What is 5G?

What are the use cases for the Logistics sector?

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1. Digital Catapult: a brief intro
2. What is 5G and why is it so special?
3. What is the status of 5G in the UK?
4. 5G use cases: benefits and challenges
1. Digital Catapult

- Here to accelerate early adoption of advanced technologies in the UK.
- We support innovation with SMEs through access to facilities and innovation/acceleration programmes supported by engagement with industry.
Driving growth

Here to accelerate early adoption of advanced technologies in the UK.

We’re building facilities and accelerating the number of trailblazer companies who work with advanced digital technologies in the UK.
The 5G Programme at Digital Catapult in a nutshell

Develop Innovation in 5G
- Testing facilities and showrooms
- Incubation / Acceleration
- Collaborative Research & Development

Thought Leadership & Evangelise
- Publications, keynotes, etc.
- Networking events
- Support to DCMS (5G programme)

Support corporate to innovate (from idea to full scale roll-out)
- 101 programme + Sprint programme + Scale Programme

- 5G Facilities
  - 5G Brighton test bed
  - 5G London Node

- 5G Innovation programme
  - 5G Brighton
  - 5G Smart Tourism

- Thought leadership
  - 5G Nation report
  - 5G Manufacturing working group
  - Cross Catapult coordination for 5G

- DCMS 5G TT program Support
  - Urban Connected Communities project
  - Sector testbed
2. What is 5G and why is it so special?

- 5G has several unique features.
- 5G is well suited to Manufacturing for its versatility and its ability to serve a large number of use cases.
“5G has the potential to change things in the same way that electrification revolutionized manufacturing in the early 20th century.”

Sherif Hanna, Director of Product Marketing, Qualcomm
So we all know what 5G is....

- **eMBB** (enhanced Mobile BroadBand)
  - Peak speed 20 Gbps

- **mMTC** (massive Machine Type Communication)
  - 1 million device connections/km²
  - High energy efficiency

- **URLLC** (Ultra Reliability Low Latency Communication)
  - 1 ms latency
  - 10^-9 error-rate, ultra reliability

**Network Slicing**
5G - Driving the automation of everything
Why is 5G so special?

User perspective of change:
- Mobile calls
- +Data
- +Faster

Technology change:
- 2G (1991) - Digital Voice
- 3G (2001) - Digital Voice+ Data-over-voice (switched circuit)
- 4G (2010) - All-IP network Voice-over-data (VoIP)

Why is 5G so special?
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Technology change:
- 2G 1991: Digital Voice
- 3G 2001: Digital Voice+ Data-over-voice (switched circuit)
- 4G 2010: All-IP network Voice-over-data (VoIP)
- 5G 2020+: The flexible mobile network

User perspective of change:
- Mobile calls
- + Data
- + Faster

- Massive IoT (mMTC)
- Faster (eMBB)
- Ultra reliable and real-time (URLLC)
The logistics sector is key to the UK economy.

Manufacturing & Logistics sector represents 32% UK GVA and 7 Mil people.
5G is the network technology that supports the widest range of applications.

Logistics use cases are extremely varied and require very different network capabilities.

5G is versatile. Compared to other technologies, 5G offers the broadest range of capabilities.

Source: Ericsson, China Mobile
3. What is the status of 5G in the UK?
Unlike 4G, the UK is currently in a strong position regarding 5G and is in line with the government objective to make the country one of the world 5G leaders.

UK is number 5 at world level.

Source: CDIA (April 2018)

UK currently is home to more than 225 5G research projects.

Source: 5G Ecosystem report (June 2018)
However, it will take many years for 5G to deliver the full potential of its promises.

The reasons are:

1. Despite a commercial launch of 5G expected as early as end of 2019 in the UK, the initial 5G offer will be limited in coverage and technical features (as deployment costs are extremely heavy, even more than 4G).

1. Despite a very active research landscape in the UK, only 1% of the 5G research budget is dedicated to innovation. Whereas use cases around eMBB (enhanced Mobile Broadband) are quite clear, there is still uncertainty around the most innovative 5G features such as URLLC (Ultra Reliability Low Latency Communication), mMTC (massive Machine Type Communication), SDN (Software Defined Network), etc.
4. What are the use cases for 5G for the Logistics (freight transport) sector?
5G use cases in Logistics can be grouped into 4 clusters:

1. **Time-critical process optimisation**
2. **Non-time-critical process optimisation**
3. **Remote maintenance and control**
4. **Connected / autonomous vehicles**
Example 1: automated warehouse with Ocado

Challenge:
“The scale of the challenge was huge: reliable and predictable communication, 10 times a second with every one of thousands of robots across a huge warehouse.”
Fraser Edwards, Radio Technical Authority @ Camb.Cons.

Solution:
Custom-made wireless communication system
~1000 robots within 50m radius single access point
Resilience based on homogeneity of the robots
Space efficient and scalable
Increase in operational efficiency
Assemble a 50-item order in 5min
Challenge:
Complex turnaround, large and diverse workforce and many moving assets

Solution:
An integrated seaport management solution based on a 5G private network

Benefit:
- Operational Efficiency
- Improve Safety
- Increase security

“5G enables prompt communication and does not distinguish between vehicles, humans and implanted sensors, as they share the same access technology”, explains Dr. Paolo Pagano.

More info: https://www.ericsson.com/en/cases/2016/5gtuscany/digitalizing-port-operations-with-5g
Challenge:
Better operational performance required by Paris CDG r
businesses
• Obsolescence of Tetra radio network
• WiFi no more appropriate (technical aspect, financials)
• Significant increase of video usage and digitizing of our
operational businesses

Solution:
An integrated airport management solution based on a 5G
private network for ground handling dispatch, visual dispatch
video surveillance

Benefit:
● Predictive and preventive maintenance
● Improvement of contents, software updates and upgrades
for servers onboard
● Operational data downloads/uploads
● Improve inter-business communication around the
aircraft (real time + zero paper)

Challenge:
The transport industry, for environmental and economical reasons, is constantly looking to reduce its carbon footprint.

Benefits:
- Significant **fuel savings (>7%)** and a consequent reduction in CO2 emissions
- Road safety. Braking reaction along the platoon is immediate (**x30 faster than humans**)
- Improved traffic flow. Platooning boosts traffic flow and reduces tailbacks (**0.5sec distance ~ 11m@80km/h**)

Example 4: Truck Platooning
PLATOONING

MOVING TOGETHER AS ONE UNIT

Source: https://www.nextbigfuture.com/2016/11/nxp-robotic-truck-platooning-will-have.html
What are the benefits?

Cost savings
Less CO2 emission
Additional revenue
Improved safety
etc.
What are the benefits? and challenges?

Cost savings
Less CO2 emission
Additional revenue
Improved safety
etc.

Technical
Educational
Cultural
Regulatory
Economical
Financial