

# ScotRail On Train Communications – The Journey

Update & Awareness session on ScotRail's efforts to provide continuous connectivity to our trains.

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# Agenda

- Where it started
- The problem
- Trackside connectivity
- Why satellite is the answer
- What are the use cases
- The challenges of satellite on train.
- Questions



# Where it started

- 2012 – ScotRail install free customer wifi, based on 3G onto the 170 fleet serving the Glasgow Edinburgh route.
  - 2013 – Fit out on other fleets begins. 4G begins to be a specification.
  - 2014 – ScotRail begin rollout of free customer wifi to stations. 20 stations initially, but now we are up to 60.
  - 2015 – Abellio Franchise begins and franchise commitment is to fit wifi on all trains.
  - 2015 – Abellio move management of the services and costs into information technology.
  - 2016 – ScotRail IT engage with Project Swift Trackside infrastructure project.
  - 2018 – 3 & 4G fit out of all fleets is completed.
  - 2018 – ScotRail agree to procure a new private LTE data network on the E&G and Stirling, Dunblane, Alloa route.
  - 2018 – Network Rail decide not to allow private LTE kit to be installed on GSM-R masts so initiative is cancelled.
  - 2020 - Robert Gardner introduces prospect of satellite connectivity.
  - 2022 – ScotRail continue to try to progress satellite.
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# The problem

ScotRail operate services the length and breadth of the country – Carlisle to Wick, Thurso, Oban and Kyle of Lochalsh to Tweedbank and Reston.

Mobile network operators (MNO's) tend to site masts in geographically advantageous positions near population centres, where there is a commercial benefit to do so.

The requirements of rail services are not taken into account.

The 4G coverage is usually “OK” in terms of the central belt between Edinburgh and Glasgow and up to Stirling.

In rural areas it becomes much more sparse, and lower bandwidths are available.

Added to this the trains move at 70-100 mile per hour, through cuttings, and under tunnels.

We run 2100 services a day and average monthly data usage is between 20-25TB of mobile data.

5G will not improve the situation.

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# The problem



Source:  
<https://www.nperf.com/>

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<https://www.nperf.com/>

# Trackside Connectivity

- 2015 at the start of the franchise there was a great deal of pressure to improve the service.
  - Franchise obligations around micro cells.
  - Lack of understanding of the reasons for the poor performance.
  - Efforts mainly focused on providing an improved service to customers.
  - 2016 – ScotRail became part of the Swift project, along with Cisco and various other suppliers.
  - Activated a 10 mile stretch of the Edinburgh to Glasgow route and two trains.
  - The project was successful in proving that trackside connectivity would work.
  - The findings of this and a subsequent procurement were:
    - Trackside didn't achieve particularly high performance (although further investment and tuning may have improved it)
    - It would be very high capital cost to install – needs fibre alongside trackside, masts, power, install hardware on trains (that gets more difficult on rural routes).
    - It would be high cost to maintain the infrastructure.
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# Why satellite is the answer



- The introduction and availability of low earth orbit data services has created a solution to ScotRail's problem.
  - Resolves many of the issues trackside and 4G has.
  - We can fit the train, rather than the train and trackside infrastructure.
  - Cost effective as we have 2000 miles of track to operate.
  - No other way of delivering mobile connectivity to a moving train for the vast majority of the routes we operate.
  - Represents the only realistic way of enabling connectivity to trains in Scotland.
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# Why do we want this anyway?



- Improved customer wifi service.
  - Improved staff wifi service.
  - Wifi Calling.
  - GPS tracking of trains in operation.
  - Live passenger counting.
  - Revenue systems.
  - Hospitality Services.
  - On Train IOT services – toilets, temperature, etc.
  - Train Telemetry.
  - Live CCTV access and download.
  - Improved passenger information services.
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# Challenges of satellite connectivity

- There is still a significant capex involved.
  - There's an unknown opex involved.
  - The fleets generally are more analogue than digital.
  - System integration.
  - Operational security.
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# Questions?

