CGI Rail Satellite Communication System

CGI has over 30 years' experience in satellite communication – perfectly placed to help businesses optimise capacity, performance and value for money.

How can satellites help?

The UK has over 20,000 miles of railway track, majority of which will never be covered by lineside fibre or be serviced by adequate terrestrial mobile coverage. However, the availability of connectivity is changing in a rapid way thanks to the growing scale of satellite communications.

The challenges of providing high-speed data connectivity across a country's entire rail network are considerable. By harnessing all available resources through satellite communications, we can begin to provide high-speed data connectivity across a countries rail network. Our solution provides terrestrial connections, while also supporting either GEO or LEO satellites, or a combination. We determine the best approach for each client in terms of coverage, throughput, and cost. This will allow us to provide the capacity and availability of connectivity that the public are demanding.

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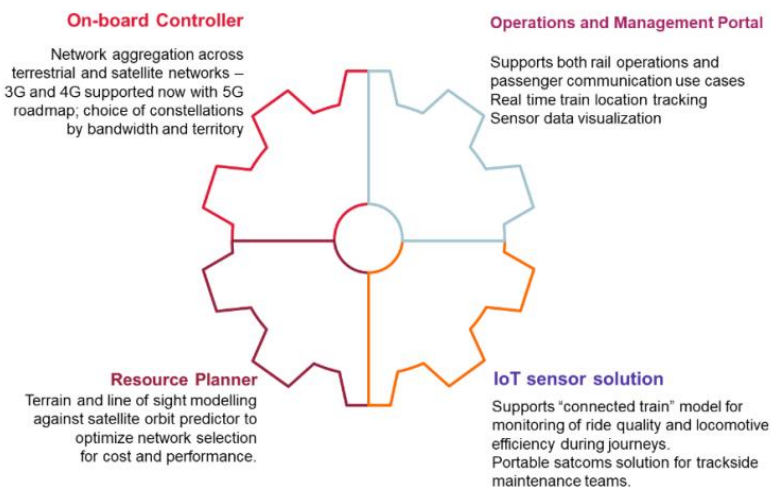
SODOR Project

CGI is demonstrating the advantages of the hybrid satellite/terrestrial service on the 'Satellites for Digitisation of Railways' (SODOR) project, in partnership with train operating companies such as ScotRail, Northern and Network Rail. In partnership with All.Space, the provider of the innovative flat-panel electronically steerable antenna, and Icomera, a range of terrestrial and satellite services will be supported, and a number of use cases demonstrated including:

- Passenger Wi-Fi
- Train crew communications
- Provision of train location information
- Collection of IoT sensor information
- Data communications service for operational video (retail, sales, ticketing).

SCS Resource Planner

Our method of optimising all available connections our business has to offer is through our SCS Resource Planner. This is the role of our Satellite Communications System (SCS), Resource Planner (RP) and Onboard Controller (OBC). This is a key part of the technology being demonstrated within the SODOR project that is aiming to provide sufficient connectivity to tracks that will struggle to provide connectivity via other means.

The range of available connections is increasing substantially through the launch of very high throughput GEO satellites, new LEO constellations and 5G terrestrial services. SCS functionality will be enhanced to support this including optimising latency, availability, cost, and other key factors. The RP will produce an optimised connectivity plan based on the availability of communication services, tailoring it to suit client needs.

On-board Controller
Network aggregation across terrestrial and satellite networks – 3G and 4G supported now with 5G roadmap; choice of constellations by bandwidth and territory

Operations and Management Portal
Supports both rail operations and passenger communication use cases
Real time train location tracking
Sensor data visualization

Resource Planner
Terrain and line of sight modelling against satellite orbit predictor to optimize network selection for cost and performance.

IoT sensor solution
Supports "connected train" model for monitoring of ride quality and locomotive efficiency during journeys.
Portable satcoms solution for trackside maintenance teams.

CGI Trials

We are undertaking trials of high bit rate high availability satellite communication systems capable of providing a range of communications onboard trains including the provision of passenger Wi-Fi and train crew communications. We are in advanced talks with OneWeb* and expect to trial a system using their Low Earth Orbit (LEO) constellation on rail vehicles later in 2023.

We are also undertaking a parallel trial using Starlink equipment with a road vehicle (see photo) so that the quality of services between the LEO operators can be compared. These trials are using a Starlink flat panel mobile terminal mounted on a road vehicle which is being driven on a variety of routes including alongside a heritage railway in North Yorkshire, which is representative of a rural railway line.

OneWeb's Low Earth Orbit network features 648 satellites along 12 carefully synchronised orbital planes. Each satellite can connect seamlessly to the antennas (user terminals) and ground network below, transmitting data in real-time and at high speed as they fly, even in places that are hardest to reach. Starlink also operate a low Earth orbit constellation utilising in excess of 3000 satellites operating in a mesh.

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Photo: CGI Trial – Road Vehicle with Starlink Equipment

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.

For more information

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