IMPACT OF 5G AND KEY INSIGHTS FOR 2020

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5G is much more than just another G. It will create a big impact for enterprises.

The world's economy is at another pivotal moment. A key catalyst for growth will be wireless connectivity enabled by 5G networks. In comparison to the adoption of 4G, the introduction of 5G technology will be driven by the enterprises, not by the consumer marker. 5G makes it possible to connect and interact with billions of devices of almost any kind. That will influence every element of how enterprises are operating. Early adopters will have the chance to sustain a long-term competitive advantage. IHS Markit is expecting that 5G will have an annual global economic output of $13.2 trillion by 2035.

WHAT IS IN FOR BUSINESSES?

In short, 5G is improving 4G performances with a factor of ~10. With its superior features such as enhanced Mobile Broadband (eMBB), Ultra-Reliable and Low-Latency Communications (URLLC) and Massive Machine Type Communications (mMTC), 5G is expected to revolutionize the industrial landscape.

These technological revolutions will enable use cases like:

- Smart 5G helmet for maintenance inspections in manufacturing
- Immersive event experiences on public spaces (with AR/VR content)
- Wireless tele-surgery in healthcare
- Smart field operator for ports/logistics hubs
- Autonomous vehicles

These and many other 5G use cases will transform your business into a connected organisation anywhere, anytime, and on any device.

Other important benefits of 5G are cyber security by design, network slicing to support your quality of service needs, and the option to have a private 5G network, which will give you full control.

In summary, 5G is transforming the way organisations, institutions and cities work and unlike previous generations of mobile technologies, it is bringing billions of "things" online and delivering new levels of insights and automation in a cost-effective manner. This will enable the connected enterprise and provides the detailed (near) real-time data in a reliable manner to make timelier and exception-based decisions.

(AIR)PORTS – THE HOTBEDS OF PRIVATE 5G IMPLEMENTATION

The majority of the largest seaports have fixed machinery and equipment that can connect to networks over cables. However, port operators also need to track and communicate with hundreds of straddle carriers and vessels not to mention thousands of employees in a complex ecosystem. For this a reliable, secure, and private network in needed. Further, port managers need to track multiple data points for tens of thousands of goods such as containers: the exact location, whether it has cleared customs, whether it is at the right temperature, whether anyone has moved or opened it, and so on. Moreover, all this must be realised in areas within several square kilometres, filled with moving metal objects and radiofrequency-emitting devices.

Considering such operations, the future of connectivity can provide the solution, with 5G at the forefront. 5G is expected to work in these harsh environments, whereas for other communication technologies, such as 4G and Wi-Fi, it is not so straightforward given range, bandwidth and resilience considerations. Furthermore, security, flexibility, and price considerations will likely drive these organisations to want to control their own networks. Deloitte predicts that ports, airports, and similar logistic hubs will generate about a third of the 2020–2025 private 5G market and they will be among the early adopters of this new technology.

Let us take a closer look to what some of the innovative ports around the globe are actively working on:

Port of Hamburg, Germany

The EU 5G Mobile Network Architecture research project (MoNArch) installed a 5G network on the TV tower of Hamburg and set up a 5G network in the Port of Hamburg. Goal of the project was it to test three different applications:

1. **Real-time monitoring of environmental data.** To monitor and analyse motion and environmental data over a large area of the port, sensors where installed on three ships. These Sensors were connected to the 5G network.
2. **Traffic management.** To guide trucks faster and safer through the port, traffic lights were connected to the 5G network to enable remote traffic flow control.
3. **Transmission of 3D AR.** Proof the ability of 5G to transfer large files in seconds. The successfully test of 5G enabled 3D glasses proofed this. The glasses allow operators to receive and view augmented reality 3D models of e.g. constructions and get video remote support.

Port of Antwerp, Belgium

The country's first 5G stand-alone test network has been deployed in the Port of Antwerp. 5G stand-alone networks have the benefits comparing to not-stand-alone networks (based on 4G core) to enable the full potential of 5G e.g. network slicing and ultra-low latency. The Port of Antwerp, the companies Borealis and Covestro started to co-innovate to develop real-life applications, utilizing the full potential of 5G at Orange´s Industry 4.0 Campus.

Deloitte Belgium is advising the Campus members on shaping and realising the business potential of 5G. In the first wave, the following Proof of Concept (PoC) will be tested in the port area:

1. **Connected tugboat.** To enhance the vessel towing process of tugboats the boats will be equipped with high-level definition radar cameras. The recordings will be broadcasted via 5G to the control room. The operator can control the cameras remotely in real time and act immediately on the information.
2. **Smart field operator / mission critical communication.** A smart field operator can leverage the 5G Technology to work more efficient and secure. This PoC will test the following use cases:
   - Receive visualisation of the digital twin of the infrastructure
   - Receive remote assistants from the control room
   - Real time monitoring via video surveillance.
   - Guaranteed Mission critical communication e.g. in case of emergency.
3. **From sensor to cloud.** The contaminant tracker is an application that automatically detects quality issues in chemical production. The application sends the needed data via 5G directly from the sensor to the cloud where it is processed further. This reduces the complexity of the network set-up.

Port of Shanghai Yangshan, China

During 2019, China Mobile, Shanghai Zhenhua Heavy Industries, and Huawei embarked on a 5G pilot trial in the Port of Shanghai.

Improving container transfer efficiency is one of the main objectives of ports. In Shanghai a rubber-tyre gantry crane was identified as the first priority to optimize. In this PoC, operators tested the real-time remote control of this crane via 5G. Once fully implemented this will greatly improve efficiency and operators' safety.

Port of Qingdao, China

Ericsson, Shanghai Zhenhua Heavy Industries, and China Unicom were executing a 5G smart harbour project at the Port of Qingdao in late 2018. The use cases included:

- A remotely operated ship-to-shore crane that lifted a container over a 5G connection
- 5G connection to 30 high-definition cameras
- Remote control of a programmable logic controller (PLC)

Port of Rotterdam, Netherlands

KPN, Shell, Huawei, Ex-Robotics, Accenture and ABB have worked with the Port of Rotterdam Authority to test the industrial applications of 5G. These tests included preventive maintenance of 160,000 kilometres of pipelines with 5G connected Ultra-High Definition (UHD) cameras where machine learning analytics was used to predict maintenance needs accurately.

WHAT NEXT FOR 5G?

Of course, the transition to 5G will not happen overnight. Initially, 5G adoption by businesses will be selective. The early use cases will likely involve the replacement of existing private local area network (LAN) solutions, as 5G will improve on their capabilities and increase flexibility and scalability. This means that, 5G will work alongside the 4G infrastructure backbone and the existing enterprise networks, filling in the gaps and ensuring that connectivity is always available to manage the information flow at scale.

Across Europe, it could take years for the necessary spectrum to become available. For example, in the Netherlands the 700MHz spectrum band is set to be auctioned during June 2020; and higher-capacity frequencies – 3.5 GHz – with the revolutionary 5G characteristics (such as uRLLC) is to be auctioned during 2022. Once fully deployed, 5G will be able to offer greater privacy and safety than Wi-Fi, while also delivering a more reliable quality of service.

In summary, 5G is set to transform the way enterprises work, primarily because companies can mould this adoptable technology to meet their specific needs. Adding connected sensors and actuators to everything from small tools to large machinery will enable the internet of everything. Unlike previous generations of mobile technologies, 5G is designed to bring billions of things online and deliver new levels of insight and automation.

ABOUT THE AUTHOR
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Thomas Uyttendaele is Senior Consultant within Deloitte Consulting with extensive experience in large-scale technology-enabled business process transformation and has specialized in I4.0, (Industrial) Internet of Things and Digital Supply Chains. Thomas is focused on connected infrastructure and has implemented multiple IoT solutions for ports and within the maritime industry.

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