



**5GMED cross-border corridors in
Europe: challenges for public
authorities, policymakers and
regulators**

White Paper

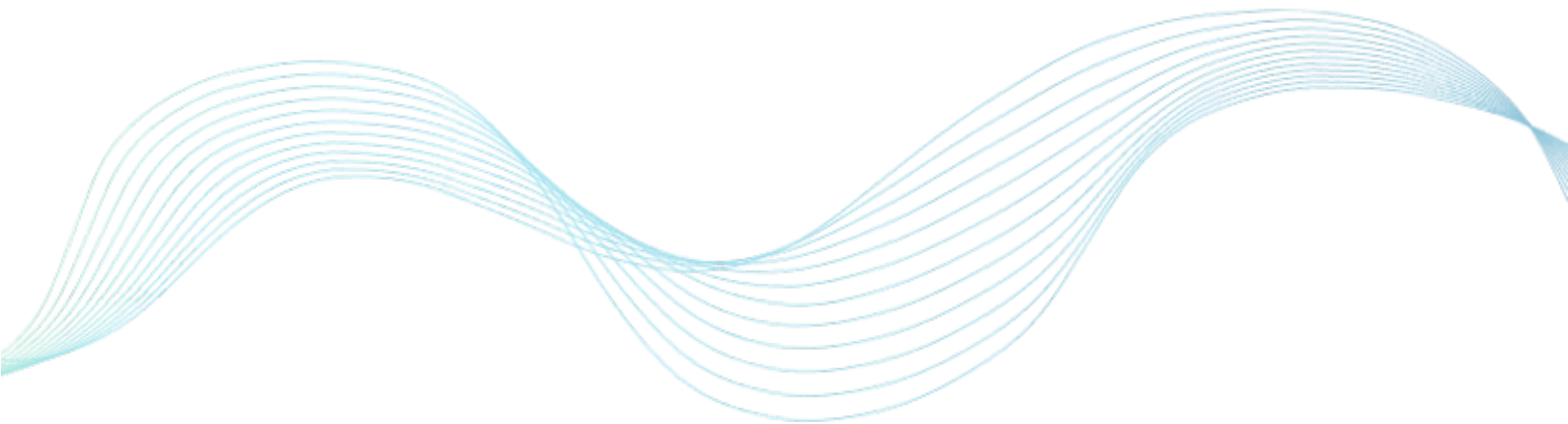


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Introduction

The deployment of 5G networks is frequently related to the installation of wireless technologies equipment and the access to radio spectrum. However, the challenges of deploying the latest mobile generation networks and enjoying their benefits also depend on a harmonization framework regulation to be established across Europe which will ensure interoperability of connectivity infrastructures across borders. Focusing on the mobility sector, such interoperability across territories through transport corridors, such as roads, rails and even waterways, is fundamental for a proper adoption and to ensure services essential for the safety and convenience of consumers.

The current white paper integrates conclusions from the first 5GMED policy-making workshop “5G along transport corridors in Europe” and internal workshops on the policy/regulation challenges of the use cases to be implemented in 5GMED.

Transport Corridors & the Path to the Digital Decade – the European Strategy

In September 2021, the European Commission has proposed a new policy programme supporting a *“human-centric, sustainable vision for digital society”*: the *“Path to the Digital Decade”*. A clear roadmap defined as *“Digital Compass”* includes clear targets to be achieved by 2030 divided into 4 points:

1. *“digitally skilled population and highly skilled digital professionals”*;
2. *“secure and sustainable digital infrastructures”*;
3. *“digital transformation of businesses”*;
4. *“digitisation of public services”*.

In the second point related to *“secure and sustainable digital infrastructures”*, the European Commission proposes that *“by 2030 all European households will be covered by a Gigabit network, with all populated areas covered by 5G”*, while in the point *“digital transformation of businesses”*, mobility appears as key ecosystem to go through digital transformation with a *“great potential for reducing traffic accidents, enhancing quality-of-life, and improving the efficiency of transportation systems, including concerning their environmental footprint”*. Therefore, among the multi-country strategic projects, it is foreseen the *“Pan-European deployment of 5G corridors”* for both rail operations and Connected and Automated Mobility (CAM) expecting it to greatly contribute to road safety and environmental ambitions detailed in the Green Deal agreement. The European programme Connecting Europe Facility 2 and the Recovery and Resilience Facility will be supporting and co-financing edge-nodes for this purpose as part of the 5G infrastructure. *“Depending on the chosen scenario (“cloud to edge” or “edge to cloud”), the deployment could range from one edge node every 200-300 km to every 50-60 km and reach a total varying between 100 and 1000 nodes (along highways) across the EU by 2030.”*

Challenges for public authorities, policy makers and regulators

5GMed cross-border corridor between Figueres (Catalonia, Spain) and Perpignan (Occitania, France) covers two transport infrastructures: highspeed train and highways. Any kind of connectivity infrastructure to be deployed in such cross-border region should have both infrastructures into account. Furthermore, the two different transport infrastructures have also very different connectivity requirements. While the connectivity should be low and continuous for the highways, the railways require high bandwidth in comparison targeting the gigabit range. Such differences should be properly tackled by regulations and regional/national policies that allow the business models of the services to be deployed to remain sustainable. In addition, there should be agreements regarding the legal framework among countries sharing borders. As an example, in Spain the Mobile Network Operators (MNOs) should cover 100% of specific roads in 700MHz frequency, while in France around 80% of coverage of the territory should be met by 2025 and 90% in 2027 in 3.5 GHz frequency. It is urgent an agreement that aligns properly in a realistic way the deployment of new infrastructure.

5GMED and other cross-border corridors projects assume a great importance in the support of public authorities and policy makers in this area. While maturing and testing the 5G portfolio of technologies and infrastructures required in cross-border transport corridors, its applications and use cases, increasing trust on the technology's capabilities. While countries define national 5G strategies, the definition of joint Memorandums of Understanding, Memorandums of Intent and Letters of Intent are best practices to start aligning on the infrastructure requirements to ensure seamless connectivity in cross-borders.

All in all, the deployment of 5G infrastructure in cross-border corridors is dependent on 3 key factors:

- Technical maturity: both performance and security
- Harmonized regulatory framework: clear alignment with European Commission recommendations that could support seamless connectivity across borders in Europe
- Sustainable business model since the public investment will not cover the infrastructures on 100%

Collection of 5GMED project challenges addressing policies and regulations issues during the definition of its use cases

Use Case 1: Remote Driving

Experience/Challenge description	Policy/regulation challenges
Remote driving relies strongly on AI	Assist vendors navigate EU's AI regulation in a Remote Driving context. Map the different AI systems expected to be found in Remote Driving with the EU AI regulation, the 'risk pyramid'.
Remote driving in high-capacity roads	Policies are needed to establish who will execute the Remote Driving and who will be responsible for the resulting actions.

Use Case 2: Road infrastructure digitalization for intelligent management of the connected and automated vehicles mobility

Experience/Challenge description	Policy/regulation challenges
Seamless Infrastructure coverage, including both radio and edge computing resources (the user should not experience any traffic hit when moving from the station to the vehicle and vice versa even if some other networks are already present (public wifi, CBTC network...))	Regulate the split between: shared network infrastructure, which is investment-intensive, whose ownership may not be frequently changed and requires long-term commitment operations, which are subject to competitive conditions
Data collection from sensor deployed in road infrastructure and treatment at the Edge.	General Data Protection Rules apply. In cross-border road sections, it is required to comply with both countries laws simultaneously at the Edge.
Circulation of Automated Vehicles on high-capacity roads.	Policies and regulations are needed to establish who will be responsible for actions resulting from vehicles driving in higher automated modes (SAE level 4 & 5).

Use Case 3: FRMCS applications and business service continuity

Experience/Challenge description	Policy/regulation challenges
<p>Continuity between the travel leg of a journey and transport hubs such as train stations</p>	<p>Consider guiding operators on co-existence between FRMCS and local area networks found for example in a train station. Co-existence with other technologies such as public wifi and CBTC networks often found in subway and train stations.</p>
<p>Current initiatives foster collaboration between mobile operators and rail operators for network sharing in 8/900Mhz along track. 8/900Mhz do not provide the required support for Gigabit Train making necessary additional initiatives.</p>	<p>Consider fostering rail investment for the support of Gigabit Train, to provide a passenger experience as at home or at work, a support required for railway success.</p>
<p>Current spectrum auctions do not require MNO investment along railway lines in many European countries. This fact combined with the lack of adequate business case for MNOs along most of the railway lines is a barrier to the support of the Gigabit Train.</p>	<p>Consider fostering rail investment in train to track backhauling at 70Ghz, for rail operational improvement services, passenger Wi-Fi internet access, and for the use by mobile operators for 5G services from cell on board and mobile Voice over WiFi.</p>
<p>Using cells at 3,5Ghz for Gigabit train support brings complexity (stacking of multiple cells in different frequencies and sites) spectrum dependency from the MNO, a lot of civil works and energy consumption, in total High Capex & Opex And slow deployment.</p>	<p>Consider fostering rail investment in train to track backhauling at 70Ghz, for the use by rail operators for rail operational improvement services and Wi-Fi to passengers, and for the use by mobile operators for 5G services from cell on board and mobile Voice over WiFi.</p>
<p>Power distribution for powering mobile telecom equipment along track represents a high proportion of infrastructure deployment costs.</p>	<p>Consider fostering the decarbonization of the telecom equipment along track, by the use of low power consumption technologies and renewable power sources.</p>

Use Case 4: Infotainment

Experience/Challenge description	Policy/regulation challenges
Use of sensible user data (speed and position)	General Data Protection Rules apply.
Consumption of media content across Spain and France	Copyright issues: some media content might be not available in one of the two countries, so we should use content that is available in both.
Media content streaming by users	Regulations related to the kind of content the user could stream. There should be a regulation (moderation) of content, which avoids the streaming of violent or not allowed content.

BEREC Radio Spectrum Policy Programme has relevant opinions on ITS and FRMCS¹. Just to state the obvious, there should be a Pan-European approach to spectrum regulation for ITS. For example, use of the 5,9GHz band and availability of a sufficient amount of interference-free spectrum. This is specially relevant given the criticality of some of the use cases (Remote Driving) and need for satellite coverage. Availability should reasonably happen at the same time across Europe. Europe may consider use spectrum in regulated but not necessarily licensed use, maybe a mix of the type of industrial spectrum use found in EU Member States (Germany) and CBRS-like schemes developed in the US. Some EU Member States have linked some of the 5G spectrum licenses to MNO minimum coverage commitments.

¹ RSPG Opinion on a Radio Spectrum Policy Programme (RSPP): https://rspg-spectrum.eu/wp-content/uploads/2021/06/RSPG21-033final-RSPG_Opinion_on_RSPP.pdf