

CGI Satellite Communication System for Railways



With over 30 years of satellite communication experience, we are perfectly placed to help businesses optimise capacity, enhance performance and achieve better value for money.

How can satellites help?

The UK has over 20,000 miles of railway track, the majority of which is unlikely to ever be covered by lineside fibre or to be serviced by adequate terrestrial mobile coverage. However, the availability of connectivity has rapidly increased due to the availability of high-speed satellite communications networks. By harnessing all available resources including satellite communications, we can begin to provide high-speed data connectivity across the country's entire rail network.



Our solution has been successfully demonstrated with multiple new satellite networks including Eutelsat OneWeb. It dynamically selects the most suitable communications bearer and chooses the optimal network carrier, either satellite or terrestrial, based on various factors such as coverage, throughput, and cost. This flexibility enables us to provide the capacity and availability of connectivity demanded by the public.

As a supplier-agnostic systems integrator with 30 years' experience in the rail, telecoms and satellite communications arenas we are perfectly placed to help our clients achieve the best possible business benefits from these opportunities.



SODOR Project

We are collaborating with train operating companies such as ScotRail, Northern and Network Rail, to showcase the benefits of the hybrid satellite/terrestrial service on the 'Satellites for Digitisation of Railways' (SODOR) project. In partnership with Icomera and Eutelsat OneWeb*, we will support a range of terrestrial and satellite services, demonstrating several use cases including:

- Passenger Wi-Fi
- Train crew communications
- Provision of train location information
- Collection of IoT sensor information
- Retail, sales, and ticketing.

**Low Earth Orbit networks such as Eutelsat OneWeb feature large numbers of satellites (648 for Eutelsat OneWeb). Each satellite can connect seamlessly to the antennas (user terminals) and ground network below, transmitting data in real-time. Crucially there is always a satellite which can be seen above the trees so unlike earlier rail solutions the link can be maintained even in areas with obstacles close to the track.*

A comprehensive fully-bonded multi-bearer mobile solution

To meet the evolving rail industry needs CGI has undertaken trials of high data throughput, high availability satellite communication systems designed to enhance onboard train communications.

Recently we have deployed an enhanced solution that bonds together various bearers, including multiple 4G/5G terrestrial connections with satcoms solutions.

Our solution dynamically shapes user traffic to utilise available bandwidth efficiently across these networks, responding instantly to changes in network and bandwidth availability, prioritising critical applications over non-essential traffic.

This solution has been deployed on our mobile test vehicle and used to demonstrate compliance with various typical railway use cases, including current and future scenarios defined within the Future Railway Mobile Communications System (FRMCS) requirements.



Successful hybrid railway pilot

We successfully demonstrated our two-bearer solution, combining an existing terrestrial (4G) network with Eutelsat OneWeb LEO constellation. This was demonstrated on the North York Moors Railway, becoming the first UK rail trial using LEO satellites and one of the first globally.

The primary goal was to show how satcoms can significantly enhance both passenger and train crew connectivity by complementing existing terrestrial (4G) network infrastructure.

Even with just one satellite terminal and using a trial satellite service, the >95% satellite coverage combined with 65% 4G terrestrial connectivity enabled a service to easily cope with many passengers using all sorts of streaming and communication applications for almost the entire journey. The pilot also demonstrated an Internet of Things (IoT) use case, sending real-time ride quality data from our ride quality sensors referred to as RoughRide.



The challenges of providing high-speed data connectivity across a country's entire rail network are considerable. By harnessing all available resources including satellite communications, we can begin to provide high-speed data connectivity across the national rail network.

About CGI

Founded in 1976, CGI is among the largest IT and business consulting service firms in the world. We provide comprehensive, scalable, and sustainable IT and business consulting services that are informed globally and delivered locally.

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