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5G Varnost

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5G Safety - Phase 1 Industrial survey, sub-phase IR.2

Application examples and requirements 5GSafety

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1. Abstract

With the release of the first global 5G standard in 2018, the wireless technology industry has made a major leap towards reshaping the way people communicate. 5G is the technology that has the capability to lay foundations for completely new forms of intelligent connectivity that in addition to fixed and wireless technologies for the first time introduces also a range of completely new concepts, such as artificial intelligence, autonomous driving and green mobility, smart and connected cities and societies, augmented and virtual reality, wearable computers, as well as delivery of new forms applications and flexible use of spectrum, including parts that have not been used in cellular networks before. The potential of these technologies is expected to drive 5G innovation.

5G is the latest, fifth generation or networks that has been designed in a way to improve speed, reliability and responsiveness of both wireless and fixed networks and offer standardised solutions for nearly any industry secotr on a global scale. We can expect to benefit from unprecedented transmission speeds, improved capacities and reduced latency. The improvements will facilitate the use of services with real-time responsiveness, such as tridimensional video monitoring of mass events or vehicle to vehicle and robot to robot communications. The most intense impacts of 5G are expected in the automotive industry, Internet of Things (IoT), industrial solutions and mission critical communications.

In public safety communications, the use of the fourth generation of mobile technologies (4G) itself is already a huge improvement, which is only further re-established with the introduction of 5G. The European Commission's 5G for Europe Action Plan is encouraging member states to introduce 5G for public safety needs and emergency communications to improve performance of communication services, including the use of new models of private emergency networks hosted on top of shared broadband 5G infrastructures. In addition, the technological advancements are forcing the public safety domain to follow the trends and migrate their telecommunications systems to broadband IP infrastructures, in particular in response to visibly increasing needs to use a variety of applications and services with heterogeneous performance requirements, such as specialised IoT services for public safety needs, massive machine to machine communications (M2M), HD video-based intervention monitoring using autonomous drones, etc.

The key to introducing 4G and 5G into the public safety domain is to strategically and systematically address specific challenges associated with the sector-specific requirements. This comprises specific communications capabilities as well as customisable and non-mainstream implementation modes as well as co-existence of PPDR (Public Protection and Disaster Relief) on shared public 5G infrastructure. To meet this challenging objective, the 5G Safety project has set as one of its main goals to establish solid shared understanding of the expectations and needs of the public safety stakeholders and to identify and clearly specify of the pertaining usage scenarios. The results of these activities are provided in this document.

This report provides 15 elementary and 7 complex end-to-end scenarios that together form the vision of how the 5G Safety solution operates from various technical standpoints as well as from an application viewpoint towards its end-users. The scenarios address the usage of advanced data, IoT and location services for improved operational picture of emergencies, possibilities and opportunities to use such intel together with advanced transmission capacities to improve response efficiency of emergency services and therewith more saved lives, as well as ways of use of video technologies for virtual monitoring, support and interventions as part of field operations. In addition, the scenarios tackle the migration challenges as well as possibilities to deliver hybrid communication capabilities and uninterrupted intervention management support in the event of massive catastrophes. The 5G technology in this respect promises also a range of new capabilities and services to support digital health applications and solutions for mass events in such contexts, both from the perspective of preventive measures as well as part of the interventions. The scenarios rely on a range of innovative technologies, such as advanced positioning, IoT, medical sensors, autonomous drones, augmented and mixed reality, etc.

The challenges that each of the scenarios presents require a systematic approach spanning throughout the design, development and prototyping and have to be reflected in the corresponding 5G capabilities

accordingly. To do so, we have completed a mapping exercise that uniquely identifies the required capabilities, which can be later on integrated and used as part of the conceptualisation and prototyping activities, and for a PPDR-specific base for a subsequent evaluation and validation framework as part of the demonstration activities. The results of the mapping exercise of the defined scenarios to ITU-based key performance indicators shows that the 5G Safety vision primarily relies on high reliability and prioritisation capabilities, two features that 5G inherently incorporates as opposed to previous generations of communications networks (and 4G in particular). In addition, the exercise has pointed out two additional PPDR-specific requirements, i.e., high reliability and advanced 5G coverage capabilities. The said results will play an important part in subsequent activities involving design of the 5G Safety architecture and services, both in terms of the identified and supported requirements as well as from the perspective of designing specific service subgroups that respond to the PPDR needs.

Last but not least, a tight and constructive cooperation with the key representatives of the public safety stakeholders, regulators and policy makers represents one of the priority goals of the 5G Safety project, the objective of which is to ensure compliance of the resulting portfolio with the actual expectations and needs of the domain as well as to influence further development of the PPDR communications domain and catalyse the emergence of a new market ecosystem for 5G Safety technologies. In this respect, the 5G Safety consortium has in the first project phase validated and extended the specifications of the proposed usage scenarios by cooperating tightly with project supporters, PPDR stakeholders and regulators and policy makers. This was completed in the form of two dedicated 5G Safety events, as follows. The first event was the First open 5G Safety workshop, co-located with the 19th PSCE conference, where a dialogue was successfully established, the aim of which was to arrive at a shared understanding of needs and requirements of the operational practice as well as to conduct early validation of the ideas backing of the 5G Safety usage scenarios. The workshop attracted considerable international attendance and served for the 5G Safety partners to demonstrate our initial project results and address and discuss openly a number of open challenges in the 5G PPDR. The second event took place as an Innovation workshop, the aim of which was to validate the specified usage scenarios in the form of moderated creative processes and discussions. This event also achieved considerable attendance with a large number of Slovenian public safety representatives, including AMZS, DARS, mountain rescue services, voluntary and professional fire fighters, emergency medical services as well as other call centres and response units within the public safety ecosystem in Slovenia. Both events have jointly confirmed the importance of early involvement of public safety stakeholders. They allowed the 5G Safety consortium to validate our assumptions and gave crucial insights into operational practice as well as the pertaining requirements and expectations, which served as steering points for further refinements of the proposed scenarios. At the same time, the events served as good examples of constructive cooperation between the industry, academia and public sector in Slovenia as well as on an international scale.