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telent puts West Coast Mainline communications on track with UK's first GSM-R network

Running from London Euston to Glasgow Central, the West Coast Mainline is the most heavily used railway in Europe today. Covering over 640 km, the line carries both freight and passengers, and handles over 75 million journeys every year.

In the late 1990s, over 150 years since the railway first opened, and 40 years since it was last modernised, work started on the West Coast Route Modernisation (WCRM) programme, a scheme that was, and still is, the largest railway reconstruction project in Europe.

The modernisation planned to enable tilting trains to use the line, increasing the speed at which trains could travel to 125mph and shortening journey times. It also aimed to increase capacity on the railway, improve performance and enhance safety. The project in its entirety covered over 2,500km, 2,800 signals (including 13 major junctions), and 10,000 bridge spans. It also had to be completed while the railway remained open.

Project requirements

Running more and faster trains over a finite space required state-of-the-art communications to ensure safety and optimise logistics. A fixed and mobile network infrastructure, capable of providing voice and data communications between train drivers, guards and signallers was needed.

Specialising in bespoke communications networks, **telent** was selected through competitive tender, and brought the ability to design, commission, install and maintain network infrastructure on a massive scale.

"Having already worked on projects such as the Hong Kong airport railway and the Jubilee Line extension, **telent** brought substantial project management experience, as well as a strong track record of quality and safety, and a highly skilled team of planners and engineers," said Steve Pears, General Manager of Rail at **telent**.

telent was commissioned to provide a complete, end-to-end communications solution, including an assessment of the infrastructure required, the design of the network, the procurement and installation of all equipment, network testing, and ongoing maintenance.

Full radio coverage was required along the full length of the line, including through all tunnels and cuttings.

Design

"The network needed the capability to support data and voice traffic," explained Steve. "A call started in London needed to be continued, if necessary, until Manchester. Anyone who has travelled on a train, and tried to make such a call on the public cellular phone networks will know just how difficult that is."

GSM-R was selected as the technology that would meet this need. Widely used in Europe, this was the first time that GSM-R was used in the UK (the technology is now an industry standard across the country). **telent** designed a solution that met European Rail Traffic Management System (ERTMS) level three performance standards: an independent GSM-R radio network with SDH data switching nodes and optical fibre to connect the radio sites.

To achieve complete coverage, 180 GSM-R mobile radio base stations were required. Linked by 500km of 48 core fibre optic cable, the base stations were supported by a full optical network, containing 20 SDH multiplexer nodes, all of which are managed from a core network centre in Stoke.

telent was responsible for the complete infrastructure design, including the radio network, the telecommunications network and the civil engineering for all the radio masts.

Delivery

"This was a very complex project – both in terms of structure and delivery," said Steve. "Delivering a £100 million, 5 year project, is a significant undertaking in any situation, but to do so working alongside the other subcontractors and next to a railway that has to remain fully operational required exceptional planning."

To ensure that the project was completed on time and on budget, **telent** used its lifecycle management process and contract review programme with both the customer and subcontractors. Good practice and documentation of all aspects of work was essential to ensure that the project was a success.

telent also had to be extremely flexible in its working hours and patterns as much of the work had to be completed at night, when the trains were not running. This meant sharing the limited space at the side of the railway line with many other contractors.

"500km of track, between London and Manchester, is a lot of ground to cover," explained Steve. "Communication and the ability to work as part of a wider team were vital: all the work along this distance had to be done within a few feet of the track, a very narrow corridor of operations, which had to be shared with a range of other contractors, including overhead line and track renewal teams. We maintained flexibility in our working schedules and were extremely responsive, so that if a window opened up when we could work alongside the track, we were able to take it and maximise the opportunity.

"To deliver a project of this scale successfully was a real achievement," added Steve. "Our flexibility and forward thinking enabled us to adapt to differing requirements as the programme evolved and developed."

Results

"Our hard-work, dedication and tenacity paid off when we managed to complete the network on time and within budget," said Steve. "The customer's requirements for radio coverage, functionality, performance and availability were all met and it's an achievement of which we are extremely proud."

telent continues to maintain and upgrade the West Coast Mainline communications infrastructure, which first became operational in December 2002, and is working to integrate further GSM-R infrastructure on this network.

The company has been involved in the majority of West Coast Mainline resignalling and renewals programmes, including the Watford to Bletchley, Norton Bridge, North Staffs, Nuneaton, Milton Keynes and Coventry.

"Our work on the West Coast Mainline has demonstrated that **telent** has the skills and capacity to undertake a complex and highly-demanding project on one of Europe's busiest railway lines," concluded Steve. "We have developed a well-earned reputation for excellent service and expertise in railway and other transport communications in the UK and Germany, and will continue to seek the most innovative and cost-effective solutions for our customers."

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Point 3
Haywood Road
Warwick
CV34 5AH
England

www.**telent**.com