

How 5G will supercharge Dutch industry

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01. Supercharged 5G New opportunities in the Rotterdam - The Hague area



From its conception, 5G was designed for industrial use, marking a departure from previous mobile network generations. Downloads run up to a hundred times faster through up to a thousand times more bandwidth with considerable latency reduction between devices. The successor to 4G paves the way for completely new business models: technologies that were until recently considered almost impossible to implement effectively, will soon offer a wealth of new possibilities. 5G is bound to create opportunities across many sectors and propel new innovations onto the market.

AI farming with harvesting robots, inspection drones and software that can turn any phone into a hearing aid: just a few examples of the many innovations that 5G can facilitate or optimise. The newest network generation is poised to accelerate the largescale introduction of the Internet of Things (IoT). Jos Maccabiani, Senior Business Developer Digital Technology at InnovationQuarter, explains: "IoT devices exchange data, primarily using wireless networks. Making this

data accessible requires good connectivity and a lot of bandwidth. That's exactly what 5G offers."

02. The advantages of 5G Mobile connections that suit your service

< 1 ms

Potential response time: 5G has the potential to have a response time of less than 1 millisecond, while 4G's response time ranges from 60 to 98 milliseconds. With the massive increase in bandwidth, 5G allows for the transmission of massive amounts of data and for connecting a much larger number of devices simultaneously. The connections are more secure, more reliable and tens of times faster. 5G is a combination of various existing and new technologies that can be applied selectively to get the optimal type of connection for each specific application.

Consider unmanned vehicles: if they cannot respond to their environments fast enough, it might lead to dangerous situations. Or consider robots used at petrochemical plants to detect explosive gasses. They require enough bandwidth to send data from high-resolution cameras to the analysis software. The new 5G technologies, such as network slicing and edge computing (see box below), enable completely new applications.

How does 5G work?

There are a few key differences between 5G and previous mobile network generations.

► Using 5G, mobile telecom networks can be tailor-made using software. This enables network slicing, for example: creating independent virtual networks that can each be configured with separate parameters, such as capacity, the number of devices that can connect to the network and the inter-response time between connected devices (latency). If one slice is overloaded, other slices are unaffected. Network slicing also allows the parameters of a network to be fine-tuned for its users. ► Another key difference is edge computing, which brings computation closer to the 5G antenna, the source of data. As the information only has to travel a short distance, latency is reduced and a lower bandwidth capacity is required throughout the network.



Innovation catalyst

Because of its many advantages, 5G has been hailed as the catalyst for data-driven innovation. '5G opens up solutions for collecting and processing data that are impossible with 4G, WiFi or other wireless technologies. With 5G I therefore expect to see rapid uptake and deployment of sensor networks, autonomous drones and robots", expects Maccabiani. Important drivers for robotization and automation are increasing productivity, but also the lack of skilled workers for the traditional way of working. "In horticulture, for example, there are not enough workers to harvest crops in the greenhouses, resulting in lower revenues. It is there that you see increased interest in harvesting robots - robots that are able to autonomously harvest the ripe tomatoes or strawberries and leave unripe fruit on the plants. Without those technologies, your business will soon fall behind the curve.'

Transition to 5G

Pascal Heijnen, senior consultant for 5G and IoT at TNO, notes decisive action is essential for entrepreneurs to seize opportunities and stay ahead of the game. He explains: "In less than two years, mobile operators will have stand-alone 5G networks available throughout the Netherlands. They will no longer require 4G as a backup, which is currently the case."

The transition to 5G is not as simple as with previous generations. "5G has a different network architecture, allowing data and applications to be placed at the edge of the network", says Heijnen. "With previous mobile networks, these were placed centrally, which meant they stayed the same during the transition from 3G to 4G. The shift to 5G is no longer plug and play; it requires serious adjustments." He advises businesses to begin researching 5G as soon as possible and urges them to consider three questions: What new opportunities does 5G offer? How can we ensure our applications are properly adapted? What will these opportunities bring?

03 Fieldlabs Experimenting with the latest 5G technology

To drive private sector research, seven existing field labs in the Greater Rotterdam-The Hague area have been equipped with 5G facilities. Using these labs, small and medium sized enterprises in the region can test their 5G applications in a real-world setting. The Do IoT Fieldlab, affiliated with TU Delft, has the most modern 5G facilities, with antennas, modems and appropriate technical expertise for experimentation.

"Our facilities can give businesses a leading edge", says Lenneke de Voogd, programme manager at Do IoT Fieldlab. "And you can experiment with more than just 5G here. You can even work together with scientists to develop the network technology of the future as we move towards 6G."

The 7 regional 5G field labs:

- The Green Village, Delft (using Do IoT Fieldlab's 5G network)
- Unmanned Valley, Katwijk aan Zee (using Do IoT Fieldlab's 5G network)
- ▶ Tomatoworld*, Honselersdijk
- Duurzaamheidsfabriek*, Dordrecht
- ▶ RoboHouse*, Delft
- ▶ KPN Innovation Playground, Rotterdam
- ▶ T-Mobile 5G Field Lab, The Hague

* The 5G facilities at Tomatoworld, Duurzaamheidsfabriek and RoboHouse are currently being built.





creating sensor-based impact

Stand-alone infrastructure

Do IoT Fieldlab's network has a stand-alone infrastructure. "It's a private network, so it's not part of the public 5G network", explains De Voogd. "It functions completely independently in a secure environment – the TU Delft Campus and Unmanned Valley in Katwijk, in our case. The data never leaves this private network."

To promote knowledge exchange and the continued development of 5G towards 6G, Do IoT Fieldlab is working closely with other Dutch knowledge and research partners and 5G field labs, including 5Groningen and 5G Hub in Eindhoven. The field lab in Delft also functions as an expert desk for both business and government, answering questions about the latest network technologies to make them as accessible and hands-on as possible.

The Green Village: sustainable living

One of the seven regional 5G field labs is located at The <u>Green Village</u> in Delft, where sustainable innovations for the urban environment are being developed. These include solutions for the energy transition, climate adaptation, smart cities and smart homes. This is where <u>Audus</u>, a start-up from Wassenaar, is currently working with Do IoT Fieldlab to test and develop unique software to improve the audio quality of online speech applications such as video calling. This software will be able to turn any phone into a hearing aid by modulating sound.

"With 4G, there is a delay in the audio because of the communication between your phone and the server running the software", explains De Voogd. "The delay is negligible when you're just listening to someone, but it's too significant for live conversations. The fast response time of 5G is a prerequisite for this innovation."





Unmanned Valley: drones and autonomous vehicles

Two years ago, TU Delft and the municipality of Katwijk opened a unique testing site for drones and autonomous vehicles at the <u>Unmanned Valley</u> field lab. Located at former Valkenburg Naval Air Base, this area has its own air traffic regulations, making it the only site in the Netherlands that allows for the continuous, flexible flying of drones.

The BeachBot and the SwarmBot by <u>TechTics</u>, a company from The Hague, are two innovations that are currently being tested at Unmanned Valley together with Do IoT Fieldlab. These autonomous vehicles scour Katwijk beach, detecting and picking up litter. Both robots function autonomously, but they still require improved remote controlling to accurately grab things. The reduced latency and the larger capacity of 5G enable improvements, not least the use of a 360-degree video stream while driving and better control of the litter gripper.





Tomatoworld: data-driven horticulture

For almost 15 years, tech companies and researchers have been using <u>Tomatoworld</u>'s Westland greenhouses to test horticultural innovations. Working with Do IoT Fieldlab, a 5G network is being created for the development of future-proof horticultural technologies.

<u>Gearbox Innovations</u> would like to use the field lab to advance its GearSense. This virtual cultivation advisor can bring us one step closer to data-driven horticulture: cameras with smart software which can count and measure factors such as the growth speed and temperature of plants and fruits. A good wireless network will increase deployment of this innovation. Without 5G, wiring is needed, as the reach of the antenna, the bandwidth and the reliability of the wireless network would not be sufficient to process the camera images.

Duurzaamheidsfabriek: Industry 4.0

The <u>Duurzaamheidsfabriek</u> at Leerpark in Dordrecht offers innovation space for digital applications in the manufacturing industry, also called Industry 4.0. In addition to water jet cutters, 3D printers, welding robots and tools for virtual and augmented reality (VR and AR), the location will soon feature 5G facilities provided by Do IoT Fieldlab.

SenseGlove, a TU Delft spin-off, has already expressed interest in using these 5G facilities to test its innovative VR glove. Using force feedback and motion tracking, the glove allows users not only to see virtual objects and tools but also to hold, push, touch and squeeze them as if they were real. It will enable production workers to master complex tasks in a virtual environment.

"Such a training environment only works if the virtual world responds to your movement directly", says Maccabiani. "Today, it requires complex and expensive physical setups. 5G's reduced latency will make it possible to send the virtual world to the VR headsets and gloves in real time."



04. Innovation support Subsidy for 5G innovation in a field lab

To boost the development and scale-up of 5G applications, the Opportunities for West (Kansen voor West) programme has made a grant available in the form of Do IoT Vouchers for 5G innovation in the Greater Rotterdam-The Hague area. The vouchers have a value of between €10,000 and €50,000 and cover the cost of working with Do IoT Fieldlab and the use of material and equipment.

The vouchers also give access to mentoring and promotion of the project, spearheaded by InnovationQuarter. Mentoring consists of a collaboration with 5G experts from leading organisations like TNO and TU Delft as well as support for experiments at the Do IoT testing facilities. "The vouchers connect their recipients to a large and relevant network", says Maccabiani. "Through this programme, all participating parties aim to empower 5G innovation in the region."



Vouchers still available

Various tech companies and their partners have already received vouchers, including the aforementioned Audus and TechTics. Applications are still open for new project consortia which must comprise at least one tech company, one field lab and one end user. Maccabiani notes: "Applicants don't have to formulate their development plans all by themselves. InnovationQuarter and Do IoT Fieldlab can offer active support."

The innovation programme aims to bring the unique facilities and the wealth of expertise the region has to offer within the reach of forward-thinking companies. Maccabiani states: "If you want to remain an industry leader, now is the time to start transitioning to 5G. As there are currently no industrial sites with direct access to the network, the vouchers are a ticket to closing the gap."

Don't wait too long

5G experts and supporters are urging entrepreneurs not to wait too long to investigate the possibilities and applications of 5G. "It offers valuable opportunities, but it will also come with new requirements for tech company products", says Maccabiani. He recommends that entrepreneurs make the right investments at the right time and take steps in drafting a road map for research and development.

Maccabiani concludes: "Think about what you can do now and how you can apply 5G within your company. And make sure you benefit from this unique network of partnering regional 5G field labs. Those two years will fly by."

Contact us

Do you want more information? Could you use some help scaling up your 5G idea? Do not hesitate to contact us. We are happy to tell you more about the <u>potential of 5G</u> and the subsidy scheme.



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