5G empowering
vertical industries

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5G VERTICAL SECTORS

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EXECUTIVE SUMMARY

Europe is faced with economic and societal challenges such as ageing of populations, societal cohesion, sustainable development. The introduction of digital technologies in economic and societal processes is key to address these challenges. 5G network infrastructures will be a key asset to support this societal transformation, leading to the fourth industrial revolution impacting multiple sectors. In the next decade, it is expected that the manufacturing industry will evolve towards a distributed organisation of production, with connected goods, low energy processes, collaborative robots, integrated manufacturing and logistics. These concepts are notably embodied under the Industry 4.0 paradigm. The automotive and transportation sector will bring to market autonomous and cooperative vehicles by 2020 with significantly improved safety and security standards, as well as new multimodal transportation solutions. Due to the ongoing development of renewables, the traditional power grid will evolve into a smart grid, supporting a much more distributed generation and storage of power with real time dynamic routing of electricity flows using smart meters in houses. Entertainment and digital media

sectors are working on the integration of broadcast TV and digital media, including an ever increasing amount of user generated content, high quality media and innovative real time interfaces such as haptics. E-health and M-health will optimise new, revolutionary concepts such as European "Personalised or Individualised Healthcare" and the transition from hospital and specialist centred care models towards distributed patient centred models.

As a result of these transformations, vertical industries will have enhanced technical capacity available to trigger the development of new products and services. Identifying key vertical sectors' requirements, anticipating relevant trends early and mapping them into the 5G design is a fundamental element for the 5G success. Therefore a close collaboration of vertical industries and 5G infrastructure providers will be mutually beneficial.

This paper presents innovative digital use cases from most important vertical sectors in Europe, namely: Factories of The Future, Automotive, Health, Energy and Media & Entertainment, and how their requirements impact 5G design. An inclusive analysis of the corresponding

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requirements shows that *latency* (below 5ms), *reliability* and *density* (up to 100 devices/m^2), along with tight constraints on territory and/or population coverage, are the most important performance targets 5G needs to achieve for supporting all possible services of the five investigated sectors.

Moreover, with universal availability of instantaneous communications, high level of guaranteed QoS, and cost levels appropriate for meeting customers' expectations, 5G will pave the way for new business opportunities. With 5G, networks will be transformed into intelligent orchestration platforms. By cementing strong relationships between vendors, operators and verticals, 5G will open the field to new business value propositions. Cross vertical collaboration fostered by 5G will benefit Small and Medium Enterprises' (SMEs) engagement and entrepreneurs. However, these opportunities depend on our

ability to leverage 5G over previous investments and on a regulatory framework that incentivizes the deployment of 5G for Europe and will enable innovative services. Such services will be enabled by 5G networks which will ensure quality, security and safety. Deploying 5G for vertical sectors in Europe by the earliest date currently contemplated by the industry (2020) should thus be a common framing objective.

5G architecture is expected to accommodate a wide range of use cases with advanced requirements, especially in terms of latency, resilience, coverage, and bandwidth. Thus, another major challenge is to provide end-to-end network and cloud infrastructure slices over the same physical infrastructure in order to fulfil vertical-specific requirements as well as mobile broadband services in parallel.

The 5G standardisation framework will be defined in 2016. Use-cases originating from verticals should be considered as drivers of 5G requirements from the onset with high priority and covered in the early phases of the standardisation process. 5G will also integrate different enabling technologies (e.g. mobile, fixed, satellite and optical), spectrum-regulatory frameworks (e.g. licensed and unlicensed) and enabling capabilities (e.g. Internet of Things – IoT). The corresponding standardisation bodies need to work closely together, including with key vertical sectors, with an aligned roadmap. In the context of radio standards development, vertical use cases should be duly considered when identifying spectrum priorities. ∎
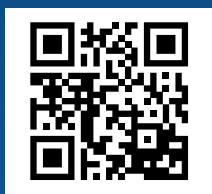
5G PPP

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