PARK SIGNALLING
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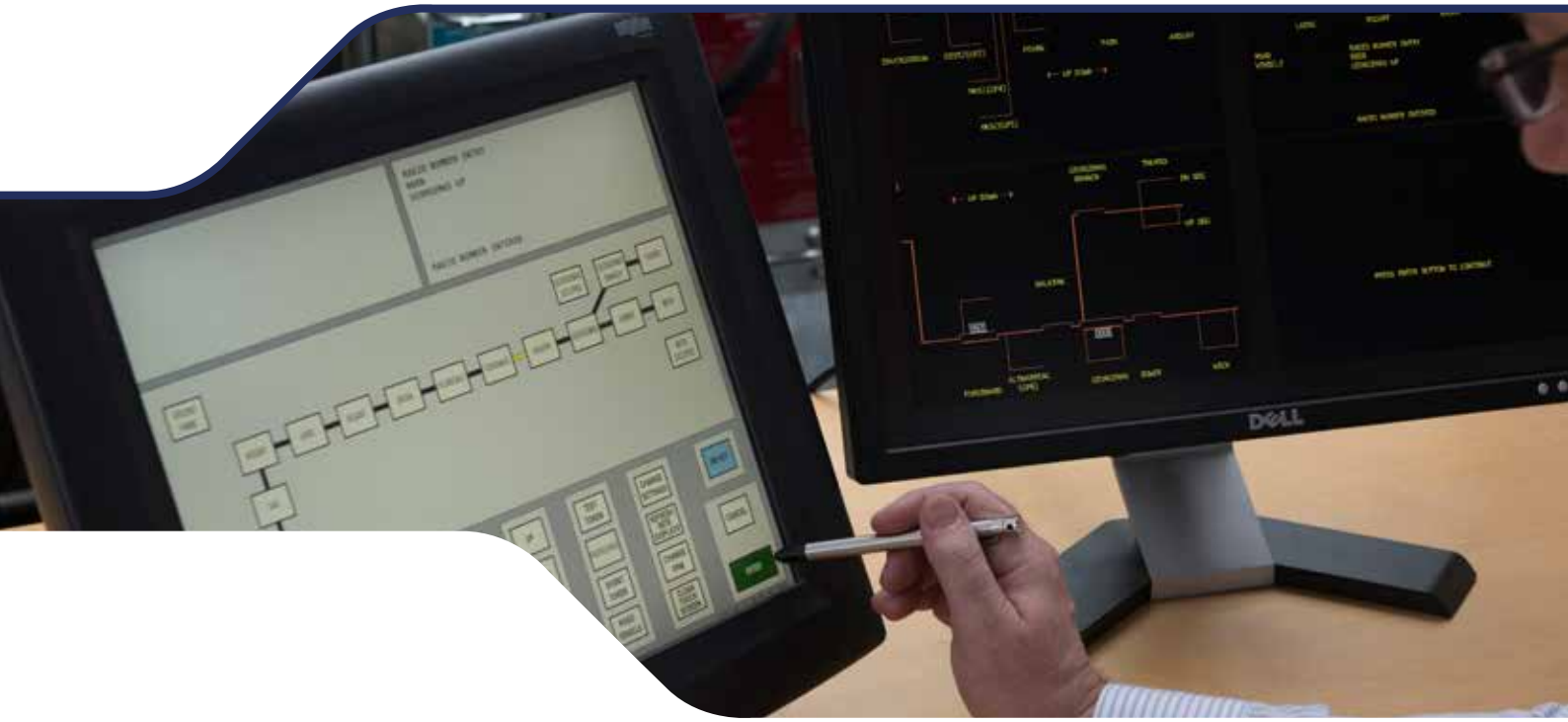
RETB Signalling
by Park Signalling

Radio Electronic Token Block Signalling (RETB)

Radio electronic token block (RETB) is a method of controlling movements on railways with simplified infrastructure, enabling reductions in the overall cost of operation. The essence of the system is the secure transmission of uncorrupted data by the means of a radio network.

This system can also be configured to include Train Protection Warning System (TPWS).



The Challenge

The challenge was to deliver a a fit for purpose Signalling and Track-to-Train communications system in lieu of migration to ERTMS, FTN & GSM-R, on the West Highland and Far North RETB Signalling Systems in Scotland.

The West Highland and Far North RETB radio systems previously operated in the Band III sub-band 2 (196-206MHz) frequency spectrum and OFCOM announced that these frequencies were to be reallocated the following year. It was vital to provide an effective solution, quickly.

Without addressing the issue Network Rail would have been exposed to interference from Ireland and Norway and the RETB upgraded radio systems now operate on Band III sub-band 1 (177-191MHz).

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Park Signalling had previously produced and installed the Trackside Radio Control Unit (TRCU) for the West Highland and Far North RETB Signalling Systems in Scotland. The TRCU 'eavesdrops' on RETB electronic tokens issued from the RETB Interlocking via the radio system and interfaces and controls the TPWS at passing loops. The radio interface to the TRCU's at 38 locations was also upgraded.

This project also included specific works for Park Signalling at Inverness Signalling Control Centre in support of the upgraded radio system on the Far North RETB Signalling System. This resulted in the RETB Interlocking split at Invergordon and the provision of a second RETB Interlocking.

This was followed by a mid-life upgrade of the control centre equipment, replacing the obsolete first-generation equipment.

RETB explained..

The control centre responsible for the line of route is equipped with an RETB interlocking, which safely manages signaller and driver interactions, has custody of the tokens and is responsible for their control and safe management to SIL 4. The tokens are held in the form of data which can be transmitted to a train as an addressed telegram representing an 'electronic token'.

Transmission is effected using the control centre interface with co-operation between the driver of the train and the control centre, working over a secure radio network allowing control of large and long stretches of route. The radio network also provides a speech link between the driver and the control centre. All data and voice transmissions are continuously recorded in a secure manner and can be easily reviewed in the unlikely event of an incident.

The cab display unit in the driving cab of the train, locomotive or on-track machine has its own unique radio number and they are fitted in each driving cab. When the cab display unit receives a token from the RETB interlocking via the radio network it displays (in alpha-numeric form) the geographical section that the train can occupy between token exchange points on the railway.

The displayed token can be returned from the cab display unit back to the RETB interlocking, again by co-operation between the driver and the control centre. Transportable token units can be used by engineering staff to take and give back possession of the railway in a safe and controlled manner, following the same methodology as at lineside.

The Solution

The project required close collaboration with the incumbent Train Operating Company, Network Rail operation staff, maintainers, the radio system supplier Comms Design Limited and Telent.

Several challenges were overcome such as space restrictions, human factors associated with the operations and project timescales. The project programme was complex due the many interactions and dependencies with the other work-streams.

Technically there was little risk other than the possible non-availability of the tools on which the original system was developed. This risk was mitigated and controlled by means of creating a backup of the original system including tools before work commenced. A rigorous and complete Factory Acceptance Test of all equipment, witnessed by Telent and Network Rail was conducted before the equipment was shipped and installed on site. This proved to be extremely successful and meant that any design issues could be quickly rectified in a controlled environment. Installation and testing times were reduced and as the system worked first time, site health and safety risks were reduced due the short time working on site.

The Results

Park Signalling's successful delivery of the RETB project has resulted in a number of benefits being realised by Network Rail, these include:

- Provides upgraded train protection functionality on RETB lines in the UK
- Park Signalling's existing Trackside Radio Control Unit (TRCU) 'eavesdrops' on RETB electronic tokens via the upgraded radio systems
- TRCUs are fitted at passing loops and interface to the Thales TPWS equipment
- TRCUs are configured to only respond to specific electronic tokens
- When required the TRCU suppresses the TPWS equipment to allow trains to depart and pass the stop board at the passing loop without a TPWS activation
- The RETB Interlocking split at Invergordon has allowed capacity increase on the Far North RETB Signalling System
- The provision of a second RETB Interlocking has allowed two signaller operation on the Far North RETB Signalling System
- The replacement of the obsolete first-generation control centre equipment