ZVEI:
Die Elektroindustrie

Position Paper

5G for Europe's Industry

German Electrical and Electronic Manufacturers' Association

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1. Motivation

5G – the fifth generation of mobile communication – is expected to bring a quantum leap in terms of volume, speed and security of data transmission. One of the main differences between 5G and previous generations of mobile networks is 5G's strong focus on machine-type communication and the IoT. This paves the way for numerous new use cases and applications in many different vertical domains, including the automotive, healthcare, agriculture and energy sectors, in particular industrial manufacturing and production. The 5G infrastructure will enable digital change in the European economy and society.

The ZVEI - German Electrical and Electronic Manufacturers´ Association is highly interested and involved in the future development of the 5G standard and the deployment of 5G in a wide variety of vertical industries, such as the manufacturing, automotive and agricultural sector. As a result, the ZVEI has developed a catalogue of requirements that facilitate the smooth introduction and implementation of 5G in the member states of the European Union.

2. 5G in the industrial context

5G has the potential to be the technological backbone for the future (industrial) Internet of Things and lift Industrie 4.0 to the next level by fulfilling the promised value add (modularity, flexibility of industrial production). If Europe takes the right decisions, we have the chance to create the lead market for industrial 5G and help our companies to secure their role a lead supplier for the industrial production.

To lift this huge potential of 5G in the industrial domain, certain requirements – technological and spectrum-wise – need to be met.

Technology / Standard:

Industrial requirements need to be included in the 5G standardisation. Therefore, in April 2018 ZVEI founded the 5G Alliance for Connected Industries and Automation (5G-ACIA)[1] which is the global ecosystem for 5G in the industrial domain. 5G-ACIA compromises all relevant stakeholders from OT- and ICT industry as well as academia and serves as the central and global forum for addressing, discussing, and evaluating relevant technical, regulatory, and business aspects with respect to 5G for the industrial domain. Beginning of 2019, 5G-ACIA became market representation partner of 3GPP for the industrial domain. In addition to input into standardisation, 5G-ACIA covers all relevant aspects such as spectrum and operator models, network architectures, technologies and test/validation.

First industrial requirements – focusing on massive machine type communication – will be included in 3GPP Release 16 which is expected to be final in mid-2020. Release 17, expected to be completed by the end of 2021, then focuses on core industrial requirements like latency and reliability (URLLC).

[1] www.5g-acia.org

Spectrum:

Industrial communication has certain requirements that need to be met. Until now, wireless communication within industrial factories and plants uses so called „ISM" bands with license-exempt spectrum. The underlying problem with these bands is, that many use-cases need guaranteed communication which cannot be guaranteed due to the "listen before talk" principle. A further issue is the declined availability due to the massive rise of users and applications. Industrie-4.0-applications therefore need dedicated spectrum which guarantees the specific requirements (latency, reliability, availability).

We believe that direct assignments to the end user, so called local licenses, are the best way to fulfill industry needs, like Germany and UK follow this concept, since it has the following benefits:

a. Operational safety and data protection: For liability reasons, full control over the data and access to sensors and actuators as well as full control over the implemented security and data protection measures by the factory operator is absolutely necessary. In addition, technicians from public network operators who have to maintain network infrastructure components represent a potential threat to security in certain areas of a company (e.g. with regard to industrial espionage). In addition, the legislation stipulates that the operator of a factory is responsible for its security. In addition, the factory operator needs full control over security patch updates, for example, so that these do not take place during production, but in maintenance windows specifically designed for this purpose. Although the use of security measures at the highest security level (e.g. end-to-end encryption) can reduce the need for "isolated" operation to some extent, it should be noted that three types of applications are excluded from such an application: The operation of battery-powered sensors, the migration of automation functions to the 5G edge cloud, and control applications with tight time constraints (motion control, cooperative robots, etc.).

b. Decoupling from the wide area network (WAN): In a factory environment, for example, the decoupling of production lines is an important design paradigm. It guarantees that production can continue even after a connection to the outside world has been broken. This reduces the dependency on a 5G WAN (or the core network of a public network operator) and ensures the required high quality of service under all conditions.

c. Economic and innovation aspects: Local licenses guarantee independence from the network operator in regards of quality of the networks as well as the timing of the set-up of the 5G network. This can therefore become a decisive factor for competition between different production plants. Rural SMEs and MidCaps would be particularly affected due to delayed 5G network roll-out (similar to the trend for LTE). Furthermore, industrial users are free to choose between different suppliers (mobile network operators, infrastructure providers or other players) which will foster innovation since new players on the market and business models can evolve.

It must be emphasised that spectrum is not a business model as such – as it is the case with the mobile network operators, but necessary operating resources. Therefore, costs need to be reasonable, as spectrum is only one of the cost factors for a 5G network (besides planning, set-up, deployment and maintenance).

3. Conclusion and recommendations

Industrie 4.0 and manufacturing industry stand to benefit greatly from 5G communication technologies. Various promising use cases have been outlined, with somewhat diverse and often challenging requirements. Key technologies of 5G networks have been described that are potential candidates for the realisation of 5G in Industrie 4.0 deployments. However, as great as the benefits of 5G for the industrial domain may appear, challenges of equal magnitude must still be addressed. This applies not only to the technological feasibility of key performance indicators and functional requirements of industrial use cases, but also to challenges regarding cross-industry communication, interaction, harmonisation, standardisation and regulation. The task is now to create a worldwide common framework condition for access to the 5G spectrum for industry.

ZVEI therefore suggests the EU to take the following actions:

- Foster the approach of local licenses: To lift the potential of 5G in the industrial domain, industry needs dedicated spectrum resources. We believe that direct assignments to the end user, so called local licenses, are the best way. Germany[2] and UK follow this approach. If countries don't opt for local licenses it should at least be guaranteed that spectrum leasing is laid out in the regulation (e.g as the case in Finland[3]).
- Promote a harmonised and innovative approach that fulfills industry requirements within the EU as well as in other world regions. This paves the way for European industry to create an industrial 5G ecosystem and become lead supplier and lead market for industrial 5G and Industrie 4.0

Ensure security as a key requirement. We urge for an EU-wide harmonised approach based on objective criteria that need to be fulfilled by all 5G infrastructure suppliers. An exclusion of certain providers is not useful.

[2] 100 MHz between 3.7 and 3.8 GHz are available for industrial applications and other local solutions. This corresponds to 25 percent of the allocated frequencies.

[3] This approach does not exclude public network solutions from mobile network operators, where network slicing could provide a liable solution for the industrial domain network.

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