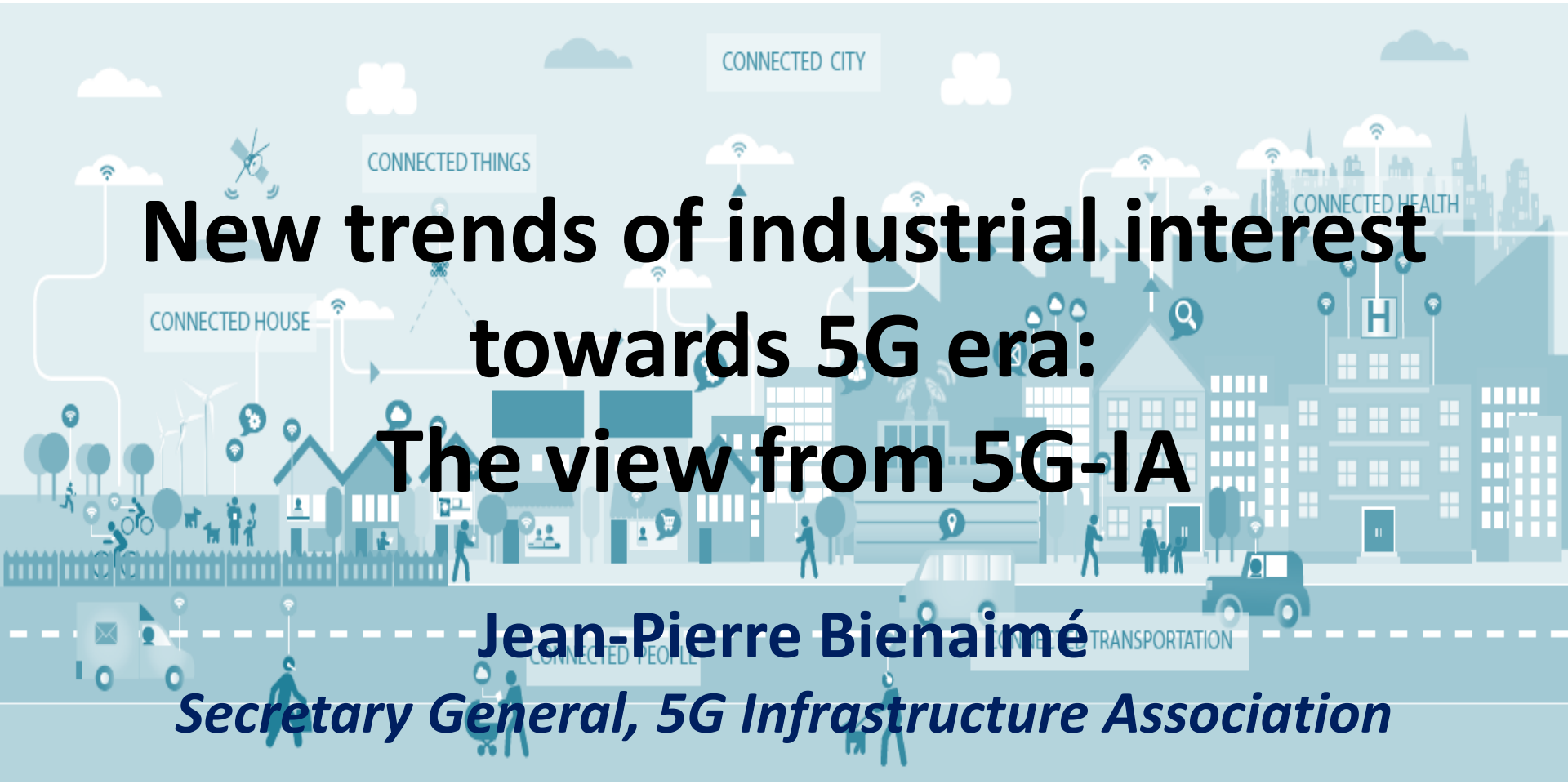


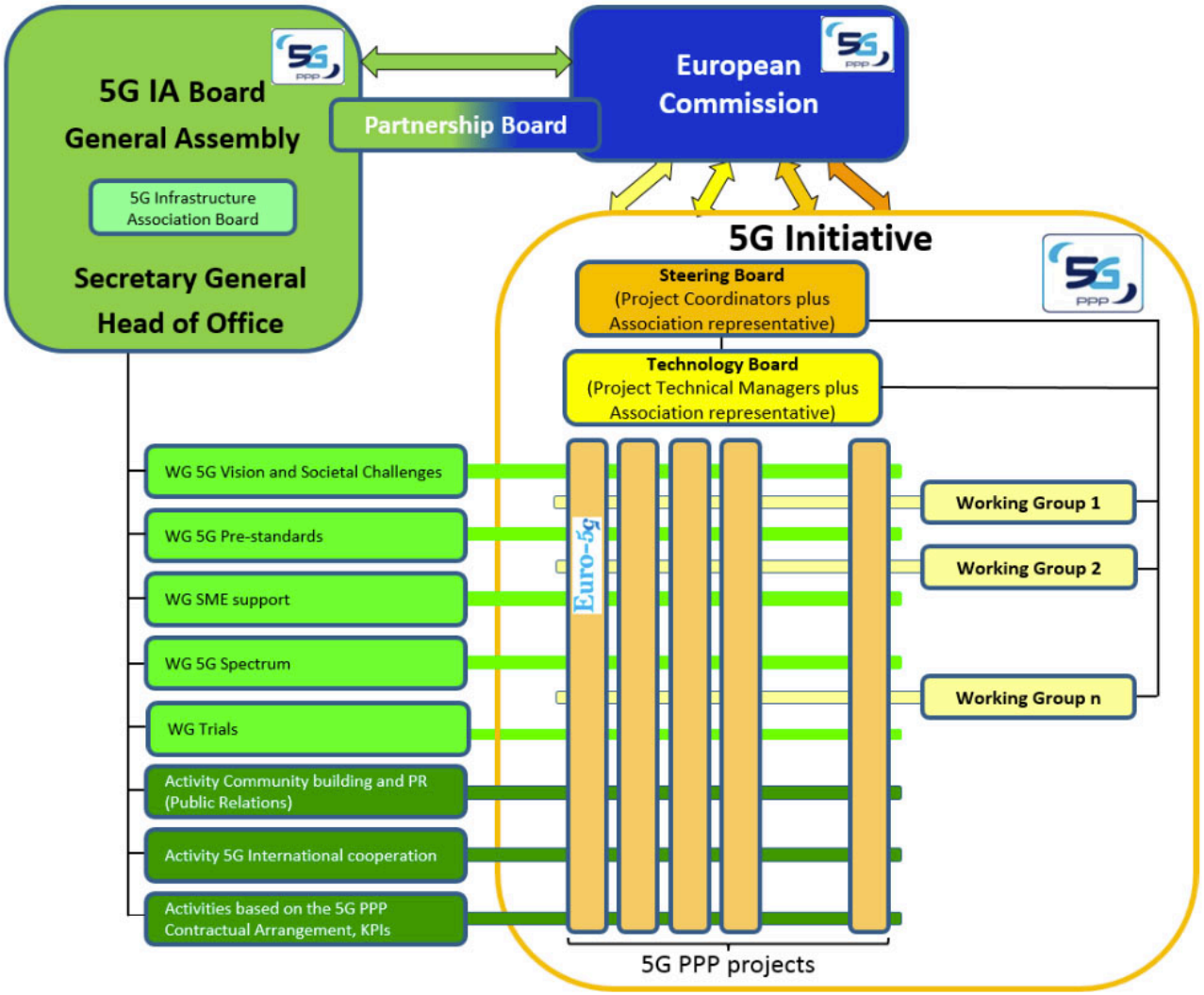
New trends of industrial interest towards 5G era: The view from 5G-IA

Jean-Pierre Bienaimé

Secretary General, 5G Infrastructure Association

http://5g-ppp.eu/

5G PPP Overall Governance



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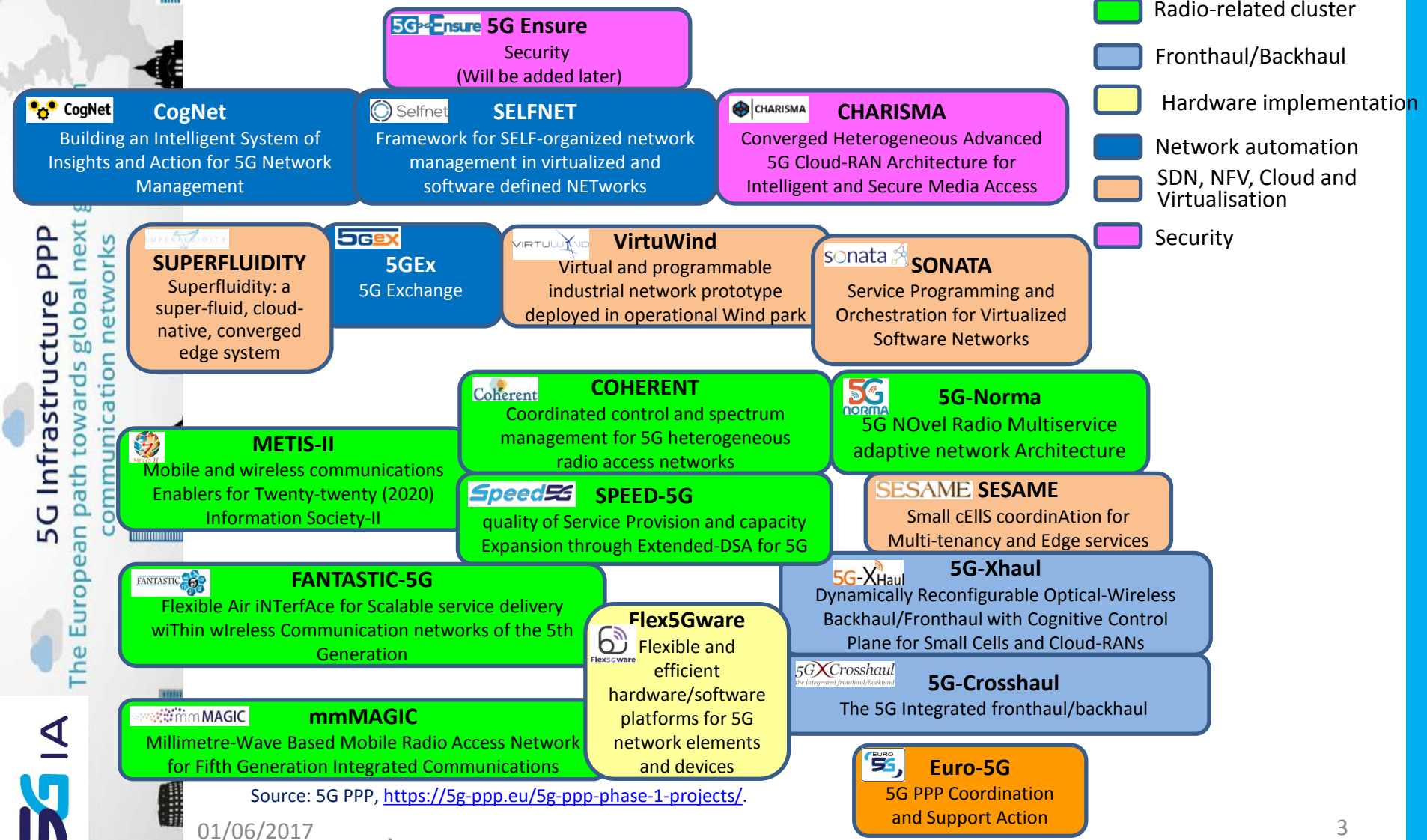
Horizon 2020 5G PPP
19 Phase 1 projects on-going



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

5G Industry Developments: World

- **The race is on for Gigabit LTE:**
  - LTE-A is now mainstream: 190+ cellcos in 90+ countries
  - First LTE-A Pro networks launched: Telstra first commercial Gigabit LTE network in Jan 2017 with 4CA + 4x4 MIMO antennas)
  - LTE-U/LAA enters the Gigabit fray with US players
- **MWC 2017:**
  - various 5G experiments from USA, Japan, Korea, Canada. Announced launches of Fixed Wireless Access in June 2017.
  - Progress in NFV/SDN & Network slicing
  - Public appeal by 22, then 40 operators/vendors for an acceleration of 5G standardization
- **3GPP:**
  - Speed up of the standardization process by 6 months, approving a non-standalone implementation of New Radio (NR) by Dec 2017. The first 5G NR will use < 6GHz & mmW spectrum

5G Industry Developments: Europe

- **Operators :** 2020 appears to be a likely start date:

  - Nordic & Baltic Regions: common 5G development plan for earlier lauches
  - DT will introduce 5G in its entire footprint from 2020
  - Orange 5G lauches between 2020 & 2022; trials with Ericsson & Nokia, and recent agreement with Peugeot to develop the 5G connected car.
  - Telefonica committed to 5G, but wants to adapt the network to the customer and not the other way around…

- **Verticals:**

  - Smart cities drive interest: 15 « trials cities »
  - interest shown for connected car: 5GAA creation
  - Euro2020**:** clear target, as a popular event, displayed on 13 different cities
  - role of SMEs, contributing to research & standardization, supported by EU Research programmes

Cooperation of public and private side in Europe

- Industry in Europe endorsed 5G Manifesto on July 7, 2016
  - 5G as key enabler for digitalisation of European economy
  - Ecosystem-forming initiatives by industry players and the role of EU
    - Supporting standards definition activities
    - Pan-European 5G trials
  - A 5G Action Plan unfolding in a Digital Single Market
    - Spectrum
    - Aligned roadmaps and deployment priorities across EU Member States
  - Investments at the centre of 5G Policy Framework

Source 5G Manifesto, July 7, 2016,

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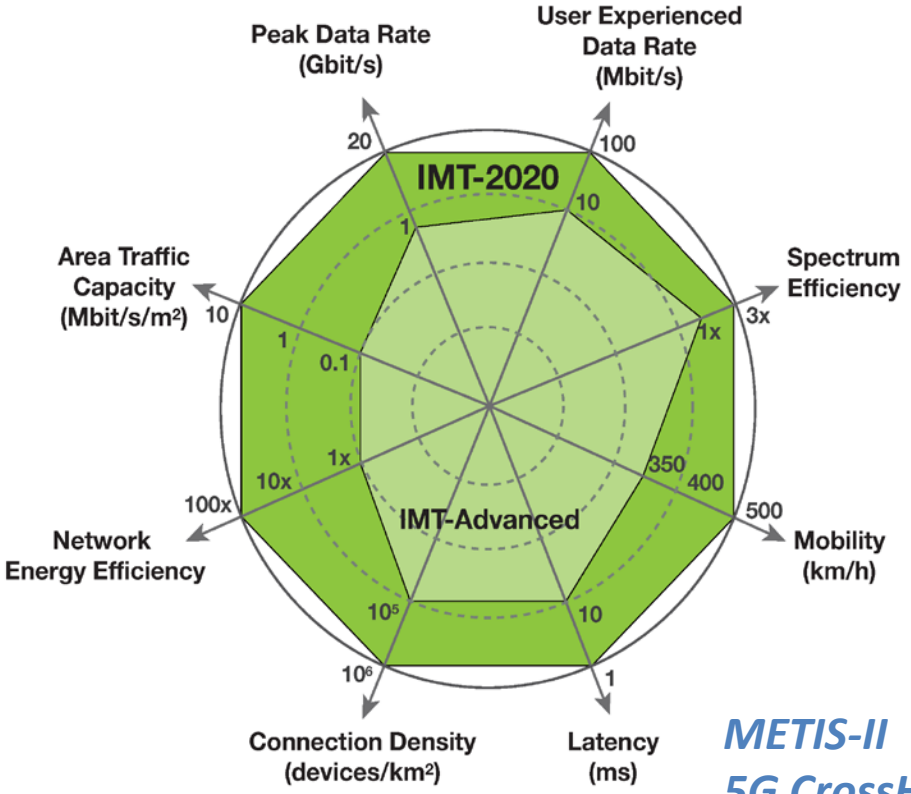
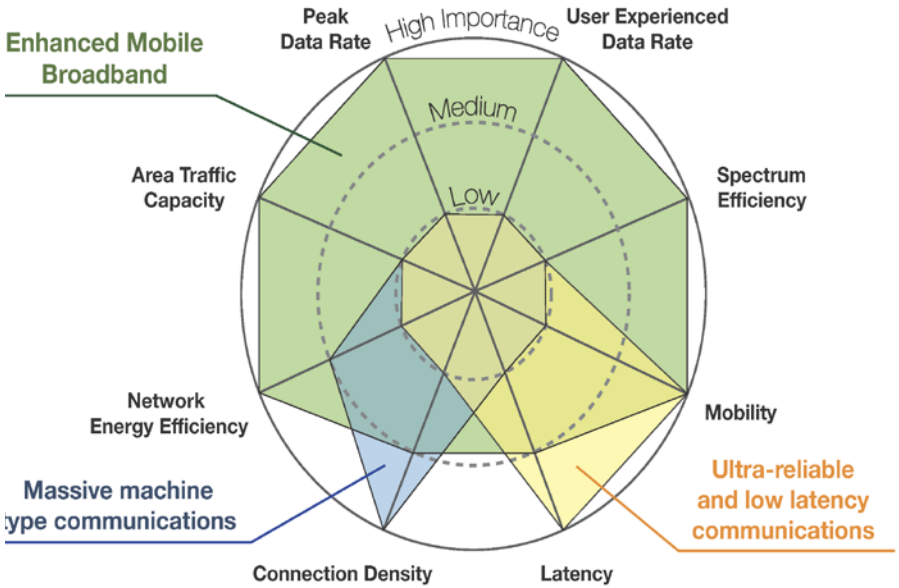
5G innovations for new business opportunities

New 5G PPP/5G IA white paper,
MWC'17 - 28 February, 2017

Target 5G KPIs from ITU





METIS-II
5G CrossHaul
SESAME
Coherent
Speed5G
Fantastic-5G
5G Norma
mmMAGIC
Flex5GWare
Charisma
5G Xhaul

Where do we stand with 5G requirements (1)? 3rd Cross 5G PPP Workshop 6-7 February 2017

KPI	Requirement	METIS-II performance	Key contributor
C-Plane latency	< 10 ms	7.125 ms	RRC Connected Inactive, reduction of processing time in BS and UE
U-Plane latency	< 1ms	0.763 ms	Shortening of TTI, reduction of processing time in BS and UE
mMTC energy efficiency	> 10 years on a single 5 Wh battery	> 10 years on a single 5 Wh battery	Extension of DRX, C-Plane latency reduction, deep sleep energy conservation features
Peak data rates	> 20/10 Gbps for DL/UL	21.7/12.4 Gbps for DL/UL	MIMO spatial multiplexing (for lower frequencies), exploitation of mmW bands
Mobility interruption time	0 ms	0 ms	Multi-connectivity + make-before-brake

Where do we stand with 5G requirements (2)? 3rd Cross 5G PPP Workshop 6-7 February 2017

KPI	Requirements	METIS-II performance	Comments
User throughput (use case 1, UC2 and UC3)	UC1: 300 Mbps UC2: up to 5 Gbps UC3: 50/25 Mbps for DL/UL	UC1: 1 Gbps+ UC2: up to 7.85 Gbps UC3: 50/25 Mbps for DL/UL	Only DL values for UC1 and UC2 Different methodology applied for UC3 evaluation
mMTC device density (UC4)	> 1 mln/km^2	4 mln/km^2	Depends heavily on the traffic/report periodicity of mMTC devices. 1 upload of 1000 bits every 100 s was used in METIS-II
Reliability (UC5)	99.999% at 50/1000m for urban/highway	99.999% at 45/150m for urban/highway	For highway scenario, requirements seems very difficult to meet (revision needed?)
Network energy efficiency (UC1, UC3)	Should follow (at least) capacity improvement	For the capacity x1000, network energy efficiency improvements of 350-7500 were reported	Evaluation done only for Dense Urban environment. Savings depend on the load level in LTE-A/5G network

Recommendations

➔ **Standardization** is essential for realizing 5G promises

➔ **Spectrum availability** is key for 5G development and deployments

➔ **Cost-efficient deployment** strategies are needed

➔ **New business opportunities** are expected to emerge from 5G, enabled by 5G PPP innovations

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Pan-European Trials Roadmap 2017-2020+ Objectives

- Enable global **European leadership on 5G technology**, deployment and profitable business models.
- Demonstrate benefits of 5G to **vertical sectors**, and associate them to the standardization and development process.
- Show a clear path to **successful and timely deployment**, and complement commercial trials and demonstrations as well as national initiatives.

➔ **Before 2018:** technology trials run by independent trial consortia in various countries, including Vertical industries, and aiming to demonstrate key 5G functionalities and technical / technological enablers.

➔ **From 2018:** trials aim to demonstrate wider interoperability and support for vertical use-cases in order to claim global public attention.

5G PPP International cooperation Bilateral & Multilateral MoUs

- China IMT-2020
  - MoU signed with IMT-2020 (5G) Promotion Group on September 29, 2015 in Beijing
- Japan 5GMF The Fifth Generation Mobile Communications Promotion Forum
  - MoU signed with The 5G Mobile Communications Promotion Forum on March 25, 2015 at NGMN Industry Conference in Frankfurt, Germany
- South Korea 5G Forum
  - MoU signed with 5G Forum on June 17, 2014 after signature of Joint Declaration between EU Commission and Korean government in Seoul, Korea
- USA 5G americas
  - MoU signed with 5G Americas on March 2, 2015 at Mobile World Congress 2015 in Barcelona, Spain
- Brazil Telebrasil Associação Brasileira de Telecomunicações
  - MoU signed with Telebrasil – Projeto 5G Brasil on 28 February, 2017 at Mobile World Congress 2017 in Barcelona, Spain

Source: 5G Infrastructure Association.

5G PPP supports international cooperation towards consensus building

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Pre-standards

Spectrum

Vision and Societal Challenges

Activity 5G PPP Contractual Arrangement, KPIs

5G IA INFRASTRUCTURE ASSOCIATION

Trials

Activity Community building and Public Relations

5G IMF The Fifth Generation Mobile Communications Promotion Forum

5G Forum

5G americas

IMT-2020

SME support

Telebrasil Associação Brasileira de Telecomunicações

and further international partners…

Architecture

Use cases and performance evaluation models

OPNFV Software Networks (SDN and NFV)

Security

Network Management, QoS

Source: 5G Infrastructure Association.

Towards a smooth and committed 5G roadmap…

- **Avoid fragmentation:**

- 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 (2017 & 2019), and Spectrum bands identification & harmonization
- Avoid premature « 5G » launch announcements

- **Be quick, business-oriented and cooperative**:

- Implement pan-european & international 5G trials, including the verticals,
- Boost the standardization process, while respecting the steps
- Push collaborative international research as means for consensus building, even between competitors, to prepare future standards

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http://5g-ppp.eu

Thank you for your attention!