

5G Use Cases From Across Europe

Nikita Shetty & Andrew Savill
BABLE Smart Cities



A spin-off from



"We expect 5G to become the worldwide dominating mobile communications standard of the next decade."

Senior Vice President Electronics, BMW Group

"As high-tech city of Eindhoven we are convinced that 5G technology can make a valuable contribution to our society. Which is why we have expressed an ambition with the central government for a region-wide 5G pilot. "
- ***alderman for Economy, Brainport, Education and Innovation of the city of Eindhoven:***

Healthcare



Industry



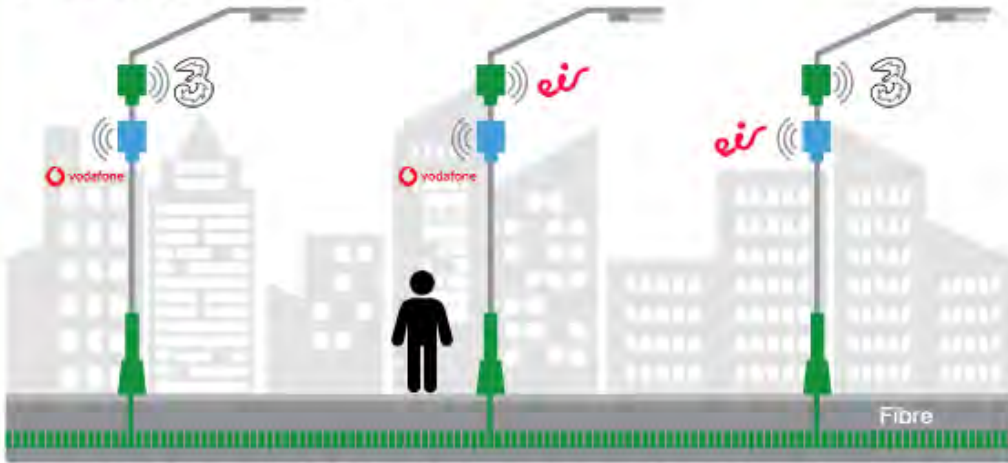
Energy



Mobility



1. Shared Infrastructure



Example above where multiple MNOs deploy their own equipment on shared city assets such as traffic or street lighting poles.

Logo and city assets for illustrative purposes only. Other scenarios may apply.

2. Exclusive Concession



This gives exclusive rights to one MNO, which makes it difficult for other MNOs to gain access.

Logo and city assets for illustrative purposes only. Other scenarios may apply.

5G Infrastructure Deployment

3. Neutral Host



Neutral Host involves a single physical device deployed on city assets that can be shared by multiple operators (as opposed to multiple installations of such equipment).

Logo and city assets for illustrative purposes only. Other scenarios may apply.

Docklands 5G Network

Dublin 2019



Building Neutral host networks to ensure equitable 5G access

Leveraging on city infrastructure (light poles, bins, etc) to install small cells

Triple Helix partnership for deployment

Additional costs and technical risks for operators when using neutral host model

Potential for new revenue streams using neutral host model

“Key priorities for the rollout of 5G for local authorities will include: Minimizing road openings and associated disruptions, shared use of assets minimizing clutter, ensuring equitable and fair access to assets for operators, reducing CapEx costs and also delivering a digitally inclusive city” Survey respondents, Dublin 5G report

Lighting Grid Network by BrightSites

Tampere, Londo, Eindhoven 2022



Deployment of flexible mesh wireless network in areas where fibre cannot be provided using Lighting Grid

Using mmWave technology

Neutral host network

Several Smart City Use Cases deployed using wireless network

Infrastructure helps offer WiFi, 4G & 5G

Reduced carbon footprint by 90% by avoiding roadworks for fibre deployment

“Wireless connectivity has become an essential element of modern city infrastructure. It helps to attract businesses and talent, provides information for visitors and citizens and enables smart city concepts. The lighting grid offers the opportunity needed for seamless 5G deployment and Massive IoT applications due to its proximity, granularity, scale, power and elevation.” Signify

Healthcare



Telemedicine
Remote Surgery
Remote Patient Monitoring
Medical Sensors
Connected Ambulances
Medical Imaging
Augmented Reality
Clinical Collaboration



Healthcare – 5G IoT for Telemedicine

Milan 2018



Post-heart failure scenario - patient at home wearing clinically-certified connected clothing

All data collected via IOT sensors across Vodafone's 5G network and architecture, sent to monitoring platform where algorithms assess daily progress of patient.

Both physical and emotional state supported by video calls

Meanwhile machine learning can build a picture of the patient and accurately identify situations in real-time

“By monitoring the patient at home, we can develop a new and more effective care model. 5G is the key enabling technology, making it possible to send and process huge amounts of data seamlessly and in real time from connected devices, but also to ensure the secure management of these sensitive data”

Head of 5G Programme Vodafone Italia.

Healthcare – Connected Ambulances

Milan, Birmingham, Barcelona



Sharing real-time data between patient and hospital whilst en-route, preventing treatment delays on arrival

Paramedics send vital signs and 360° images in real time or make reliable video calls to aid diagnosis

Doctors receive diagnostic exams from the scene before the patient arrives at the hospital, optimising the treatment time

Paramedics can instantly review a patient's healthcare history and apply required procedures by wearing AR-equipped glasses

Connected ambulances help staff in A&E to target treatment and prioritise the most urgent cases

“Neurologists in the hospital, for example, might ask a patient who has had a stroke to move their arm. If there’s a lag on the video call, the neurologist can’t really understand if it’s the technology or if the patient has been impacted by the stroke.” - 5G Sector Lead for Health & Wellness, Vodafone Italia.

Mobility



Driverless passenger vehicles
Truck Platooning
Last mile delivery by land & air
Connected bus-stops
Vehicle fleet monitoring
Navigation & augmented reality
Enhanced agricultural machinery
Infotainment



Mobility - Driverless Passenger vehicles

Barcelona 2022



Driverless shuttle bus service is deployed at large exhibition trade fairs to transport people to different pavillions across large distances

Barcelona home to worlds longest running driverless metroline since 2016

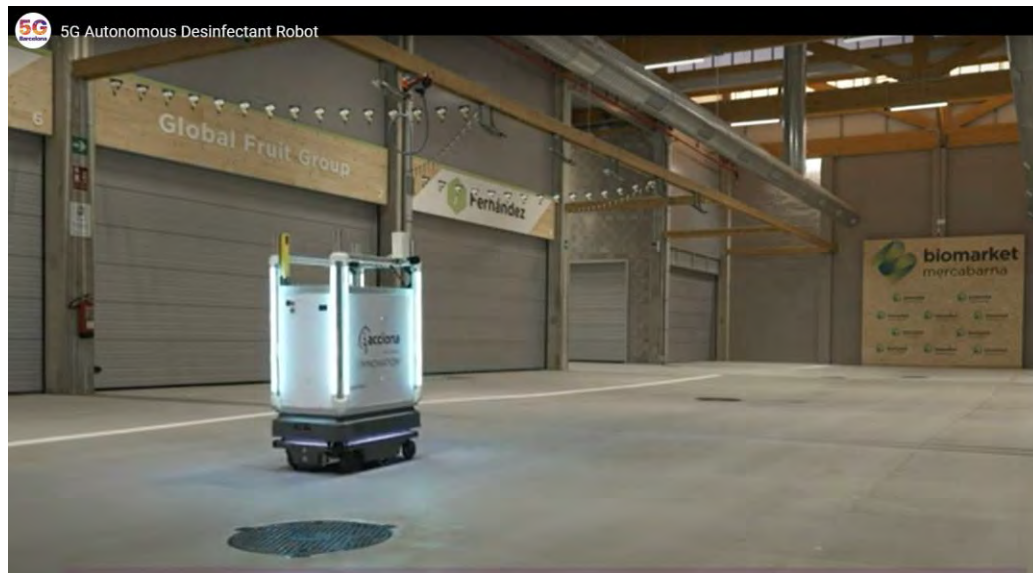
Barcelona home to one of Europe's largest living labs for connected and autonomous vehicles CAV



“By 2023, 20% of the world’s population will have 5G coverage. It will have an enormous impact in terms of user experience and the digital transformation of industries and cities.” - *Commercial Director, Telefonica*

5G Autonomous Disinfectant Robot

Barcelona 2020



5G Robot disinfects areas potentially contaminated by viruses, bacteria, etc.

Eliminates Germs from surfaces and airborne particles using Ultraviolet light.

In Mercabarna, 23,000 people pass by every day

Can be operated during rush hours as it detects and avoids obstacles

Remote control of vehicle is possible

Can be used in quarantine areas and labs

Future applications: hotels, airports and public places

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Mobility - Self-Drive Kiosk

Cologne 2021



Snack dispenser on wheels

6 week trial in an urban commercial district

10am – 4pm daily at walking speed of 3 mph

Vehicle had some fixed stops but could be halted at anypoint with a wave

Vehicle monitored itself with camers and 5G SIM card

Customers could track movement and order by app

All payments using contactless

"We want to learn more about the technology, test its use and understand how customers react, where there are still challenges and what potential arises from the use of the technology," - *Head of Research & Innovation at REWE Digital*

Mobility - Supermarket Delivery

Hamburg 2022



Cartken delivery robots delivering REWE food orders

Equipped with multiple cameras enabling real-time decision making for a range of scenarios

Machine learning and navigation algorithms enable continuous improvement of journeys, whilst remote monitoring human intervention in an emergency

Customers track movement and order by app

Deliveries possible indoor and outdoor, and can be safely deployed in hospitals, airports and campuses

“We're constantly testing new technologies. The use of autonomous delivery vehicles should give grocers new insights into future shopping. Customers conveniently order their goods from home using an app and have them delivered to their front door within two hours by our delivery bot,” - *Innovation team, REWE Group*

Energy



Smart Grids
Smart Meters
Remote Equipment Monitoring
Digital Data Management



Industry



Industrial Automation

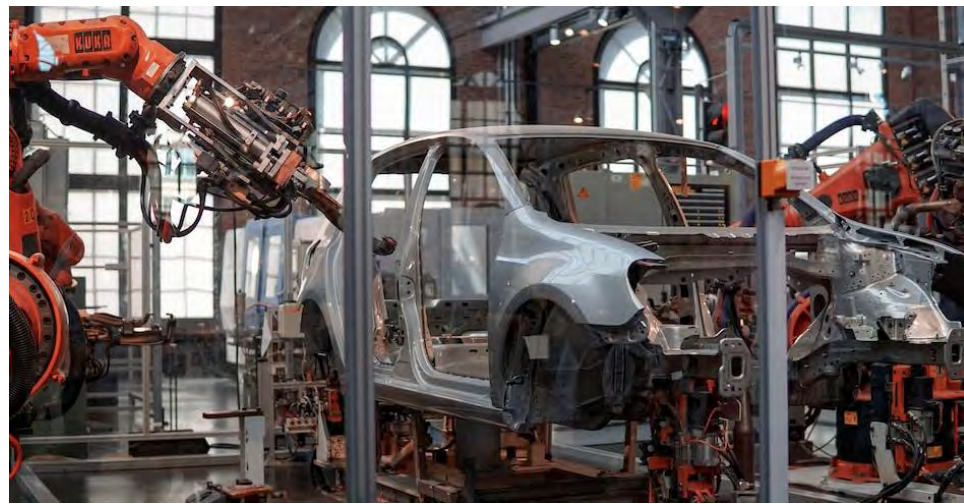
Remote Monitoring and Maintenance

Additive Manufacturing

Automated Guided Vehicles

Supply Chain Optimization

Trouble shooting using Digital Twin





Innovation with cities and for cities

a community driving the Smart City movement

or try common searches from the community

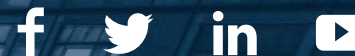
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www.bable-smartcities.eu
info@bable-smartcities.eu



Let us work together!

Looking forward to partner up with you

Feel free to contact us.

Nikita Shetty: nikita@bable-smartcities.eu

Andrew Savill: Andrew@bable-smartcities.eu



Innovation with cities and for cities