Department for Transport

NetworkRail

hs2

Crewe Hub - HS2 & 'Digital Railway' Proposals

David Coles, DfT

Andrew Spiers, Network Rail

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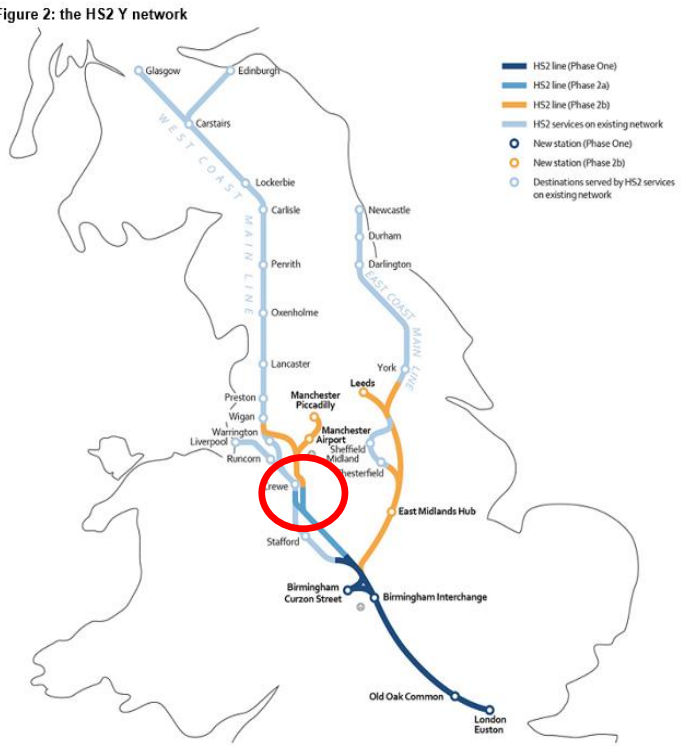
Background

1. Since 2015 Network Rail has been developing options to facilitate a greater number of train services as part of the Crewe Hub concept, beyond that envisaged under the HS2 train service specification.

2. NR has developed a layout in partnership with the Department and HS2 to accommodate the potential enhanced service specification for 2026 & 2033, detailed by the Department in the Crewe Consultation Document (July 2017).

3. With the full support of the Secretary of State, NR is introducing a new standard, effective from 1st May 2018, which requires all signalling renewals and upgrades to be digital, or at least digital ready, to enable future upgrade to full digital operation.

Figure 2: the HS2 Y network



4. There are distinct advantages for HS2 if its trains can run into Crewe using the same digital train controls they will use on the new HS2 lines.

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What is meant by a ‘Digital Railway’?

Digital Railway systems include:

- European Train Control System (ETCS) – it can be Level 1, 2 or 3
- A Traffic Management System (TMS) which improves performance and reliability through real time train service management
- Driver Advisory Systems / Automatic Train Operation (DAS / ATO), enabling timely instruction to drivers/vehicles to regulate the service and maintain/recover the timetable
- ATO varies from:
  - Grade of Automation 0 (fully manual) to GoA 4 (‘or ‘unattended)’ Driverless

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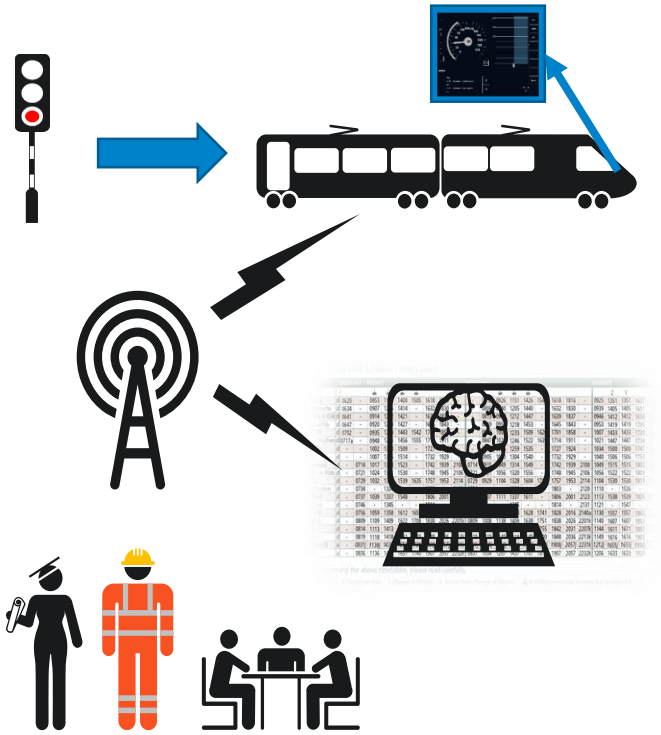
‘Digital Railway’ Deployment on HS2

- ETCS Level 2 – the maximum safe speed the driver needs to obey is displayed in the cab and communicated to the train by radio, so there are no lineside signals.
- The minimum distance apart trains can travel depends on the braking characteristics of each train. With ETCS, this is no longer dictated by the maximum braking distance of the worst performing trains on that line.
- ATO GoA 2 - driving and stopping are automatic.
- An integrated Traffic Management System (TMS) - The “brain” behind digital signalling. It maximises the throughput that existing track can support, and adapts the timetable in real-time as operational conditions change, aiding timetable recovery.



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Advantages to HS2 of a ‘Digital Crewe’

ETCS (Level 2) into Crewe station would:

- Facilitate a simpler and safer transition from the HS2 network to the conventional railway network (CRN) at a key performance interface
- Allow for an ATO controlled arrival/departure to/from the station which will speed the clearance of junctions and provide performance benefits
- Provide a logical handover point between traincrew with HS2 competence and traincrew with conventional railway competence.

Wider fitment of digital capabilities through Crewe would also offer the potential to:

- Resolve headway issues between Crewe and Weaver Junction/Manchester
- Support an ‘Integrated’ Traffic Management System on WCML North
- Use DAS to manipulate the precise timing of trains moving from the CRN to HS2 to mitigate late running.

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Remodelling Challenges at Crewe

- Ideally we would remodel Crewe in a ‘big bang’ – close the station for a sustained period, renew the entire signalling ‘interlocking’ (the train control ‘brain’) and any new track layout in one go.
- That was how Crewe was last renewed in the 1980s, and it would make installing a ‘fully digital’ or ‘digital ready’ train control system at Crewe much easier.
- However, the impact on the travelling public of a prolonged closure at Crewe is currently believed to be unacceptable, so we assume we will need to stage the works – closing, altering and reopening individual parts of the station layout a bit at a time.
- This means that, as the track and lineside signalling equipment is ripped out and replaced in stages, the interlocking has to be reconfigured and retested every time – probably around 40 stages for Crewe.
- The 30 year-old existing interlocking at Crewe is in too delicate a state to be subjected to that kind of repeated ‘brain surgery’, so the first step will be to replicate the existing interlockings ‘like-for-like’, so they can be safely altered thereafter, as each stage is commissioned.
- Introducing a new digital or digital ready interlocking is therefore not straightforward - further work is needed to develop the optimum solution.

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Proposed Next Steps

- DfT to convene a workshop within three weeks to agree an additional ‘Digital / Digital Ready’ remit for the Network Rail development team working on the current GRIP 3 study for Crewe Hub.
- Remit to include identifying the costs, benefits and staging implications of:
  - An ‘ETCS ready’ only interlocking at Crewe (the ‘base case’)
  - A ‘minimum’ ETCS deployment before 2027 to suit HS2 running into Crewe
  - Additional ETCS deployments before 2027 in and around Crewe to suit HS2 and potentially other rolling stock
  - ETCS deployments thereafter, including after 2033.
- Attendees:
  - DfT (High Speed and Rail Group Passenger and Digital Services)
  - HS2 Ltd (Operations and Engineering)
  - Network Rail (Route, HS2, Systems Operator and Digital Railway)