

Appendix A: GSM-R in Heathrow Tunnel

Contents

1. Introduction2

2. Project objective3

3. Reasons for the proposed change.....4

4. Specification of works4

5. Proposed timescales5

6. Consequence of the proposed change5

7. Possession strategy5

8. Costs and compensation5

8.1. Additional terms and conditions5

9. Distribution list7

Appendix B - Scheme Plan8

1. Introduction

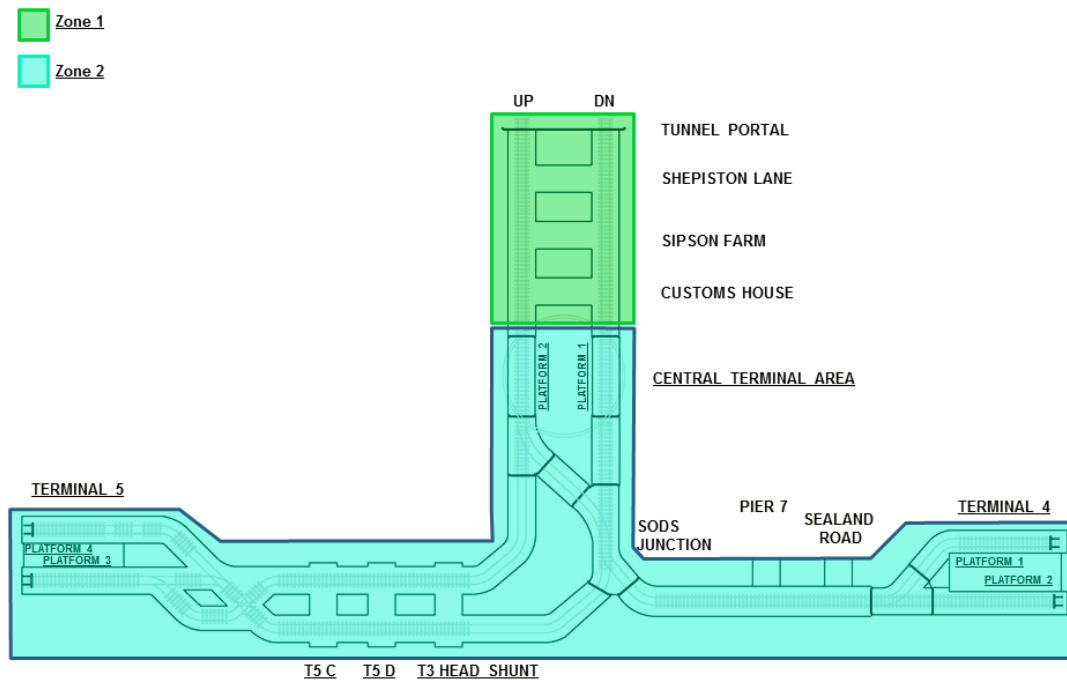
Heathrow Global System for Mobile Communications Railway (GSM-R) scope of works and services are required to implement GSM-R for voice coverage, for cab-signalling communications, and data coverage, to support the implementation of European Train Control System (ETCS) Level 2, on the Heathrow Branch Lines to enable Crossrail services to run to Heathrow Stations.

The introduction of Crossrail will deliver a 4 train per hour (tph) service to Heathrow from the Crossrail Central Section, replacing the 2tph Heathrow Connect Service that runs from Paddington mainline station. The service is planned to commence in May 2018, although will initially run from Paddington mainline station, with dynamic testing of the new trains, and the ETCS system in the tunnels, from the end of April 2017. The works on the Heathrow Branch Line for GSM-R and ETCS are on the Crossrail Programmer's critical path.

Crossrail rolling stock will be fitted with GSMR radio equipment and European Rail Traffic Management System (ERTMS) compliant signaling equipment. It will not be fitted with the Great Western Automatic Train Protection (ATP) system that is currently installed on the Heathrow branch. The Network Rail (NR) National Telecoms Team has been rolling out the GSM-R radio system on the rail network as a replacement for the National Radio Network. This roll-out was completed on the Great Western Mainline at the end of 2012, but does not currently include the Heathrow Branch, which has infrastructure for Cab Secure Radio (CSR).

The Heathrow Tunnels GSM-R network has been designed as a two-zone RF-over-fibre (RFoF) system. RFoF architecture was chosen based on the coverage required, cost of implementation, resilience and performance compared to a traditional passive network design, please see Fig1 below.

Figure 1: 2 Zone Solution



Note: The term '**Zone**' has been used to differentiate the coverage areas from the 4 BTS '**Sectors**' being radiated by the complete system. Each coverage 'zone' is served by 2 BTS 'sectors' 1 main and 1 backup.

2. Project objective

- GSM-R infrastructure design, implementation, testing and commissioning in the Heathrow Tunnel and station platform areas, tunnel cross passages, evacuation shafts, and equipment rooms.
- Connection to the National GSM-R network, including, where necessary, updates to the Base Transceiver Stations at Hayes and West Drayton, and updates to the Master Switching Centre.
- Coverage, reliability and availability to meet the quality of service levels for both GSM-R voice and data sufficient for ETCS level 2.
- Radio coverage for voice in the running tunnels, cross passages; and evacuation shafts at Shepiston Lane, Sipson Farm, Custom House, Pier 7, Sealand Road, Terminal Three (T3) Escape Shaft and T5C Escape Shaft.
- Supply of necessary equipment including base transceiver stations; remote radio units, optical master units, combiners, radiating cable, and fibre.
- Supply of radiating cable and associated equipment from the tunnel portal to; Central Terminal Area (CTA), and from CTA to T4 and T5.

- Supply of a GSM-R fixed terminal at the Heathrow Express Control Room (HECR) and at the back-up facility at T5.
- Product and system approvals through the NR Acceptance Panel and Heathrow Assurance Review Panel (HAL-ARP).

The project should keep the project within Network Rail Telecoms (NRT) who are leading the Heathrow Express (HEX) trains GSMR radio fitment with Heathrow Express Operating Company (HEOC) informing NRT of our progress as they need to tie in their programme to the completion of our works.

3. Reasons for the proposed change

Network Rail and Crossrail Limited (CRL) have entered into a Framework Implementation Agreement (IA) dated 17th August 2009. Further to the Framework IA, CRL have instructed Network Rail to carry out the Works set out in the Implementation Agreement Brief; Works on the Heathrow Branch. This work covers the implementation of GSM-R voice coverage, for cab-signalling communications, and data coverage, to support the implementation of ETCS Level 2, on the Heathrow Branch Lines to enable Crossrail services to run to Heathrow Stations. The provision of trackside ETCS is being done by the Network Rail ETRMS.

CSR could only be removed once HAL Fleet fitment for GSM-R functionality is completed is in place at Heathrow and GSM-R is commissioned in the tunnel section to the airport, GSM-R exchange is forecast for June 2017.

4. Specification of works

This project is to provide GSM-R coverage in Heathrow Spur, including Heathrow tunnels, platforms and emergency escape shafts. The provision of GSM-R coverage in Heathrow tunnels is required;

- For integration of the GSM-R system into the GWML Route
- To provide BTS S9000 (HEX), Kathrein 800 10465 VV Pol Antennae and associated Fibre Optic/Coaxial Radiating Cable within the Heathrow infrastructure.
- To provide Alias Plates, the group standards for signage GIRT7033 ISS 2 can be found on www.rgsonline.co.uk
- Support the introduction of Crossrail services to the Heathrow Airport infrastructure
- Allow ETCS level 2 signalling to be introduced as a component of ERTMS
- Enable the eventual withdrawal of CSR (Cab Secure Radio)
- Provide GSM-R Coverage within the Emergency Escape shafts for driver and passenger evacuation from the tunnel infrastructure (Excluding CTA, T4 & T5 Stations)

Heathrow Tunnel Infrastructure is located south of the main line ELR: MLN1 between Hayes & Harlington Station and West Drayton Station. The ELR for the Heathrow Infrastructure is HLL. The Handover from asset ownership

between Network Rail and Heathrow Airports Limited is outlined within The Infrastructure Management Agreement.

5. Proposed timescales

- Option Selection – Complete
- Single Option Development – Complete
- Procurement – Complete
- Solution Survey & Detailed Design – 25/04/16
- Installation – 26/04/16 to 15 September 2016
- Commissioning & Integration 1/08/16 to 21/11/16
- Scheme Hand-back 22/11/16 to 28/12/16

6. Consequence of the proposed change

GSM-R cab radio fitment in the Heathrow Express and Heathrow Connect vehicles cannot commence until GSM-R HAL tunnel coverage is provided, and therefore the works will need to be in place before the CSR switch-off between Paddington and Heathrow.

The CSR programme has agreed to keep CSR operational until this project has completed the installation in the tunnel.

Entry into service arrangements will be subject to HAL-ARP approvals and agreement with Operators.

Rule Book modules for GSM-R shall apply and be adopted on the HAL Infrastructure.

7. Possession strategy

Possession requirements will be negotiated through the normal planning process in place for the Heathrow Infrastructure. Any associated restriction of use compensation for current Access Beneficiaries will be calculated through the Compensation Agreement between Crossrail Limited and Heathrow Express Operating Company.

8. Costs and compensation

Compensation will be calculated in line with Part G of the HAL Network Code unless alternative arrangements have been made. All possession related compensation will be paid through the standard Schedule 8 where applicable.

8.1. Additional terms and conditions

Once this Network Change has become an established HAL Network Change (as defined in Part G of the HAL Network Code), HAL may, if it wishes to make any modification to the terms or conditions (including as to the specification of the works to be done, their timing, the manner of their implementation, the costs

to be incurred and their sharing, and the division of risk) on which the change was established, use the following variation procedure: Heathrow Airport Limited shall ensure the specific variation (or variations) is formally communicated to all parties to this notice (the original consultation notice) for consideration. The parties to the consultation shall consider and respond to the variation (or variations) in accordance with the procedures set out in Conditions G1 and G2 allowing for the changes in detail that must follow as a result of the procedure applying only to the proposed variation. It shall not be necessary for Heathrow Airport Limited to re-issue the entire Network Change notice for consultation.

9. Distribution list

Organisation	Name	Email
--------------	------	-------

Train Operators

Heathrow Express	Warren Johnson	warren_johnson@heathrowexpress.com
MTR Crossrail	Ian Brightmore	ian.brightmore@mtcrossrail.co.uk
	Jonathan James	jonathan.james@mtcrossrail.co.uk
	Steve Agace	steve.agace@mtcrossrail.co.uk

Other Infrastructure Managers

Network Rail	Eduardo Da Silva	eduardo.dasilva@networkrail.com
Network Rail	Angela Bradbury	angela.bradbury@networkrail.com

Other Parties (for information purposes)

ORR	Central email address	operations.team@orr.gsi.gov.uk
Department for Transport	Central email address	passengerservices_access&operations@railexecutive.gsi.gov.uk
Crossrail Ltd	Tony Byrne	tonybyrne2@crossrail.co.uk
	Paul Richardson	paulrichardson@tfl.gov.uk
Passenger Focus	John Sears	john.sears@transportfocus.org.uk
ATOC	Miranda Cleary	miranda.cleary@atoc.org

Appendix B – scheme plans

See separately attached documents:

- 1) • WHR1B-ETL-DRG-ALA-000889-C01 – Overall System Radio Schematic
- 2) • WHR1B-ETL-DRG-ALA-000950-C01 – Overall System Fibre Schematic
- 3) • WHR1B-ETL-DRG-ALA-000760-C01 – GSMR – POI – Heathrow Airport Tunnels – BTS Location