Cover Story

5G

Between false hope and real possibilities

TEXT Stéphane Etienne / Hypallages Sàrl (Internet marketing service in Luxembourg City)
TRANSLATION FROM FRENCH Martin Davies / Hannah Ekberg

Since October 2020, the four operators who won the bidding for the allocation of 5G frequency bands have been working hard to meet the precise timetable set by the Luxembourg government. By 2025 at the latest, they must have covered the entire country. The first sites of this new mobile network have already been launched in Luxembourg City and are currently being developed in Ettelbruck, Diekirch and in the south of the country. Beyond an imaginary future so vaunted by supporters of 5G, what advantages can companies derive from it? Should we really consider 5G a game-changing technology? The answers to these questions reflect this new technology itself: they are complex and open to debate.

Inaugurated in September 2018 by the government, the national 5G deployment strategy is part of the 'Digital Luxembourg' initiative. Its main objective is to position the country as a 5G pioneer. To implement this strategy, the Grand Duchy has put in place an ambitious roadmap. In June 2019, the first call for projects was launched to facilitate the emergence of innovative technologies and services based on this new mobile communication network. In July 2020, the Luxembourg Institute of Regulation (*Institut Luxembourgeois de Régulation, ILR*) auctioned the allocation of frequencies in the low (0.7 GHz) and middle (3.6 GHz) bands intended for the deployment of 5G in Luxembourg. Four operators ultimately won contracts. In early July 2021, a second call for projects was launched ahead of the '*Connecting tomorrow – 5G, broadband and beyond conference*'. This conference will, after those held in 2018 and 2019, be the third of its kind organised by the Ministry of State's Department of Media, Telecommunications and Digital Policy and will be held at LuxExpo The Box, Kirchberg, Luxembourg and online from 5 to 7 October 2021. It will address not only 5G technologies and ultra-high-speed networks, but also other communication technologies such as *Quantum Key Distribution* (QKD). By 2025, 5G will be present in the major cities and towns, along the major transport axes, and in all the strategic areas in Luxembourg.

Huge project! But what exactly is 5G? What is behind the name and what are the various technical solutions associated with it?

What are we talking about?

5G is the fifth generation of mobile networks, succeeding the 2G, 3G and 4G technologies. The latter, also called LTE for Long Term Evolution, still prevails today. The first technologies only allowed voice calls and then SMS. The following generations have made it possible to develop new uses such as connecting to the Internet, accessing applications or making video calls.

5G differs from its predecessors by a significantly increased speed of data transfer and an extremely reduced latency time. For comparison, 5G will theoretically be ten times faster than 4G, with a speed above 1 Gbit/s on average per user. For example, it will take about 50 seconds to upload a 2-hour (6 GB) movie to a streaming platform. Even more remarkable than its speed is 5G's latency – its reaction time. It is almost in real time, which is to say much less than 10 milliseconds. These two advantages combined will allow higher speed, faster access and a greater number of simultaneous connections.

'By 2025, 5G will be present in the major cities and towns, along the major transport axes, and in all the strategic areas in Luxembourg.'

Like all wireless technologies, 5G relies on electromagnetic waves that travel through space. These waves are distinguished by their length and frequency – the number of times a wave oscillates in a second (measured in Hertz, 1 Hz corresponding to one oscillation per second). The shorter the wave, the higher its frequency and the more information it can carry in a given time. 5G will transmit on different frequencies, grouped into bands (low band around 0.7 GHz, middle band around 3.6 GHz and high band around 26 GHz). In the initial phase of the 5G network deployment, the frequencies used will be close to those of 2G, 3G or 4G (in the 0.7 GHz and 3.6 GHz bands). Subsequently, higher frequencies will be used depending on performance and capacity requirements. Currently, in Luxembourg, the July 2020 auction only granted licences to operators for the low and middle bands.

5G and coronavirus

While it is legitimate to ask questions about the impact of 5G, we should not believe the craziest rumours circulating on the Net, especially those linking the deployment of this technology and the pandemic. 5G has been accused of spreading the virus. For some, the current health crisis is just a pretext for the development of a deadly vaccine that can be activated by 5G radiation, the objective being a massive depopulation of the Earth! Others believe that there is no such thing as COVID-19, the symptoms being caused by 5G emissions. Faced with such allegations, one could be tempted to laugh, but they have led to acts of vandalism. Several hundred 5G antennas have been damaged in this way in Europe.

Wearable sales are exploding!

What with working from home, connected activities at home, and a new relationship with health, the health crisis has changed our daily lives and, with it, our consumption of '*wearables*'. These connected products, in the form of clothing or accessories that we wear such as wireless stereo headphones, smart watches, smart patches or virtual reality headsets, are said to be on the rise. According to consulting firm Gartner, the market would have grown by 70% in 2020 to reach USD 69 billion. Before the crisis, the same firm was betting instead on a market of USD 51.5 billion, an increase of 27% compared to 2019. According to Gartner, this craze for ready-to-wear connected objects is unlikely to fall back in the coming years.


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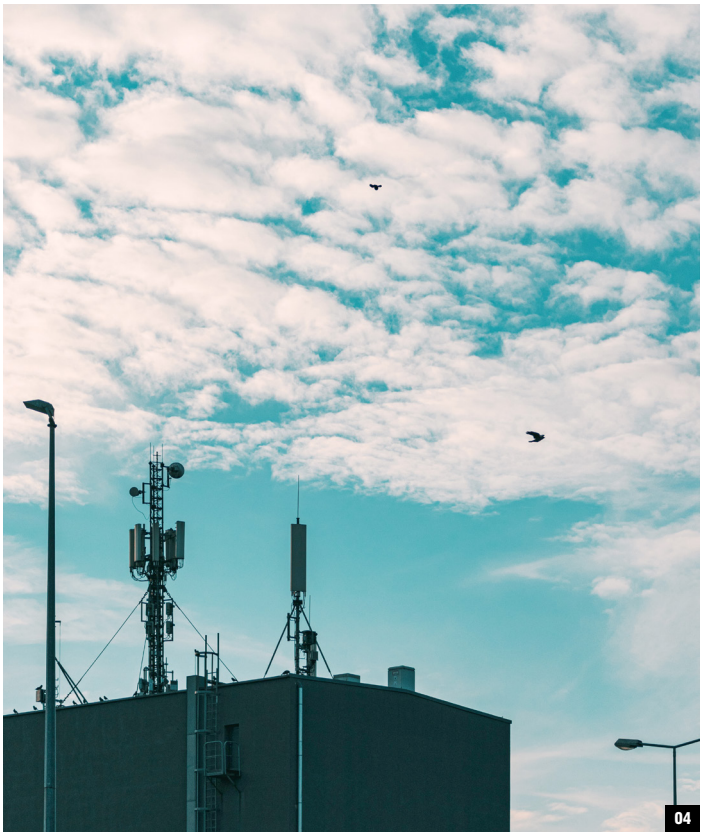
Since the 5G signal is less able to pass through obstacles such as buildings, coverage can no longer be guaranteed by a small number of large antennas that broadcast the signal in all directions, as is the case with 4G. To realise the full benefits of 5G, a greater number of small, so-called adaptive, antennas will be needed. Unlike traditional mobile phone antennas, these do not constantly spread their waves over a large area but direct the radio signal to users when they need it. As the frequency bands expand, the number of antennas and relays will need to increase proportionately.

Faced with such a deployment, both financial and infrastructural, one might wonder what 5G is going to be used for. In reality, 5G is far from an end in itself. Above all, it will serve as a springboard for the emergence of a very broad spectrum of applications. Thanks to it, virtual reality, augmented reality, the Internet of Things (IoT) and artificial intelligence will be able to flourish in sectors as diverse as work and training spaces, industry and logistics 4.0, health, transport and smart cities.

More virtual and mobile working and training spaces

The first concrete applications using 5G will mainly involve the workplace. The capabilities of 5G will make it possible to increase the uses of video and to use virtual, augmented or mixed reality more intensively. New visualisation services will become widespread such as the use of virtual reality for training, guidance, troubleshooting, videoconferencing and remote meetings. Customers will have the opportunity to project themselves into environments featuring commercial products, such as, for example, virtual tours offered by real estate developers. Thanks to augmented reality glasses, technicians will be able to intervene thanks to the remote assistance of engineers who will guide them in carrying out their operations.

The Internet of Things will also become more widespread in companies, especially for everything related to the equipment and security of buildings, whether it is office access control, electronic locks and security, other forms of automation, or for predictive maintenance of equipment and to anticipate breakdowns. The combination of artificial intelligence, virtual reality, the Internet of Things and 5G connectivity will also accelerate the use of digital doubles – digital replicas – for performing tests, developing prototypes without breaking equipment and making substantial savings.



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5G will also give more mobility to the workplace. Thanks to this new technology, getting rid of a cabled network without losing strength of connectivity and removing the constraint of fixed workstations will be possible. Everyone can work wherever they want, on the move, at a trade show or at a client's. For example, site managers will be able to easily retrieve and download particularly heavy files from their workplace, such as detailed and 3D architectural plans.

A lever for industry and logistics 4.0

Connected and automated industry, or Industry 4.0, already exists, but 5G will bring it more speed, efficiency, reliability and responsiveness. More devices equipped with wireless sensors will be able to connect simultaneously to the same network and communicate with each other about their status and operations. They will thus generate a large amount of information that will allow algorithms to model the production chain in real time, thus optimising their general performance and maintenance. The American consulting firm McKinsey gave the example of a gold mine in Africa which, thanks to sensors, was able to detect abnormal variations in oxygen levels during leaching, a

01. 02. 03. 5G succeeds 2G, 3G and 4G technologies. The first technologies only allowed voice calls and then SMS. The following generations have made it possible to develop new uses.

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04. The 5G signal is less able to pass through obstacles such as buildings, so coverage can no longer be guaranteed by a small number of large antennas that broadcast the signal in all directions, as is the case with 4G.

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Dr Maria Rita Palattella
Senior R&T Researcher
Luxembourg Institute of Science and Technology (LIST)

'We want to put 5G at the service of sustainable agriculture'

You coordinate the Lux5GCloud project. What are the objectives?
Lux5GCloud is a national project co-funded by the Media and Communications Service (SMC) of the Luxembourg government. It aims to integrate data from telecommunications satellites and the Internet of Things in a secure cloud platform (*Cloud Hierarchy Database Platform* or CHDP), to extrapolate relevant information through the use of *machine learning* algorithms and deliver it in real time to end users through 5G connectivity. This innovative project will not only unleash the potential of 5G and advanced technologies such as the Internet of Things, but also pave the way for follow-up projects for a prototype of CHDP in Luxembourg and its future commercialisation on the market. All stakeholders will find a financial advantage: those who make their data available and those who will have access to it to improve their services. This platform will be able to provide access to a wide range of applications, such as monitoring and managing natural disasters.

To develop this project, you took smart and sustainable agriculture as a case study. Can you tell us more?
Due to climate change, agricultural areas are facing new pressures such as critical weather events (drought, floods) for which farmers need precise and real-time monitoring. To meet this need, we are going to set up a crop monitoring system that will make it possible to check soil moisture, droughts and plant water stress through the combination of Earth observation images collected by satellites and data collected by *in situ* sensors. Lux5GCloud will also relay high-resolution images obtained by an advanced IoT device, equipped with a camera and 5G connectivity. All of this data will then be analysed by new machine learning algorithms developed by LIST researchers. These will be able to detect any anomalies in key parameters. Lux5GCloud will thus allow precise monitoring of soil moisture problems, better adaptation to drought, greater resilience of ecosystems, as well as the establishment of the first national '*5G Smart Farm Platform*'.

Concetta Valvason
President of the Stop 5G
Luxembourg collective

'There are alternatives that are less harmful to health than 5G.'

Your collective warns against the negative effects of 5G. What do you think they are?

There are three types: health, environmental and societal. Through the gradual use of higher frequencies, 5G will worsen electromagnetic pollution and increase the negative impact on our health. Many recent studies have proven the harmful effects of radiation. These include the increased risk of cancer, impaired fertility and development, decreased quality of sleep, changes in behaviour, increased sensitivity to radiation, oxidative stress to cells and damage to the body's DNA. Of course, other studies prove the opposite, but when it comes to 5G, there is no certainty that it will not cause harm, because of a lack of long-term research. It is no coincidence that the WHO classifies electromagnetic waves as 'potentially carcinogenic'.
This new technology will have disastrous consequences on our environment. New antennas will have to be built and energy consumption will explode. Finally, 5G is based on the logic of always more and always faster and will accelerate the drift towards a society of overconsumption. That said, we are not opposed to progress, on condition that it is well controlled.

Are there credible alternatives to using 5G?

Almost 80% of the traffic generated by the Internet takes place in closed places, whether at home or in the office. So why not replace Wi-Fi with fibre optic cables inside buildings? Optical fibre does not emit electromagnetic radiation and is much more stable and faster than 5G. As for mobile traffic, it could be supported by other technologies such as wireless infrared or Li-Fi ('Light Fidelity'; see also the interview on page 90). This allows access to the Internet using the frequency of the light signals of the LED bulbs. It is not only more environmentally friendly – LED lamps have very low energy consumption – but also faster. It's like fibre optic, but wireless!

You rely on a global approach, 'Stop 5G on Earth and in Space'. What does it consist of?

This is an international appeal initiated in September 2018 by Arthur Firstenberg and calling for the end of the deployment of 5G on Earth and in space. The petition currently has nearly 300,000 signatures across 214 countries and territories.

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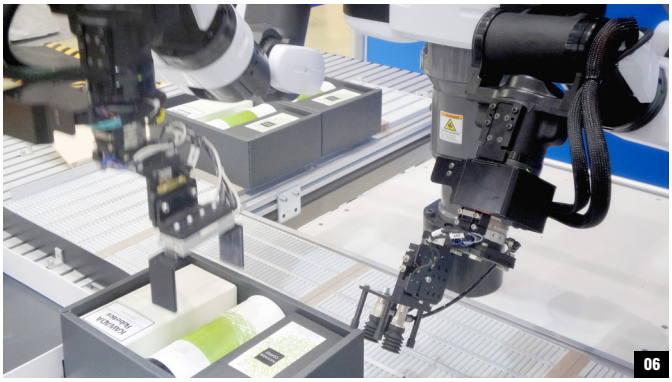

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05. 5G differs from its predecessors by a significantly increased speed of data transfer and an extremely reduced latency time. The throughput is higher, the access faster, and the number of simultaneous connections greater.

Linkedin Sales Solutions / Unsplash

06. 07. 08. 09. 10. 5G will serve as a springboard for the emergence of a very broad spectrum of applications. Thanks to it, virtual reality, augmented reality, the Internet of Things and artificial intelligence will be able to flourish in multiple sectors, such as, for example, industry and logistics 4.0, transport, or smart cities (photo 09, the city of Nice in France).

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crucial step in ore extraction. After correcting the malfunction, the gold mine saw production increase 3.7% with a value of USD 20 million. This modelling of the production chain will also offer it more flexibility and responsiveness. This can easily be adapted to changing demands, or even modify the product directly. In the event of a problem, immediate feedback – facilitated by sharing bandwidth based on critical applications – will directly recalculate the production plan and automatically notify the end customer of any delay in delivery.

With the increased throughput of information generated by 5G, augmented and virtual reality will scale up in factories. To take just the example of augmented reality, operators will be able, with its help, to visualise in real time and directly on the machine all the important information on its operating state. If they cannot resolve the problem, what they see may be transmitted to an expert who, remotely, can annotate the images or point to a component.

5G will also dramatically improve logistics, whether for inventory automation or stock management. Automated Guided Vehicles (AGVs), which autonomously store and move products inside warehouses, will be easier to operate with this new technology,


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'Thanks to it, virtual reality, augmented reality, the Internet of Things and artificial intelligence will be able to flourish in diverse sectors.'

using cloud-based artificial intelligence – a sort of central brain located in a data centre – to deliver materials 'just in time' within the factory, or better prepare orders and their shipment, or even synchronise to distribute important loads.

Promises for the health sector

The current health crisis has demonstrated how essential it is to think of new ways to provide remote healthcare and to guarantee the responsiveness and adaptability of health services. Telemedicine has thus experienced a real boom, mainly via teleconsultation. Faster and more reliable, 5G technology will promote other at-distance medical procedures. The possibility of exchanging high-definition content in real time and in a secure manner (scans, MRIs, etc.) will facilitate multidisciplinary consultations between remote hospitals and the establishment of connected ambulances which will speed up diagnosis and patient care.

The better image quality provided by the speed of 5G will promote the development of telesurgery. Surgeons using connected automated arms will be able to operate on patients remotely around the world. The first operation of this type took place in China in April 2019. Despite the 3,000 kilometres that separated them, the practitioner was able to implant a neurostimulator in the body of a patient with Parkinson's disease.

Better connections will also encourage the proliferation of monitoring programmes and platforms. Patients, the elderly, or people with chronic illnesses will be provided with connected devices (glucometers, wireless blood pressure monitors, connected scales, real-time alert triggers in the event of a fall, etc.) which will send their data directly to doctors or remote monitoring centres. They can, remotely, adapt treatments, give advice, or ask patients to make an appointment.

Vehicles communicating with everything

Even if absolute forecasts vary from analyst to analyst, there is a general consensus that the connected car market will grow rapidly in the years to come. Soon, vehicles will be equipped with a communication system – Vehicle to Everything or V2X – which will allow them to exchange information not only amongst themselves, but also with other users (pedestrians, cyclists …) and with infrastructure (roads, signs, traffic lights…). Accidents and travel times will be reduced, and traffic will be smoother. The operational efficiency of transport professionals will also be enhanced. The ability offered by 5G to download a large amount of content in near real time will allow planes, ships and trains to quickly retrieve navigation information and to share replenishment and predictive maintenance data during landing, docking, or arrival at the station.

Smarter cities

Intrinsically linked to mobility, the cities of tomorrow will also be marked by the arrival of ultra-fast mobile Internet. More and more cities, as is currently happening in the French municipalities of Angers or Nice, will use sensors to improve the maintenance of natural spaces (intelligent watering of green spaces, detection of the filling of rainwater retention basins), and optimise waste collection.

Insurance and the Internet of Things (IoT), the perfect alliance

All specialists are unanimous: the IoT opens up a world of opportunities for insurance companies. Connected objects will strongly contribute to a better appreciation and better control of risks, not only in the housing sector, but all sectors! Automobile insurance policies can thus be more targeted depending on the driving behaviour of the insured and the frequency of maintenance of the vehicle. In the field of health, it will be possible to monitor physiological data that can prevent the onset of certain diseases, whether in humans or domestic animals. Another significant advantage: connected objects will offer insurers an almost permanent and stronger link with their customers.

You can learn the Internet of Things (IoT)!

There are Masters in the Internet of Things all over Europe, in particular among our French neighbours. The vocational training available in Luxembourg is relatively short (between 8 and 20 hours) and provided mainly in English by the Luxembourg Lifelong Learning Centre of the Chamber of Employees. ILNAS also conducts a free training course (in English and lasting 3 hours) aimed at providing an overview of basic concepts as well as an overview of relevant technical standardisation activities in the field of IoT and related technologies through normative monitoring. Note that the *Lycée des Arts et Métiers* in Luxembourg has offered a Higher Technician Certificate (BTS) '*Internet of Things*' since September 2018.


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'5G will theoretically be ten times faster than 4G, with a speed above 1 Gbit/s on average per user.'

Stimulated by 5G, virtual and augmented realities will allow new uses such as visualising road works before their construction or more immersive tourist and cultural offers. Since 2018, Luxembourg City has been conducting a pilot project in Pfaffenthal. Using 3D glasses, bus trip visitors can immerse themselves in the daily life of the neighbourhood in the 19th century. Even though the experiment was interrupted by the pandemic, tours are expected to resume at the end of 2021 if health conditions permit and extend to other neighbourhoods if successful.

Combined with artificial intelligence, *Massive IoT* – the interconnection of hundreds of thousands of sensors and connected objects – will facilitate the analysis and planning for the energy consumption needs of buildings and allow greater fluidity of traffic thanks to traffic lights that will instantly adapt to the traffic of vehicles, bicycles, scooters and pedestrians.

Multifaceted issues

If the increase in connected objects in the near future opens up many possibilities and gives way to a new reality, grey areas will nevertheless remain. What are the economic, security, health, societal and environmental issues going to be?

Economic issues first. Will 5G be an important competitive factor for companies? Nothing is less certain, say some specialists, or at least not for now and not for everyone. 5G technology is not yet mature, has yet to prove itself, and is not always necessary for the development of certain applications. Taking the example of the connected car mentioned above (V2X), there are two opposing communication technologies: the C-V2X system, where cars are directly connected to the global 5G network, and the ITS-G5 system (*Intelligent Transport System – G5 for 5.9 GHz*), where cars are connected to each other via a form of wi-fi. This technology is more mature and has been studied for much longer than 5G, the sector having already reserved the 5.9 GHz frequency band for this kind of innovation. There are also nuances to take into consideration in certain sectors, such as, for example, for drones and telesurgery. If 5G does have a role to play in the development of drones, everything will depend on the context. The drone that can save lives is more likely to happen than the one that delivers a parcel to your garden. As for telesurgery, if it ever develops, fibre optic will be used more than 5G, the surgeon rarely operating anywhere other than in an ultra-equipped, clean room. Likewise, in Industry 4.0, 5G is not necessarily the panacea. As long as robots only perform repetitive tasks without great precision and without any movement, fibre optic will be more than sufficient.

5G infrastructure also brings a number of uncertainties about cybersecurity vulnerabilities. The probable increase of terminals accompanying 5G will also increase the number of network access points as entry points for possible cyber-attacks. In addition, not all connected objects will have the same level of security, especially if they

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were mass-produced at bargain prices. The issues of personal data protection, the impact on privacy and restrictions on citizens' liberties will also arise with increasing urgency. The recent Pegasus spyware scandal that infected the mobile phones of several thousand journalists, politicians, businesspeople, and activists around the world is the best example of this. Using sensing and 5G to generate *big data* for predictive purposes is very useful, but it can be dangerous when not used properly. This was the case in 2017 when people were refused entry to the *Tomorrowland* electronic music festival in Belgium. Predictive profiling screening had analysed all ticket holders and identified a few dozen individuals likely to be linked to the terrorist attacks in Brussels. It later turned out that most of them had nothing to do with the case.

5G and connected objects also raise questions about their impact on health. There is nothing to prove with any certainty that they will have a harmful effect… or not. With our current state of knowledge, scientific research cannot make precise statements about the possible dangers of 5G and its use. Long-term studies are not yet possible as the technology remains in its infancy. In addition, researchers are faced with a methodological and ethical dilemma. Any type of study, whether randomised, controlled, observational, or case control, has advantages and disadvantages and for obvious ethical reasons, scientists are not allowed to conduct studies in which people are consciously exposed to danger. There remains a precautionary principle, which

11. 12. 13. New visualisation services will become widespread. The use of virtual reality or the Internet of Things will become more popular, for example, for everything relating to the equipment and security of buildings or home automation.

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Juan Rocha
Cybersecurity advisor
Securitymadein.lu – CASES

'Understanding connected objects better will avoid the worst surprises.'

Will the deployment of connected objects entail new types of risks?

No, the nature of the risks is not going to change, but they will multiply as the Internet of Things (IoT) takes an important place in our society. A connected object is made up of software, sensors and a communication protocol, which are all possible sources of attack. If, in addition, it has an Internet connection, there is a vunerability to hackers! The level of security will also vary from manufacturer to manufacturer. To take an example, low-cost mass-produced connected objects from other regions are much more vulnerable than those made in Europe where there is robust legislation on security and data privacy.

What precautions should companies take to secure their sensitive data against these risks?

First of all, you need to update the software regularly. This makes it possible to correct the vulnerabilities known to hackers and thus minimise the probability of being attacked.
Next is the password. Most connected objects contain default accounts whose usernames and passwords are generally known and appear in public documentation. From the first use, they must be erased and replaced by nominative accounts and complex passwords. Obviously, it is not easy to remember these passwords, especially when you have several connected objects, but this problem can be circumvented with password managers. These digital safes exist in free and paid versions and you only need to know a single password to access them.
It is imperative to physically secure the connected devices. It's just common sense. You wouldn't think of leaving your cell phone unattended on the street!
Finally, companies are strongly advised to divide their network into several segments, especially if it contains vital applications. Each segment will have a well-defined perimeter and a different level of security depending on the critical nature of the information it contains: one network for the server, another for the surveillance cameras, yet another for the updated Wi-Fi arrangement of guests or clients.

More information: secure-iot.lu

Dr Shyam Wagle
ICT and Technical Standardisation Project Manager, ANEC GIE (Agency for Standardisation of the Knowledge Economy – Economic Interest Group)

'Standardisation: A competitive advantage for companies.'

What are the main standardisation activities related to the development of 5G and the Internet of Things (IoT)?

The IoT, combined with the promises of 5G connectivity, opens up new prospects for economic development. The deployment of these technologies involves challenges that are currently being addressed by standardisation bodies, such as interoperability, interconnectivity or security (cf. ILNAS national technical report on IoT standardisation). The ISO/IEC JTC 1/SC 41 standardisation technical committee and the *European Telecommunication Standards Institute* (ETSI) are the main players in IoT standardisation. Regarding 5G, the *International Telecommunication Union* (ITU) has defined performance requirements, and the 3GPP consortium develops standards in conjunction with regional telecommunications standards bodies, such as ETSI for Europe.

How can standardisation represent a competitive advantage for companies?

Companies that adhere to technical standards make sure to develop products and services that follow best practices. These are all prerequisites to facilitate the distribution of solutions on the market and gain the confidence of users. Strategically, companies can also participate in standardisation, allowing them to anticipate new requirements or influence the content of standards to gain competitive advantage.

Concretely, how can companies participate in and improve their skills in standardisation in Luxembourg?

ILNAS, the national standardisation body, provides national, and, under certain conditions, free registration for companies in the standardisation technical committees of ISO, IEC, CEN and CENELEC. They can thus monitor and contribute to the development of future standards. In addition, to facilitate the use of standards, ILNAS also offers free consultation on reading terminals that provide access to the entire online catalogue of its eShop. Finally, with the support of ANEC GIE, ILNAS also offers awareness-raising and training in technical standardisation to support national companies in their standardisation process.

14. 15. The very good image quality offered by 5G will promote the development of telesurgery and remote medical procedures.
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'The installation of 5G as such will not revolutionise anything, but what we are able to do with it will.'

is interpreted differently depending on whether we are favourable or unfavourable to the deployment of 5G.

The hyper-connectivity generated by this new technology is also being debated. Many analysts believe that 5G may accentuate behaviours such as addiction, hyperstimulation, and attention deficit disorder. Our relationship to the world could also change. By setting up an infrastructure allowing total and permanent connection, anywhere and anytime, 5G could help strengthen the technical and economic hold of digital platforms on our lives, in how we consume, in our interactions with other people, with objects, or with institutions. Will we all eventually become digitally autistic? Many experts are convinced of this.

5G's ecological footprint is also under fire. Olivier Roussat, CEO of French telecom service provider Bouygues Telecom, told the French Senate in June 2020 that whilst it would allow us to use less energy for the transport of data, it would also considerably increase speed and stimulate a greater consumption of data. In other words, the energy consumption of all operators will show a significant increase in the months following the deployment of 5G. A rebound effect. Many NGOs fear another negative impact on the environment in the long term, caused by consumers upgrading large quantities of domestic appliances (5G smartphones,

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replacement of unconnected objects by connected objects, etc.).

The end of overheating? Not really

Should we therefore conclude that 5G will not bring the long-awaited revolution? Perhaps the question should be phrased in other terms. The installation of 5G as such will not revolutionise anything, but what we are able to do with it will. The infrastructure of this new technology is comparable to a new motorway. Trying to directly estimate the value of a road does not make sense and yet it carries the economy and evolves along with it.

Like a real one, this motorway is also likely to become very congested. While 5G can effectively relieve the 4G network threatened with saturation and cope with the explosion in data consumption, its installation only postpones the problem. The technology, by offering a higher speed, will become even more attractive than what preceded it and will not necessarily favour a parsimonious use of data. Quite the contrary. Already, all eyes are on 6G, the ultra-ultra-high-speed network which should see the light of day at the start of the 2030s. Its uses are still uncertain but working groups have already been formed in Europe (the Hexa-X project), the United States (the Next G Alliance), Korea and China. The latter already put the world's first 6G experimental satellite into orbit in November 2020.

This perpetual rushing ahead could be an opportunity to rethink our relationship with the consumption of mobile data and to learn to set limits on certain uses. Could digital sobriety become the new credo? The future will tell. ▬

And what about *vintage* objects?
Find our detachable poster at the back of the magazine !

'Will 5G be an important competitive factor for companies? Not for now and not for everyone.'