



BT - 5G in manufacturing

21 June 2022

Speaker:

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5G in manufacturing briefing

Agenda

- Our view of the 5G market and use cases
- Our 5G strategy
- Customer engagements

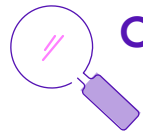
5G Market & Early Use Cases

BT's Approach to Deployments

The road to private 5G for global organisations

Market trends

Transition to hybrid working whilst investing in cloud-based solutions	Rapid growth in volume of data and number of connected devices	Increased automation and growth of internet of things (IoT)	The pursuit of better productivity and operational efficiency	Dramatic increase in number of security threats
Investment in new digital innovations, to drive competitive advantage	Digital transformation plans have been accelerated due to the pandemic	Need for perfect predictability and improved reliability	The rise of digital industries	Sustainability becoming a key business driver



Customer focus areas

- ✓ Seamless, reliable user experience
- ✓ Cloud adoption
- ✓ Advanced networking infrastructure
- ✓ Cyber security resiliency
- ✓ Digital transformation
- ✓ Technology convergence

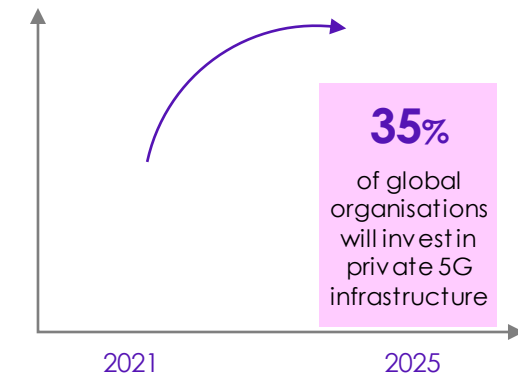


Market size and growth

The 5G private network market is estimated to reach **\$14bn** by 2028...
...with a compound annual growth rate (CAGR) of **40%** from 2021 to 2028



Investment outlook



Market Trends / early use Cases identified for 5G

Industry requirement for networks to support enhanced mobility, Immersive interaction & Inspection

Autonomous guided Vehicles (AGV)

5G offers a high-speed and low latency network for the communication between AGVs.



Robotic Arm

5G enables the introduction of Teleoperated robotic arms.



Sensors & LiDAR

5G enables remote teleoperations to allow cars to be automatically driven from the end of the production line to the correct location



Augmented Reality & Digital Twin

5G enables the introduction of AR to run an immersive Experience and in combination with the use of a Digital Twin this will improve the collaboration between Design & manufacturing teams.



Visual Inspection

Fully automated visual inspection that consistently Finds defects that are often missed by the human eye.



Remote Expert

5G enables remote experts to safely collaborate in a virtual environment to aid & assist in diagnosing, fixing or advising on mechanical problems in the field.



Challenges with global 5G deployments



5G market has lots of noise
and different providers

Security
concerns – E2E
infrastructure

Complex
partner
ecosystem &
deployment
model

End user device
availability due
to semi-
conductor
shortages

Complex to
deploy in the
real world

Business case –
often need
multiple use
cases

Our 5G strategy

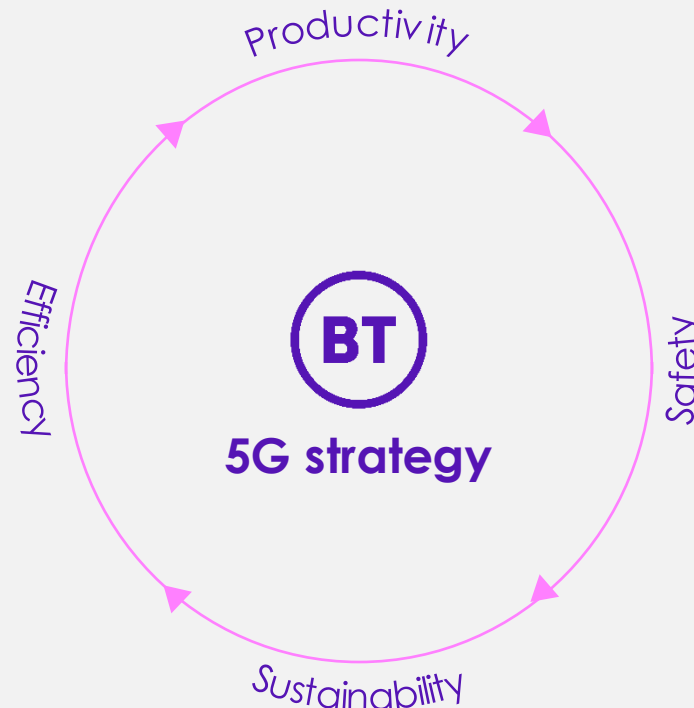
Delivering full solutions, beyond connectivity, that address business value aligned to our customers' strategies

Our solutions

- End-end capabilities with connectivity as a key enabler
- Design to requirements through co-creation & co-innovation
- Productisation as market develops to maturity
- Horizontal solutions tailored to vertical requirements

Our expertise

- BT's Division X established to accelerate key growth areas
- Focused sales and solution specialists
- Leveraging our heritage in Public 5G design and deployment
- Leveraging partnerships to address the full value chain



Our customers

- Convenience-oriented / risk-conscious
- Customers with complex requirements wanting a provider with cohesive end-to-end capabilities
- Co-creation/innovation approach
- Key sectors: manufacturing, port operations, transport and logistics, health and life sciences, energy, retail

Our ecosystem

- Partnering with 'best in breed' industrial vendors
- 5G innovation and research
- Customer partner boards
- Network equipment vendors

How we're delivering 5G for manufacturing customers



Delivering value for our customers





Digital Twin

Remote Operations of Cranes

Autonomous Vehicles

Artificial Intelligence

Enviro

CCTV

VR / AR

Drones

Mobility

**4G/5G Private Network
Stormont & Gotto
Wharfs**

**Connectivity
4/5G
Private**

**Connectivity
5G
Public**

**Connectivity
WiFi**

Data Exchange

**Movement
& Monitoring**

AR Wayfinding

CCTV

**Innovation
Ecosystem**

Environmental

Smart Traffic

**5G Digital Fabric
Innovation Ecosystem
Queens Island**

SAILORTOWN

CITY QUAYS

SMART DISTRICT

SSE Arena Belfast

Titanic Belfast

Hollywood

George Best
Belfast City
Airport





Belfast Harbour – What’s Next?

- Working alongside Belfast Harbour to establish a wider range of use cases with associated business case.
- Partnering with Ericsson a new approach to business case development was trialled to show a route to business value through provision of 8 use cases
- The initial investment return over 5 years was positive and well received by the customer. Next Steps – A decision on expansion and deployment of the network and use cases during Q2/Q3 2223.

5G Solutions: Belfast Harbour Phase 2 Use Cases



Remotely Operated Hoppers: Retrofitting sensors to provide teleoperation of existing heavy plant



Augmented Realty: AR capabilities for remote maintenance and remote ‘on the job’ support



Condition Based Monitoring: IoT sensors for monitoring of equipment leading to predictive maintenance into the Digital Fabric



Flexible CCTV: Expansion of the phase 1 surveillance solution



5G Enabled Wi-Fi: Provision of Wi-Fi using 5G backhaul for visiting ships



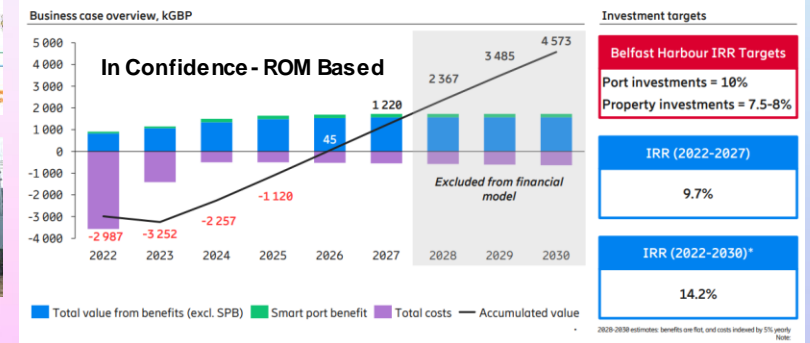
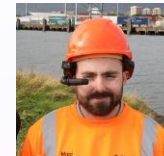
Drones: Provision of drones for visual inspection



Remotely Operated Ship to Shore Cranes (In Development)



Autonomous Guided Vehicles (In Development)



Delivering value with our partners:

5G partnership with Manufacturing Technology Centre (MTC) to boost wireless connectivity and productivity

The 5G connected facility will allow manufacturers of all sizes to explore benefits from multi-edge computing and wireless connectivity in digital manufacturing and robotics.



Manufacturing Technology Centre (MTC)

Summary

A 5G-enabled system featuring automated logistics, robotics and vision inspection to serve one or several production lines with varied inspection requirements.



Autonomous Guided Vehicles (AGV)

Moves part from a collection point in the factory to quality inspection zone



Robot Arm

Arm mounted on a plinth with 360 degree rotation for manipulating the part during inspection



Vision System

Camera mounted on arm, video feed passed through AI engine to analyse quality of parts & detect anomalies



Safety Scanner

Safety laser system providing perimeter access protection around the inspection area



Three key takeaways about our 5G proposition

1

5G is part of our end-to-end capabilities that we're delivering globally

2

Private 5G is a core component of our broader digital industries proposition

3

Our innovation and partner ecosystem is bringing our 5G proposition to life.





**Means
Business**