



EUROPEAN COMMISSION

Directorate-General for Communications Networks, Content and Technology

Net Futures

Network Technologies

Brussels, 1 December 2015  
TK/jv Ares(2015)s- 6088419

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Cc: 3GPPLiaison@etsi.org

**Subject: Liaison Statement to TSG RAN #70**

Dear Mr Flore,  
Dear Mr Krause,

*Dear Dino, dear Joern,*

Please find attached subject Liaison Statement and supporting material in relation to 5G use cases originating from verticals. I look forward to presenting and discussing this document at the upcoming TSG RAN meeting in Sitges.

Yours sincerely,

Thibaut Kleiner  
Head of Unit



## EUROPEAN COMMISSION

Directorate-General for Communications Networks, Content and Technology

Net Futures  
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**Title:** Liaison Statement (LS) on 5G use cases from verticals.

**Source:** European Commission – DG CONNECT – Unit E1, Network Technologies

**To:** 3GPP TSG RAN meeting #70

**Cc:**

**Contact Person: Mr Bernard Barani**

**E-mail Address:** [bernard.barani@ec.europa.eu](mailto:bernard.barani@ec.europa.eu)

**Attachments:** White papers on verticals requirements: i) 5G Automotive Vision; ii) 5G and Energy; iii) 5G and the Factories of the Future; iv) 5G and e\_Health

01.12.2015

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### 1. Introduction:

This document provides a short overview of on-going activities related to use cases from key vertical sectors under the European 5G flagship initiative, the "5G Public Private Partnership" (5G PPP), and their relation to the overall European 5G approach. Recommendations on how verticals related work should be taken into account in global 5G standardisation and in defining the future Study Items of 3G PP TSG RAN are proposed.

### 2. 5G – Policy Drivers

The advent of a Digital Single Market (DSM) has been identified as a key priority for Europe, as outlined by the Digital Single Market Strategy<sup>1</sup> adopted on 6 May 2015 by the European Commission. The objective is to develop an inclusive digital economy and society across Europe, to the benefits of citizens, consumer and businesses. It notably intends to prepare for an era where all businesses will be primarily digital. From that perspective, the goal is to further the rapid integration of digital technologies into daily business practices to fundamentally change entire sectors and processes. It calls upon disruptive technologies like the Internet of Things, Cloud Computing, or big data analytics to deploy further into European business processes. In that context, 5G networks are seen as a key pillar to realise the wider ambitions of the DSM.

Whilst Europe is putting in place an ambitious Digitisation policy, this trend is shared globally, with multiple initiatives world-wide to develop "digital automotive", health, factories and many more. The next convergence wave is thus expected to target industrial and professional businesses that have very specific networking requirements, and 5G is considered to be the

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<sup>1</sup> See Communication COM(2015) 192 final available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015DC0192&qid=1438594190467&from=EN>.

platform of choice to support this industrial and economic transformation. Standardisation is at the heart of the policy objectives: Commissioner Oettinger has publicly expressed his support to global 5G standards and a related public consultation has been launched to seek stakeholders views on 5G priority standardisation topics<sup>2</sup>. The official launch of 5G standardisation initiatives under the umbrella of key SDO's like 3G PP is thus considered by the European Commission as a key milestones, which needs to take due account of the policy ambitions of the various contributing regions.

### **3. Verticals, relevance to policy context**

From a European perspective, this means that 5G should be developed as an enabler of full digital ecosystems served with different service capabilities and profiles. Similarly to cloud computing platforms, it is expected that 5G networks will also become platforms for innovation. The 5G Public Private Partnership<sup>3</sup> (5G PPP) supported by the European Commission has outlined the role of verticals in the 5G PPP Vision Document<sup>4</sup> : *"In addition, we will see some specific network platforms for each vertical sector with dedicated features and performance requirements (e.g. high reliability for health or automobile verticals or high density of terminals for smart cities). The use of COTS (Commercial of the Shelf) instead of current proprietary technologies, will change the market with these industries having a much greater influence on the development of network services and their SMEs will be able to innovate and launch new applications leveraging the new capabilities of 5G."*

In this context, the 5G PPP has further developed with key European players of the vertical markets a number of business cases and associated requirements they would impose on the underlying network infrastructure<sup>5</sup>. The following verticals are being considered with a list of potential business cases pushing the limits of the current network technology

#### **Automotive**

- A1- Automated driving.
- A2- Road safety and traffic efficiency services.
- A3- Digitalization of transport and logistics.
- A4- Intelligent navigation.
- A5- Information society on the road.
- A6- Nomadic nodes.

#### **eHealth Use Cases / Future Healthcare application**

- H1- Assets and interventions management in Hospitals (Assets tracking and management, Intervention planning and follow up)
- H2- Robotics (remote surgery, Cloud Service Robotics for Assisted Living)

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<sup>2</sup> DSM standards public consultation closing on 4 January 2016, see:

<https://ec.europa.eu/digital-agenda/en/news/have-your-say-standards-help-achieve-digital-single-market>

<sup>3</sup> <http://5G-PPP.eu>

<sup>4</sup> <http://5g-ppp.eu/wp-content/uploads/2015/02/5G-Vision-Brochure-v1.pdf>

<sup>5</sup> White Papers also available for download at: <https://5g-ppp.eu/white-papers/>

- H3- Remote monitoring of health or wellness data (Ageing well, Life style and prevention, Follow up after acute events and assisted living in chronic scenarios)
- H4- Smarter medication (Beyond Monitoring: applying medication to the patient on a remote basis, Smart Pharmaceuticals, Algorithm supported theory-based health behaviour change)

#### **Energy**

- E1- Grid access
- E2- Grid backhaul
- E3- Grid backbone

#### **Media & Entertainment**

- ME1- Ultra High Fidelity Media:
- ME2- On-site Live Event Experience
- ME3- User Generated Content & Machine Generated Content
- ME4- Immersive and Integrated Media:
- ME5- Cooperative Media Production:
- ME6- Collaborative Gaming

#### **Factories of the Future**

- F1- Time-critical process optimization inside factory to support zero-defect manufacturing;
- F2- Non time-critical optimizations inside factory to realize increased flexibility and ecosustainability, and to increase operational efficiency
- F3- Remote maintenance and control optimizing the cost of operation while increasing uptime.
- F4- Seamless intra-/inter-enterprise communication, allowing the monitoring of assets distributed in larger areas, the efficient coordination of cross value chain activities and the optimization of logistic flows.
- F5- Connected goods, to facilitate the creation of new value added services

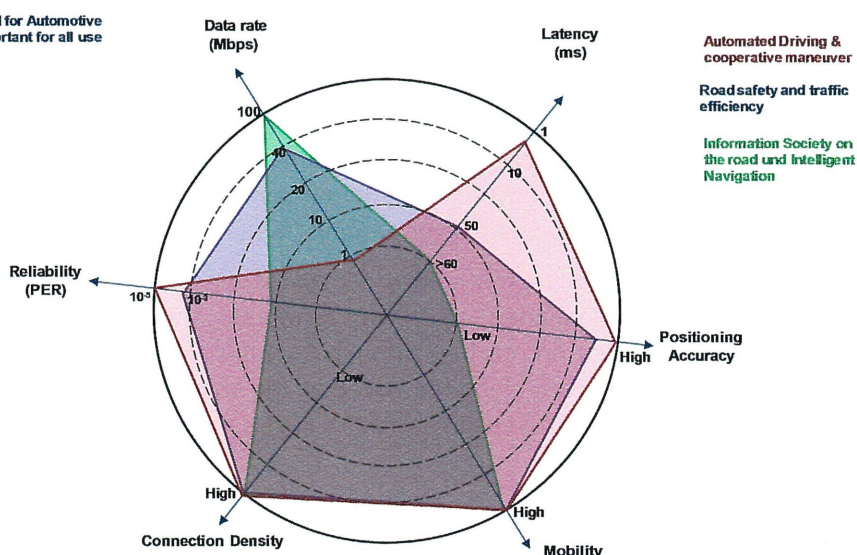
The table below is an early attempt<sup>6</sup> to characterise and map the business models with 5G networks requirements. The objective is to come up with a set of detailed vertical 5G requirements that can be released at the Mobile World Congress 2016 whilst being usable in the context of 5G standardisation developments

	<b>Automotive</b>	<b>Health</b>	<b>Energy</b>	<b>Media</b>	<b>Factory</b>
Very low latency / High reliability	A1, A2	H2, H4	E3		F1, F3
Low latency, less critical			E2	ME4, ME6	
High Download throughput	A5			ME1, ME2	
Large coverage outdoor	A1-A6		E1		F4, F5
Large coverage indoor		H3			F2
High Upload throughput				ME3, ME5	
Precision geolocation	A4	H1			

<sup>6</sup> Draft interim results, on going work at 5G PPP level



The below draft diagram, worked out in the context of a sub case of the automotive use cases, illustrates the targeted expected results to be achieved during Q1 2016 for the main use cases.



#### 4. General use cases identifications and challenges

Use cases for 5G are also actively considered in other fora and initiatives. NGMN has developed twenty five use cases for 5G, as representative examples, that are grouped into eight use case families. The use cases and use case families serve as an input for stipulating requirements and defining the building blocks of the 5G architecture. The use cases are not meant to be exhaustive, but rather as a tool to ensure that the level of flexibility required in 5G is well captured.

Similarly, the SMARTER initiative under 3G PP SA1 has identified more than 70 use cases in document TR 22.891, each with description, potential service requirements, and potential operational requirements. These use cases are classified under the three classical use cases families of the "ITU triangle" with one additional family called "NEO" for network operations.

However, important further work may be required before stabilising consistent and core use case set of requirements to be further exploited in the context of 5G standards development, considering that:

- there is an important disparity of initiatives working out their own sets of use cases and requirements;
- the granularity and the very definition of a use case is highly variable from one use case to the other, ranging from true use case, to connectivity attribute or feature.

#### 5. Implications and drivers for 5G standards developments

Against above summary background, it is suggested that the 5G standardisation process should take due account of the following:

- **Verticals are key:** use cases originating from verticals as described under section 3 above have been identified as key domains for 5G. They should be considered as drivers of 5G requirements from the onset. Any possible prioritisation should not be implemented to the detriment of use cases originating from vertical sectors;

- **Verticals require a holistic approach to standardisation:** the vision of 5G driving the standards developments should address the entire network, including new and evolved radio access technologies, new RAN and core network architectures based on fundamental changes to business models and eco-systems from the onset.

- **Verticals require an inclusive approach towards standardisation:** based on the ongoing 5G PPP work with verticals and considering that verticals usually work with their traditional standardisation bodies, the European Commission is ready to support the organisation of discussion workshop with key verticals on 5G requirements, notably in the context of the roundtable on automatic driving launched by Commissioner Oettinger with the automotive industry<sup>7</sup>, of running 5G energy initiatives<sup>8</sup> or of running "factories of the future" initiatives<sup>9</sup>;

- **Liaison across standardisation actors:** a holistic 5G standardisation approach also requires to consider early in the process the needed liaison with other relevant bodies. For instance, a very low latency performance can not be reached through RAN design only and requires defining a "latency budget" across all network elements covering the related use case. This may entail active liaison with standardisation bodies like OPNFV, in the context of new architectures and virtualisation beyond RAN.

- **Need to harmonise use case definition and requirement:** definition of use cases, attributes and network requirements need further work to come up with a consistent set of 5G requirements, be it at RAN or architecture level;

- **Spectrum issues:** taking into account the recent results of WRC 2015 in the context of IMT 2020 agenda items, use cases compatible with the use of frequency bands below 6 GHz should be duly targeted, as several bands in this range have been subject of additional harmonised allocations, whilst identification of additional IMT 2020 bands above 6 GHz will not be completed before 2019.

## 6. Recommendations and Actions

In designing the future Study Items for 5G RAN standardisation, 3G PP TSG RAN is invited to duly consider the drivers outlined in previous section. Limiting the 5G standardisation to the definition of a new RAT complementing LTE to address a specific set of new requirements in priority may limit standards to a narrow issue with a risk to introduces restricted design assumptions impacting the long term 5G vision and the emergence of true 5G ecosystems

## 7. Date of next meeting

18 December, meeting of 5G PPP vision/verticals requirements Working Group.

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<sup>7</sup> See: <https://ec.europa.eu/digital-agenda/en/news/eu-commissioner-oettinger-holds-roundtable-automated-driving-frankfurt>

<sup>8</sup> See e.g: <http://www.virtuwind.eu/>

<sup>9</sup> See e.g: <http://www.effra.eu/>