S5GConnect
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Expression of Interest: FAQs

Ayrshire Manufacturing Industries:
Understanding Connectivity Challenges for 5G Use Cases

Important Information:
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1. What is ‘latency’ in a 5G context?

    - Latency in telecommunications refers to the time delay between the transmission and reception of data. While 4G technology typically operates with a latency of around 200 milliseconds, 5G significantly reduces this delay to approximately 1 millisecond (1/1000 of a second).

2. What are some applications of low latency?
    - High-Quality On-the-Go Experiences: With 5G's low latency, mobile users can access ultra-high-definition video and seamless virtual reality experiences, enhancing on-the-go entertainment and immersive content consumption.
    - Dependable Mission-Critical Operations: 5G's low latency ensures the reliability of time-sensitive applications like vehicle safety systems and medical devices, guaranteeing consistent and dependable performance in crucial scenarios.

3. What is ‘reliability’ in a 5G context?

    - In the context of 5G, reliability refers to the consistent and dependable performance of the network in delivering data, maintaining connections, and meeting service expectations, even under varying and demanding conditions.

4. What is the difference between ‘growth’ and ‘scalability’ in this context?

    - Growth refers to an increase in output or revenue, while scaling refers to increasing output or revenue without increasing input resources or production costs at the same pace.

5. Why would scalability be of interest to me and my business?

    - Cost-effective technology allows easy global access to your target customers so that you can take advantage of your market share globally. Low costs for systematization and automation of processes allow you to gain a competitive advantage over your competitors and secure your business model and niche.

6. What is the Internet of Things (IoT)?

    - IoT, or the Internet of Things, refers to physical objects embedded with sensors and actuators communicating through wired or wireless networks, allowing digital monitoring or control of the physical world. Its applications span various sectors, including:
        - Offices (e.g., energy management, building security)
        - Standardised production environments (e.g., manufacturing, hospitals, farms for efficiency and inventory optimisation)
        - Custom production settings (e.g., mining, construction, oil and gas for predictive maintenance, safety)
        - Vehicles (e.g., condition-based maintenance, usage-influenced design, presales analytics for transportation).
    - *Source:* What is IoT: The Internet of Things explained | McKinsey

7. What is a benefit of the Internet of Things?

    - Existing cellular networks are not able to keep up with the explosive growth in the number of connected devices, from smart refrigerators to devices monitoring battery levels on manufacturing shop floors. 5G will unlock the potential of IoT by enabling exponentially more connections at very low power.
    - *Source*: What is IoT: The Internet of Things explained | McKinsey

8. What are some uses of the Internet of Things in a manufacturing context?

    - Proactive Maintenance Planning: IoT enables predictive maintenance by monitoring machinery in real time, identifying potential faults before they cause breakdowns, reducing downtime and maintenance costs.
    - Optimised Inventory Management: IoT sensors track inventory levels, enabling efficient stock management, reducing excess inventory, and ensuring timely replenishment.
    - Efficient Smart Manufacturing: IoT facilitates process automation, allowing for real-time data analysis, machine-to-machine communication, and adaptive production, enhancing overall efficiency and productivity in manufacturing operations.

9. What does automation refer to in a 5G context?

    - Automation in a 5G context refers to the integration of high-speed, low-latency 5G connectivity with advanced technologies like artificial intelligence and robotics to

enable efficient and remote control of processes, machinery, and systems, reducing human intervention in various tasks and operations.

10. What impacts can 5G have on manufacturing?

- Advancements in 5G technology, combined with AI and cloud computing, are transforming the manufacturing landscape.
- This integration facilitates smart robots reconfiguring assembly lines, surveillance using security drones, and autonomous vehicles transporting goods nationwide.
- Thanks to 5G's rapid speed and minimal lag, factory processes and inspections can now be conducted remotely, boosting productivity.
- Key applications include cloud-controlled machinery, seamless augmented reality guidance for workers, real-time analytics through AI-powered cameras, swift decision-making from extensive data pools, and scalable IoT connectivity for efficient data transfer.
- These technologies promise heightened productivity and worker safety, shifting focus from routine tasks towards leveraging data-driven opportunities, fundamentally reshaping the manufacturing sector.
- *Source*: Five ways that 5G will revolutionize manufacturing (mckinsey.com)

11. Detailed manufacturing use case descriptions for 5G connectivity types:

- Enhanced Mobile Broadband (eMBB):
    - Use Case: Remote Training and Monitoring
    - Description: Manufacturing businesses use eMBB to facilitate remote training sessions or monitor equipment and processes in real time across a wide coverage area. For instance, technicians on the move or stationed remotely can access high-definition video streams or complex data sets to troubleshoot machinery, provide remote guidance, or receive training while working from different locations within the factory premises or even while travelling in a moving vehicle.
- Ultra Reliable Low Latency Communications (URLLC):
    - Use Case: Real-time Robotic Control
    - Description: URLLC is essential for mission-critical communications requiring ultra-low latency and high reliability. In manufacturing, this might involve real-time control of robotic systems performing precise tasks such as precision assembly or handling hazardous materials. For example, controlling robotic arms with minimal delay or ensuring immediate response in emergency shutdown scenarios where reliability and low latency are crucial.
- Massive Machine Type Communications (mMTC):
    - Use Case: Smart Factory IoT Network
    - Description: mMTC supports numerous connected devices in a confined area, ideal for IoT applications in manufacturing. In a smart factory setup, various sensors across machinery and equipment transmit data for predictive maintenance, monitor production metrics, or track inventory in real time.

These sensors form an interconnected network, enabling efficient data exchange and coordination to optimise manufacturing processes.

Other resources available:

5G Use Cases & sector guides including manufacturing, supply chain & logistics among others: https://scotland5gcentre.org/usecases/

Understanding 5G: https://scotland5gcentre.org/understanding5g/

5G Guides & reports including manufacturing at whisky distilleries in Scotland: https://scotland5gcentre.org/guidesandreports/

Scotland 5G Centre videos: https://vimeo.com/scotland5gcentre

S5GC partners' videos (available on S5GC use cases page too):
https://www.youtube.com/watch?v=AYMlF8-U9pQ
https://www.youtube.com/watch?v=I3Ph3WaHs24&t=139s
https://www.youtube.com/watch?v=i5iUwOF3dk8
https://www.vodafone.co.uk/business/5g-for-business/5g-customer-stories/ford-factory
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