# Huawei's contribution to BEREC's public consultation about 'BEREC 5G radar 2020-2026'

*July 2020*

Huawei welcomes the opportunity to comment on the 5G Radar 2020-2026. In this paper we present our views on several issues which are quite important in the years to come, including small-cells, FWA, EMF, sustainability and other issues that should be considered.

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## Huawei comments on relevance and timing of the developments

| | Theme | | One-liner (with reference to the paragraph in the Report on the impact of 5G on regulation and the role of regulation in enabling the 5G ecosystem | Trend | Relevance and timing | Huawei comments |
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| 1 | Privacy | Private information as cost | End-users may not understand the impact of sharing their private information in terms of the data economy in 5G. (4.2) | Gigabit speeds and other enhanced capabilities may increase user's ability to generate or disseminate private information and to generate more private information on the web. | Data will be generated only when the new services have been launched, which will take some years. **Timing: 2024.** Despite this may become a bigger issue, BEREC's role might be limited. **Relevance: Low.** | |
| 2 | Privacy | Sharing of end-user data between different actors | Increased data exchange between parties in the 5G eco system. (4.2) | Smart city use cases increase (harvesting data from different uses). Data processing actors in the 5G value chain develop but may not have a direct relationship | Data will be generated only when the new services have been launched, which will take some years. **Timing: 2024.** | |

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| | | | | with end users and therefore unable to request data processing consent directly. | Despite this may become a bigger issue, BEREC's role is not yet clear.<br>**Relevance: Low.** | |
| 3 | Security | Network and application security | Cybersecurity: higher sensitivity and dependency on 5G networks<br>(4.1) | Any vulnerability in 5G networks or applications running over 5G networks could be exploited, potentially causing serious damage to critical infrastructures and services (e.g. smart city, industry automation, e-health, logistics) and affecting the economies and societies of the EU.<br>In the IoT environment, the growing number of connected devices enabled by 5G will increase the entry points for possible network security attacks. | From early in the process, when vendors and suppliers are selected, network security is a relevant topic. Studies building on the work of Recommendation 2335, and the EU Toolbox of risk mitigating measures are relevant.<br>**Timing: 2021.**<br>This topic is high on the political agenda, and one of BEREC's strategic priorities.<br>**Relevance: High.** | |
| 4 | New business models and value chains | New business opportunities | 5G has the potential to impact existing value chains.<br>(1.1) | 5G technical developments and the increasing role of 5G across a range of industries have the potential to impact existing value chains and result in new business models beyond connectivity. They may influence both wholesale buyer and retail end-user choices in terms of providers (MNO, MVNO, WISP, other micro operators e.g. using a network slice) | New technical developments and new business opportunities resulting in changing in value chains starting to emerge.<br>**Timing: 2022-2023.**<br>**Relevance: High.** | |

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| | | | | and / or fixed network operators. | | |
| 5 | New business models and value chains | New bottlenecks, dominance and monopolies | 5G use cases may increase dependency on data for market access.<br>(1.2) | 5G is a potential driver for IoT applications with more data produced, stored and analysed, which can lead to network effects creating or strengthening dominant players (such as digital platforms) who may have incentives to frustrate access / sharing of their proprietary data. | 'New bottlenecks' is a topic BEREC has already identified in the DotEcon/Axon study in 2018. These topics are likely to intensify during the first phase of the 5G uptake.<br>**Timing: 2022-2023.**<br>**Relevance: Medium/high.** | |
| 6 | New business models and value chains | Creation of new wholesale markets | 5G could allow for new players to enter the market.<br>(1.2) | Industry automation use cases potentially increase the need for tailor-made 5G services by new micro-operators (plant wide operators, campus operators), thus creating new business models such as e.g. intermediaries that could provide wholesale access, bundle or repackage solutions for the specific industry or specific local sites with the necessary network operator. | Timing: **2022-2023.**<br>Relevance: **Medium/high.** | |
| 7 | New business models and value chains | Private/local networks | Introduction of private/local networks.<br>(1.2) | Many see an increase in revenue streams for operators to arise from the business-to-business segment where private/local networks will play an important role for certain verticals/sectors. Enhanced | **Timing: 2022-2023.**<br>**Relevance: Medium/high.** | |

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| | | | | 5G features such as URLLC and network slicing could be applied to Private/Local networks. | | |
| 8 | New business models | Network slicing and 5G wholesale markets | Higher QoS-requirements might be implemented using 5G network slices (1.1, page 6) | Industry automation and other use cases (e-health, gaming…) with specific URLLC and bandwidth needs may increase the need to be able to differentiate services with different classes of quality of services which might be supported by the use of network slicing beyond other technical solutions. These use cases will have to follow Net Neutrality regulation. | Even though the standards are still to be finalised, operators are already preparing for it. Slicing is likely to play a larger role in the near future.<br>**Timing: 2022.**<br>**Relevance: Medium.** | |
| 9 | Quality of Service | QoS-requirements of Pan-European services | How might 5G impact the operation of potential transnational / pan-EU operators. (3.1) | Pan-European services (e.g. connected mobility) will require continuous QoS and seamless handover, both within a country and between different countries. This could imply a need for increased QoS provisioning for interconnection and roaming. | The special services are still several years away. **Timing: 2024.**<br>Interconnection with proper handover based on QoS is crucial.<br>**Relevance: High.** | - |
| 10 | End-user | Transparency of information | Stronger need for information on coverage and QoS of 5G networks to enable informed choices. | The introduction of 5G enables operators to differentiate products and services in much more complex ways. Information on coverage and QoS potentially becomes more | The special services are still several years away. **Timing: 2024.**<br>QoS is strongly related to slicing. It is also important for BEREC's monitoring work to see what | We fully agree that information on coverage and QoS becomes more and more important, such information is not only valuable for verticals, but also important for personal subscribers. It is suggested that regulators require operators to provide detailed coverage and QoS information |

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| | | | | important, not only for M(V)Nos, CAPs, for IoT SPs, for verticals, but also for end users. Especially with services tailor-made for specific user groups (network slicing) it becomes crucial where and when a service is available (e.g. geographically or in a roaming situation). | operators are offering, and knowledge building.<br>**Relevance: High.** | earlier and refresh it regularly which will facilitate subscribers' selection. Special emphasis should be given to the shortcomings of crowd-sourced measurement tools like speed tests. Information is especially required where no tests or a very low number (rural areas) are performed. |
| 11 | Numbering | M2M numbers and mobile numbers | Increased demand for M2M and mobile numbers.<br>(2.4) | Massive Machine Type Communications increase. As a result, demand for numbers for M2M/IoT/MTC communication increases (given the expected increase of number of connected devices). The rising demand for devices could also lead to an increasing and potentially massive demand in other E.164 numbers (e.g. mobile numbers) and other types of numbering resources/identifiers (e.g. IPv6). | The timing and relevance may be different per Member State, depending on the market dynamics and their impact on the availability of numbering resources.<br>This is relevant to NRAs and BEREC because of involvement of NRAs in assignment of numbers inside blocks.<br>**Timing: 2022**<br>**Relevance: Medium** | |
| 12 | Numbering | Mobile Network Codes | Increased demand for MNCs, especially due to local/private networks (campus networks).<br>(2.4) | The importance of having a sufficient supply of numbering resources available to meet the demand, especially of campus networks. Verticals and intermediary operators may want to provide own SIMs, potentially leading to increased demand for MNCs. | The timing and relevance may be different per Member State, depending on the evolving business models.<br>**Timing: 2022**<br>**Relevance: Medium** | |

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| | | | | When E.212 MNCs are used for cross-border IoT/M2M applications, global MNCs under MCC 90x could be used. MCC 999 could be applied for standalone private networks where interconnectivity and roaming are not supported. | | |
| 13 | Numbering | eSIM | Using eSIM to support application implementation and switching.<br>(2.4) | Using eSIM may help in initial device provisioning and in switching between providers due to lower implementation costs when over-the-air switching is applied. The availability of eSIM is also relevant in IoT use cases with device miniaturization and deployment in high-risk and/or restricted accessibility environments. | The timing and relevance may be different per Member State. 5G may accelerate the adoption of eSIMs in more devices.<br>**Timing: 2022.**<br>**Relevance: Medium** | |
| 14 | Interoperability | Interoperability | Possibilities of interoperability of networks, including cross-border.<br>(3.3) | There will be an increased number of service providers and localized networks. It will be vital that different networks are interoperable, wherever this is demanded, especially in a context where 5G involves important virtualization of the network and increased reliance on software, notably through SDN and NFV technologies. It might require a deeper standardization process or the implementation of APIs. | First the new services need to be developed before the interoperability of the networks becomes relevant. The last standards still need to be developed.<br>**Timing: 2024.**<br>BEREC may not be involved with the standardization process, but interoperability is important for network effects, avoidance of dominance of new platforms, end-user choice, operator-lock-in etc.<br>**Relevance: High.** | |

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| | | | | Lack of interoperability could raise many issues. Notably, it could hinder end-to-end connectivity.<br>Furthermore, if verticals want to switch to a new service provider whether WISPs, MNOs, MVNOs, micro-operators or fixed providers, vendor lock in could become a more prevalent issue due to the opportunity to highly customise networks in 5G. | | |
| 15 | Roaming | New requirements for national roaming | National roaming agreements will include new requirements, such as coverage and infrastructure sharing. (2.5) | New services will become available requiring a high level of coverage and/or QoS which in many cases will not be possible to be provided by a single network or operator alone. Operators may therefore require national roaming or infrastructure sharing agreements for the new services to meet QoS requirements or coverage obligations set out in the spectrum authorization regime. This would allow an efficient use of spectrum. Operators may also wish to share the costs of deploying network elements and engage in co-investment projects. | BEREC could further explore the national provisions with regard to the use of national roaming and infrastructure sharing agreements as well as co-investments. Timing of those topics should probably be aligned. **Timing: 2023. Relevance: High.** | |
| 16 | Roaming | New requirements | 5G will contribute to the addition of new services | In the next few years, other international roaming | International roaming is crucial for the functioning of the | |

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| | | for international roaming | to the current international roaming services portfolio, such as M2M.<br>(2.5) | services than voice, SMS and data, such as IoT/ M2M are likely to play an increased role. It makes sense for the current revision of the Roaming Regulation to consider those services and investigate whether there is a need to adapt the provisions to meeting both the market and technological developments. | telecom markets across the EU EEA and BEREC has a crucial role in providing its expertise to the Commission and Co-legislators when discussing amendments for the Roaming Regulation. The work has already commenced.<br>**Timing: 2022.**<br>**Relevance: High.** | |
| 17 | Roll-out | Backhaul, fronthaul and anyhaul | Further fiber roll-out in networks.<br>(2.2) | Because of the increasing demand for bandwidth, connections to the RAN (x-haul) will mainly be realised using fibre, as well as fast wireless technologies. Stakeholders emphasize that NRAs should ensure the existing backhaul is available on reasonable terms while fibre is rolled out quickly. | Backhaul is a very relevant topic in the roll-out of 5G networks. Initially operators will roll-out backhauls to existing base stations, which may still be linked with radio waves or copper. Therefore, this topic will be relevant soon.<br>**Timing: 2021/2022.**<br>**Relevance: High.** | |
| 18 | Roll-out | Small cells | Gigabit coverage requires small cell deployment.<br>(2.3) | Small cell deployment will be necessary in order to achieve gigabit coverage. A harmonized approach for network planning and permits will facilitate roll-out. Deployment is costly and initiatives seeking to allow deployment in a cost-effective manner such as infrastructure sharing, or other co-investments initiatives will likely occur. | Deployment of small cells will be intensified with the availability of suitable spectrum. For many MS availability of 26GHz is not a priority until after other pioneer bands are awarded. The timeframe is more likely 2023. The topic of small cells may have many aspects; note that the timing may differ per MS.<br>**Timing: 2023.**<br>**Relevance: High.** | We noted and appreciated the newly released Implementation Regulation on Small cells by the Commission, which will facilitate the deployment of small cells. However, as per our study and global practice, in the scenario of a densified network in urban areas, higher powers (more than E10) and/or AAU are more efficient in terms of both performance and economic cost. In order to improve coverag and capacity in such scenarios, authorities should adopt several policies |

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| | | | | | | -Simplify procedures and shorten the approval period for building and public municipal facilities permits for mobile sites<br><br>-In the scenarios of indoor coverage by small cells, it is recommended to have a holistic view of both polices on FTTC/FTTB/FTTH and on mobile technologies. This means to adopt the technology neutral way for fiber related policies and 4G/5G polices, in order to enhance and indoor coverage.<br><br>Many issues arising out of small cell deployment are a part of the more general problem of network densification, that is already a burning one. Lessons can already be drawn of it, best-practices collected and innovative ways to deal with it could be developed already now. Therefore, the timing of 2023 should be re-considered, in particular with a view to the long legislative process on European level and the necessary implementation on national level, because the solutions require localized approaches. We suggest coping with this issue earlier. |
| 19 | State aid | Coverage | State-aid to meet coverage targets. | Extension of broadband coverage to rural areas is one of the main objectives of national state aid rules and spectrum licensing conditions. The requirements associated to 5G use cases could potentially affect existing state aid plans for broadband extension. In order to increase coverage in | Coverage is an important issue, because it involves the roll-out plans of new fiber. This happens in the beginning of the process. It is important to have clarity on state aid because it concerns high levels of investments.<br>**Timing: 2022.**<br>This is relevant for operators, and also for BEREC and NRAs. | We fully agree that extension of broadban coverage in rural area is essential to reduce the digital divide. The NRAs will usually apply coverage obligation on spectrum auction. Since it might not business profitable to deploy 5G networks in very rural area, a set of stimulation measures and incentives should be released by government and NRAs. It can be state-aid policy, infrastructure access and sharing, new site resources deployment by |

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| | | | | rural areas and to reduce a digital divide, state-aid for FWA or fibre based backhaul solutions, state-owned infrastructure or spectrum coverage obligations could for example be relevant to apply. | But BEREC's role in state aid may be limited.<br>**Relevance: Low/medium.** | government, national subsidy funding and so on. BEREC should work on the mechanisms for incentivizing the industry to roll-out. |
| 20 | Convergence | Convergence | Issue of convergence of broadcast and broadband requirements in 5G.<br>(4.3) | In the context of 5G, convergence could become an issue with advances in Release 14 principally allowing improved support for national TV services to both mobile devices and stationary TV sets over eMBMS (enhanced multimedia broadcast and multicast system over LTE) and unicast | Based on stakeholder input BEREC concludes that this technical development becomes relevant later in time. For example, BEREC notes that the use of the band 470 – 694 MHz will be reviewed c. 2025, with some MS issuing licenses for broadcasting services in this band up to c. 2030/32.<br>**Timing: 2024-2026.**<br>Stakeholder input did not give much indication of relevance on the BEREC agenda.<br>**Relevance: Low.** | |
| 21 | Convergence | Fixed-Wireless Access | FWA potentially emerging as pioneer 5G use case.<br>(1.1) | 5G Fixed Wireless Access (FWA) has emerged as one of the early 5G use cases offering gigabit connectivity. With increased capacity in the networks, operators are likely to have more opportunities to offer competitive FWA services. The technological developments will enable mobile networks to match the expectations that | Fixed Wireless Access is one of the early developed business cases.<br>**Timing: 2022-2023.**<br>**Relevance: Medium.** | FWA is valuable for MNOs and to meet the EU broadband coverage requirements, and Huawei is pleased with the acknowledgement of the role given to cellular technologies in the Draft Guidelines on VHCN and welcomes the recognized ability for both 4G/5G mobile and FWA to significantly contribute to the fast transition to the Gigabit society ambitioned by the European Commission DSM 2025 strategy.<br><br>5G FWA can provide fibre-like broadband experience. It is expected that EC and NRAs can introduce FWA into the state-aid |

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| | | | | consumers already have regarding fixed broadband services. | | guideline and national broadband technologies clearly, release incentive policy and state-aid (public funding) to encourage MNOs fasten FWA development especially in less dense areas. Since 5G FWA can play a big role in European broadband market and 5G FWA is one of the early developed use cases which can help to Europe achieve the target of gigabit society, we strongly recommend that this work could be shifted to an earlier year rather than 2022~2023, we also suggest that BEREC can put higher priority on this topic and encourage NRAs to release incentives policy and public funding to support FWA development. BEREC familiar with the industry mechanisms and competitive dynamics should start to develop proposals for incentive policies to overcome the digital divide, in which FWA can play a major role. |
| 22 | EMF | Electromagnetic fields | Increased attention for EMF.<br>(2.6) | At the EU level, the limitation of exposure to EMF is based on the Guidelines from ICNIRP (endorsed by WHO and ITU). This is updated in March 2020 to include 5G technologies and may impact the EU-level framework in 2021-2022.<br>Consistency at EU and national/local level with ICNIRP EMF exposure limits is a matter of concern for stakeholders, to avoid adverse effects on rollout and reassure public opinion | With significant attention for EMF roll-out of new base stations or upgrading of existing base stations may be impacted if scientific information on health effects is miss-communicated. Locations for roll-out will soon be selected. Recent incidents have shown that this needs our immediate attention, **Timing: 2021**.<br>BEREC is very much interested in this topic, including misinformation and fake news. Otherwise the topic as such is not in BEREC's immediate remit | We fully support and appreciate BEREC's approach and efforts combatting misinformation and fake news of EMF for 5G technologies. EMF issues have become a significant obstacle to deploy 5G network in some of countries. To satisfy the unreasonable strict EMF limits, the height of towers, poles, and rooftop poles may need to be increased, which is time-consuming and costly for operators and slows down the 5G deployment process.<br>We expect that BEREC could align with NRAs and RSPG for the EMF information based on the lasted scientific literature, to remove the negative effect on misinformation and fake news. BEREC could position itself as single – |

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| | | | | using evidence-based scientific recommendations. | and competences. **Relevance: medium**. | most trusted and independent – source of information on that topic. We also expect BEREC could have a common position on EMF limits and regulation, in accordance with the latest ICNIRP/IEC/IEEE/ITU norms and studies. |
| 23 | Environment | Sustainability | 5G as an enabler of sustainability in the face of increased network energy consumption | 5G systems have been designed to ensure higher level of energy efficiency: the energy required to process a data unit has been decreased compared to previous technologies.<br>Nevertheless, the new services made possible by 5G systems may impact data consumption, which in the end may offset what a better energy efficiency can provide in terms of overall energy consumption: the so-called rebound effect. | BEREC recently started working on sustainability and its possible role in improving it. **Timing: 2021-2022.**<br>Sustainability is high on the political agenda and relevant for all NRAs.<br>**Relevance: High.** | The power consumption is an issue both in economy and in sustainability. The MNOs as well as the whole industry are bound to reduce the 5G energy consumption to lower the OPEX, and to comply the social responsibility for a green future. In view of the situation of the industry, we welcome the attentions on:<br>- An unified, holistic and more precise evaluation model on Energy Efficiency of 5G site, RAN and whole network, such as the extension of ETSI SiteEE, GSMA benchmarking of energy consumption per mobile connection; per cell site; per unit mobile traffic; per unit mobile revenue;<br>- As data transmission is involved with energy consumption inevitably, “Zero Watt Zero Bit” is an important way to improve energy efficiency in a possible way. |

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