UNIVERSITÄT BONN

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Understanding the Dynamics of Global Power Shifts

Bonn Power Focus

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All Eyes on Germany
5G Network Construction

Communication networks are a cornerstone of our globalized lives. The creation of new mobile communication standards thus has the capacity to shape the future of a nation. One would be mistaken to assume that the transition to 5G is solely about a swifter messaging of selfies. Production processes, autonomous driving, and even power grid maintenance are all interconnected with our network infrastructure. Technological and economic aspects aside, 5G standardization also affects geopolitical and security related dimensions of power.

Highlights

- *The state of the German cellular network is assessed variably, but often quite negatively.*
- *Germany is at danger of losing state power if it misses out on 5G grid expansion and hence the ongoing Fourth Industrial Revolution.*
- *Perceived intelligence threats, notably on behalf of China, are at the core of the debate on the technical implementation of 5G networks.*

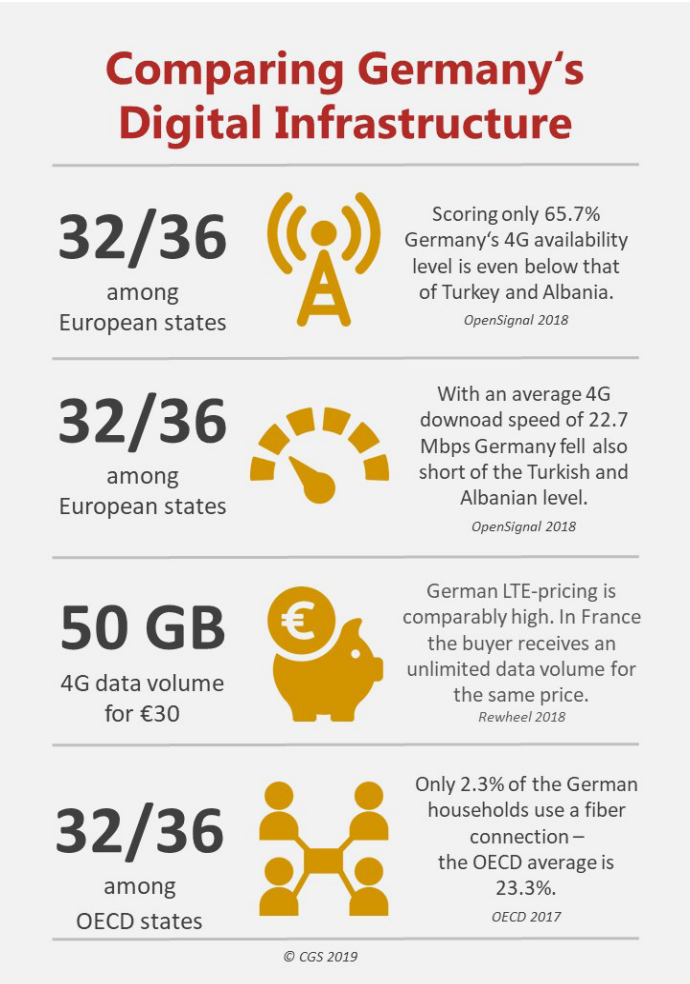
Germany Wants 5G

The Federal Network Agency's auction of 5G cellular frequencies is expected to take place in Mainz in March 2019 and will thus set the course for Germany's future. 5G revolutionizes digital telecommunication: an estimated 10 to 20 times faster download speed than 4G, a lower latency of less than a millisecond, and a more stable connection all promise near real-time communications.

The 5G grid expansion can thus be seen as a key infrastructure for Industry 4.0. 5G is the most recent generation in mobile communication which have to date emerged about every ten years: After 2G (GSM) was initially rolled out in Europe in the early 1990s, Japan developed 3G standards (UMTS) in the 2000s and 4G (LTE) was finally implemented in the US in 2010. This pioneering has been rewarded with major competitive edges for the respective economies each time, which are thus indirectly reflected in the Bonn Power Shift Monitor's ranking. The awarding of nationwide licences can therefore at times be of global importance. This is because it not only promises financial profits to the selected producers and their home countries, but also constitutes a shift towards a new industrial age.

Germany's Terra Incognita

But Germany lags behind American and Asian forerunners at the introduction of 5G. The new standard, similarly to the transition from 3G to 4G, partially builds upon existing technology and infrastructure, yet Germany – according to an OpenSignal study – already ranks low on the availability of 4G and the average download speed compared to other European countries. Only Georgia, Poland, Russia, and Belarus feature a slower download rate. The study attests Germany an 4G availability ratio of barely 66 percent. To illustrate: South Korea, Japan, Norway, and the USA all boast a ratio of over 90 percent.



German network operators deem the study's statistics questionable and claim a significantly higher 4G availability ratio as measured by the population: The Deutsche Telekom, for instance, postulates a ratio of 93 percent, Vodafone one of over 90 percent, and Telefónica cites some 80 percent. The numbers might fluctuate greatly, but as even the Bundestag publicly lamented the state of the German cellular network in March 2018, Germany gives the impression of lagging behind many of its partner states. The German government has therefore obligated providers to supply 98 percent of all German households with at least 4G standards by 2022.

Providers are referring to this combination of the supply obligation and Germany's geographic size as a reason for the significantly higher costs of the 4G rollout as compared to many other nations. According to the Finnish consultancy agency Rewheel, a German customer could buy an average volume of 50 GB LTE data for 30 Euros in October 2018, whereas the volume would have been unlimited in geographically larger France. Concerning network coverage and download speed, too, Germany's neighboring country scores higher. Policymakers are aware of this and attempt to cover the German ‚terra incognita' and promote rural areas by their 5G provision requirements. German network operators, however, feel that those political objectives are not only uneconomic, but also illegitimate. An emergency motion filed by Telefónica at the Cologne administrative court only this month could postpone the 5G auction process by several months and thus halt digital progress in Germany.

A 'Developing Nation' in Fiber Optic

Those are not the only challenges for the transition to 5G. 5G antennas have a smaller reach than those of previous generations because the frequency ranges of 5G wavelengths are shorter. Consequently, an exhaustive supply with the new standard is costlier by far than with LTE, as the number of cells to be deployed is many times higher. To use 5G technology to its full extent, the linkup of new antennas with the fiber-optic network is additionally required.

Germany, however, has a lot of backlog concerning fiber optic expansion and is even considered a 'developing nation' in this regard. For illustration: South Korea and Japan boasted a 76 percent share of fiber optic in all broadband connections in late 2017 according to OECD numbers, while Germany achieved 2.3 percent. The USA and France scored about 13 percent. According to the Federal Ministry of Transport and Digital Infrastructure, a mere 8.5 percent of German households are connected via fiber optic. Germany hence significantly lags behind its international counterparts on both the potential and actual usage of fiber optic. It is argued that civil engineering options are scarce, thus also raising the costs of laying fiber optic cables. The German government nonetheless aims at a nationwide provision of gigabyte-ready networks by the end of 2025. Faster connections are even to be supplied to commercial areas, schools, and hospitals within this legislative period. Given the indicated backlogs on the fiber optic expansion, the achieving of these objectives is in question and the exhaustive provision of 5G networks unlikely to be accomplished soon.

Germany in Two Minds

The implementation of 5G has already launched in other countries: At present, China is deemed to be at the forefront, followed by the USA, Japan, and South Korea. This is especially due to the fact that crucial components of this structural transformation are mainly produced by a few companies only, namely by Ericsson (Sweden), Nokia (Finland), CISCO, Verizon (both USA), Samsung (South Korea), and Huawei (China). At the core of the German debate on the 5G provision thus also is the question of how to deal with Chinese technology. On the one hand, Huawei is considered upfront on 5G technology and has already signed 30 commercial contracts on the 5G setup worldwide. On the other hand, the intelligence alliance »Five Eyes« comprising the United States, the United Kingdom, Canada, Australia, and New Zealand has warned about using Huawei's technology. The tech company is suspected to pass along sensitive data to Chinese intelligence which consequently would be able to deliberately spy out data or sabotage critical infrastructure.

The US and Australia have already barred Huawei from the installation of 5G. In Canada and the UK, similar to Germany and recently also Japan, Huawei components are allowed for restricted use only, while a complete exclusion is under discussion in said countries. Germany is in two minds on this issue regarding both geopolitics and economic strategy. Huawei-made technology is in use in all cellular networks except government networks, although components made in the US have also been removed from the latter after the Snowden leaks.

Huawei itself denies all allegations of espionage and has established a security lab in Bonn for their rebuttal. Here, the company offers insights into its software's secret source code to third parties. The Federal Office for Information Security has also yet to find solid evidence for intelligence activities. Although security risks persist for already existing networks, the issue has become a tightrope walk for Germany due to the firm stand taken by its allies, in which it is necessary to gauge economic, technological, and political aspects and to convey them diplomatically.

At times, the geopolitical dimension of China's rise as the second largest global power next to the USA is raised as a crucial question in telecommunications without considering commercial aspects for Germany. The expansion of network security capacities such as the Cyber Security Cluster in Bonn might contain the political bogeyman of espionage by an effective shield of encryption and cyber deterrence. However, Germany is said to be lagging behind in this area as well and in need to make additional human and technical investments.

Sluggish Transition Instead of Revolution

Transitioning to the age of gigabytes is not only essential for Germany to stay an innovation hub and to keep or even expand economic power capacities accordingly. What's more, it is an issue of national security. The rollout of 5G means more than a seamless surfing experience at home. It affects a complex of political, technical and economic aspects, in connection with which Germany gained an infamous reputation due to its comparably weak performance, even though it actually has all the necessary capabilities for a successful fourth revolution.

Christiane Suchanek
Sebastian Trautwein

Center for Global Studies (CGS)

The Center for Global Studies (CGS) of the University of Bonn explores the phenomena of power and power shifts in International Relations. The Bonn Power Focus regularly investigates strategically relevant dimensions of power.

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The data of this analysis are largely based on the systematic evaluation of the following sources:

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