



IoT WebTalk

# 5G Private & Dedicated Networks FOR INDUSTRY 4.0

Tuesday, 13 October 2020 | 09:00 EDT | 14:00 BST | 15:00 CEST





# SPEAKERS



**Alexander Deo**

Innovation Manager,  
SmartSensor & IoT  
DHL



**Chris White**

5GEM UK Project Lead  
Ford UK



**Jacob Groote**

EVP 5G  
KPN



**Lov Kher**

Managing Principal &  
Master Architect  
Verizon



**Marc Sauter**

Head of Mobile Private Networks  
Vodafone



**Marijn Bezuijen**

Business Opportunity Manager  
Shell



**Ronan Le Bras**

Head of Technical Strategy –  
IoT & Wireless Networks  
Orange



**Stephane Gervais**

Executive VP Strategic Innovation  
LACROIX Group



**Aruna Srinivasan**

Executive Director, IoT  
GSMA



**Steve Doyle**

Principal Technical Architect  
GSMA



# AGENDA

5 minutes	<b>5G Private and Dedicated Networks for Industry 4.0</b>	<b>Aruna Srinivasan</b> , Executive Director, IoT Capabilities, <b>GSMA</b>
15 minutes	<b>Creating the 5G Factory of the Future</b>	<b>Chris White</b> , 5GEM UK Project Lead, <b>Ford UK</b> <b>Marc Sauter</b> , Head of Mobile Private Networks, <b>Vodafone</b>
15 minutes	<b>5G IoT for Connected Factories 4.0</b>	<b>Stephane Gervais</b> , Executive VP Strategic Innovation, <b>LACROIX Group</b> <b>Ronan Le Bras</b> , Head of Technical Strategy – IoT & Wireless Networks, <b>Orange</b>
25 minutes	<b>Panel Discussion: 5G Private and Dedicated Networks Deployment</b>	Moderator: <b>Steve Doyle</b> , Principal Technical Architect, <b>GSMA</b> <ul style="list-style-type: none"><li>• <b>Alexander Deo</b>, Innovation Manager: SmartSensor &amp; IoT, <b>DHL</b></li><li>• <b>Jacob Groote</b>, EVP 5G, <b>KPN</b></li><li>• <b>Lov Kher</b>, Managing Principal &amp; Master Architect, <b>Verizon</b></li><li>• <b>Marijn Bezuijen</b>, Business Opportunity Manager, <b>Shell</b></li></ul>



# 5G IoT for Manufacturing offers new revenue opportunities



**2bn**

Industry 4.0 IoT connections in 2025.



**10%**

Connectivity will be 10% of \$13 billion Industry 4.0 revenues.



**18%**

Licensed cellular will account for 18% of connections.

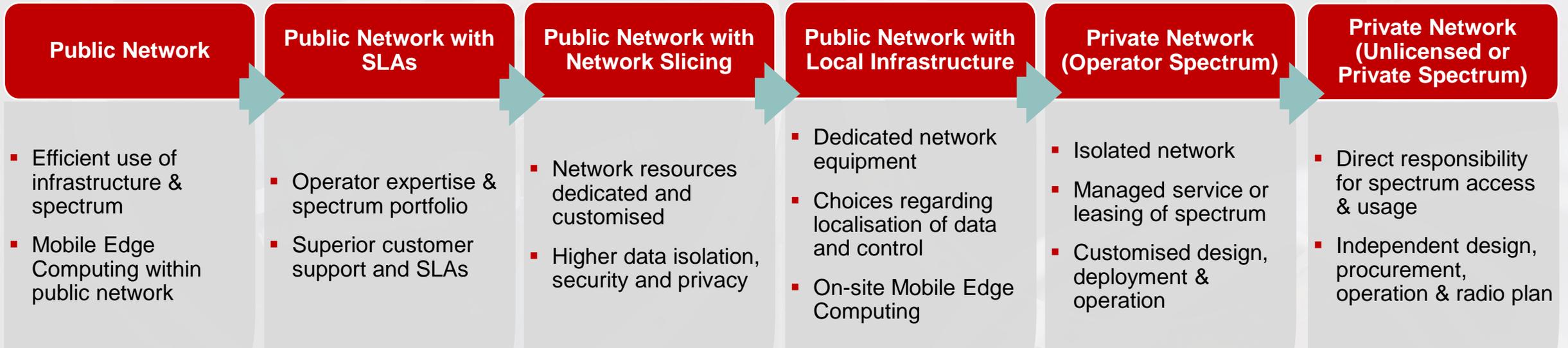


**\$1.8bn**

Operators' expected revenue is 14% of total market.

**Notes:** 1. Includes manufacturing and supply chain. 2. Source: GSMA Intelligence, July 2020.

# 5G Private and Dedicated Networks



**\$1.4bn** Operators' revenue uplift from customised network services.



Report

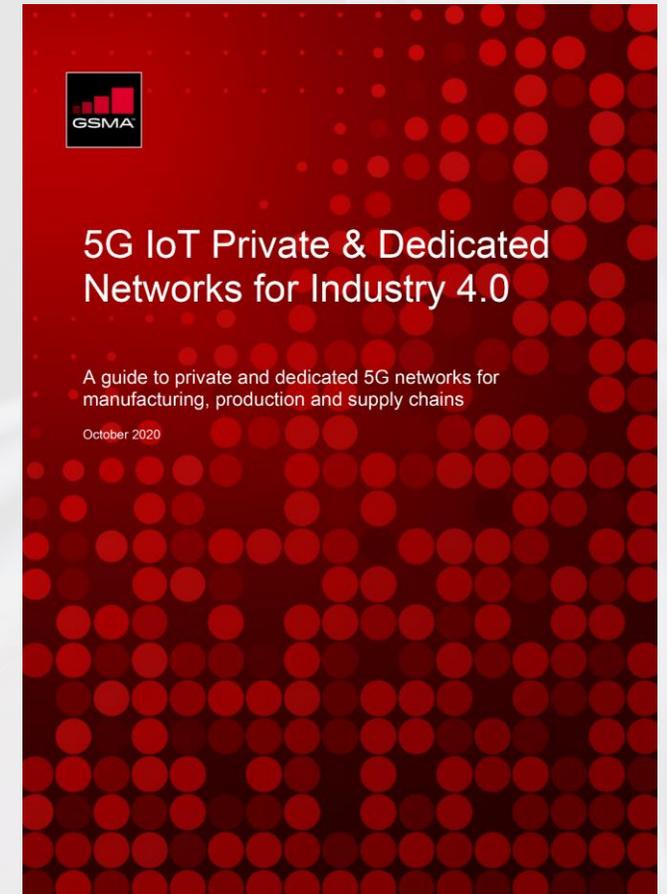
# 5G Private & Dedicated Networks for Industry 4.0

## A guide to private and dedicated 5G networks for manufacturing, production and supply chains

This report covers:

- The application of private and dedicated 5G networks to the Internet of Things in manufacturing/production and supply chain
- The benefits of private and dedicated networks
- A selection of use cases that benefit from these networks
- The range of public, dedicated and private network options available to enterprises
- Key new features within 5G that make these networks work better for industrial applications

Download now: <https://www.gsma.com/iot/resources/5g-private-npn-industry40/>





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# 5G Private & Dedicated Networks FOR INDUSTRY 4.0

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**Creating the  
5G Factory of the Future**

**Marc Sauter – Vodafone  
Chris White – Ford**



# Speakers



**Marc Sauter**



**Head of Mobile Private Networks**

**Vodafone**

**Chris White**



**Electrification and Global Engineering Alignment Manager – Europe**

**Ford Motor Company**



# Session Overview

- What 5G Private and Dedicated Networks are and their benefits
- Enterprise drivers for 5G Private and Dedicated Networks
- The various deployment models possible and their features
- Case Study: Ford Motor Company



# A wide range of industries are embracing digital transformation

## Manufacturing



Industrial robots  
Connected machines

## Transport & Logistics



Autonomous guided vehicles  
Container location tracking

## Energy & Utilities

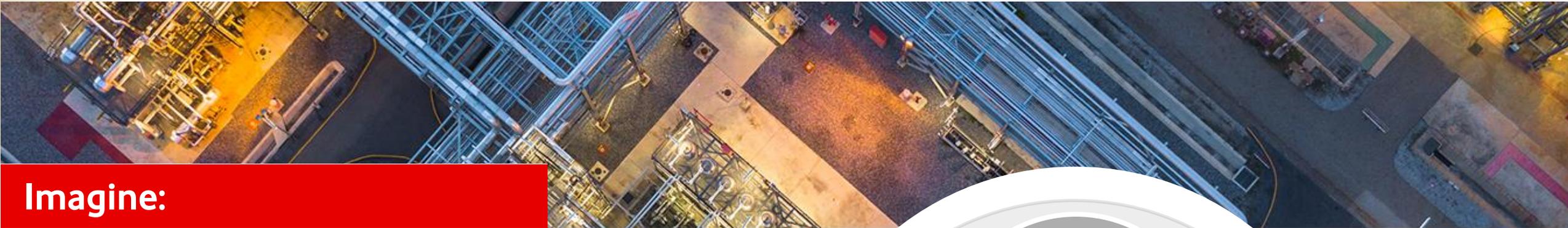


Surveillance drones  
Sensor monitoring

**Many of these capabilities require reliable,  
high-performance wireless networks**



# Doing new things in new places



## Imagine:

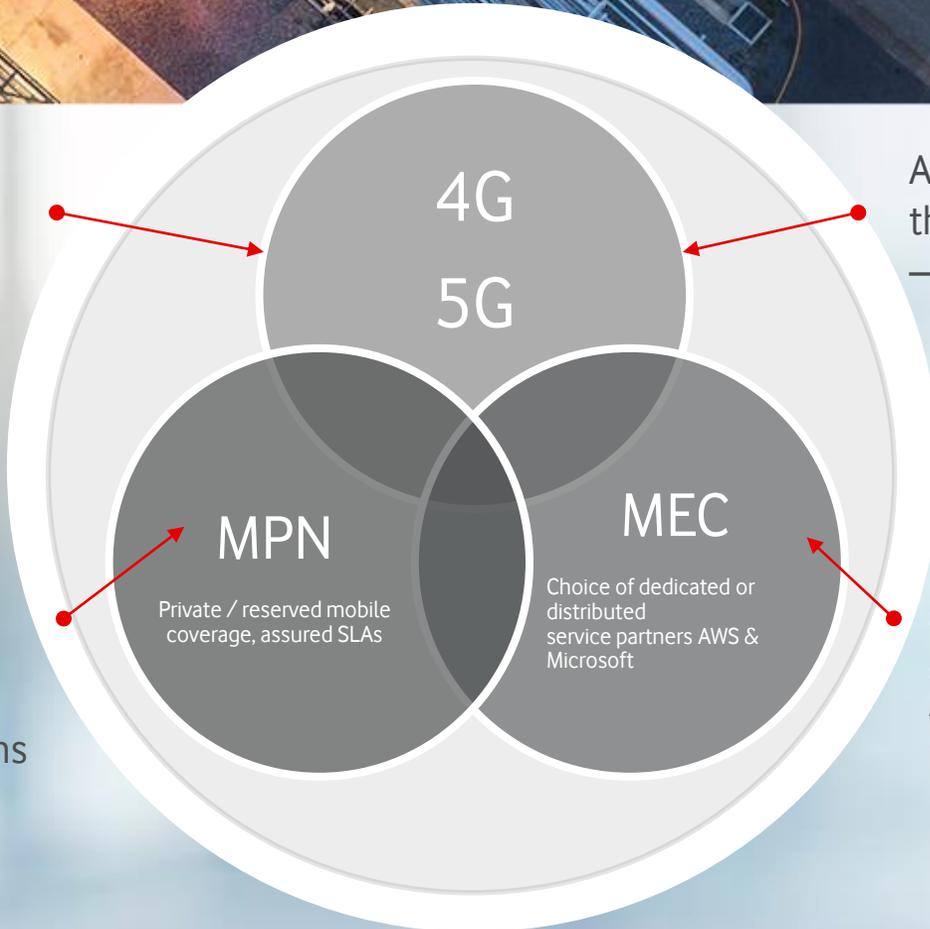
- Protecting your employees on site
- Automating, reconfiguring production
- Across large and complex sites
- Almost any remote location

## Consider:

- 4G and 5G communication
- Mobile Private Network
- Mobile Edge Computing
- End-to-end applications

Super-low latency, enabling new possibilities

Guaranteed service levels and security. 5G, 4G, NB-IoT options



Ability to connect to the public network – mobile and fixed

Computing at the edge. Mobile and fixed options



# What is a Mobile Private Network (MPN)?



drones



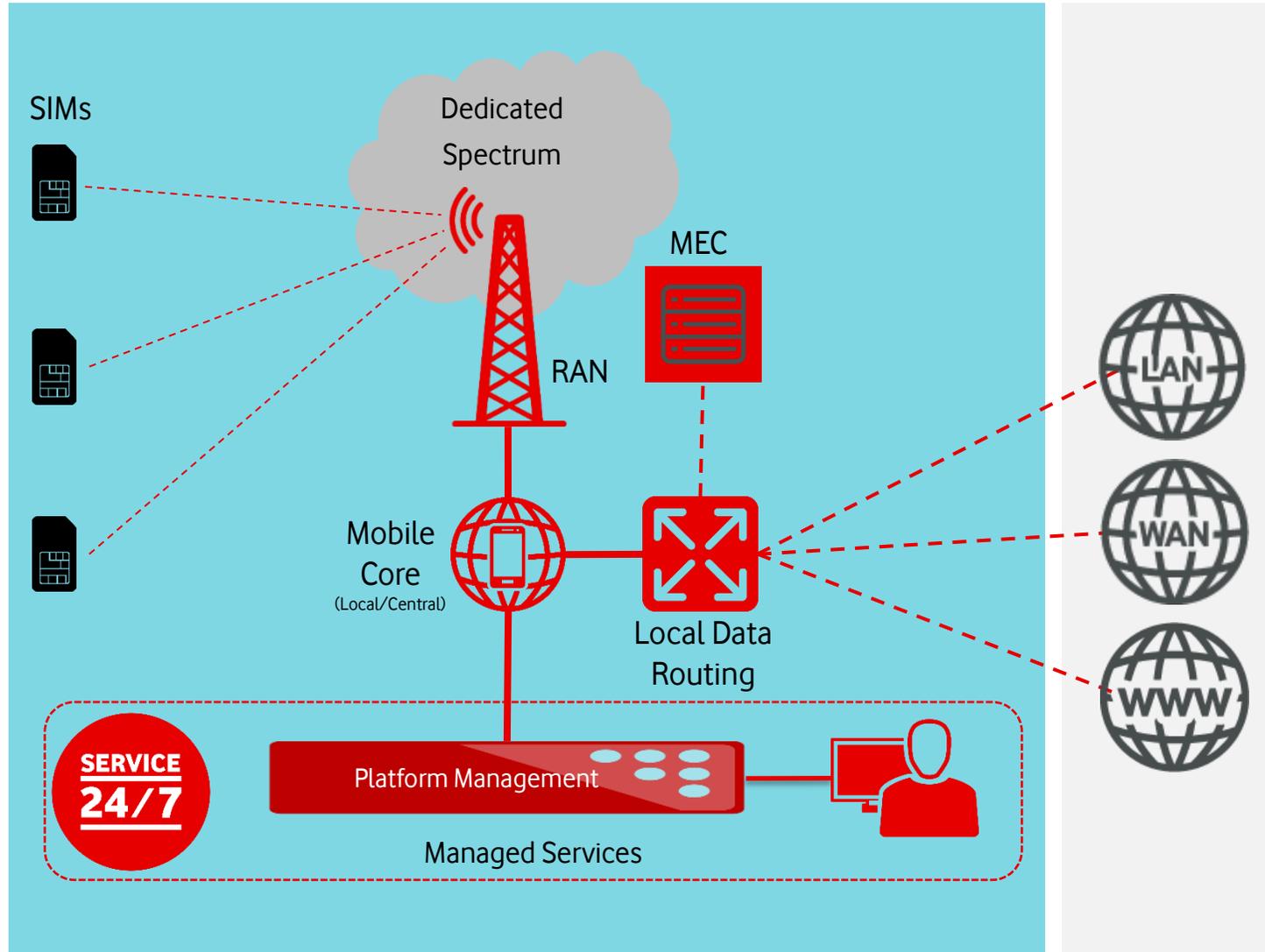
robots



factory



AR/VR



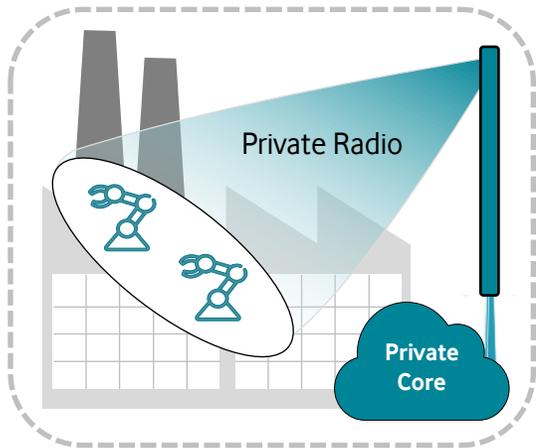
An MPN is a **secure mobile communications network** for a specific company site (e.g. Factory, Port, Campus). It provides dedicated RAN and/or Core mobile network resources (dedicated, hybrid, or slicing) to **enable customer-specific use cases**. The customer is able to control and authorize which devices connect to the relevant network infrastructure, which means it is **useable exclusively** by these devices.

# MPN Connectivity options – 3 possible versions

## Dedicated MPN

Physical standalone mobile private network

Customer Campus      Public network

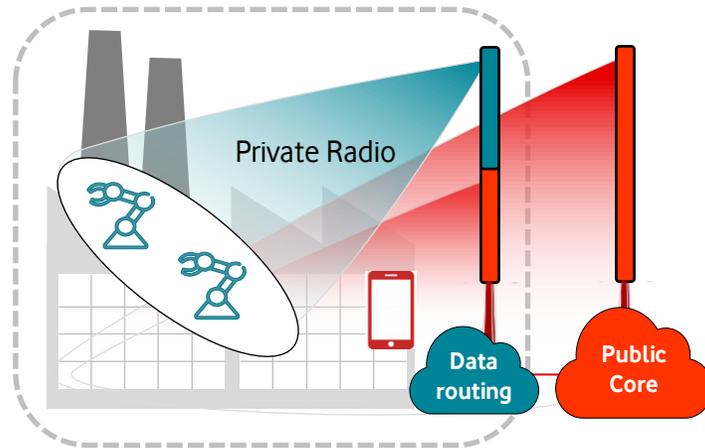


- Assured QoS ✓
- Keep your data on your campus ✓
- 100% control through customer ✓
- Interworking with public network ✗

## Hybrid MPN

Physical private network elements deployed in conjunction with the public network

Customer Campus      Public network

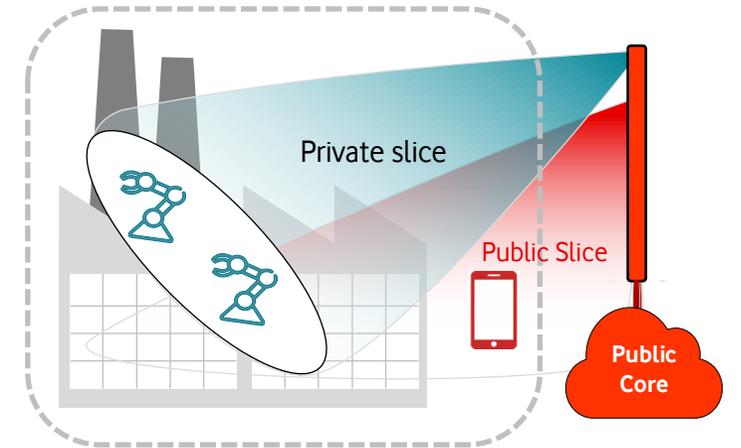


- Assured QoS ✓
- Keep your data on your campus ✓
- 100% control through customer ✗
- Interworking with public network ✓

## Virtual MPN

QoS in the Vodafone network with Network Slicing

Customer Campus      Public network



- Assured QoS ✓
- Keep your data on your campus ✗
- 100% control through customer ✗
- Interworking with public network ✓





# Case Study: Laser Welding at Ford



**EPRIME**

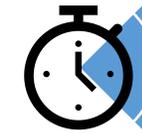
# BRING ON TOMORROW



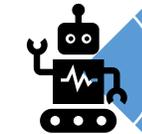
5GEM UK – A 5G INDUSTRIAL TESTBED  
ELECTRIFIED POWERTRAIN PILOT LINE – DUNTON, UK

# Enabling Vehicle Electrification: Industry 4.0 & Wireless Connectivity

## Current



Fixed connections take too long to complete, maintain and validate



Equipment cannot easily be reconfigured or move during production



Remote expert access is only possible via Ford Networks- cyber security risk



Data connections, decision making and analysis is dispersed across shop floor based computers



Physical limitations on the amount of data that can be transferred and stored

5G as a potential Enabler

## Future

Safer, faster connections that can be validated prior to equipment delivery

Reconfigurations without network updates  
Constant data from moving equipment

Equipment communicating with manufacturers, experts, service providers as well as Ford Network. Use technology such as AR, AI

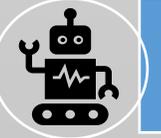
Provide more robust and manageable, centralised remote computing

New and increased amounts of data traffic accommodated

# Why does Ford need Industry 4.0?



Safer, faster connections that can be validated prior to equipment delivery



Reconfigurations without network updates  
Constant data from moving equipment



Equipment communicating with manufacturers, experts, service providers as well as Ford Network. Use technology such as AR, AI



Provide more robust and manageable, centralised remote computing



New and increased amounts of data traffic accommodated

Improved launch is a business imperative

Factory of the future and IoT Enablers



# Use Case: Laser Welding Processes in EV's

## Laser Welding of Battery tabs



2KW Fibre laser with depth monitoring of welds

Weld diversity:

Copper/ Aluminium/ nickel battery electrodes/ busbars

Differing thicknesses and weld patterns

860 milli sec weld time

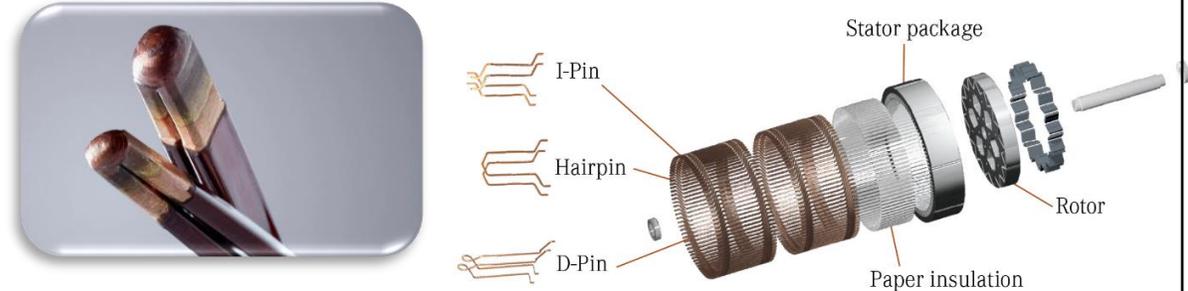
480 welds per vehicle

Heavy Data Processing

Requirement with enabled Real Time Process Analysis and Control

>250K pieces of data per battery

## Stator Motor Hairpins



- 'Hairpin' stators for e-drive or hybrid drives
  - 150 connections per hairpin stator
  - Normally 2 stators per EV (300 welds)
  - 6KW laser , pure copper to copper weld
  - Highly dependent on prior processes
  - Incoming part variation
  - Removal of insulating enamel required
  - Risk of damaging stator insulation through overheating

Laser welding hairpins and arrays are a new, complex applications - large amounts of data to be processed quickly

# 5G Laser Welding Use Case Selection

Real Time Machine Monitoring	Condition Monitoring	Remote Support	Quality Monitoring
<ul style="list-style-type: none"><li>• Machine state reporting<ul style="list-style-type: none"><li>• Blocked</li><li>• Starved</li><li>• Faults</li></ul></li><li>• Sub system state reporting:<ul style="list-style-type: none"><li>• Laser source</li><li>• Chiller</li><li>• Extraction</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Connect equipment suppliers</li><li>• Collect and process 'raw'</li><li>• Integration of simple IOT devices into legacy equipment</li></ul>	<ul style="list-style-type: none"><li>• Remote experts via AR</li><li>• Managed access to machine programs</li><li>• Fixed cameras for machine fault finding / learning</li><li>• Access to the digital twin</li></ul>	<ul style="list-style-type: none"><li>• Vision data (pre, post or in-process): Centralised vision data processing Enabling AI computing</li></ul>

- Is the technology available in the timeframe of the project (or can it be simulated)
- Is it affordable?
- Is it beneficial?
- Is it a good 5G demonstrator- or are other technologies more suitable /relevant?
- Does it highlight the skills/ offerings/ aspirations of all partners

# Project Status

## Device Availability

- Lack of 5G enabled machines/ equipment
- Industrial device suppliers are considering IoT
- Strategies for wireless connectivity in IoT are diverging
- Pilots are using equipment that is not designed/ integrated for shop-floor environments

## 5G vs. other Wireless Technologies

- WiFi6
- LoRa
- LIFI
- OE-Link
- CBRS

## 5GEM UK Initial Challenges

## 5G Concerns

- Workplace health and safety
- Use of 5G for safety critical communications
- Security

## Awareness and Understanding

- Limited telecoms/ IT experience in the engineering community
- Interdependencies with plans for IoT / edge devices
- Standardisation limited across Automotive controls architecture and software

# Further Information

Ford

Vodafone



Chris White

Manager –EU Electrification  
Chris.White@ford.com



Chris Allen

Product Manager  
Chris.Allen@vodafone.com

# Creating the 5G Factory of the Future



**vodafone**  
business





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CONNECTED  
TECHNOLOGIES  
FOR A **SMARTER**  
**WORLD**

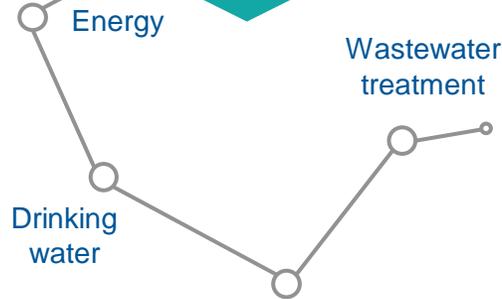
5G IoT at our Factory 4.0

Stephane GERVAIS<sup>L</sup>  
EVP Strategic Innovation  
LACROIX Group

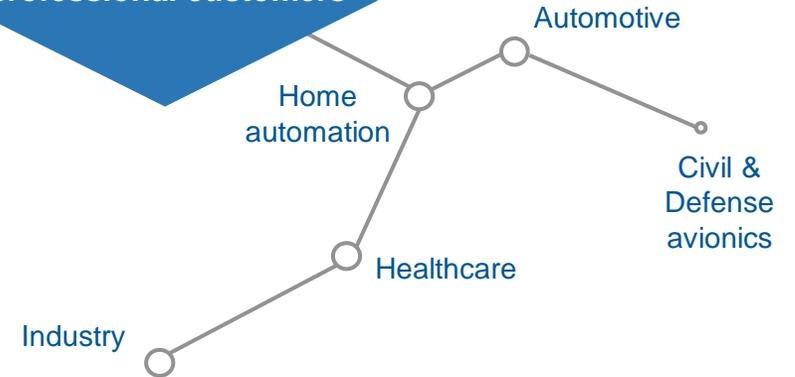
Providing our customers with equipment for a smarter and more sustainable world



**SMART MOBILITY**  
LACROIX City



**SMART ENVIRONMENT**  
LACROIX Sofrel



**SMART INDUSTRIES**  
LACROIX Elec.



# 5G: Orange – LACROIX Group Partnership

Press release du 02/07

@ OB Summit 18/04

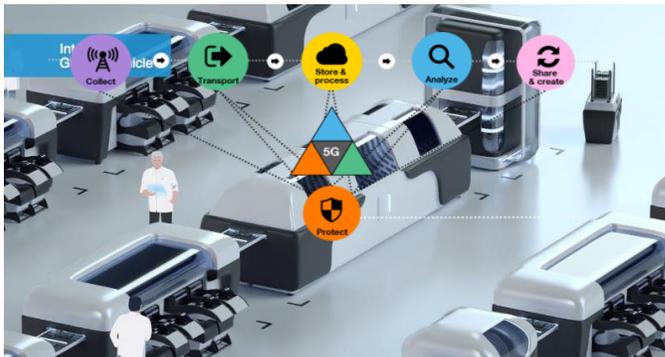
Round table with our CEO Vincent Bedouin



**Co-innovation :**  
**« Full-scale testing of 5G / IoT solutions for industrial  
production site »**



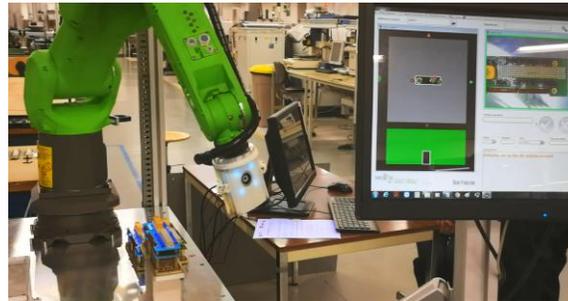
## Energy monitoring and controlling of the whole factory



## Wireless, secured and real-time factory (LAN to WAN)



## Operators supported by augmented reality



## Automatic Optical Inspection



## Secured & real-time monitoring of the factory



## Dynamically guiding AGV (Automated Guided Vehicle)

# 5G: What do We expect ?

symbiose

Building a Brand new Electronic  
Assembly Factory...In France



## Industrial innovation

Creation of the first  
French electronics  
factory of the future



## Sustainable and responsible innovation

A smart and  
environmental building  
of high energy  
performance



- Enable **Flexibility / Adaptability** with **mobility** (wireless, )
- **Speed** (decision, increasing components and material flow...)
- Higher **reliability** (quality, security, redundancy...)
- Increased and flowless information for **optimum decision** (digital twin, decision based on data...)
- “Dynamic automatization” for **best efficiency**
- **Sustainable factory** (carbon emission, energy, water and consumption, maintenance...)
- More value added for our **colleagues/operators**
- Transform the **full value chain** (forecast, ordering, stock...)
- European electronic manufacturing **boosting reshoring / near shoring**





Industry 4.0  
Learning through  
co-innovation

Orange – LACROIX  
Group



Ronan LE BRAS  
Head of Technical Strategy  
Technology & Global innovation



# From the data journey to **instantaneous** data journey



End-to-end capabilities and expertise accelerates transformation  
5G to accelerate the "Collect" part

# Co-innovation project with Lacroix

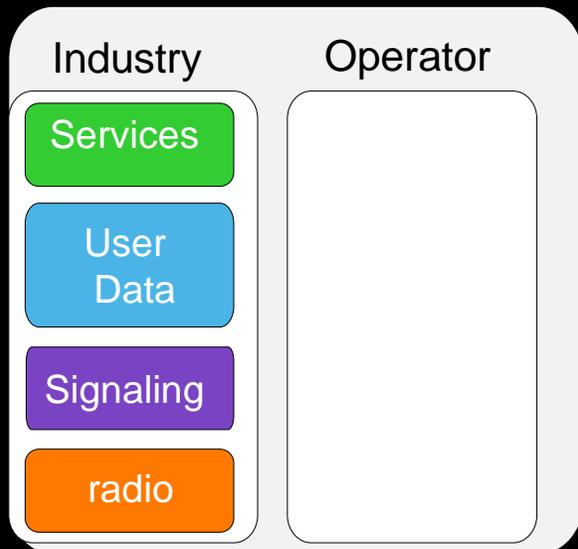


# Orange and its partners selected a solution based on scenario 3 of the 5G-ACIA.

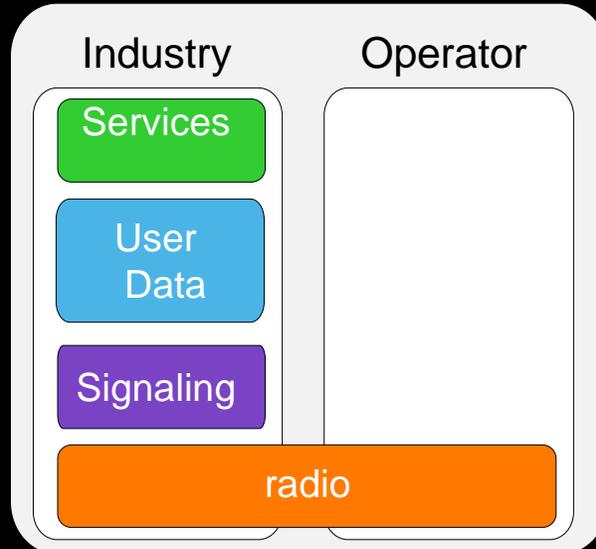
- Dedicated Indoor Radio solution using temporary 3.5 GHz spectrum
- Signalling Traffic routed to/from Orange Core network in NSA
- Lacroix User Data and services kept local



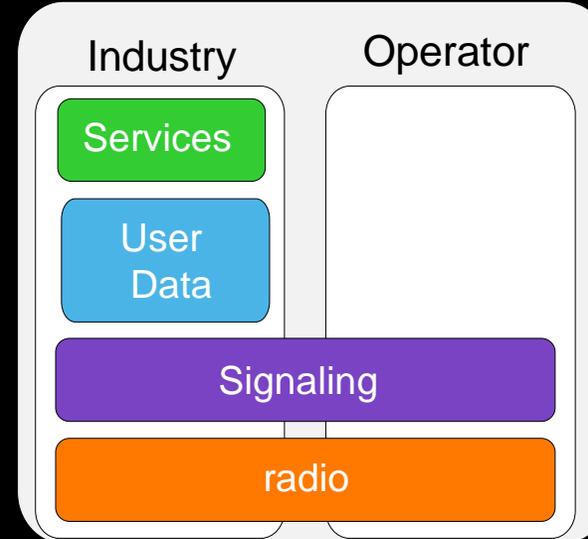
## 1. Standalone



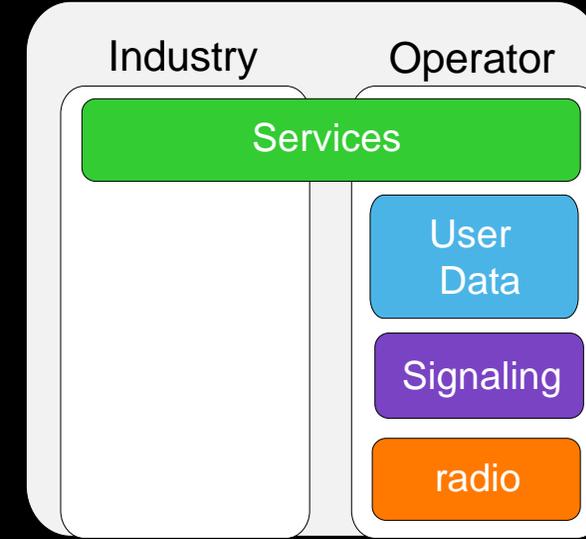
## 2. Shared radio



## 3. Shared radio & Signaling

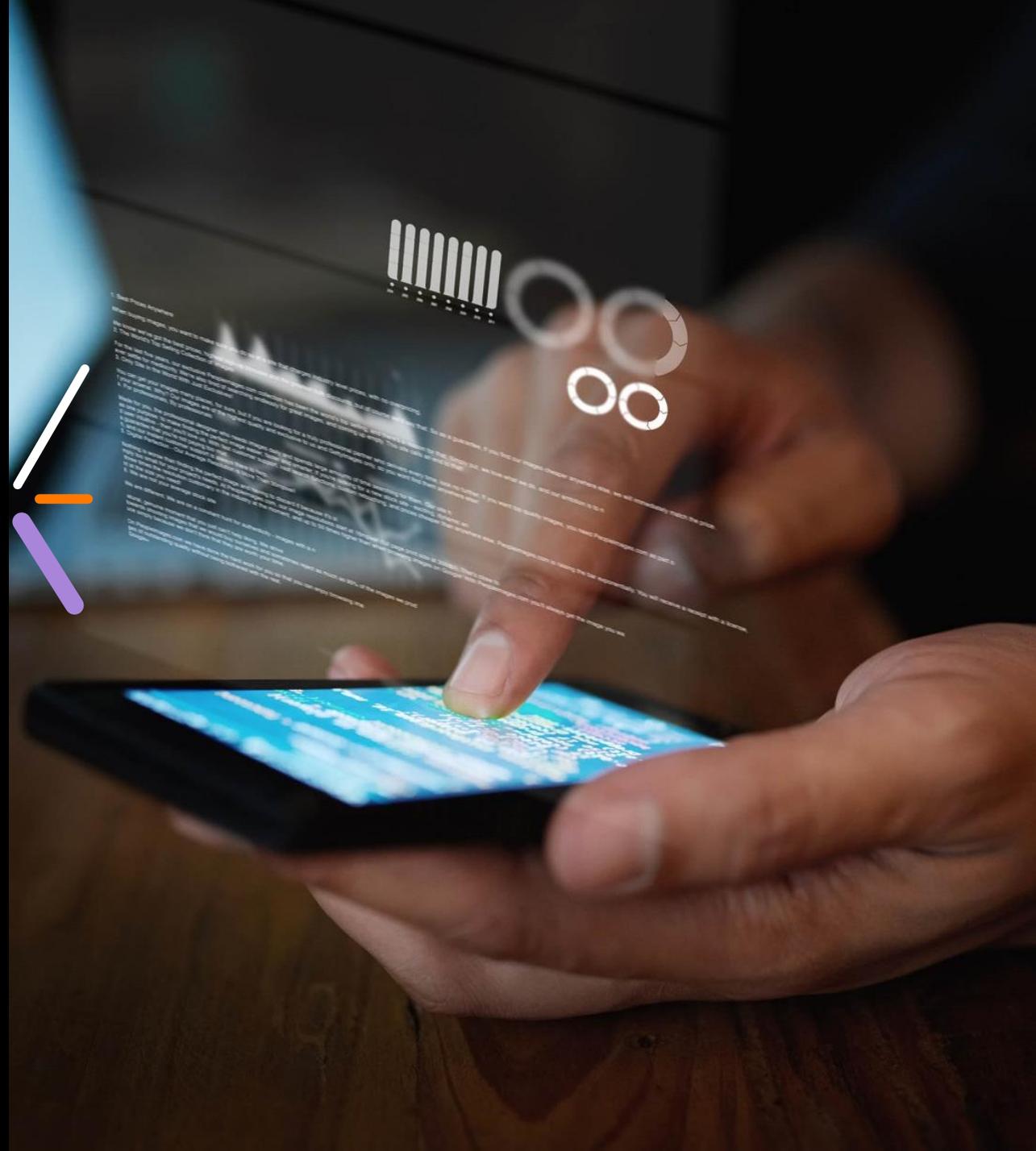


## 4. Hosted



## Orange objectives in Co-innovation

- Get knowledge from the Industry sector through real experimentation and use cases
- Understand the real needs of the customers
- Identify the role of 5G with other connectivity solutions in the factory of the future
- Evaluate the operational aspects of 5G in the industry



# 5G co-innovation on different business verticals in France and Europe

5G opens up new perspectives in the B2B world, Orange works with its customers to implement use cases thanks 5G. Co-innovation projects aim to cover as many verticals of the economy as possible



Factory of the future



Augmented worker with AR



5G for mobility



Smart harbor  
Optimized logistic through data science



Ultra High-speed  
HD video downloads



Enhanced sport/show experience



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# PANEL DISCUSSION 5G Private & Dedicated Networks Deployment

Moderator



**Steve Doyle**

Principal Technical Architect



**Alexander Deo**

Innovation Manager,  
SmartSensor & IoT



**Jacob Groote**

EVP 5G



**Lov Kher**

Managing Principal &  
Master Architect



**Marijn Bezuijen**

Business Opportunity Manager





# THANK YOU FOR ATTENDING!

## GSMA 5G IoT for Manufacturing

<https://www.gsma.com/iot/manufacturing/>

## GSMA IoT on LinkedIn

<http://gsma.at/iot>

## GSMA 5G IoT for Manufacturing Industry Resources

<https://www.gsma.com/iot/manufacturing/resources/>

## GSMA IoT Newsletter

<https://www.gsma.com/iot/newsletter/>

## GSMA IoT Marketing Group

<https://www.gsma.com/iot/iot-marketing-group/>