ERTMS DEPLOYMENT IN THE UK
ADOPTING DIGITAL TECHNOLOGY TO ENHANCE RAIL OPERATIONS

The UK is planning major Digital enhancement and ERTMS investment in Control Period 6 (2019 – 2024) and on-going through Control Period 7 (2024 – 2029) and beyond as part of an ambitious but essential programme to realise and extract the maximum advantage from the adoption of available Digital Technologies to revitalise the performance of the national railway network. In a country with a long history of conventional signalling systems and train operations, the introduction of a major re-signalling programme raises some exciting challenges. Whilst ERTMS Level 2 first entered service in March 2011 on the Cambrian line, railway authorities are now pushing for a larger deployment scheme of Level 2 ERTMS Baseline 3, on specific targeted routes which would enhance an already very safe railway, facilitate an increase in capacity, raise the performance on Britain's railway lines and contribute significantly to national economic growth.

Are there plans to introduce ERTMS in the UK?

Yes - the deployment of ERTMS is now an urgent requirement to cope with the continuing high traffic demand being encountered for both passenger and freight transport. In this respect, the key features achievable with ERTMS - higher Safety, higher operational speeds, greater traffic capacity and accompanying cost savings/ reductions in both CAPEX and OPEX are seen as vital benefits.

Where is ERTMS deployed in the United Kingdom?

Cambrian Pilot Line

A single track line of 215km - the Cambrian Line - linking Shrewsbury with Aberystwyth and Pwllheli in Wales came into full service in 2011 operating at Level 2. ERTMS replaced the legacy Radio Electronic Token Block (RETB) signalling system. 24 sets of 2 coach Class 158 DMUs from Arriva Trains Wales were ERTMS fitted for passenger operations, supported by 4 Class 97 Diesel locomotives prepared for freight and other operational duties.

A new signalling centre with two signaller positions was implemented in Machynlleth to control the total route. ERTMS is also supported by the deployment of a new GSM-R system, axle counters, new motorised point machines and balises along the track and a single Radio Block Centre (RBC) installed at the control centre in Machynlleth.

The Cambrian deployment, whilst also being an operational passenger service was viewed as a Pilot installation to learn much about the key processes, operational and technical lessons of Level 2 deployment to both UK and ERTMS standards. These lessons will be used to positive effect when further programmes for the introduction and implementation of ERTMS infrastructure and ERTMS cab signalling for the rest of the UK's national network.

ERTMS National Integration Facility - ENIF

Network Rail has established a Level 2 equipped pilot line and laboratory test facility at Hertford North to support further ERTMS development and deployment. 12.8 route km on the East Coast Main Line diversionary route has been suitably fitted to offer dynamic testing capability. In December 2017 this facility was used in a successful demonstration of Hybrid Level 3 operation which Network Rail with ProRail in the Netherlands are most seriously supporting.
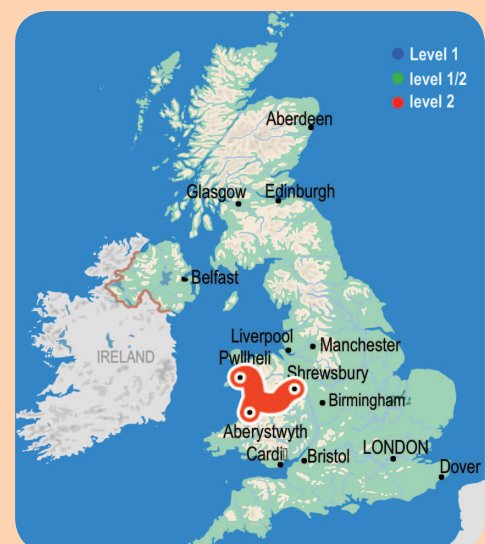
Thameslink Project

The Thameslink project running North-South through London on old existing tracks has now been completed with ETCS Level 2 and ATO in the central section. A new fleet of trains (60 x 8 coach + 55 x 12 coach) equipped with ERTMS Level 2 Baseline 3 has started commercial operation. The expectation is that 24 trains per hour through the cores section will be managed. With Thameslink, the UK is frontrunner implementing ATO over ERTMS. The utilization of ATO over ETCS allows the achievement of a very ambitious timetable in the core network.

Crossrail

Crossrail is a new, high capacity urban railway system introducing 9 new stations, 2 new depots and utilising two new 21km tunnels running under Central London and joining the national "main line" network at each of the portal extremities. CBTC will be deployed in the central tunnel section with a transition to ERTMS or TPWS at the tunnel portals. The target is 24 trains per hour. Services commence in 2019. A fleet of 115 new trains has been prepared to support this service equipped accordingly with CBTC, ERTMS Level2 Baseline 3 and TPWS systems.

Future planned routes for Digital technology

New routes and respective business cases are now under active preparation by Network Rail/Digital Railway personnel with the Department for Transport, for consideration of upgrade with Digital Technologies including ETCS L2 (with ATO), TMS, Stock & Crew and C-DAS during Control Period 6 and 7. Decisions are being made in association with the respective Network Rail Route Managing Directors demands.

The routes currently under priority study within the UK include:-

Great West Main Line	London/Paddington to Cardiff
East Coast Main Line	London/Kings Cross to Peterborough, Doncaster, Edinburgh
The Trans Pennine Upgrade	Manchester to Leeds area
London North West	Preston – Carlisle
Anglia Route	Liverpool Street to Stratford and Chelmsford
Wessex Route	Waterloo-Feltham-Woking

This listing is not exhaustive and may change as the work for the respective Business Cases progresses.

A programme to introduce new High Speed lines in the UK – namely High Speed 2 to operate from London to Birmingham (140 kms) and onward to Manchester and Leeds is underway with a view of Phase 1 being ready for service by the end of 2026. This line will adopt Level 2 Baseline 3 in its build. An initial fleet of 54 new trains, ETCS fitted, capable of running at above 280km/hr, will be procured. This huge new investment will provide much needed additional track capacity that will support the release of capacity on other UK routes.

ETCS retrofitment of trains

In parallel to the infrastructure development programme, there is concentrated work being undertaken to plan the "retrofitment" programme for the "national" rolling stock passenger and freight fleets to ensure operational readiness for access to the fitted infrastructure. First in Class contracts have now been placed with three major suppliers for a variety of passenger and freight rolling stock. Testing is expected to be undertaken at the newly fitted Network Rail test track at Melton RIDC from September 2019.

New build fleets will be expected to be supplied either ERTMS capable or ERTMS ready from the day of delivery. Very large new passenger fleets have already been ordered by Train Operating Companies (TOCs) in line with the award of new franchises. Preparations are expected to commence shortly to address the requirement of ETCS Retrofitment of the essential On-Track plant, of which there are around 200 units that will provide and guarantee the essential maintenance of the infrastructure

Complimentary technology solutions for ERTMS

Complimentary technology solutions are being studied by Network Rail and with other agencies in the UK to support the introductions of ERTMS including:-

Traffic Management Systems.

C-DAS.

Hybrid Level 3.

SUMMARY

The United Kingdom is at a crucial point of national rail network improvement and development. Introducing ERTMS into the network is seen as vital and will directly address the huge capacity demands being encountered across the UK network, will maintain safety and will with the combination of other digital complimentary technology dramatically raise the agility and availability of the network. There is significant competition available for this ERTMS deployment both for the Infrastructure requirement and the On-board solutions which will make for an exciting time of growth in the UK's national rail network for many years to come.

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