ENGLAND'S CONNECTED HEARTLAND

England's Connected Heartland
A DSIT Funded 5G Innovation Region

About the Programme

- England’s Connected Heartland (ECH) is the name of our 5G Innovation Region.
- Co-ordinated by Oxfordshire County Council, ECH is a partnership of nine councils in the heartland region. It encompasses Oxfordshire, Buckinghamshire, Berkshire, Central Bedfordshire, and Cambridgeshire. Together, we’re uncovering the benefits advanced wireless connectivity can bring.

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Releasing untapped economic, social and environmental benefits with advanced wireless connectivity.

Our tagline

ECH Programme Structure

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Oxfordshire, Buckinghamshire, Cambridgeshire, Bedfordshire, Berkshire

Harwell 5G MPN

East West Rail 5G MPN

Ecosystem / Innovation Exchange

Grant Scheme

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Our Projects

We're establishing a framework for 5G SA Mobile Private Networks at **Science and Innovation Campuses**, with Harwell leading the way. (Advanced Manufacturing)

We're developing a new commercial model for delivering **rail passenger connectivity**, starting on a section of the new track between the Bicester and Bletchley route of The East West Rail project. (Transport)

We're connecting telecoms providers, businesses and government, providing advice, guidance, and funding opportunities so that telecoms and infrastructure providers can work with businesses more efficiently and effectively. It's a novel approach, and one we call our **Innovation Exchange.**

Harwell 5G Project Approach

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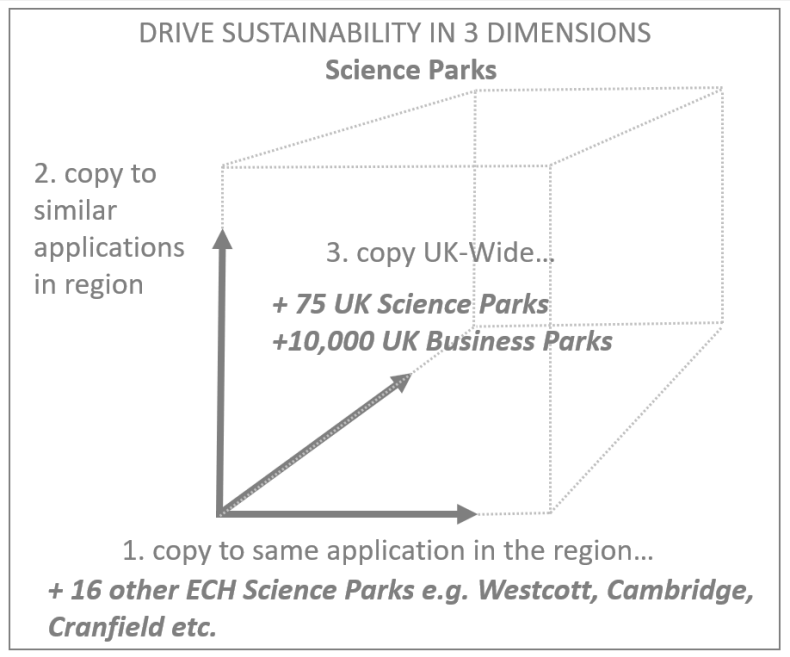
- **Provision of 5G SA network will provide excellent coverage outdoors and limited indoor coverage (Initially ten MDU's will have indoor cells)**
- **Free for twelve months then chargeable**
- **Commercial model in development – mix of individual services contracts and 'landlord' contracts with STFC and ARC**



Harwell 5G SA MPN

- Harwell Science & Innovation campus is a world leading centre in Energy, Space, Quantum, & Health sectors
- Generally good fibre access but limited by poor wireless coverage.
- 5G SA is on N77
- Interest in co-investment, i.e. Moderna
- Use cases split between:
  - Common Outside requirements such as parking management, asset tracking, CCTV, wi-fi hot spot backhaul etc
  - Indoor bespoke solutions such as assembly line sensors, device monitoring, M2M etc

Bicester to Bletchley 5G Rail Corridor project

- This project is focused on delivering connected trackside private 5G along East West Rail, a new section of rail network under construction between Bicester and Bletchley.
- Our focus is on deploying 5G along sections of this new line where there is currently limited or poor mobile connectivity. Working with the Train Operating Company and Network Rail, we will improve passenger connectivity as well as deliver functional improvements for onboard devices.

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Objectives of the 5G Rail Project

- Raise awareness and generate demand for private 5G networks in the rail industry.
- Address the challenges posed by technical and commercial aspects of improving train passenger connectivity.
- Explore how rail connectivity could offer a route to connectivity for rural not-spots.
- Develop a sustainable and scalable funding model.

Stacked Use Cases (Rail Applications)

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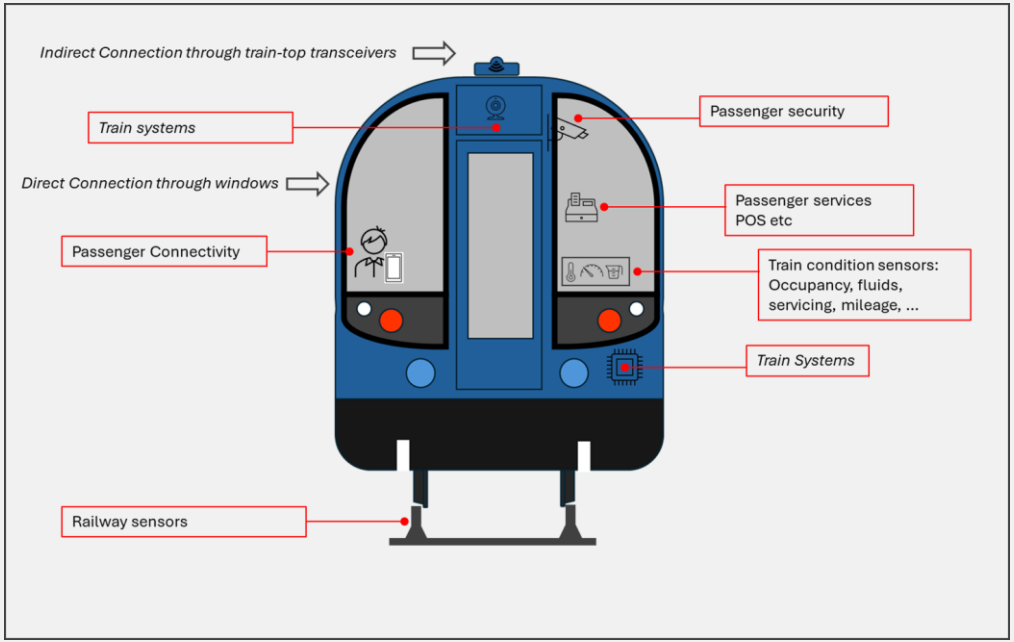

Stacked Use Cases (Trackside Neighbours)

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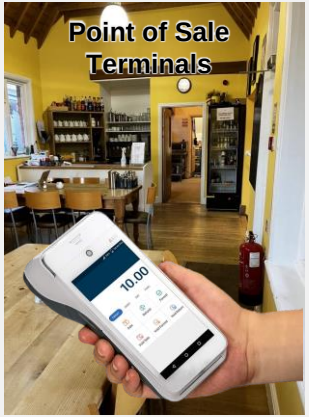

Getting Mobile Coverage On a Train

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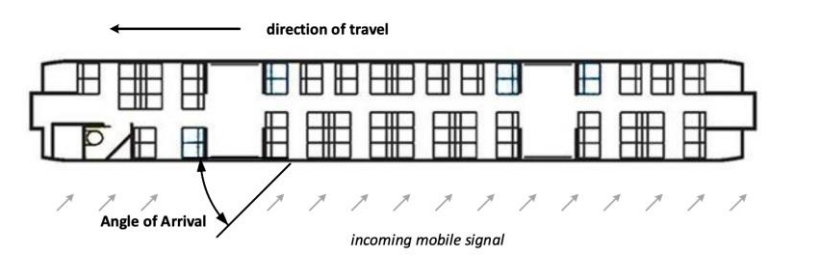
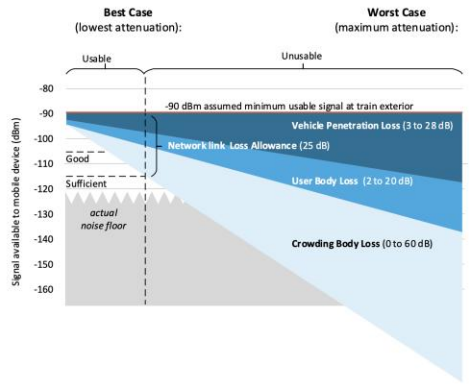
- Getting mobile coverage into a train is extremely difficult.



Source: Arup Alliance (2017). Mobile Connectivity in rolling stock – radio frequency attenuation characteristics



- Mobile signals are highly attenuated by the railway carriage.
- This is because of the…
  - Railway Carriage Design (material of the carriage body and glass)
  - Mobile Technology Generation and Frequency Allocation (higher frequencies are worse)
  - Passenger location within the train (angle of arrival of the mobile signal)
  - User and Crowding Body Loss (where the phone is when it is in use)

What is the Solution?

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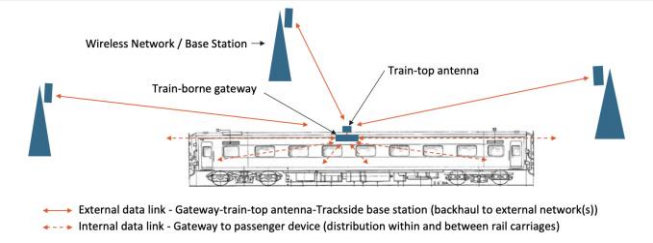

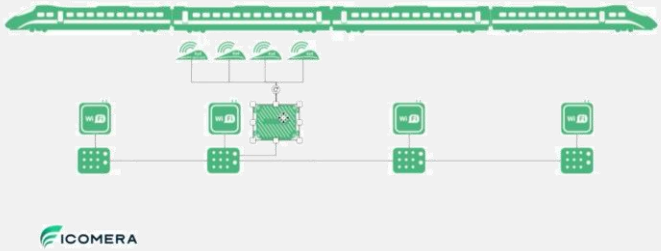

- For some years, the solution to poor Mobile coverage on trains has been to use the Mobile Networks as a "Backhaul" solution for On-board WiFi.
  - The EWR line using a solution from Icomera
- Part of the solution is to use antennas mounted on the roof of the train to provide internet access. This avoids the issues associated with the signals penetrating the railway carriage.
- However, the service is only as good as the mobile connection, and on the Bicester to Bletchley stretch of the line the coverage and capacity is very limited.
- A major problem also remains because the train-top modem which provides the WiFi connection "competes" with mobile services to end user Smartphones, which means the service is often poor even when coverage and capacity is good.
  - As 80-100 people attempt to use the WiFi service at the same time.

What is the Real Solution?

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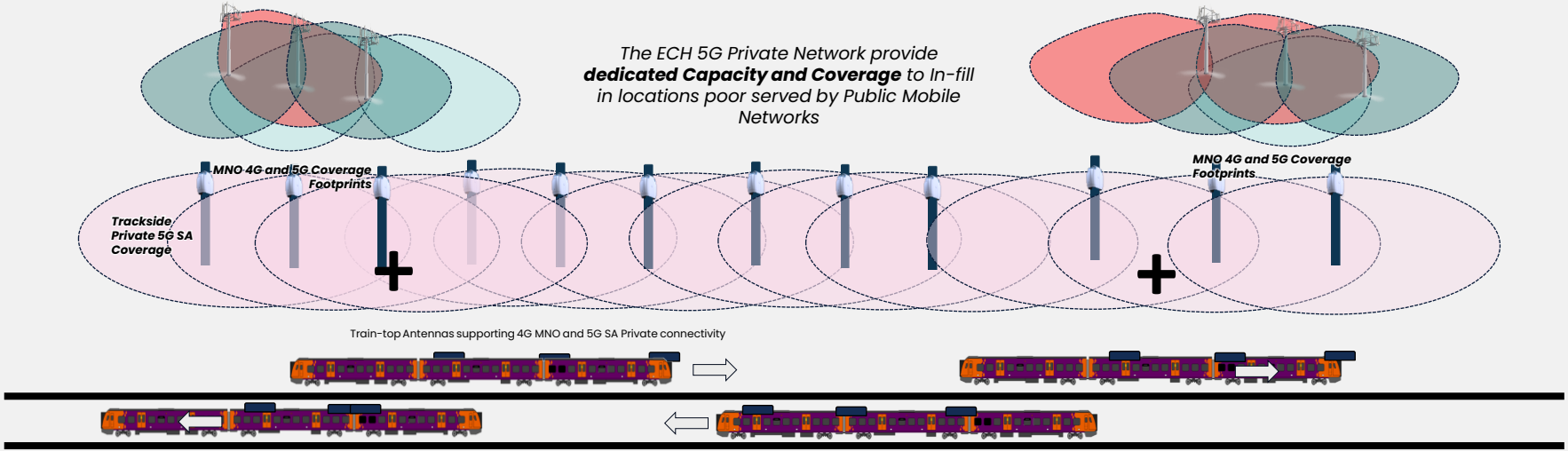
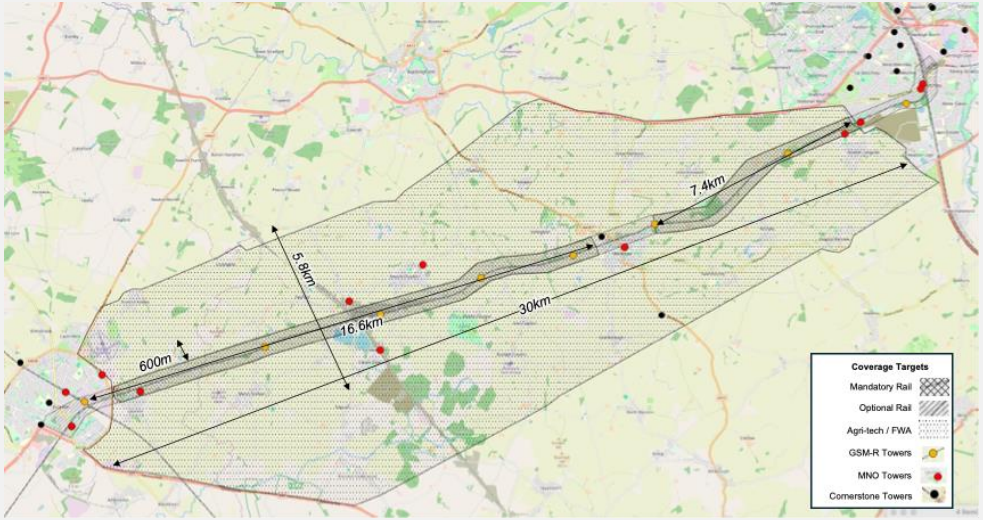


- The EWR rail solution solves the capacity and coverage shortfall using a 5G Private Network that provides dedicated additional capacity to the train (and the surrounding areas)
- This 5G Standalone Private network operates in OFCOM's 3.8-4.2 GHz Shared Access spectrum, and each base station operates using 100 MHz, which provide speeds of up to 700 Mbit/s to each train on-board WiFi, in addition to the capacity provided by the Public Mobile Operator connectivity
- This ensures an excellent service, while the train is within the footprint of the 5G Private Network

EWR Project: The 5G Coverage Target



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Project goal is to improve coverage along the railway and to the trackside neighbours, especially the villages

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Thank you

Contact

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