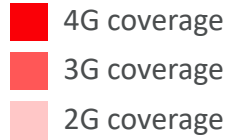


A black and white photograph of two men in profile, looking at a tablet. The man in the foreground has a beard and glasses, wearing a plaid shirt. The man behind him is slightly out of focus. A red circle is drawn around a white disposable coffee cup that the man in the foreground is holding. The background is a blurred office or public space.

## **NB-IoT y 5G en Hogares Conectados**

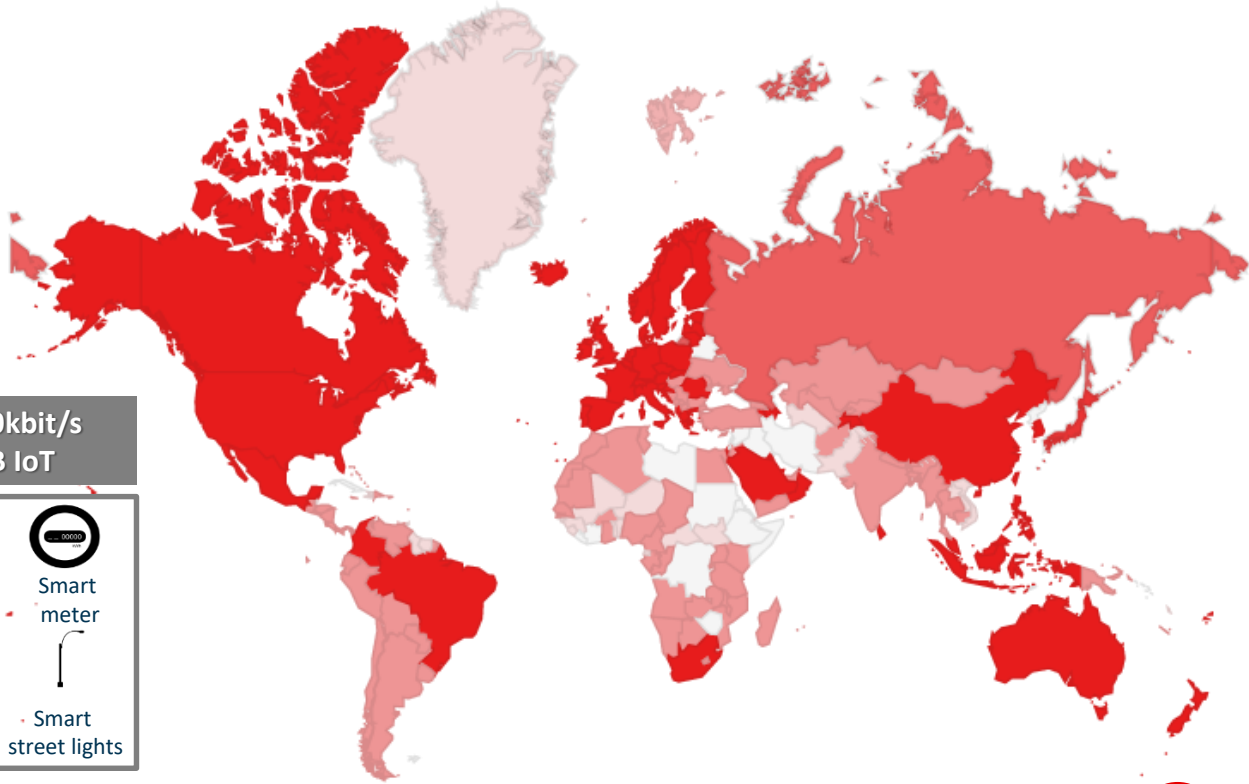
**June 2019**











# Plataform M2M Global – Technology worldwide



And also:

- Narrow Band IoT
- Satellite

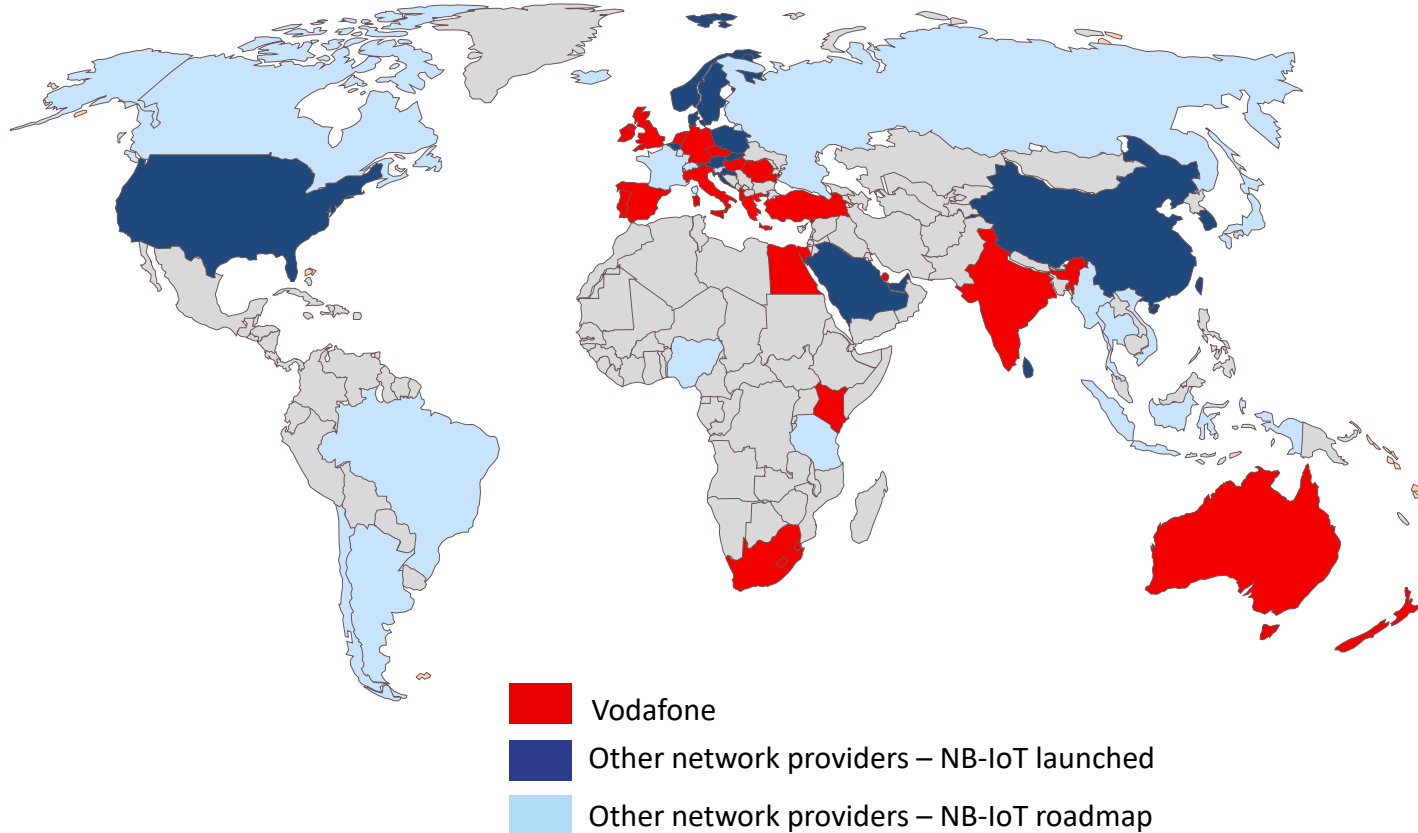


1Mbit/s+ ( 4G-3G)	100kbit/s ( 2G)	<200kbit/s NB IoT
 Smart phone  Connected car  CCTV	 Smart grid  Smart watch  object tracking 	 Smart meter  Smart parking  Smart street lights

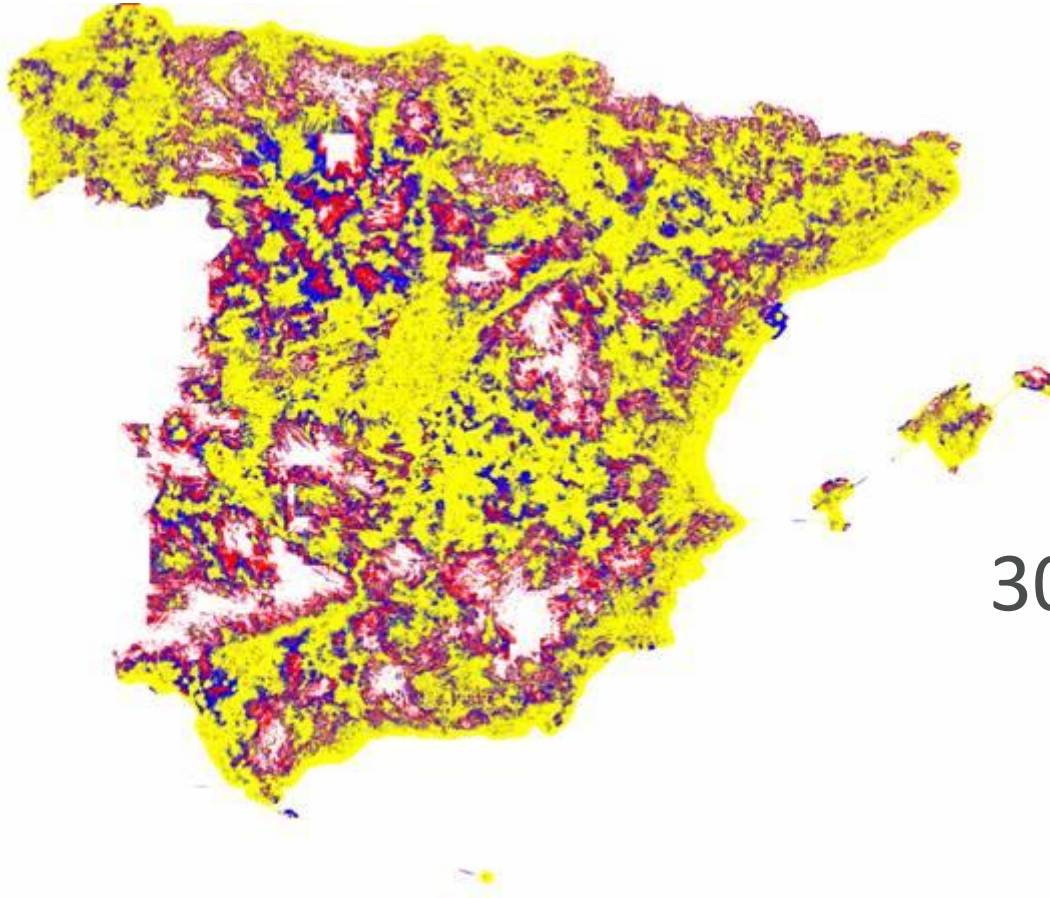


# NB-IoT expected roll-out

\*All Vodafone 4G masts by 2020\*



## Deployment in Spain



8.200 sites by  
30<sup>th</sup> September

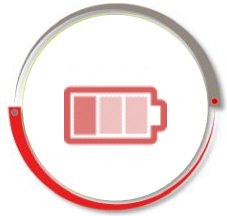


# What is LPWA and NB-IoT?



Low-Power Wide-Area Network (LPWAN) or Low-Power Network (LPN) is a type of wireless telecommunication network designed to allow long range communications at a low bit rate among things (connected objects), such as sensors operated on a battery.

NB-IoT is a standardization effort by 3GPP for a LPWAN used in cellular networks.



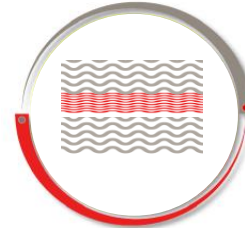
**10+ Years  
Battery Life**



**Deep  
Penetration**



**Mass Deployment**



**Low  
Bandwidth**








**Device  
Cost**



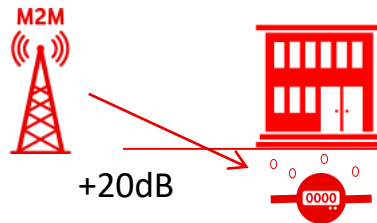
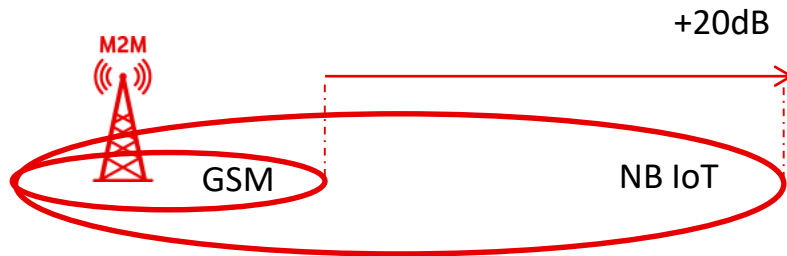
# Vodafone's choice of technology

NB-IoT is a standards based solution in licensed spectrum

			NB-IoT
Low Device Cost	 ●	●	●
Extended Battery Life	 ●	●	●
Deep Indoor Coverage	 ●	●	●
Throughput	●	●	●
Standard Based	●	●	●
No extra HW for deployment	●	●	●
Licensed Spectrum	●	●	●
Security	●	●	●
Roaming	●	●	●
Availability	●	●	●
Sector Capacity	●	●	●

# Extended Coverage – 7X Better

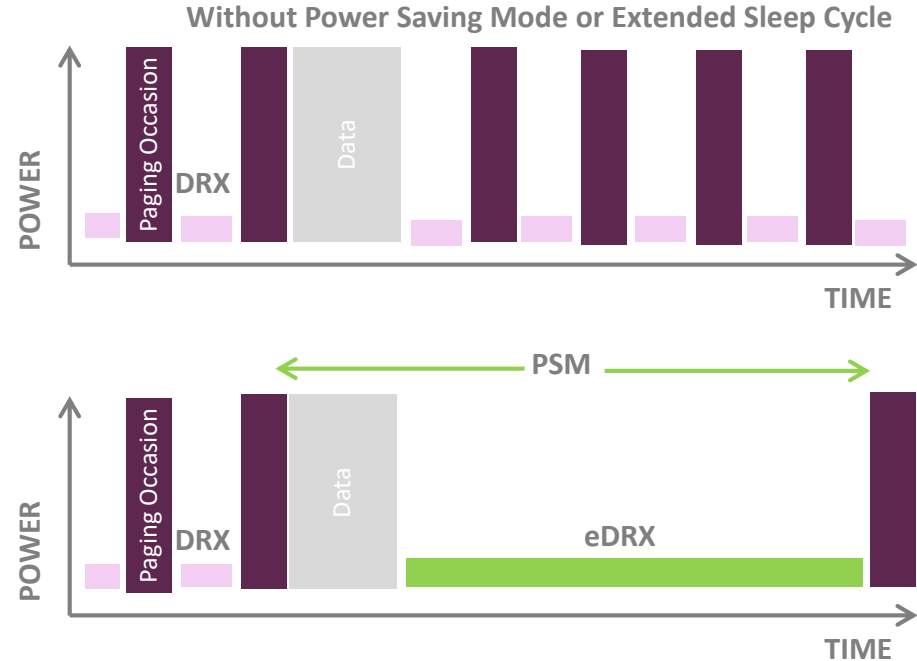
- Extended coverage mode extends coverage by up to +20 dB and is achieved by:
  - Repetition of transmissions
  - New control channels
- Based on our testing NB-IoT will be able to penetrate two to three double-brick walls, enabling connectivity of objects in underground car parks and basements



Source: Ericsson

# 10+ Years Battery Life

- Combination of Power Saving Mode (PSM) and Extended Sleep Cycle (eDRX)
- Extended Sleep Cycle eliminates unnecessary receiver activations
- Reachability improved over Power Saving Mode





# NB-IoT can transform almost every vertical

Automotive



Agriculture



Building/Asset  
Security



Consumer  
Electronics



Energy &  
Utilities



Transport &  
Logistics



Health



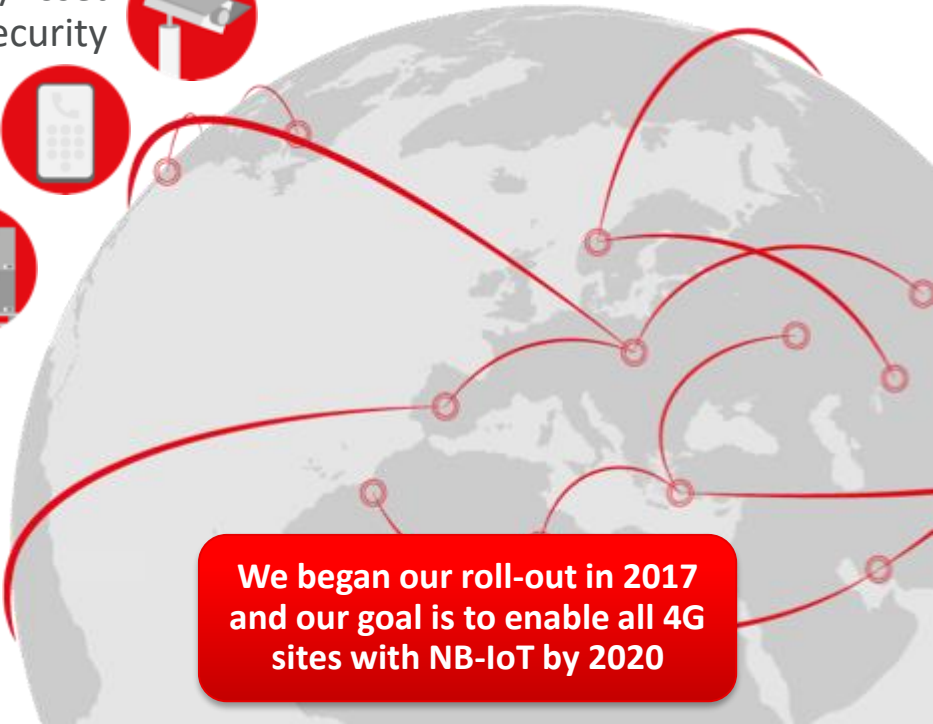
Manufacturing



Public Services



Consumer  
Goods



**We began our roll-out in 2017  
and our goal is to enable all 4G  
sites with NB-IoT by 2020**

# Current NB-IoT Ecosystem Map

(June 2018)



**Smart  
Metering**



**Water Metering  
Pulse Reader**



**Water Metering  
Gateway**



**Facilities  
Management**



**Digital Keys**



**Multi-sensor**



**Security**



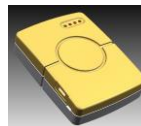
**Open Door  
Detector**



**Anti-jamming**



**Retail**



**Dash Button**



**Temperature  
Sensor**



**Industry &**



**Gas Monitoring**



**Smart Helmet**



**Accent Asset Tracker**



**Logistics**



**Fluid Tank  
Monitoring**



**Energy Monitor**



**Noxium Asset Tracker**



**Agriculture**



**Qampo**



# Where can I see Narrowband-IoT in action?



**Click to follow link**



A black and white photograph of two men in a professional setting. The man in the foreground, wearing glasses and a plaid shirt, is holding a white coffee cup and pointing at a tablet held by the man behind him. A red callout bubble originates from the text and points towards the tablet. The background is blurred, showing what appears to be a modern office or public space.

## 5G Lanzamiento, despliegue Y aplicaciones

June 2019

# Lanzamiento del servicio 5G y despliegue en Vodafone

- **Vodafone España anuncia el lanzamiento de los servicios comerciales de 5G** desde el 15 de junio en 15 ciudades: Madrid, Barcelona, Valencia, Sevilla, Málaga, Zaragoza, Pamplona y Bilbao, La Coruña, Vigo, Vitoria, San Sebastián, Gijón y Logroño, Santander.

- **Porcentaje de cobertura 5G** : más del 50% de la población en las 15 ciudades

- **Velocidades y latencias que tenemos ahora con 5G:**

❑ X10 velocidad respecto 4G (1Gbps descarga/ 150Mbps en subida)

❑ Latencia: 5 milisegundos

❑ 5G permite multiplicar x100 el nº de dispositivos conectados (IoT) a la red

A finales de año pasaremos de 1 Gbps a ofrecer 2Gbps.

- **Frecuencias:** Inicialmente banda de 3,7Ghz

Cuando estén activas las bandas de frecuencia baja de 5G (tras la subasta) se optimizará la cobertura en todo tipo de interiores.

- **Despliegue:**

3G se desplegó en aproximadamente 10 años a nivel nacional.

❑ 4G se está desplegando en aproximadamente 8 años. Aún no ha finalizado.

❑ El despliegue de 5G será progresivo, pero no podemos precisar en cuantos años se realizará.

Se continuará el despliegue en las 32 mayores ciudades del país y sus áreas metropolitanas (por ejemplo: Móstoles o Hospitalet).





# Examples

Autonomous driving



Smart city



VR



Holographic presence



Industry automation



Drones



AR



# 5G roadmap – key dates

3GPP standardisation

2018

2020

World Radio Conference

Harmonised 5G Spectrum

2019

Spectrum Release

Localised deployment

S.Korea Winter Olympics



2018



Japan Olympics



2020



Possible 5G deployment

2020+



5G in existing  
frequency bands

2022+



5G in new  
bands



# Revolución 5G





**Gracias**

