Response to RSPG23- 026: Draft RSPG Opinion: The development of 6G and possible implications for spectrum needs and guidance on the rollout of future wireless broadband networks

The European Utilities Telecoms Council (EUTC), representing European electricity and gas generation, transmission and distribution companies welcomes the opportunity to contribute to RSPG's Draft Opinion on the development of 6G and possible implications for spectrum needs and guidance on the rollout of future wireless broadband networks.

EUTC is proud that some of its members have been closely engaged with Administrations that have recently recognized the essential need for utilities to have direct access to spectrum in order to accelerate the commitment to delivering ambitious climate targets. European utilities are totally committed to facilitating the move towards renewable energy and the reduction of harmful greenhouse gasses, together with the greater electrification of society: the recognition of the role that telecommunications play in this transition is warmly welcomed.

EUTC's response focuses mainly on the lower frequency bands potentially being addressed by 6G and future wireless broadband networks. That is not to say that there will not be critical utility applications in the higher frequency bands (specifically the sub-THz bands mentioned in the Draft Opinion), simply that utility applications in these frequency ranges are not yet apparent. This response also focuses on licensed spectrum applications as critical utility communications are not well suited to licence-exempt spectrum where there is no guarantee of performance or interference-free operation.

Detailed points (in no particular order of importance)

Harmonisation of spectrum in 410-430 MHz and 450 470 MHz for mission critical services

EUTC has historically made a case for harmonisation of spectrum access for utilities in the 400 MHz bands as this is the 'sweet spot' blending coverage and capacity for mission critical applications. 6G may provide the impetus for rationalization of services in the 400 MHz bands to facilitate the harmonisation of spectrum access for mission critical services.

Extending the lower frequency band to include 380-400 MHz

Following on from the above paragraph on 410-430 MHz and 450-470 MHz bands, it should be noted that the forecast timeline for the introduction of 6G technology is likely to coincide with the decommissioning of current Public Safety Tetra networks in 380-400 MHz spectrum across Europe. This may create an opportunity for the introduction of 6G services in this band for mission critical applications.

Minimum Channel Bandwidths of at least 5 MHz

Although there is a move towards ever greater channel bandwidths in higher frequency ranges, the 400 MHz region (380-470 MHz) presents immense challenges of coordinating with existing users to avoid disenfranchising them. The process of introducing new broadband services whilst retaining access to spectrum in the same frequency ranges for narrowband and wideband spectrum users will be greatly facilitated if 6G embraces a minimum channel bandwidth of 5 MHz; and ideally 3 MHz.

2 x 10 MHz of spectrum in 470-694 MHz identified for Mission Critical Services

Taking into account the complexity of spectrum access below 1 GHz for mission critical services, and the likelihood that the needs for these applications will continue to grow for the benefit of all of society, if spectrum in the band 470-694 MHz is to become available for IMT type services from 2035, it would be wise to reserve 2 x 10 MHz of this spectrum for mission critical applications.

Resilience of future wireless broadband networks

Mobile broadband connectivity has presented society with vastly more options and facilities than could ever have been imagined by previous generations, but one element of the former copper-wired networks has been lost almost imperceptibly. This is the regulation of the legacy Public Switched Telephone Networks (PSTN) to deliver 99.999% availability not only with the provision of independent power supplies, but also rudimentary low voltage Direct Current (DC) provision to enable simple powering of terminal equipment connected to the line. This delivered an exceptionally reliable means for connecting the Public Safety and utility services for all members of society. We are at risk of losing this beneficial universal service without an adequate replacement being available.

Integration of non-terrestrial networks

Utilities are interested in developments in integrating non-terrestrial elements into networks. This has the potential to enhance resilience and facilitate coverage in geographic areas which are difficult and/or expensive to provide coverage from terrestrial base stations. Utilities see particular challenges in use of hybrid networks when seeking to provide deterministic connectivity with low latency and guaranteed asymmetry. This may provide opportunities for valuable research projects within the 6G program.

A secondary issue for satellite connectivity is the perceived security risk as the attack surface is potentially greatly increased for airborne elements, and utilities require security and resilience against attack up to and including hostile nation-state capabilities.

One final element where EUTC believes further research is needed for non-terrestrial networks (especially large LEO constellations) is the potential additional vulnerability due to space weather events. This is of great importance to utilities as these space weather incidents also cause major disruption to electricity networks. It could be catastrophic if the monitoring and switching operations required by utilities to minimize the potential impacts of space weather events could not be implemented due to loss of telecommunications connectivity.

Addressing security challenges

Telecoms faces an unprecedented level of security challenges from an ever increasingly diverse range of sources. The design of 6G networks must have security elements designed-in from the outset, including massive denial-of-service attacks.

Symmetry and latency requirements for specialist services

Specialist industry applications sometimes require demanding symmetry and latency requirements of no particular value to the majority of users. These requirements can make demand on the architecture of the network, increasing its cost or limiting its flexibility for other users. It may be that the optimum solution for delivering these highly specialized services is separate dedicated networks for which suitable and sufficient spectrum needs to be made available.

Implications of carbon reduction targets.

The overriding requirement to reduce carbon emissions associated with future wireless broadband networks may conflict with the development of 6G and associated spectrum allocations. Ever higher frequency networks implies densification of infrastructure, potentially leading to increased energy consumption. Innovative strategies may be beneficial to address this need, ranging from closer collaboration between utility energy networks and telecommunications networks, to offloading data from 6G mobile networks to local WiFi networks.

Effect of climate change

The physical effects of climate change will need to be taken into account in the construction of future wireless networks, such as the increasing potential flooding risk and higher wind loading on antenna structures.

As well as the above, there may also be effects on radio propagation modeling and radio channels particularly due to more intense rainfall events which are especially relevant at the higher frequencies being contemplated for 6G. Propagation modeling for 6G must incorporate parameters adapted to climate change which may differ from historic scenarios.

Increase in vertical and private networks

4G/LTE and 5G have seen a resurgence in demand for private networks in vertical sectors. We are still awaiting specific applications for 6G technology, but given the higher frequencies envisaged and the shorter useful ranges at these frequencies, it is likely that there will be further significant growth in private networks in 6G.

Environmental impact of 6G infrastructure

Within the draft RSPG Opinion, there appears little consideration of the potential environmental impact of future wireless broadband networks. Although most European citizens consider the environmental impact of base station infrastructure is justified on the basis of improved connectivity and services, there remains significant public hostility to the potential adverse visual intrusion of antenna structures on the environment. The move to higher frequencies may mitigate the impact to some degree because of smaller elements required at the higher frequencies, but the increase in MIMO (Multiple Input Multiple Output) densities may counterbalance this reduction in individual element size. Reducing any detrimental impact of visual intrusion from future wireless networks should be a priority.

Research into any potential adverse health effects from the use of higher radio frequencies in close proximity to humans must be included in 6G research to reassure the public that this element is being adequately addressed.

Remove existing users from spectrum to create space for new technology

It has been observed that in some administrations, existing licensed spectrum users in bands identified for future IMT services are evicted before the demand for new services in the particular band have been identified. This is economically inefficient and can result in spectrum which was previously in use remaining unoccupied for significant periods of time.

Backwards compatibility

As we move forward to 6G, backwards compatibility for legacy equipment ensures long life cycles of equipment which enhances sustainability and avoidance of stranded assets. Utility systems are often 5-10 years in planning and rollout, and are then expected to operate for at least 15 years, ideally 25 years before replacement. This not only enhances sustainability through minimizing waste and consumption of new raw materials, but also ensures that energy consumers do not have to pay for costly upgrades of technology solely to ensure continuity of operations and provision of utility services.

Future Technological Developments

Although future developments in communications technology in the utility space will undoubtedly involve massive machine-to-machine developments and application of Artificial Intelligence (AI) to improve the efficiency and effectiveness of utility operations, human supervision will continue to be required to oversee operations and take strategic decisions.

The European Utilities Telecom Council (EUTC)

The European Utilities Telecom Council (EUTC) is the leading European Utilities trade association dedicated to informing its members and influencing policies on how telecommunication solutions and associated challenges can support the future smart infrastructures and the related policy objectives through the use of innovative technologies, processes, business insights and professional people.

This is combined with sharing best practices and learning from across the EUTC and the UTC global organization of telecommunication professionals within the field of utilities and other critical infrastructure environments and associated stakeholders.

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