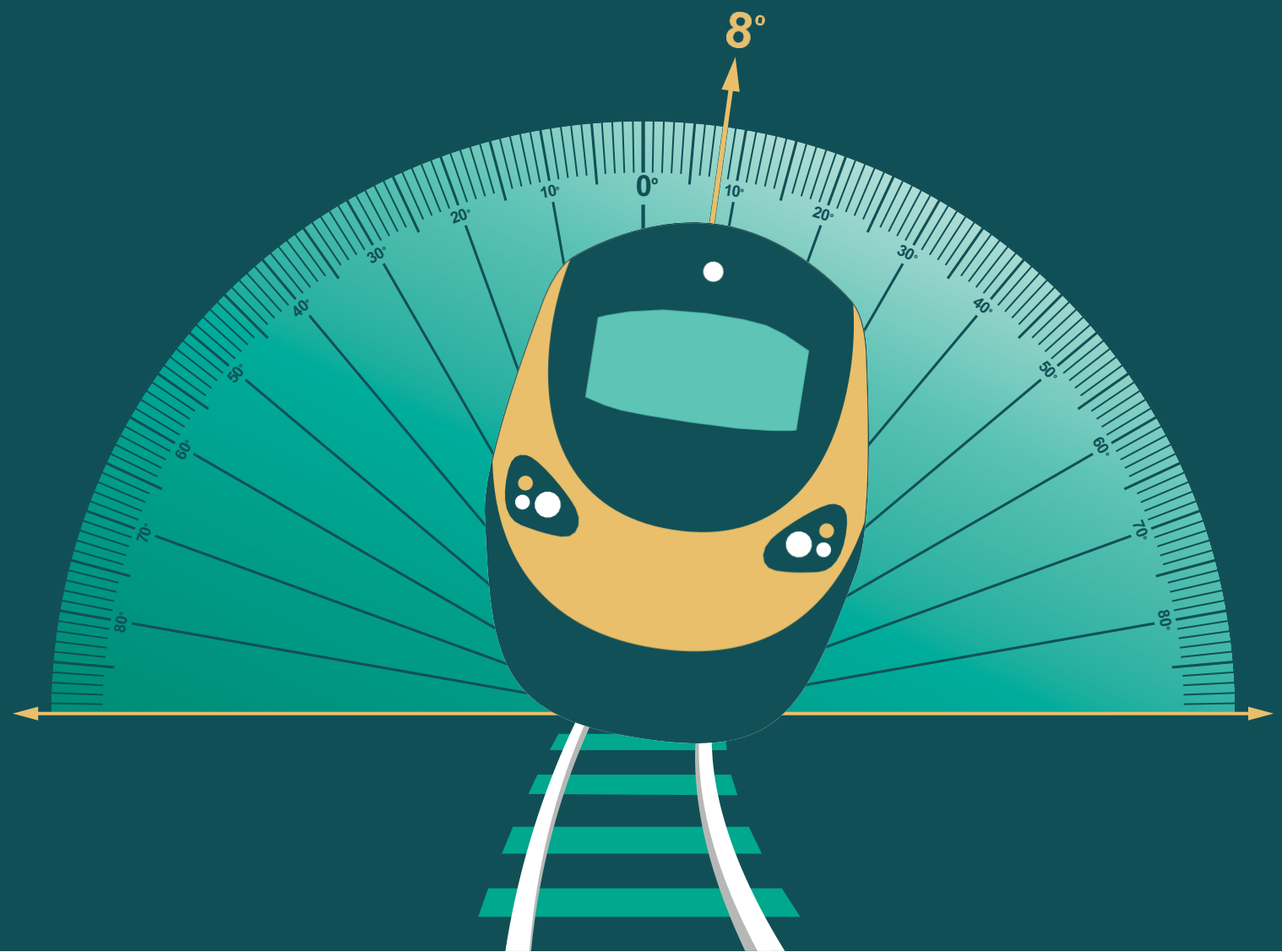
HS2 - Getting the job done...
A new approach



Version 3b

HS2 at a junction – The Problem Now

01 It is unrealistic to freeze HS2 as a London – Birmingham / Handsacre new line, but…

02 …upgrading the West Coast Main Line conventional rail network north of Handsacre for 400m trains is considered too expensive

03 This memo offers an interim solution which defers major investments until the 2040s and makes the most of all the available assets. The proposal is to renew the existing Pendolino train fleet to run at 155mph on HS2, and take key strategic decisions after HS2 has been operating for ten years

04 In only 5½ years the HS2 infrastructure will be ready for passenger trains to run, but there is no acceptable industry operating plan and passenger proposition yet

HS2 at a junction – an Alternative Plan for 2030 – 2042

Executive Summary

01 Pendolino fleet renewed and life extended for 155mph on HS2

02 New HS2 fleet to run at 186mph on HS2 to accommodate mixed speed operation and reduce costs, until 2042

03 New HS2 fleet to run on HS2 as 400m trains London to Birmingham, and 200m trains London to Liverpool and Birmingham to Manchester

04 Pendolino fleet to run on HS2 as 266m trains London to

Manchester and London to Scotland until 2042

05 Remaining trains from both fleets operate on WCML Conventional

Rail Network services until 2042

HS2 at a junction – Recap - the current situation

01 Northern legs - Phase 2a and 2b cancelled

02 54 200m trains ordered for use on the Conventional Rail Network (“CRN”) which is configured for 266m trains

03 Necessary enhancements to CRN not funded / unproven / very disruptive

04 Capacity crisis between Handsacre and Stafford

05 Outcome is slower trains than planned and less passenger capacity than now

06 Uncertainty over Euston - Old Oak Common

Recap: The HS2 plan was

01 17 services per hour on HS2 “Y” network, with ETCS and ATO

02 206mph average speed + 5% “added time” timetable

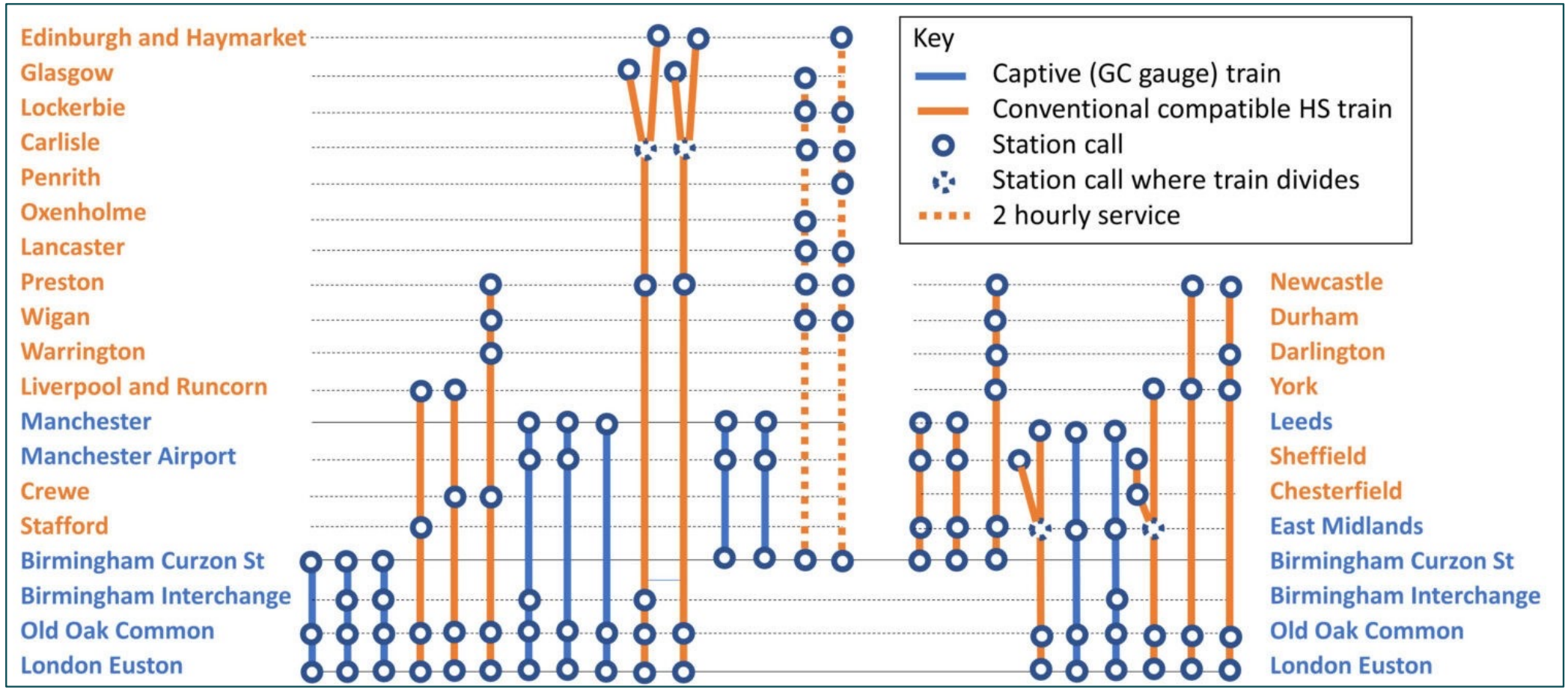
03 Trains capable of 225mph and infrastructure designed for up to 250mph

04 400m 16 coach trains dividing at Crewe, Carlisle and East Midlands Parkway to serve two destinations

05 54 new train sets ordered from Hitachi / Alstom, operating as single set 200m trains or double set 400m trains, each with a pantograph taking power from the overhead catenary system

06 Enhancements to Conventional Rail Network (“CRN”) infrastructure, stations and depots to accommodate 400m new trains, allow non-tilt trains to run faster and draw necessary power to run at full speed

Recap: Indicative standard hour phase 2 HS2 service plan



The current situation is

01 HS2 being built Birmingham / Handsacre - Old Oak Common only, and Old Oak Common unsuitable as permanent terminus, with track layout / entry switches limiting punctual departures to 8-11* per hour

02 NPR new line progressing : Liverpool - Warrington - Manchester Airport – Manchester, with underground station in Manchester city centre. Station will be on the scale of Stratford International if 400m platforms included

03 No 400m platforms or stabling facilities funded on CRN and platforms only exist at Preston and Carlisle. Enhancements disruptive and expensive

04 200m 8 coach trains on HS2 / CRN result in reduction of seats from present (607 to 528) e.g. London – Manchester / Glasgow.
No CRN capacity to run additional trains

* Opinions differ

The current situation is

05 HS2 train will be up to 17 minutes slower London to Glasgow than a Pendolino with no infrastructure interventions

06 Compatibility issue with 400m trains with two pantographs to run on WCML CRN at 110mph+ with 1960s overhead wire design and condition - wire bounce and power draw

07 Huge commissioning challenge - new trains, new & modified infrastructure, crew training, new depots - all while running existing service

08 Capacity crisis at pinch points: Handsacre - Stafford, Manchester Piccadilly etc., preventing more passenger and freight trains running

An alternative plan for 2030 to 2042

An alternative proposal for getting the job done: use the proven Italian model of mixed tilt and non-tilt trains on both high speed and CRN lines:

01 HS2 Birmingham - Euston service to run with 400m HS2 trains at 186mph, every twenty minutes (3,000+ seats per hour)

02 Extend NPR by building “New Northern Line” (“NNL”) between Fradley and Manchester, built for 155mph, and complete the Delta triangle

03 HS2 / NNL Euston - Liverpool / Blackpool services to run with 200m HS2 trains at 186mph / 155mph, three trains per hour

04 HS2 / NNL Euston – Manchester / Glasgow services to run with 266m Pendolino trains at 155mph, five trains per hour

05 HS2 / NNL Birmingham - Manchester services to run with 200m HS2 trains at 155mph, 2 trains per hour, journey time 50 minutes, potentially extended to Leeds via NPR when built

06 Reduce scope of Euston to have just two 400m new platforms, in addition to two existing 400m platforms (for Caledonian Sleeper). All other platforms to be unchanged. The two new 400m platforms will be the platforms used for the 400m Birmingham service, with one continually occupied with 15 minute turnrounds, the other as spare / occupied by shorter trains, along with the Sleeper platforms for most of the day

07 Do not commission ATO; commission ETCS and cruise control only, with existing Pendolino and ETCS trained traincrew supplemented by new recruits for new services. Rethink need for Platform Edge Doors at Old Oak Common and Birmingham Interchange if every train to now stop, and make provision for future installation

08 Do no enhancements to any WCML CRN infrastructure, stations or depots: just renewals consistent with higher line speed requirements and passenger comfort expectations

09 Continue with renewal of Warrington - Quintinshill signalling with ETCS to allow Pendolinos to run faster than 125mph in tilt mode - signal sighting and braking distance is a significant constraint at present. A similar renewal Quintinshill - Rutherglen / Midcalder Jn with ETCS will allow further acceleration. London - Glasgow in less than four hours with stops (e.g. Oxenholme) will be achievable, without new trains

11 Euston* departures per hour via HS2 - Indicative Timetable

Time	Destination	Train type	Speed on HS2 in mph	Seats
xx.00	Birmingham Curzon St	HS2 400m	186	1,056
xx.03	Liverpool Lime Street	HS2 200m	186	528
xx.06	Glasgow Central (fast)	390 266m	155	607
xx.09	Manchester Piccadilly	390 266m	155	607
xx.20	Birmingham Curzon St	HS2 400m	186	1,056
xx.23	Liverpool Lime Street	HS2 200m	186	528
xx.26	Edinburgh / Glasgow	390 266m	155	607
xx.29	Manchester Piccadilly	390 266m	155	607
xx.40	Birmingham Curzon St	HS2 400m	186	1,056
xx.43	Blackpool North	HS2 200m	186	528
xx.46	(vacant path to	mitigate delays)		
xx.49	Manchester Piccadilly	390 266m	155	607

The xx.00, xx.20 and xx.40 186mph trains will be 3 minutes behind the xx.49, xx.09 and xx.29 155mph trains at Delta Junction, depending on stopping pattern
Liverpool services can be either HS2 200m 186mph trains or 390 266m 155mph trains, or a mix of both *or Old Oak Common for interim period

Proposed future for HS2 train fleet

01 54 trains ordered, 8 coaches, 200m, 528 seats, maximum speed 225mph. Body assembly Newton Aycliffe, bogie assembly Alstom Crewe, interior assembly Alstom Derby. I propose normal operational speed 186mph to reduce EC4T and maintenance costs. I am not proposing to delay construction or vary the order

02 12 year initial maintenance contract, with maintenance at new Washwood Heath depot, Birmingham, and overnight servicing proposed at CRN depots. I propose that all maintenance and overnight stabling is confined to Washwood Heath and Curzon Street station, and contract still runs c. 2030 to 2042

03 I propose that 3 tph Birmingham Curzon Street - Euston, using 16 coach 400m trains, would require 16 sets in traffic, 2 spare and 2 on maintenance = 20 sets

04 New HS2 trains will not initially operate London to Manchester as this would result in a reduction in seats. 16 coach 400m trains will come later when 400m terminal platforms are provided as part of the NPR Manchester city centre station.

Proposed future for HS2 train fleet

05 I propose that 2tph Birmingham Curzon Street - Manchester, using 8 coach 200m trains, would require 5 sets in traffic, 1 spare and 1 on maintenance = 7 sets. To replace current XC Birmingham – Manchester 2tph formed with 186-246 seat Voyagers with HS2 trains formed with 528 seats, and reduces journey from 90 to 50 minutes

06 This leaves 27 sets to be redeployed on CRN and HS2 services as eight coach single pantograph 200m trains - e.g. Euston - Birmingham via Milton Keynes, Euston - Liverpool via Milton Keynes and HS2. They can displace the ten Class 807 seven car 453 seat electric units being delivered currently, which can be redeployed elsewhere, to provide more seats on Euston – Liverpool. Redeployment in the future on high speed lines would remain an option (e.g. new NPR Manchester Piccadilly station with 400m platforms, or electrified North Wales / Chester – Euston service).

Proposed future for Class 390 Pendolino fleet

01 56 trains in service, 35 with 11 coaches, 266m 607 seats and 21 with 9 coaches 218m 467 seats. Tilt / TASS fitted, with one of two counter tilting pantographs in use at any time. Commissioned for 140mph in tilt mode, normal operational speed currently 125mph in tilt mode. Built Washwood Heath, Birmingham 2004 and Savigliano, Italy 2009. Pendolino tilting train family, widely used across Europe, in particular on Italian high-speed lines and CRN

02 Maintained by Alstom at depots in Manchester, Glasgow, Wolverhampton, Liverpool and Wembley

03 A recent condition assessment concluded that the trains and systems are in good condition and with continuing maintenance their reliable life can be extended to 2046. SNCF are currently life extending TGVs built in 1988 to 2042 – project “Botox”.

04 ETCS fitment and driver training will be undertaken in advance of Warrington - Quintinshill signalling renewal, planned for c. 2029

Proposed future for Class 390 Pendolino fleet

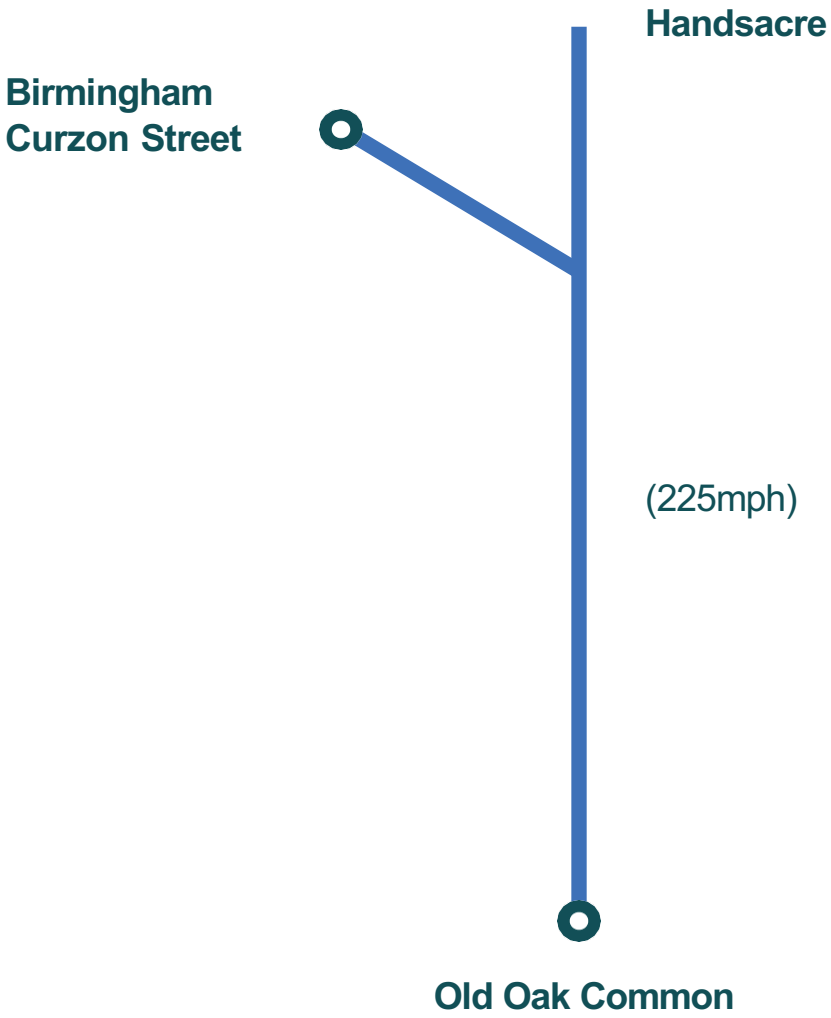
05 I propose that the Pendolino fleet is renewed with new bogies and traction systems which would support running at 155mph in non-tilt mode. The technology exists and is in reliable operation on recent Pendolino builds

06 A major fleet overhaul is scheduled for 2026-2029 when ETCS, new bogies and new traction systems could be installed. The overhaul is being planned now

07 The trains are owned by Angel Trains who could fund the enhancements over the next twenty years, and negotiate the programme with Alstom, who own the IP, so no public sector procurement would be required. Alstom could undertake the work at their facilities in Widnes, Crewe and Derby

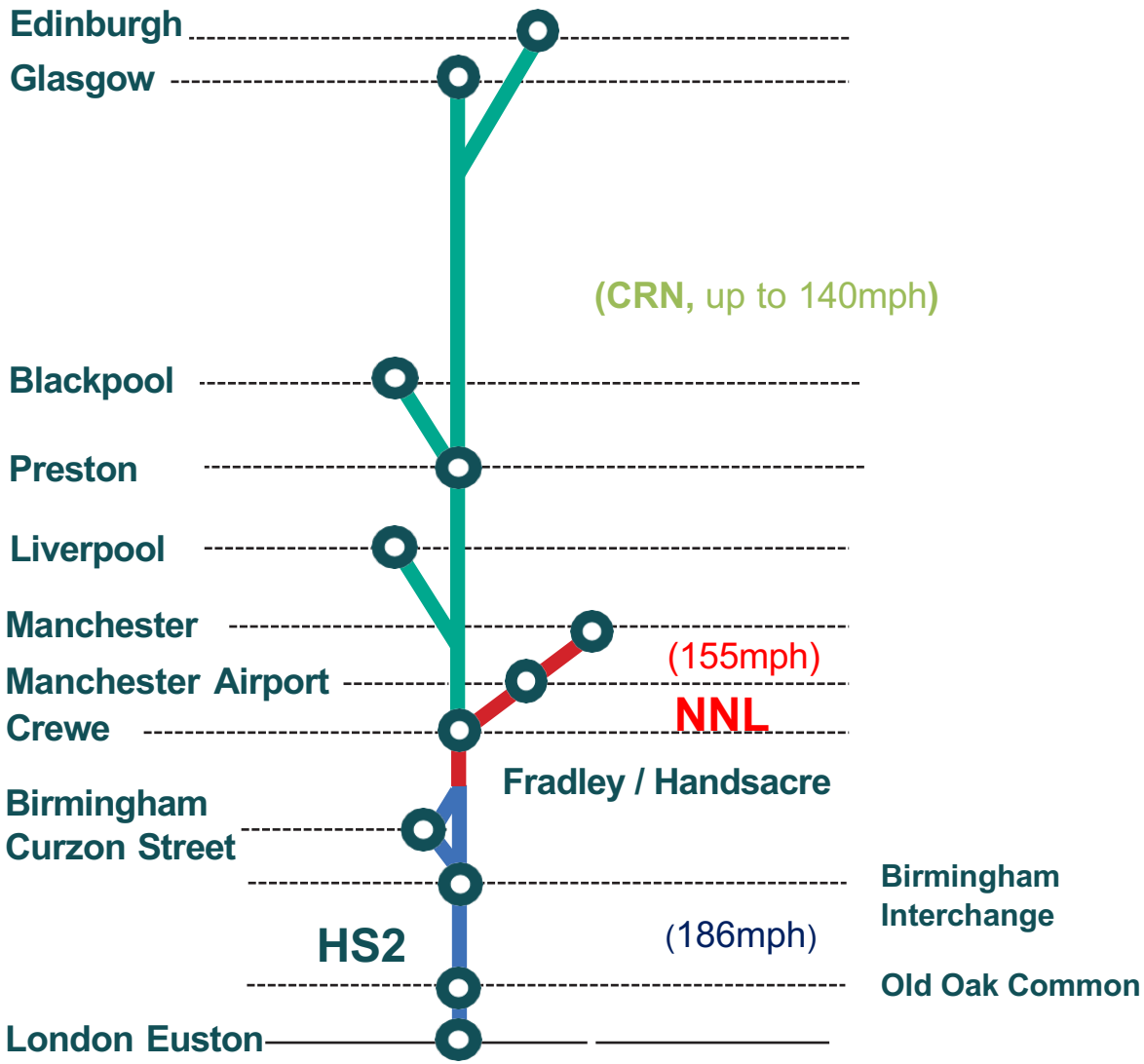
08 Fleet replacement procurement would start c. 2037, taking into account the available network, initial HS2 experience, technology development, future plans and passenger demand, with a view to a new fleet being introduced from 2042 along with a new contract maintenance period for the first HS2 fleet

The faster network from c. 2030 is currently looking like this



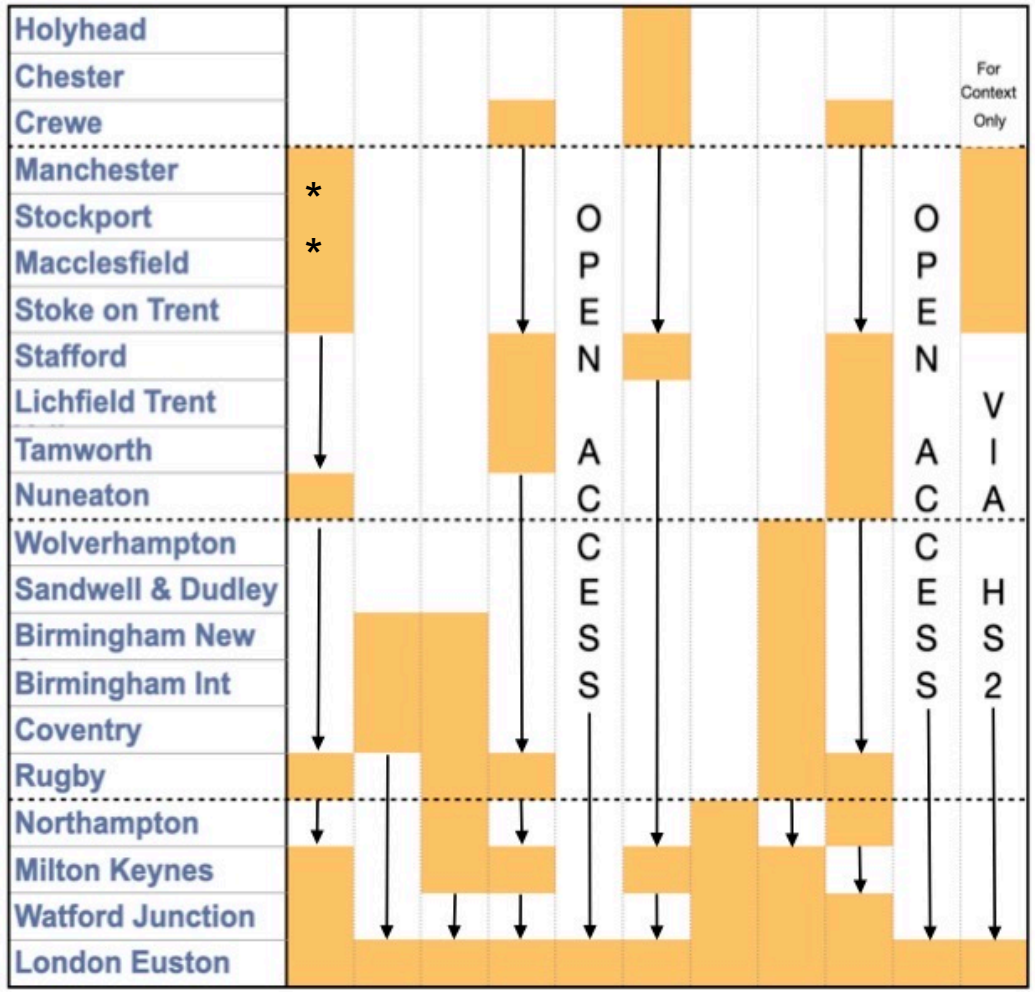
- Capacity constrained by Old Oak Common and CRN
- Birmingham Curzon Street : HS2 trains 2tph to Old Oak Common ? Only two of seven new platforms in use ? Will there be enough demand for 400m trains ?
- 200m HS2 trains 2tph on London – Liverpool will be more seats and faster than now
- 200m HS2 trains on London - Manchester or Glasgow results in fewer seats than now
- Chester / North Wales requires bi-mode trains, so CRN
- Two track CRN WCML between Colwich and Stafford prevents additional passenger and freight services on most of the CRN WCML
- Euston still the London terminus for many destinations = a confused product for passengers

The faster, higher capacity network from c. 2030 can look like this



NPR not shown for clarity but is expected to be a new line Liverpool – Warrington - Manchester Airport - Manchester

The remaining WCML fast lines service can look like this



Possible CRN WCML Rugby – Euston Fast Line standard hour service only, and associated service origins. For illustrative purposes only.

* No reliable path exists for this service into Manchester without an existing service being withdrawn – this is a fourth Manchester – London train per hour - or a NPR new station

Developing the passenger market – M40 / M1 south corridor

01 Attracting large numbers of passengers to the high capacity HS2 Birmingham – London services is key to releasing capacity on the CRN for new passenger and freight growth

02 To become the default choice for passengers HS2 services will need to have a product and price for all market segments, including those where Chiltern and West Midlands Trains have successfully attracted new passengers with low fares

03 Future service specification authorities will need to intervene to focus limited capacity to grow passenger volume on flows such as Milton Keynes / Bletchley / Rugby / Coventry / High Wycombe / Bicester / Banbury – London and leave the Birmingham city / M42 corridor to London market to HS2 services

04 The competitor for rail on this corridor remains the private car on the M1 and M40, and the strategy for rail growth should be modal shift attracted by price, time, capacity, flexibility, comfort, reliability, connectivity, car parking, accessibility and positive social associations.

Reasons why this idea should be progressed

01 Removes all CRN enhancements, reducing cost, disruption and uncertainty. WCML renewal only e.g. Crewe, Carlisle, ETCS, OLE, track etc. to achieve higher speeds on existing infrastructure and better performance

02 Reduces cost of a new line (“NNL”) between Fradley and Manchester, with maximum speed 155mph

03 Reduces cost, scope, disruption and time at Euston

04 Reduces cost, time and complexity of commissioning

05 Reduces cost, time and complexity for training of traincrew and depot staff

Reasons why this idea should be progressed

06 Reduces dependency on Old Oak Common as a interim terminus

07 Significantly reduces journey time on all routes, including London to Glasgow

08 Increases capacity on all routes, including WCML CRN, for both passengers and freight, maximising industry revenue

09 Makes maximum use of existing infrastructure, technology people and trains ordered to achieve the maximum benefit as quickly as possible. Cancels “captive GC gauge HS2” trains

10 Provides for different project phase completion dates c. 2030 to 2034, e.g. HS2 phase 1, NNL, NPR, signalling renewal with ETCS

HS2 at a junction

The right route to take at this junction, at this moment, with spades in the ground, credibility battered and funding severely constrained, is to follow the successful Italian high-speed network model.

Adopt this solution which provides faster journeys and more capacity on *all* routes by using a mix of tilt and non-tilt trains on a network with a mix of new high speed and conventional lines.

Please note I am not being paid by anyone to prepare this idea and have no vested interest in any of the organisations mentioned in it. I am an experienced WCML railway operator who wishes to see the emerging HS2 move forward in a manner that best integrates it with our rail network, for our future customers, colleagues, economy and environment. As soon as possible.

I am grateful to the many railway professionals who have encouraged me and helped me to develop this proposal.

Chris Gibb
6th May, 2024, version 3b
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Feedback welcome. Not Confidential.

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Brescia

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Do not cross the railway lines