wireless logic

Businesses using M2M & IoT-enabled applications

Preparing for the sunset of 2G & 3G

Get ready for the next generation LPWAN technologies

Q1 2020

Who should read this guide?

This guide is for two types of organisations:

Organisations that **rely on 2G or 3G connectivity** for machine-to-machine (M2M) and Internet of Things (IoT) communications.

Organisations **bringing new IoT devices to market** and considering their connectivity options.

Sunset | sun-set |
vb & adj
To intentionally phase something out or terminate it. Can mean switching off or simply withdrawing support so that a service will be degraded and may effectively become redundant. The final stage or closing down.

Introduction

The 2G/3G sunset is here. Operators across the globe have either already shut down their 2G and 3G networks or are planning to do so in the coming years. Now is the time to start considering the alternatives and ensuring that they are suitable for your applications.

This guide will enhance your understanding of how the 2G/3G 'sunset' could impact your business and what options you have for future-proofing your IoT landscape.

It will also demonstrate how Wireless Logic — the leading European connectivity platform provider — can help you migrate from 2G and 3G to 4G or Low Power Wide Area Network (LPWAN) technologies that may best suit your future requirements.

So far, 2G, 3G and 4G have co-existed. With the launch of 5G, there is a lot of discussion from Mobile Network Operators (MNOs) about turning off 2G and 3G. This is because they want to free up spectrum for 4G and 5G and the more cost-efficient, greater-revenue-generating technologies associated with them. Like anything, it's a case of 'out with the old, in with the new'.

But with turning off 2G in particular, 'out with the old' might not be so simple. As a safe, ubiquitous, low power platform for transporting small packets of data, 2G networks have become rather entrenched, underpinning large swathes of M2M and IoT connected devices in the UK and other parts of Europe.

The global 2G/3G sunset: what, when, why?

A sunset happens when a technology provider terminates or phases out one of its products or services so that it is no longer supported.

So, in the context of cellular technology, it is when a Mobile Network Operator (MNO) switches off one of its networks. That means that all devices and services that use only that network are no longer able to connect.

Most consumer devices like phones support multiple generations of cellular technology, so would continue working once an older network is sunsetted. But it is a different story in the world of IoT where connected devices in the field are typically supported by just one cellular generation, mainly due to module costs.

Sunsetting is not unusual. It is the natural progression of things. To make room for newer, better products and services, older versions are discontinued. This has happened with the first generation of cellular technology, the analogue-based 1G, which was phased out after the digitally-based 2G rendered it obsolete.

The focus now is on sunsetting the 2G and 3G networks in order to re-farm the spectrum MNO's use for expanding 4G and deploying 5G.

Asia and North America

As for when the switch-off is happening, there is no global roadmap and so the timetable varies wildly from region to region. Asia Pacific has been leading the way with 21 2G sunsets and seven 3G sunsets by July 2019. In some countries, such as Japan and South Korea, there is no 2G available at all. The 2G switch-off is also well underway in North America, with all 2G networks likely to shut down by the end of 2020[1].

> There are several factors for MNOs to sunset one or more of their networks. They include:
>
> ⊘ To free up spectrum for modern technologies that offer better cost and energy efficiency, enhanced functionality and an improved customer experience
>
> ⊘ To avoid having to maintain and modernise end-of-life 2G or 3G equipment, which offers a lower return on investment (ROI) than expanding 4G or deploying 5G
>
> ⊘ To reduce the operating complexity of running too many networks and reduce the range of devices that need testing, provisioning and supporting.

Europe

In Europe, the outlook is very different. Major networks such as Vodafone have announced their intention to not support 3G networks across Europe beyond 2020 whilst retaining support for 2G only until 2025.

This is the situation in the UK, where the 3G sunset is expected to happen in the next 2-3 years but the 2G sunset is unlikely to occur before the mid-2020s. Sunset dates and announcements are changing frequently which is why IoT users are being advised to look ahead and consider future-proofing their equipment and deployments now.

The one certainty is that 2G and 3G will be switched off. A major influence will be in 2025, when the Public Switched Telephone Network (PSTN) in Europe will be switched off meaning no requirement of voice services on 2G and 3G. Additionally, once 5G goes mainstream, the pressure on MNOs to shift away from their 2G and 3G offerings is only going to increase.
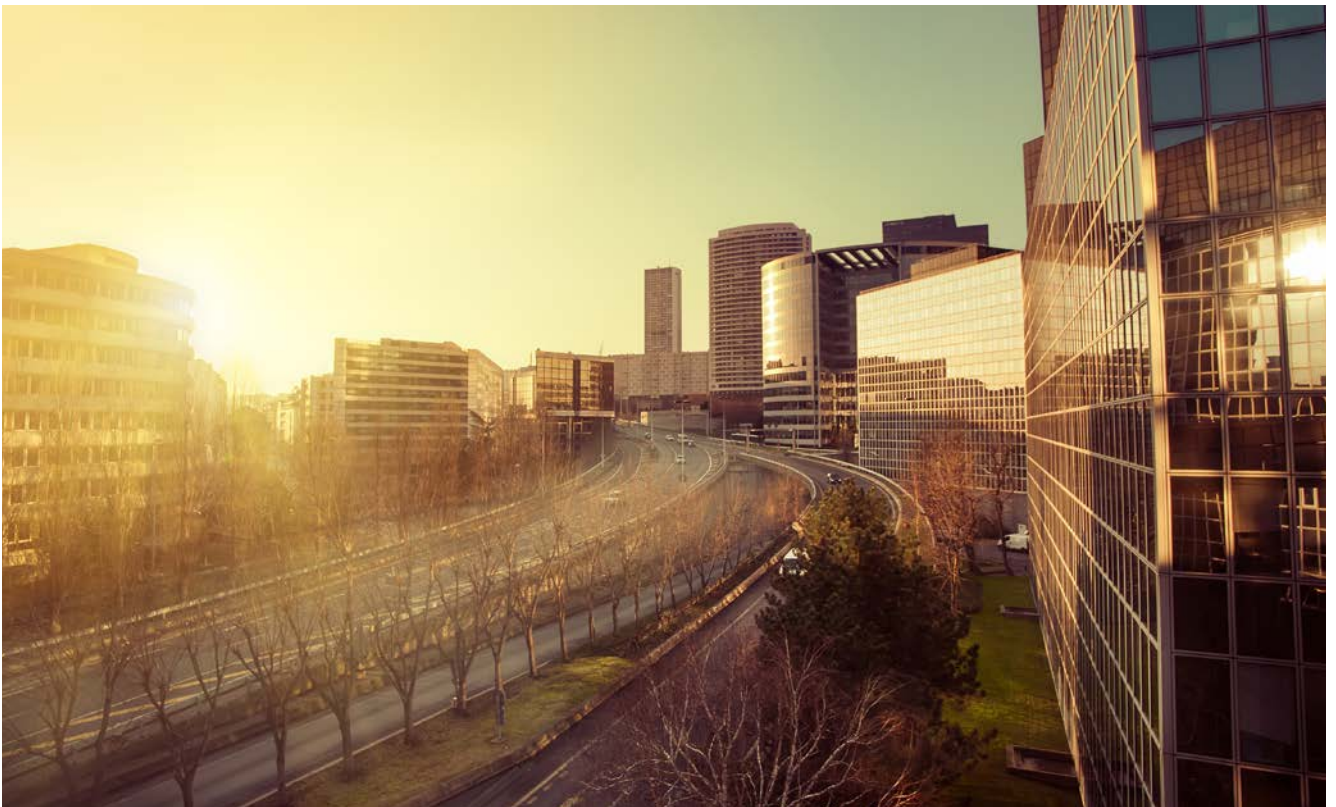
Reasons why 2G and 3G still operate

If you knew nothing about this area, you'd be forgiven for wondering why, if the world is in the throes of embracing 5G, the three-generations-behind 2G wasn't sunsetted a decade or more ago.

Only in the last few years have MNOs started sunsetting their 2G networks and 2G is still used in most parts of the world.

IoT applications —
Low data, low power, high need

A big reason for this is the IoT. Yes, 5G will take the IoT into all-new realms, paving the way for connected cars, remote robotic surgery and other data-hungry IoT deployments that can't be achieved at the moment. But a huge part of the IoT is the more basic but no less critical applications e.g. fleet management, asset tracking and industrial metering — all designed for higher yields, greater efficiency and improved compliance but typically requiring low through-put of data. And while newer generations of cellular technology offer the capacity to transfer more data at higher speeds, many industrial IoT users just don't need it.

Location, location, location

Industrial IoT sensors are often installed in remote and hard-to-reach locations. This is why industrial IoT devices are engineered to have long lifespans, use low power and have the maximum possible battery life. It makes sense that the low power, low bandwidth, low cost 2G networks continue to hold appeal and is the reason why many new IoT applications are still being connected to 2G.

Large deployments, ubiquitous coverage

Two further reasons for IoT users to remain on 2G are volume and coverage. Many industrial IoT applications involve the deployment of a very high volume of devices in the field (also known as Massive IoT). This makes upgrading them all a very expensive task, but it also means they require ubiquitous coverage. 2G remains the most widespread of all the cellular generations and continues to offer better coverage in rural and remote locations, as well as offering better indoor penetration than 3G or 4G.

2G or 3G... which will go first?

The retention of 3G is largely to do with the fact that when most 4G networks were deployed, they lacked native support for voice.

As 4G is a Long-Term Evolution (LTE) technology, it doesn't support circuit-switched voice technology like 2G and 3G do. The voice technology that 4G uses, Voice over LTE (VoLTE), is complex to deploy and optimise, so many 4G devices didn't have it until recently.

According to Ofcom[2], 4G carried only 7% of the UK's voice traffic in 2018, while 3G carried 81% and 2G carried 12%. This is changing, though. According o individual MNOs, by mid-2019 4G's voice traffic had gone up to 60%[3].

This is why 3G is likely to be switched off before 2G. Its usefulness has persisted in its voice capabilities but in all other aspects 4G is an upgrade that renders 3G obsolete.

2   Ofcom, 'Connected Nations Update' Spring 2019,
    https://www.ofcom.org.uk/__data/assets/pdf_file/
    020/130736/ConnectedNations-2019-Update

3   "The Potential Impact of Switching Off 2G in the UK" — a Report
    for the UK Spectrum Policy Forum by Real Wireless — October 2019

What is different in Europe?

As the continent that gave the world the Global System for Mobile Communications (GSM), Europe was for many years the world leader in mobile technology.

GSM — the technology on which 2G is based — became the most widely used wireless technology in the world, with availability in 219 countries and a market share of over 90% by the mid-2010s.

With the advent of 5G, Europe's premiership has ended. US networks such as AT&T and Verizon have been aggressively driving 5G's development from the beginning and relentlessly seizing spectrum from 2G networks in the process. Meanwhile their European counterparts have been more cautious about it. The fact that there is more competition in Europe and more policing by competition authorities has made the implementation of 5G a trickier task to coordinate. As a result, 2G has become ever more entrenched.

Why change? Everything is working so well...

There is also a sense of 'if it ain't broke, don't fix it' in Europe among IoT users. One view is that 2G technology is perfectly practical. In a smart building context, there's no need to transfer enormous data-eating files and videos if all you're doing is changing the lighting in a car park or reading the temperature/humidity levels in a pump room. A 2018 report by ABI Research showed that, in fact, 2G IoT connections would continue to grow in Europe, peaking in 2022 before beginning a slow decline.

But change is coming...

European Sunsets*

Vodafone across Europe
2G Support: *Until 2025*
3G Support: *Phasing from 2020*

Swisscom
2G Shutdown: *By end of 2020*
3G Shutdown: *After December 2022*

T-Mobile, Netherlands
2G Shutdown: *November 2020*
3G Shutdown: *From January 2021*

Telia, Norway
3G Shutdown: *By end of 2021*

Telenor
3G Shutdown: *April 2021*

Telia, Sweden
3G Shutdown: *2025*

Tele2
3G Shutdown: *2025*

Deutsche Telekom (T-Mobile)
2G Shutdown: *December 2020*
3G Shutdown: *June 2021*

Orange, France
2G Shutdown: *2024*

KPN, Netherlands
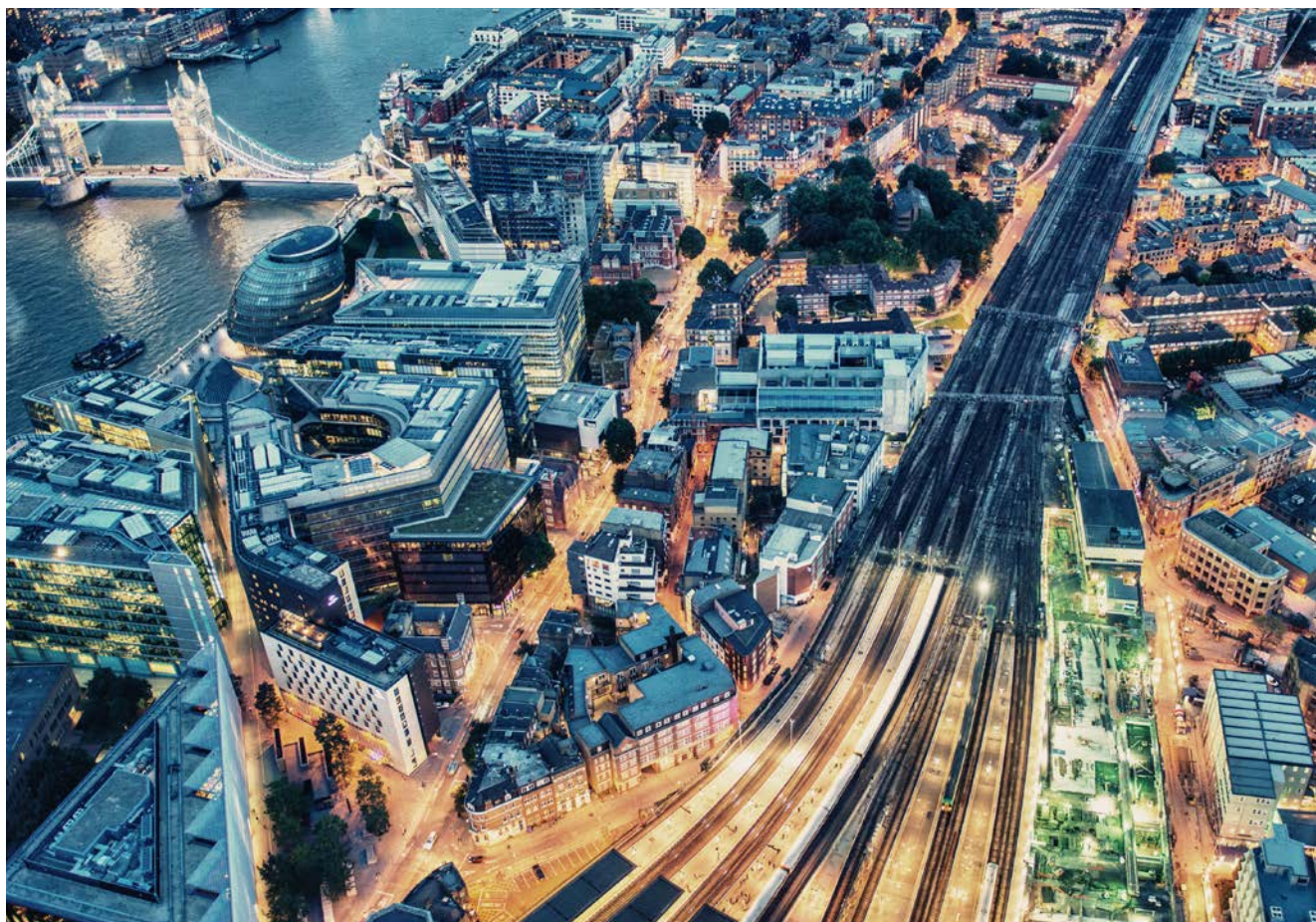3G Shutdown: *January 2022*

EE UK
2G Support: *Until 2025*
3G Support: *Until 2022*

**For a more comprehensive list, go to
wirelesslogic.com/support**

* These are for guidance only and should not be relied upon.
  SOURCE: Google, October 2020

Sunset in the UK – the influence of major applications

In the UK, 2G remains important for applications such as smart building management, vehicle telematics, vending machines and agricultural monitoring.

There are also two key use cases likely to significantly delay the UK's 2G sunset: the government's smart electricity and gas meter roll-out and the EU-mandated eCall system, which instantly connects vehicles to emergency services in the event of an accident. eCall and the smart meter programme rely primarily on 2G/3G connectivity and both the smart meters and eCall-equipped vehicles have a lifespan of 10-15 years. This means that the MNOs supporting these systems will need to keep their 2G or 3G networks supported for a period of time.

There is the possibility that the smart meters and vehicles will get upgraded to 4G before their end-of-life, although at present this is highly implausible financially. There's also the possibility that the UK's three 2G operators will agree to provide a single, shared 2G network to extend the lifetime for 2G even further.

The fact that 3G will be turned off first is still something users need to be mindful of. Compared to 2G, there has been relatively little adoption of 3G in the industrial IoT. There are some mission-critical applications such as CCTV that rely on 3G so migration strategy and plans must be factored in — sooner rather than later.

☀ Goodbye 2G and 3G

Welcome to Low Power Wide Area Network (LPWAN) technologies.

The new alternatives

Today we're at a fork in the road. One path involves leveraging 4G and eventually 5G for high-speed applications in mission-critical and consumer IoT industries, which need to connect people or sites with high-bandwidth solutions.

The other involves the emerging technologies of cellular LPWAN and non-standards based LPWAN technologies such as LoRa and Sigfox. These will directly replace 2G and 3G services in the coming years as Mobile Network Operators phase these technologies out.

There's never been a more important time to consider the future for your legacy and forthcoming deployments of connected IoT assets.

The new world of LPWAN

Cellular LPWAN solutions for mainstream applications —
replacing 2G & 3G services, enabling new IoT application opportunities.

Introducing LTE-M (Cat-M1) and NB-IoT (Cat-M2)

Although there are a number of LPWAN options emerging, the cellular technologies — LTE-M and Narrowband IoT (NB-IoT) are both leading the way. These are services that have been designed for IoT & M2M that utilise a very small slice of the 4G spectrum.

NB-IoT vs LTE-M

Whether you use NB-IoT or LTE-M boils down to how your devices are deployed and the needs of your application — location, connection frequency, speed of connection, mobility and latency are all key factors.

NB-IoT works best for static, low data applications (<5MB per month) such as water and gas meters. It's expected that NB-IoT will reach a similar level of coverage to 2G, with some commentators suggesting an increase in reach of +20% due to its ability to have deeper penetration into buildings and basements. Applications can operate for long periods of time (up to 10 years) in 'non-powered' locations, where battery-enabled devices can remain on-site for years.

LTE-M is optimised for higher bandwidth and mobile applications, and is likely to directly replace 3G (and some 2G) services in the coming years. It delivers latency and speeds broadly equivalent to 3G, supporting firmware updates and applications from low power sensors to high bandwidth applications up to 1GB of data per month. It works well with mobile applications as connectivity is seamlessly managed between cell sites.

Migrating your IoT applications

Businesses that are currently utilising 2G or 3G connectivity for their applications have three main options in their migration planning:

1 **Connect to/remain on 2G/3G networks**
Whilst still working for now, risk service degradation and a lack of support as MNOs move towards 2G/3G network closure.

2 **Consider cellular LPWAN connectivity**
Look to deploy LTE-M or NB-IoT connectivity for new and existing deployments in order to ensure your applications are future-proofed.

3 **Use a hybrid solution**
Some modules and SIM cards are compatible with 2G/3G and certain cellular LPWAN services. This means that you can utilise 2G and 3G services today, but be ready for a seamless migration to cellular LPWAN.

Find out more *wirelesslogic.com/lpwan*

LTE-M and NB-IoT uncovered

	NB IoT (LTE Cat-M2)	LTE-M (LTE Cat-M1)
Global Standards Based	✓	✓
Major MNO Support	✓	✓
Typical Connection Speed *(Download / Upload)*	0.07 Mbps/0.03 Mbps	Up to 1 Mbps
Coverage *(Decibel (dB) gain GSM)*	+20dB GSM *(Wide area & good subterranean penetration)*	+11dB GSM *(Wide area & good subterranean penetration)*
Connection Frequency	Sometimes connected	Frequently Connected
Mobility	Handover between cells not supported	Seamless connectivity between cells
Response Time	Slow ~1 sec	Medium ~100ms
Total Cost of Ownership	Low *(low module costs and long device lifecycle)*	Low *(low module costs and long device lifecycle)*
Power Efficiency	Very High *(up to 10 year battery life)*	High *(up to 7 year battery life)*
Power Saving Mode (PSM)	✓	✓
Extended Sleep Cycle (eDRX)	✓	✓
International Roaming	✓ *May be restricted by some networks*	✓ *May be restricted by some networks*
SMS	✕	✓
Two-way Voice	✕	✓

See the full comparison table at *wirelesslogic.com/bearer-comparison*

LTE-M and NB-IoT uncovered...
Application examples:

HIGH LATENCY LOW SPEED
Applications best suited to NB-IoT
Environmental monitoring | Flow Scada | Metering |

LOW LATENCY HIGH SPEED
Applications best suited to LTE-M
| E-healthcare | Assisted living | Security | Retail payment solutions | Asset management | Fleet management

Farming | Vending | Smart homes | Smart city | Intelligent buildings | Highways | Building management | Asset tracking

Understanding latency
Network latency is the time it takes for a packet of data to travel to and from two points — getting onto the network and receiving information back. The lower the latency, the nearer to 'real-time' communication.

Understanding speed
Network speed is measured by the amount of data that can be transmitted per second. This is particularly relevant where applications require a larger data package to be sent in a short time.

Get ready for the change

Forward planning is essential. Whether you have an existing deployment or are planning a new one, these are the steps you should take.

STEP 1

Consider your connectivity needs
Think through your existing and/or planned use cases

Do you need a continuous feed of your data, or is time stamped data sent through in bursts sufficient?

Will assets/devices be localised (e.g. a building or campus), or span a city, country or the world?

Will you need to transfer data on the move or is the application stationary?

Will AC power be available or is battery/ solar power your only option?

Will your equipment be outdoors in a harsh, potentially hazardous environment or indoors with climate control?

STEP 2

Consider your operational challenges
Think through the logistical aspects of a migration or deployment

How many 2G and 3G devices are you operating (or planning to deploy) in the field?

What barriers are there to physically swapping connectivity hardware in each of your devices/assets?

STEP 3

Talk to us for impartial advice...

- ⊘ We'll assess your current and projected 2G/3G IoT applications in terms of connectivity, coverage and hardware/SIM compatibility with cellular LPWAN
- ⊘ We'll propose a range of options and help you map out a deployment or transition plan
- ⊘ We'll focus on optimising your Total Cost of Ownership.

Time to rethink?
Talk to Wireless Logic

A successful migration to LPWAN or 4G needs careful planning and the right advice.

At Wireless Logic, we built our reputation on an impartial approach to IoT connectivity. We provide the broadest range of connectivity options and will talk you through appropriate technologies to optimise your applications' communications.

We're not biased to one bearer service over another — we'll recommend the best-suited connectivity which delivers long-term ROI for you.

For LPWAN, we'll work alongside MNO-recommended hardware providers, to ensure your application utilises fit-for-purpose technology designed specifically for low power operation.

- ⊘ We'll assess your current and projected 2G/3G IoT applications
- ⊘ We'll propose a range of options and help you map out a deployment or transition plan
- ⊘ We'll focus on optimising your Total Cost of Ownership.

We look forward to connecting you.

Talk to us now...

Call: **0330 056 3300**
Email: **hello@wirelesslogic.com**

UK

Wireless Logic Group Ltd
Horizon
Honey Lane
Hurley
Berkshire
SL6 6RJ, UK

0330 056 3300

Denmark

Wireless Logic Nordic
Valdemarkshaab 11
DK 4600 Køge
Denmark

70 22 20 45

France

Wireless Logic France
Parc de la Duranne
255, Avenue Galilée
13857 Aix-en-Provence
Cedex 3
France

04 42 16 60 17

Matooma
Le Liner
ZAC de l'Aéroport
Montpellier Méditerranée
Entrée 2 SIS -
2630 Avenue Georges Frêche
34470 Pérols
France

04 88 36 07 40

Germany

Wireless Logic GmbH
Technopark
Am Hochacker 4
85630 Grasbrunn
Germany

04109 555 400

Wireless Logic mdex GmbH
Bäckerbarg 6
22889 Tangstedt
Germany

04109 555 444

Netherlands

M2MBlue BV
Josink Maatweg 43
7545 PS Enschede
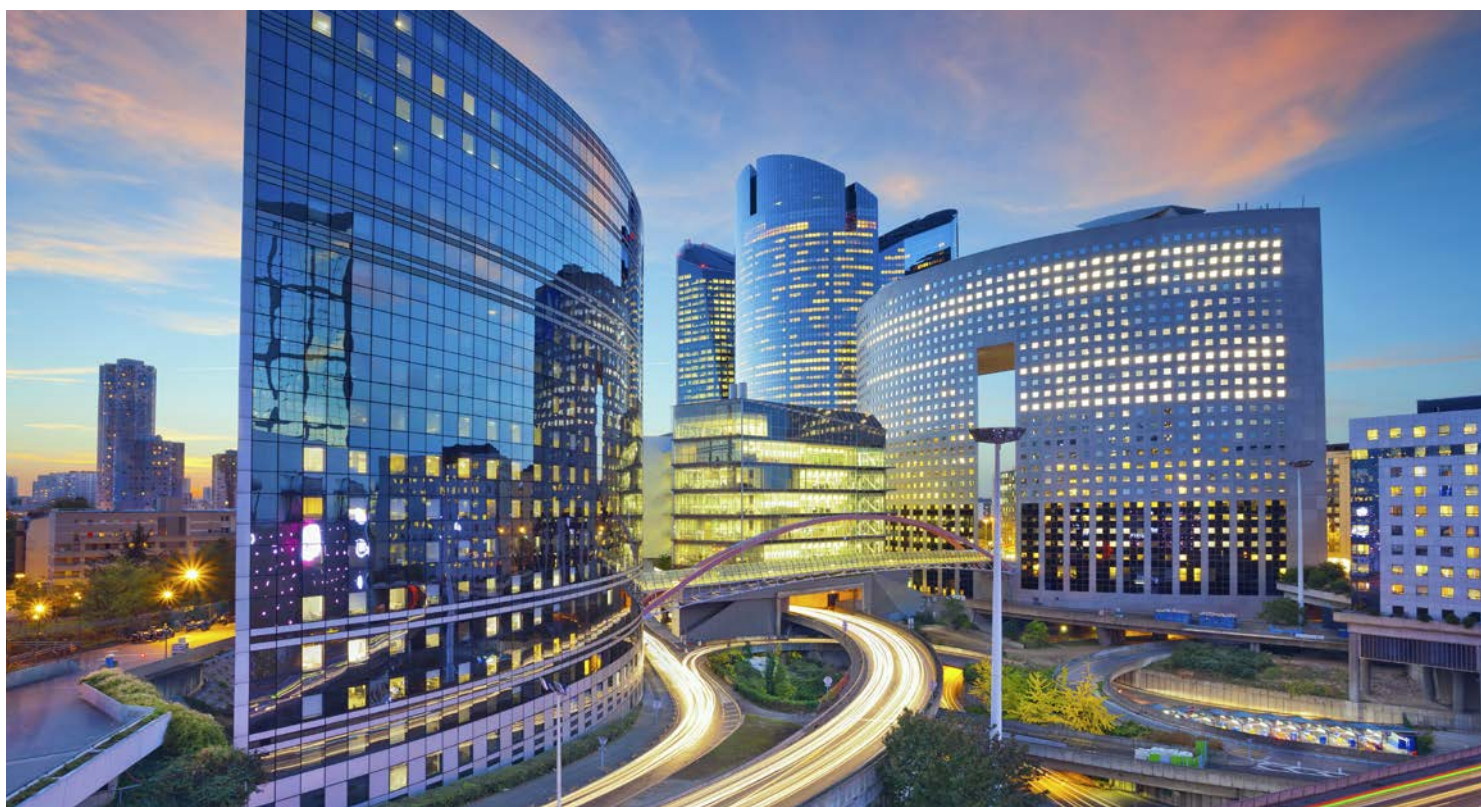The Netherlands

085 0 160 666

SIMPoint
Esp 237
5633 AD, Eindhoven
The Netherlands

040 8 489 489

Spain

Wireless Logic SL
C/ Jose Luis Goyoaga 32
Edificio Noray, Oficina 103
48950 Erandio (Bizkaia)
Spain

34 944 043 962

wirelesslogic.com

wireless
logic

Businesses using M2M & IoT-enabled applications

Preparing for the sunset of 2G & 3G

Get ready for the next generation LPWAN technologies

December 2019