Explained:

5G – what does it mean for Norway?

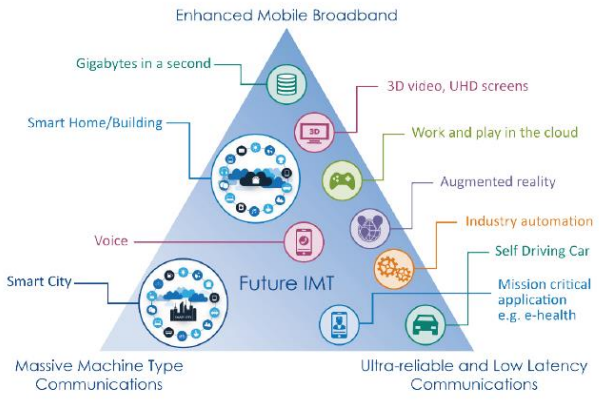
5G is the fifth generation of mobile networks. While the third generation gave us data and mobile apps, and the fourth generation provided video streaming, 5G will have significant implications across several dimensions:

- **Higher speed:** 5G will be 10–100 times faster than 4G and comparable to fibre networks. This will drastically improve the mobile services of today, along with facilitating for future applications such as virtual and augmented reality.

- **The Internet of Things (IoT):** The number of connected units per square kilometre can increase from 1,000 to one million. Data from sensors will provide raw data for machine learning, industry and new services.

- **Low latency:** The delay in the net is expected to decrease from 30-50 milliseconds (4G) down to 1 millisecond. This enables operations that require a high degree of precision, such as surgery, to be done from a distance.

- **Guaranteed capacity:** The 5G-network facilitates for the use of software that can guarantee capacity in the network for e.g. emergency services.



Possible areas of 5G use (Source: ITU).

5G

>> is faster, more precise and can handle far more connected units
>> can provide smart cities, new industry and e-health
>> requires frequencies and big investments
>> raises questions about digital divides and security

OPPORTUNITIES WITH 5G

Much like with the Internet, it is difficult to predict exactly how 5G will be used. Along with better mobile broadband, the technology allows new areas of use for both private firms and the public sector.

Industry 4.0

New sensors can deliver data about goods and products all the way from raw material to production, distribution and use. This opens up opportunities for small factories, prediction of maintenance, as well as documentation of quality and carbon footprints. 5G also makes it possible to oversee and control facilities with high resolution video where it is difficult to pull cables, such as oil platforms.

Smart cities

Smart cities use digital tools and data analysis to organise the life of the citizens, businesses, and the public sector in new ways. 5G and the Internet of Things can lay grounds for better urban planning, efficient and green transportation, smart energy and renovation, and increase citizen involvement.

Emergency response

The current Norwegian emergency network is primarily created for voice communication. With 5G the emergency services can reserve their own individual networks and exchange texts, photos and videos, and thereby strengthening their understanding of a given situation. The emergency services will have full capacity in their part of the network, even in festival areas with thousands of mobile network users.

Health

It is a political goal to use technological solutions for remote monitoring and measurements. 5G will guarantee the necessary availability and security in the network. Medical equipment, such as

ultrasound machines, can be controlled over the 5G-network so that doctors can make accurate diagnoses and do surgery with minimal delay.

STATUS

We are currently seeing a race to launch 5G early. China, USA, Japan and South-Korea are all heavily invested. Chinese authorities are facilitating for experimentation and investing massively in infrastructure.

In Norway, the government aims to spend 150 million kroner to free up potential frequencies in order to accelerate the rollout of 5G. The technology is already being tested in Kongsberg, Elverum and Oslo. The telecom operators Telenor, Telia and ICE all have plans to launch 5G in Norway during 2020. The Nordic ministers have also signed a letter of Intent for the Nordic region to be the first and most integrated 5G-region in the world.

Implementation of the 5G-network generally depends on three elements:

- **International regulations** decide how network components and user equipment communicate. 3GPP is responsible for the standards and the most central standards are expected to be ready towards late 2019 or early 2020.

- **Different types of frequencies** are necessary for a comprehensive 5G network. The operators can use existing frequency allocations as well as purchase rights to new frequencies from the government. Some frequencies are being auctioned during spring 2019.

- **Investments** in the physical infrastructure is expected to be higher than for 4G. To offer the Internet of Things in the high frequency bands in urban areas will require 15–20 installations per square kilometre, in contrast to the 2–4 of today. The cost could therefore be 4–6 times as high.

RELEVANT QUESTIONS

Business- and district policies

The 4G-network today covers more than 99% of the population and was deployed by two operators, without any public subsidies. Even though 5G will play a key role in the digitalisation, the expansion is associated with uncertainty of future use, along with high investment costs.

According to the International Telecommunications Union (ITU), this could mean that commercially attractive areas, such as big cities, will be prioritised, causing greater digital divides.

Therefore, ITU encourages a review of the digital policy. For Norway, this could include the following:

- **Frequency management:** Through frequency allocations the government can ensure efficient societal utilisation of the resources and increase the mobile broadband coverage in the country. For instance, there are coverage requirements alongside set railway- and road stretches.

- **Public procurement in big projects:** By investing in the new generation of emergency networks and new types of health services, the government can contribute to the distribution of the 5G-network.

- **Contribution scheme:** A similar arrangement as the subsidies for broadband can prevent an uneven distribution of the 5G-development, for instance to support SMBs.

- **Local authorities** can facilitate for 5G-development by e.g. making areas available.

Security

As 5G may be used in areas such as health, industry and emergency communication, it will become critical to society. This raises questions of which security obligations the providers should abide to.

In that regard, the role of the industry leading Chinese firm Huawei, has been debated. The Chinese Intelligence Law obligates both private firms and individuals to cooperate with Chinese authorities if they are asked to.

American authorities have banned Huawei products and encourage their allies to be vigilant and ban firms threatening the integrity of the infrastructure. The EU-Commission has yet to take a stance, but will do so in October, based on national risk evaluations.

The Norwegian Government has not yet decided whether the security legislation disqualifies Huawei from being a provider to the 5G-network. The Minister of Digitalisation is currently in dialogue with the operators Telenor, Telia, and Ice regarding security demands to equipment providers in order to reduce vulnerability in Norwegian networks.

Net neutrality

The opportunity to reserve capacity in the 5G network opens for new services and business models. This can challenge the principle of equal handling of all traffic on the Internet, known as net neutrality.