

***SPIRIT***

**a Strategic Plan for an Integrated Regular-Interval Timetable :  
draft proposals for the East Coast Main Line**

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This paper is published for discussion and may be freely circulated. Comments are welcome.

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## SUMMARY

This paper describes initial proposals for a Swiss style of timetable for the East Coast Main Line, that is, one which is integrated and regular and based on the concepts that underpin the *Taktfahrplan*. The time is ripe: various formal processes are under way, and there are hints that the ideas may at last have some traction.

Chapter 2 sets the proposals in the current context: the Government plan to rebrand the line, and the application to the Office of Rail Regulation for rights to operate an open-access service between Edinburgh and London. Section 2.1 outlines the first and offers a critique of the timetable aspects of the Department for Transport's Invitation to Tender, while section 2.2 describes the application and reports on the responses of other industry players.

Both are of great significance, but readers may find themselves exploring unfamiliar territory rich in arcane and perhaps tedious detail. If that leads to an (understandable) inclination to skip the chapter then we have a problem, namely that timetabling has become so embedded in a game played between government entities and large corporations in a dense bureaucratic jungle that its profound interactions with railway policy and strategy are no longer properly understood. One purpose of this paper is to expose the implications, to assert the communal interest in the outcomes and thereby to inform and broaden the public discourse.

Chapter 3 sets out the strategic planning background. First the case is made and graphically illustrated for emphasising the public-interest dimension in railway policy [§3.1]. This is followed by the specific arguments in favour of integrated timetabling, particularly in respect of capacity, community-benefit objectives and connectivity [§3.2]. The principles that characterise integrated timetabling practice are outlined next, with an emphasis on the means by which connections are optimised at the key nodes of the network and on the importance of symmetrical timings [§3.3]. The final section [§3.4] questions contemporary assumptions about the freight business and explains the way paths for freight trains will be incorporated in standard hours.

Chapter 4 starts with an analysis of Network Rail's study identifying the most effective use of the capacity of the East Coast Main Line after completion of the planned enhancement of the infrastructure [§4.1]. PTN's proposals are then explained in detail [§4.2]: the technicalities; the scheme for three trains/hour between Edinburgh and London; the relationships between services to form an attractive pattern between Newcastle, York, Leeds, Peterborough and London; regional and local services in Scotland; provision for Retford, Newark and Grantham and for direct services for off-route places; and the structure of the Great Northern network as part of Thameslink. The plans are focussed on 2020 when the two new fleets of trains (the InterCity Express Project and the Thameslink units) are expected to be in full service.

A suite of charts produced by the *Viriato* timetabling software illustrates the outcome of the many interlocking choices. It is hoped that they will provoke discussion and perhaps influence official decisions.



## **1. Introduction**

### **1.1 Background and outline**

1.1.1 This is a discussion document, not a definitive plan. In describing the development of ideas for an integrated timetable it addresses a number of concerns about contemporary railway planning which I suspect are quite widely shared but not adequately discussed. I hope that feedback will not only improve the timetable proposals but advance the debate at a crucial time for our railway and for the railway policy of the present and a future Government.

1.1.2 At this stage the proposals relate to the East Coast Main Line [ECML] (and in this first draft largely to its sections in Scotland and Greater London), but the experience of preparing them can be taken as illustrative of more general problems. I shall welcome comments both on the policy questions and on the detail of the timings (including of course correction of any errors).

1.1.3 Following a preliminary exercise covering Highland and North East Scotland I chose to start what may evolve as a national project with ECML because, in addition to my familiarity with it from being a frequent user and from earlier analysis, two current matters highlight my concerns. One is the Invitation to Tender for the new franchise, in which the approach to timetable planning seems singularly weak and likely to yield a disappointing outcome. The other is the application by Alliance Rail Holdings for access rights for an Edinburgh <> London service. If approved this would have so profound an effect on the entire ECML that it must be examined in a wider context than through the regulatory processes of the Office of Rail Regulation [ORR].

1.1.4 The proposals draw on three previous ECML exercises by PTN, namely the research project with the Institute for Transport Studies in the University of Leeds that was sponsored by Government and the railway industry (2000-2004), an input to the GNER refranchising bid in 2004 and further work in association with ATOC when what became the 2011 timetable was the subject of much controversy. Each of these tentatively indicated that considerable benefit might accrue from introducing an integrated, regular-interval timetable<sup>1</sup>.

## **2. Current ECML matters**

### **2.1 Refranchising**

2.1.1 The Invitation to Tender [ITT] for the InterCity East Coast [ICEC] franchise was issued by the Department for Transport [DfT] on 21 March 2014<sup>2</sup>. As promised following the revision of franchising policy in the aftermath of the West Coast débâcle in 2012 the ITT places great stress on the quality of bids, although my understanding of the extraordinarily elaborate scoring matrix is that financial results remain the dominant consideration in selection of the winning bid. What is most concerning for the present purpose, however, is the approach to service planning.

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<sup>1</sup> The summary report for the first can be found at <http://www.dft.gov.uk/rmd/project.asp?intProjectID=10047> and documents relating to the third are available on the PTN website.

<sup>2</sup> See <https://www.gov.uk/government/publications/intercity-east-coast-franchise-invitation-to-tender>. The selection of the three bidders raises questions regarding the involvement of a foreign state railway and the effect of competition law should it be decided that the East and West Coast Main Lines be franchised to the same company (the ITT has some clauses relating to the second question), but these are beyond the scope of this paper. I do however declare an interest in that I support the campaigns to retain the ICEC operation in public ownership as well as making the public-interest case for integrated timetabling outlined in Chapter 3.

2.1.2 The Introduction states that “The Department is seeking ambitious and innovative Bids” [op.cit., ¶1.3.1]. Later it is claimed that the “Prospectus sets out the Department’s vision for an ICEC Franchise that delivers excellence in service quality, enables transformation, and becomes a global benchmark for InterCity services” [¶2.3.1]. Leaving aside the overblown language<sup>3</sup> one might expect that such sentiments would lead to at least an outline of a vision for the future timetable, even if the fiction has to be maintained that this will emerge from the entrepreneurial brilliance of the bidders. Instead the Table of Objectives following the second quote has nothing to say about timetabling, despite it being quite prescriptive about various other topics and despite the ITT laying down that bidders must submit a fully-specified Working Timetable for each of several scenarios [¶4.10.1], regardless of the problems that are likely to surround them.

2.1.3 As I have stressed in previous papers it seems to me incontrovertible that the timetable is the central feature of the product, or ‘offer’, of any public transport operation – and yet it has been consistently under-regarded in the context of the fragmentation and marketisation of railways. This is important because, as the next section argues [§2.2], there are vital public-interest issues inherent in the way in which timetables are planned and priorities for paths are established. The Department’s approach in the ITT is therefore profoundly disappointing.

2.1.4 It refers to generating “additional benefits for passengers” [¶5.1.5], to improving “whole-industry cost-efficiency”, to supporting “better strategic planning at industry level and between operators” [¶5.3.3.2] and to delivering “wider rail network benefits beyond the geographic scope of the Franchise” [¶5.3.3.5]. In the same vein evidence is required on how the bidder’s Innovation Strategy “will encourage the development of innovative products, services and processes that promote better customer service and operational performance” [¶5.3.4.3]. Yet none of this is illustrated by any discussion of the type of timetable that might be developed.

2.1.5 On the contrary, such references as there are relate only to resource or technical aspects, to interactions with other operators’ services or to narrowly-conceived detail. Thus, for example,

- ⇒ DfT requires a Franchise Operator whose “Train Plans and timetables will target the available capacity of the [Class 80x Intercity Express Programme [IEP]] fleet where and when it is needed most, in order to minimise the extent of crowding and to avoid it being unduly concentrated on particular services or routes” (whatever that means) [¶5.4.1.3];
- ⇒ the operator must “develop and deliver a train service that is compliant with the Timetable Planning Rules and Sectional Running Times ... unless the Bidder can justify any proposed departures from the published [Rules and Times], and that its proposals are endorsed by Network Rail” [sic, ¶5.4.1.7];
- ⇒ there is a requirement for an immensely detailed crowding model [¶6.3.4.12];
- ⇒ train services must be “compatible with the overall capacity of the rail network, taking into account the infrastructure enhancements delivered by Network Rail ... , and in particular which are deliverable alongside the TSGN [Thameslink], open access, freight and other service patterns described in [an accompanying] Table” [¶5.4.1.5], although “bidders should also make their own assessment as to what other services, over and above those shown in [the table], may operate” [¶5.4.1.6] and “show the assumptions made in regards to other franchised services” [¶4.10.1]; and
- ⇒ there are stipulations about “maintaining direct journey opportunities that are important to passengers ... ; [providing] services that are well-spaced rather than services that meet the

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<sup>3</sup> National Express promised “a world class service” in 2007.

TSR requirements but are tightly bunched; and offering journey times that are not unnecessarily extended”<sup>4</sup> [¶5.4.1.4].

2.1.6 The accompanying table [5.2] makes it very clear how the already-strong influence of the London outer-suburban services on ICEC pathing will become dominant when some of them form Thameslink services working to and from places south of the river, although bidders are advised that they are free to propose an alternative to the illustrative TSGN scheme<sup>5</sup>. However they must also respect the revised Northern timetable to be introduced in 2018, secure one Class 4 freight path in each off-peak hour between Peterborough and Stevenage and not plan anything to the detriment of existing open-access operations. The latter point is then complicated by the need for an ‘Access Rights Contingency Plan’ that acknowledges the possibility that ORR may approve a new hourly fast Edinburgh <-> London service [¶5.4.1.12, and see §2.2 below].

2.1.7 Nowhere is there any recognition that the scale of these constraints makes large changes unlikely: DfT continues to ignore the impact of sequential letting of franchises whereby the track-access process for each agreed timetable limits what can be achieved by the next one and hence stifles any radical overhaul. Nor is there any mention of the merits of standard-hour patterns, while the benefits of mirror-image timing [see ¶3.3.8-17 in this paper] are still not understood. And the words ‘connection’ (with regard to a journey of more than one stage) and ‘interchange’ are absent from the document, as though any relationships with other operators’ services (or with buses) are of no consequence to passengers<sup>6</sup>. And the introductory listing without elaboration of possible new destinations (Huddersfield, Middlesbrough, Scarborough, Sunderland (via Newcastle) and Harrogate (via York) appears tokenistic [¶2.1.2].

2.1.8 The conceptual muddle is compounded by the style of the Train Service Requirements [TSRs], which follow the precedents of previous franchising and display no fresh thought<sup>7</sup>. The tables list (for weekdays, Saturdays and Sundays separately) the minimum number of calls to be made at each station, the times of first and last services, minimum provision in peak and off-peak periods and for some relations (station-to-station flows) the average journey-time to be achieved. The idea of a ‘quantum’ of service [see ¶5.4.1.1] expresses a lawyer’s understanding of the timetable and tends to fossilise existing practice: it does not permit or encourage a comprehensive rethinking of what the market and/or the public interest will require in future years. Indeed, as if to emphasise the disjunctures in timetabling, it is explicitly stated that “Services operated by another train operating company cannot count towards meeting any of the requirements”.

2.1.9 Moreover, the tables contain some strange prescriptive items that appear to reflect the wishes of interested parties without considering more basic features of the timetable such as appropriate frequencies and regular patterns:

⇒ “Up to 7 calls per day at Newcastle may be replaced by calls at Middlesbrough”;

⇒ “In services arriving KGX between 07:00 and 20:59, the interval between calls at Northallerton shall not be greater than 2 hours 10 minutes”;

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<sup>4</sup> This requirement is qualified by a curious statement that implies that current allowances are unreasonable without specifying what is reasonable: “In particular, timing allowances for performance, pathing and engineering time and differentials between public and working timetables must be kept to a reasonable minimum”.

<sup>5</sup> The (opaque) phrasing of one paragraph [¶5.4.1.8] almost implies that the ICEC timetable will be subservient to Thameslink: the Franchise Operator “will successfully administer and implement all future Timetable changes, including changes arising from any Thameslink Programme configuration states”.

<sup>6</sup> There is a reference [¶5.7.1.6] to improving “the door-to-door journey experience ... in line with the DfT’s door-to-door strategy”, but its practical meaning is left wholly vague.

<sup>7</sup> These are available at the website referenced in footnote 2. The quotations are taken from TSR2, which covers the years after the full introduction of the new trains in May 2020.

⇒ “I call at each of Huntingdon and St Neots is required in trains arriving KGX 08:00-08:59” (this is a novelty for ICEC services).

Similarly a table setting out the required connectivity for selected combinations of Doncaster, Retford, Newark, Grantham and Peterborough and for Leeds <> Wakefield <> Doncaster offers no explanation of why other relations up and down ECML are not protected in this way – and the language is again legalese rather than rooted in a real understanding of the market (for which frequencies of 9 trains / day x direction may be considered inadequate):

⇒ “the individual timings of the trains should be distributed through the day to provide a reasonable range of journey opportunities which meet passenger demand on each of the flows, and in particular demand for travel to/from work and education”.

2.1.10 Finally all the itemisation is brought together in an explanation of how the scoring system will be applied. Exceeding the requirements will be rewarded if

“the train service proposition as a whole generate[s] additional passenger benefits by addressing the needs, priorities and aspirations of passengers and other stakeholders that the Bidder has identified through consultation and other research, for example because they provide additional train services (which could include more early morning or late evening services, or proposals to meet evidenced demand for additional services on bank holidays) [or] new or enhanced direct services between locations ... which have no such services or where the current direct service is limited [or] faster journey times between London and Leeds, Newcastle and Edinburgh”.

2.1.11 However, “for the avoidance of doubt” any proposals will only be recognised if “in the Department’s reasonable opinion there is sufficient demand to justify such services and they materially increase rail passenger volumes, rather than primarily abstracting revenue from other train operators (whether franchised or open access)”. There then follows a complex section explaining how proposals may or may not be contractualised.

2.1.12 No doubt the bidders will do what they can with this convoluted approach – one that is neither wholly flexible nor fully specified<sup>8</sup> – but it will be most surprising if it yields anything significantly superior to the hotchpotch of the so-called Eureka timetable of May 2011. That outcome would not do justice to the huge sums expended on the new trains, to the national importance and costly upgrading of the East Coast Main Line or to the expressed view of the Director of Rail Franchising at DfT that “we could aim for a Swiss-style timetable with cross-platform connections. A standardised, repeatable and symmetric timetable is what is needed”<sup>9</sup>.

2.1.13 To me the contrast between this franchising model and the Swiss model is stark. I am convinced that at the very least the public interest requires that an application of the latter – ie. an integrated national timetable plan – must be researched for Britain’s railway. That is what the later parts of this paper discuss in respect of one initial case-study. But first it is necessary to review another current issue affecting ECML.

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<sup>8</sup> Compare “The Franchise Operator shall not be required to operate services on Christmas Day or Boxing Day” [TSR2, General Provisions, ¶3.1] with “Bidders must also submit a contingency plan for a scenario in which the Franchise Operator does not obtain all of the access rights necessary to deliver TSR2” [ITT, ¶5.4.1.12].

<sup>9</sup> In an address to the Railway Study Association, reported in *Modern Railways*, January 2014, p.75. In an earlier talk, reported in the same issue, p.79, Chris Green argued that recasting timetables to optimise capacity utilisation would mean “creating regular interval timetables on each route”.

## 2.2 The Alliance proposition

2.2.1 Alliance Rail Holdings Ltd is a subsidiary company of Arriva UK Trains Ltd, which in turn is a subsidiary of Deutsche Bahn [DB], the German State Railway. Alliance itself is shown in Companies House records to be a tiny company with a negative net worth of £759,000. It is therefore reasonable to assume that its ambitions are being sponsored by DB. The open-access operator Grand Central is a sister-company, and by a quirk of history Alliance holds the rights to the name *Great North Eastern Railway*, which it proposes to use for its ECML service.

2.2.2 Alliance submitted a draft track access contract and application form to ORR<sup>10</sup> in February 2014 for an hourly service between Edinburgh and London King's Cross, stopping only at Newcastle upon Tyne Central. It would be operated by a fleet of 12 9-car Pendolinos (Class 390). Journey times would be 71 minutes between Edinburgh and Newcastle and 149 between there and London, giving, with one 3-minute dwell, an overall timing of 3 hours 43 minutes. Departures would ideally be at 'clockface', ie. regular, times, but Network Rail [NR] would have the right to 'flex' by  $\pm 3$  minutes. The rights would be 'firm' rather than 'contingent' and would be implemented at the main timetable change in December 2016.

2.2.3 The proposition ostensibly rests on the capability of a service with such frequency and timing to attract traffic from airlines, and Alliance asserts that its business model indicates that this would comfortably exceed abstraction from the incumbent franchised operators (ICEC throughout and CrossCountry – also an Arriva company – between Edinburgh and Newcastle) and hence be acceptable under ORR's competition principles. The company points out that NR has recognised that current journey-times are competitively 'sub-optimal'<sup>11</sup> and that a great many schemes in the Control Periods that have just ended and just started [CP4 and CP5] should make both acceleration and the necessary paths feasible. An eventual timing of 3½ hours is foreseen.

2.2.4 The application documents are confident that the fast paths can be found when the ECML timetable is revised for 2016, but no details are presented. The interested parties that have commented on the proposal stress that the 2016 recast is not the principal one, that being for full introduction of the Class 80x IEP trains in 2020 along with fruition of the infrastructure and signalling enhancement programmes. In any case, too, some express disbelief that the fleet and the attendant infrastructure modifications<sup>12</sup> and the necessary operating licence and safety case could be got ready in only 34 months. Somewhat disingenuously, Alliance responds by saying that they wanted bidders for the ICEC franchise to be aware of its intentions – which is fine if bidders are unconcerned but could damage the public interest and railway financing if the value of the bids is drastically reduced or heavily qualified after allowing for substantial abstraction.

2.2.5 A number of themes are raised in (mostly) highly critical submissions to ORR. They are summarised here, with my view included. I declare an interest in that I believe the railway to be more than the sum of separate schemes pursued for private profit. I am therefore sceptical about the claimed virtues of Open Access [OA] and profoundly sceptical about whether it yields net benefits when the downsides and wider considerations are weighed in the balance. Here however I only comment on specific issues related to ECML and to this application.

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<sup>10</sup> See <http://orr.gov.uk/what-and-how-we-regulate/track-access/track-access-process/current-track-access-applications/new-contracts-section-17-and-18>. The responses are also available through this link.

<sup>11</sup> “Present passenger figures for the ECML suggest the rail share of the Edinburgh – London market is sub-optimal, with substantial numbers of passengers opting to travel by air. Continued focus will be required on timetable development, minimising the time penalty of station stops and exploiting the improved capability of new rolling stock” [Network Rail. Draft Network Specification (London North Eastern and East Midlands), February 2014].

<sup>12</sup> Track balises and possibly some gauging work would be required to take advantage of tilting – Alliance state that discussions are taking place with Network Rail on funding. If this only benefits Alliance trains (the IEP sets will not have tilt equipment) an interesting question arises as to whether any party other than Alliance should pay.

2.2.6 **The availability of capacity for such a high-speed service.** Alliance quotes statements from Network Rail about the extra paths that should be created by the various infrastructure projects, but there seems to be some disagreement about exactly what will be available, particularly in the peaks. Moreover, in the absence of a consolidated list prioritising possible uses of the enlarged capacity and of operationally-detailed timetabling to knit them all together it is not credible to claim unequivocally that suitable paths will exist and by implication that they are a natural first priority<sup>13</sup>. Instead, as Freightliner remarks, there is “a somewhat blithe assumption” that a recast will yield fast paths. Nor is the application Alliance’s only bid for capacity, since they also envisage additional West Yorkshire and new Lincolnshire paths. But then Alliance personnel have never lacked sublime assurance in their claims.

2.2.7 **The impact on other operators.** DB Schenker (paradoxically another part of DB) warns against the timetable becoming “ossified so that the future growth in freight services could not be accommodated” and suggests “that the availability of sufficient capacity to accommodate the proposed services remains an expectation rather than a fact that has been demonstrated”. While I have reservations about the way in which freight paths are presently planned<sup>14</sup> this seems to me a reasonable concern, given how the Alliance service would dominate planning and especially bearing in mind that the application has to be for firm rights over a long period (probably 15 years) in order to minimise the company’s risk in respect of the purchase or leasing of a specialised fleet and of the infrastructure works to whose cost it may be contributing<sup>15</sup>.

2.2.8 East Coast (the Government-owned company Directly Operated Railways) makes a broader point: “to achieve the extremely ambitious proposed journey times, the paths would need to be hard wired which will have a significant detrimental impact on all other services around them, worsening the overall ECML timetable to the detriment of other users and customers ...this proposal ... would undermine the overall integrity of the ECML timetable, reducing connectivity [and] extending journey times to other destinations”.

2.2.9 Alliance dismisses this as “without foundation”, but East Coast and others quite rightly argue that ORR should not make any decision on the Alliance bid until it also has on the table the new franchisee’s proposals – though that of course merely highlights the inherent contradictions caused by misaligned timescales within the prevailing franchising and capacity-planning process<sup>16</sup>. Similarly, Freightliner points out that no timetable modelling has yet been done to establish the real capacity that the CP4 and CP5 projects will deliver – thereby revealing another fundamental weakness, namely the disconnect between infrastructure and operational planning.

2.2.10 First Group in principle “welcomes proposals for additional services on the network, particularly where any such proposal offers fair competition and complementary services to the franchised services offer, is in accordance with the criteria and procedures for the grant of track access and does not unduly disturb the economic equilibrium of any relevant public service contracts”. As a global corporation and as the owner of open-access Hull Trains it could hardly say otherwise, and the phrasing is nicely nuanced. Nevertheless it goes on to express such doubts about the availability of capacity, given the many aspirations, between Newcastle and York and south of Peterborough, as to

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<sup>13</sup> And that if insufficient capacity exists then Network Rail must declare the route congested and prepare plans to address the problems – as though that would be easy or cheap.

<sup>14</sup> See ¶3.2.5 and §3.4.

<sup>15</sup> NR reminds Alliance that a contract for more than 10 years requires an “exceptional case” under European Law.

<sup>16</sup> Alliance alleges in their riposte to East Coast that the latter’s documentation of existing rights is confusing, “too highly specified” and in some cases erroneous.

“lead to a fundamental issue that the industry has not had to deal with before, the possibility that an existing franchise service may have to be withdrawn to accommodate an open access proposal that provides greater benefit. Whether this service proposal will provide greater benefit is, of course, open to question and will require detailed analysis of the full range of considerations. These may extend beyond purely economic assessment, to include for example social impacts and wider journey implications. Certainly it would appear that if this service were to replace an existing service and result in a reduced calling pattern or loss of journey opportunities, the connectivity for those locations would be affected and could lead to significant customer and stakeholder concerns”.

First makes clear that the proposal would ‘materially affect’ bids for the ICEC franchise (in which it is involved) and by extension DfT funding.

2.2.11 Northern reminds ORR that, in addition to the possibly disadvantageous consequences for its existing services, a recast strongly influenced by the Alliance plan could lead to increased unit and train-crew numbers, so weakening the finances of its resource-led franchise. Alliance’s tart response is that this “needs to be placed in context against the significant value created by the introduction of a completely privately funded new service (and the 275 jobs that accompany it) against the perceived ‘loss in value’ of a very heavily subsidised franchise”.

2.2.12 **Connectivity.** No statement from Alliance mentions either the impact on the timetable offer for the huge range of journeys that use ECML or how their service might connect with others, beyond noting as inevitable that the slower of the two ICEC Scottish services would be overtaken at some point by its faster and that East Coast paths should be “significantly more flexible” on the assumption that that would benefit both operators<sup>17</sup>. This cavalier attitude is of course characteristic and is associated with its preoccupation with direct London services, but it will not do when so much is at stake.

2.2.13 In its riposte to the East Coast comments Alliance presupposes that the new franchisee would respond to the competition by adjusting its own offer. Fares are one thing (but not relevant here), cutting out intermediate stops in order to compete on the principal journey times would be altogether another and replete with public-interest concerns. It is not entirely clear what the ‘ECML Connectivity Fund’ is supposed to achieve, but if its buzz-word means anything at all it must mean spending money to enhance inter-urban connectivity across the ECML geography, not just acceleration for the benefit of one operator.

2.2.14 Transport Scotland, in a surprisingly superficial comment, supports the application ‘in principle’ but is unsure about its viability, practicability and impact on ICEC.

2.2.15 The two conurbation authorities on the route have reacted in different ways. Nexus, the Tyne and Wear Passenger Transport Executive, commented briefly, being ‘broadly supportive’ because of the shorter journey-times on offer but cautious about the availability of paths and hoping (rather naively) that NR would “develop a timetable delivering attractive local connections to this service”<sup>18</sup>. It also had the honesty to admit that Nexus supports Newcastle International Airport’s *Masterplan 2030* which forecasts significant growth in passenger numbers.

2.2.16 Metro in West Yorkshire aspires to a Leeds <> London frequency of 3 trains/hour and is therefore concerned about the allocation of capacity. It is also worried that revenue abstraction from the ICEC budget could result in reductions in funding for inter-urban and local services within the planned scope of Rail North, which could jeopardise plans for it to take on some of the

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<sup>17</sup> In reply to the East Coast submission to ORR.

<sup>18</sup> Alliance’s reply (and similarly to Transport Scotland) is that they would gladly assist in this, but as they well know reordering timetables to secure better connections is a tortuous business under the present regime.

risk (whether the transfer of inter-city premiums to support such services is economically rational is a difficult question – but not one for this paper).

2.2.17 **Performance.** Alliance “is confident that any risk to performance and operations will be minimal” despite agreeing that only a clean-sheet review of the timetable can demonstrate the real capacity of ECML, post-CP5. First Group on the other hand points out that the timetable is currently ‘forced at key points’, that it needs to be more resilient and that this is a critical factor for the Passenger Performance Measure in CP5. Rightly, it implies doubts about whether Alliance has considered the question with sufficient care.

2.2.18 **Abstraction of revenue from the ICEC franchise.** East Coast “believe [sic] that the abstraction from this proposal will be on an unprecedented scale”. It “would significantly reduce funds available to the Secretary of State, significantly reduce long term franchise value and put at risk the business case for any future government investment in the ECML”. Alliance asserts that this will not happen, but *prima facie* that appears highly optimistic. However, since neither party’s calculations are in the public domain the matter lies for the moment with ORR’s assessment.

2.2.19 **Access charges.** Alliance rests its business case on continuation of the regime that currently applies to charges for non-franchised operators. This requires payment of the Variable Track Usage Charge, along with the Capacity Charge that is intended to deter unnecessary use at congested times and the tariff for the consumption of electricity for traction. Its exclusion of liability for the Fixed Track Charge rests on the 2006 court judgment<sup>19</sup> in its favour and against the then-franchisee, GNER. The argument was that the amount so levied was an ‘artificial construct’ of Government policy<sup>20</sup> and hence not a legitimate base under European law for a mark-up on the Variable Charge, especially for an innovative operator exploiting marginal capacity.

2.2.20 This struck many observers at the time as perverse, a legalistic intervention in what should be decided on economic grounds. It is a sorry commentary on successive governments that the anomalies it creates have not been addressed<sup>21</sup>, still more that the likelihood of a larger and more brazen application was not foreseen. And plainly the Alliance scheme is of a wholly different nature from other OA operations. The frequency and speed of the service will consume much capacity. It will dominate pathing. It may deprive other operators of paths. It will benefit many passengers but disbenefit many others (so long as the service is not part of integrated timetabling and ticketing arrangements). It will make substantial use of infrastructure enhancements costing some £700 million of public funds. And (although the institutional responses to the consultation cannot say this) profits made by Alliance will accrue to the government of another country.

2.2.21 East Coast drew attention to some of these issues and pointed out that ORR is committed to a comprehensive review of Access Charges during CP5, with wide implications for railway financing and thus making a major decision based on the existing regime premature. Its commentary implicitly questions whether the proposed operation would be viable if a properly commensurate contribution to infrastructure costs were to be required: that is probably the case,

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<sup>19</sup> Mr Justice Sullivan in the case of (the then) GNER versus the ORR & others.

<sup>20</sup> Namely, to take the infrastructure manager’s total costs, deduct income from the Variable Charge and all other sources and then raise the balance by an arbitrary (ie. not justified in rational economic terms) division between the Fixed Charge and the block grant to the infrastructure manager. In other words the charge could be varied by a policy change and does not relate to the specific use a train makes of the network.

<sup>21</sup> There are both strategic and specific problems. As examples of the latter we quote the fact that Hull Trains are permitted to serve Retford and Grantham but not Newark North Gate and Peterborough (as a consequence of ORR decisions regarding abstraction but with no concern for the coherence of the timetable), and the disregard for the number of seats when granting paths so that supposedly precious capacity is taken up by small open-access trains.

although the financing of Open Access is so obscure that it is difficult to be sure<sup>22</sup>. Alliance responded robustly, if somewhat self-righteously.

2.2.22 **The position of the Department for Transport.** DfT's submission<sup>23</sup> opened by appearing to be even-handed by stating that it values the benefits of OA competition<sup>24</sup>. It then went on, however, to explain that the Government does not "at this stage support an increase in open access competition" because of the impact it has on the financing of the railway, investment strategy and operations. DfT then asked for a specimen timetable to enable the effect of a fast service having to pass a number of slower services to be assessed, probably knowing full well that this is far from completed. Similarly it wanted to see the consequences for the IEP programme. I doubt whether the DfT realised what a hostage to fortune their Minister's statement would prove to be. And it would be comical if it were not rather serious that a Government Department can only appeal to ORR to "pay particular regard" to its concerns when determining the application.

2.2.23 Alliance accuses DfT, in typically robust fashion, of responding "with the same unsubstantiated and negative arguments it has used on a number of previous occasions". DfT had stated bluntly that "Open access operators are effectively being subsidised by passengers on franchised services which are paying full track access charges to support the maintenance and operation of the network". Alliance relies on the 2006 judgment to rebut this. It goes on to argue that ORR recognises that the differing methods of gaining access to the network put franchised and OA operators into 'different market segments' and thus that to impose 'mark-up' charges on the latter would represent illegal discrimination under the Access Management Regulations 2005<sup>25</sup>. This is first-order chutzpah since the purpose of the application is for Alliance to capture a substantial slice of the incumbent's business: it is improbable that a successful pitch for the air market could justify the cost of the service on its own.

2.2.24 The company deploys a number of contentious and self-serving arguments<sup>26</sup> to support its criticism of the Department and is not above abuse: "it is difficult to take your concerns seriously". Moreover it has the presumption to imply that their service would represent so

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<sup>22</sup> The ultimate ownership of Grand Central was hidden in the British Virgin Islands before its acquisition by Arriva, at which time it appears to have had a negative net worth of £44 million. DB presumably absorbed that deficit for strategic reasons. Equally, the ORCATS system for distributing pooled revenue so lacks transparency that whether the company is being allocated its correct share of, for example, York <-> London sales is not publicly verifiable.

<sup>23</sup> It is believed that the letter was not published on the ORR website until a complaint was made.

<sup>24</sup> This was taken by Alliance to refer to remarks by Stephen Hammond (Parliamentary Under Secretary of State for Transport with responsibility for railways) in a Commons reply to a question from a sympathetic MP on 23 January 2014: "Open access operators have helped to provide innovative services for passengers and have helped to grow new rail markets – often with excellent passenger satisfaction scores. The additional competitive pressure in the market provided by open access can also improve the experience of passengers of franchised services". He went on to say that ORR "applies the 'not primarily abstractive test', which aims to ensure that applicants for open access routes will generate at least 30p of new revenue for every £1 of existing revenue which is abstracted from franchised operators. ... Our policy is to support the not primarily abstractive test in its current form". Alliance is naturally sure (it denies 'cherry-picking') that its scheme can pass the test, but this is tendentious – and in any case it is not self-evident that its wider benefits would justify transferring £100 of current franchise revenue to the new operator for every £30 it generated.

<sup>25</sup> The Railways Infrastructure (Access and Management) Regulations 2005 [<http://www.legislation.gov.uk/ukxi/2005/3049/contents/made>]. Quite why different legal procedures place two operators competing for the same inter-urban traffic in two different markets is difficult to follow, yet DfT appear to have endorsed this [see the Alliance reply to First Group].

<sup>26</sup> One argument is that fares have fallen more at East Coast stations where open-access is present than at those where it is not. This tells us no more than that the incumbent has responded to the competition as one would expect it to do. It does not deal with the difficulty that a lower franchise premium reduces the finance available for the network from its users. Open-access operators will of course wish to benefit from future enhancements.

patently a priority use of the infrastructure as to justify changes to existing contractual rights<sup>27</sup>. This might be justifiable but, once again, not without considering wider implications than Alliance would think relevant. And it can be arrogant too: “use of the IEP rolling stock will not be jeopardised if Alliance’s application is successful. There are a number of other opportunities where aged inter-city trains could be replaced if not all were required on the ECML”.

2.2.25 The tone of the Alliance application is that it is entirely consistent with the Government’s objectives, perfectly legitimate legally and economically and capable of benefitting every operator, and thus travellers, by precipitating a comprehensive overhaul of the timetable. Naturally the company has no doubts about its entitlement to capture a large block of ICEC revenue<sup>28</sup> and to play a central role in what Network Rail calls “an exceptionally valuable asset in the national transport system”. Whether that is necessarily in the public interest is a matter that should be evaluated in a more transparent and democratic process than that which ORR is obliged to adopt. One motive for this project is to research the issues and to test the implications of the proposed service – without prejudging which company should operate it and where the profits should go.

### **3. The strategic issues**

#### **3.1 The public interest**

3.1.1 Public opinion as evidenced in polls and political discourse supports ‘renationalisation’ of the railway. Given past ambivalence toward the reputation of British Rail this is in some respects surprising. It plainly owes a great deal to resentment of increased fares and the creaming off of profits, and it tallies with the general failure of the operating companies and their short-lived brandings to attract loyalties. However I believe it also reflects two deeper sentiments, namely a suspicion that fragmentation of the railway is technically mistaken and a conviction that certain industries should be run ‘in the public interest’<sup>29</sup>.

3.1.2 The problem for political parties inclined to implement such a policy is that a definition of ‘public interest’ and the structural form of a ‘renationalisation’ that would deliver perceptible benefits are very far from being developed. This is obviously a wide-ranging topic, but one should start with the deliverable that is central to the product being offered – the timetable [a point introduced above at ¶2.1.3]. If public transport exists to provide appropriate levels of accessibility to work, education, family, community events and leisure in a socially equitable manner and on a foundation that is more truly sustainable than a system that is inequitable and over-reliant on the private car, then it follows that the timetable must afford attractive levels of convenience. In turn that normally means good frequencies, high but not necessarily the highest possible speeds, connectivity across the network and adequate levels of service even at times of low demand.

3.1.3 Such a specification cries out for more detail, and I am making the case elsewhere for the importance of setting various minimum standards. The proposals in this paper nonetheless reflect the vision and will perhaps encourage thinking about how to define and implement the broad objective. In that context several particular points need stressing. The first is that in a ‘public interest’ regime there is no room for players to pursue private aims at the expense of the whole. Second, while ticket promotions to fill seats will undoubtedly continue, they should diminish in

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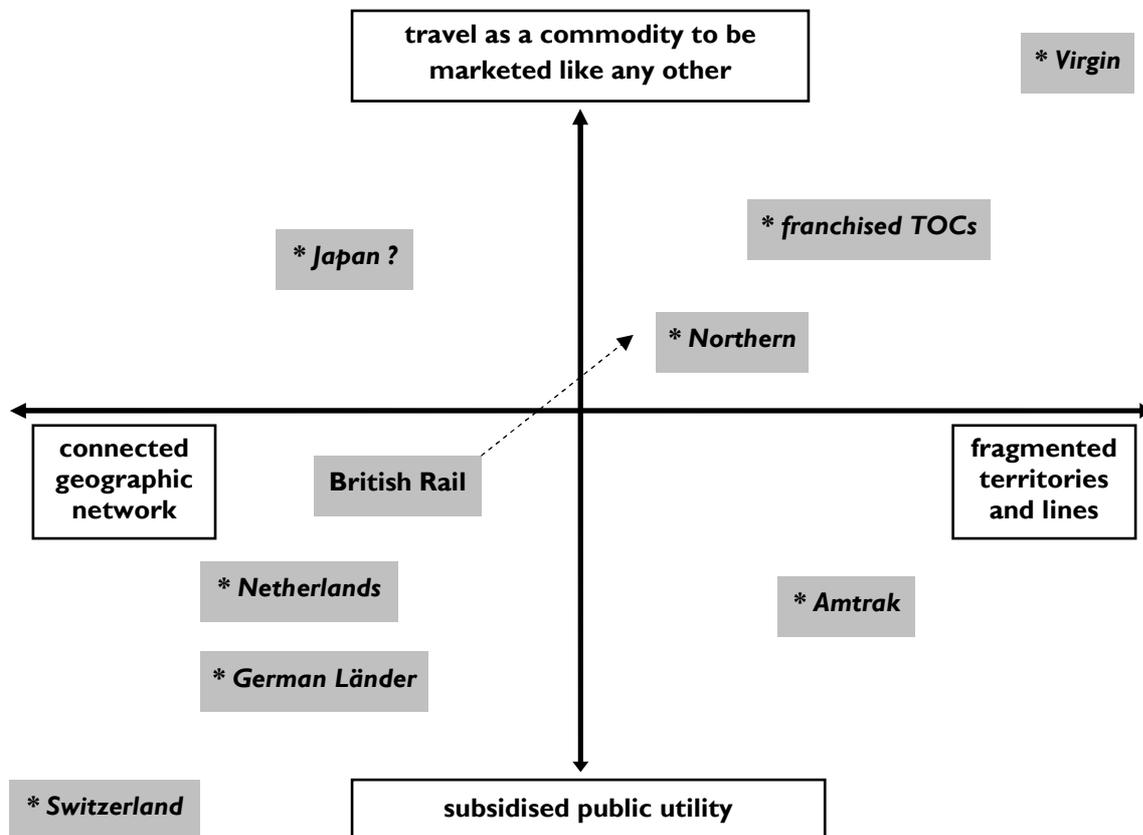
<sup>27</sup> It refers to the Access and Management) Regulations, paragraph 18(5) [see footnote 25].

<sup>28</sup> See for example ¶4.1 of the application form [link at footnote 10].

<sup>29</sup> Parallel contemporary attitudes toward the energy and water sectors support this interpretation.

importance relative to the marketing of the everyday convenience of the *network* of services. And third, this strategy requires no assumptions about what types of organisation will undertake the actual delivery of the timetable: that is a separate issue on which this paper remains neutral. *The essential concept is that our railway requires a 'guiding mind' focussed on designing its timetable*<sup>30</sup>.

**Figure 1. Ways of running a railway**



3.1.4 Figure 1 summarises the issues that need debate<sup>31</sup>. It does not purport to be definitive and is presented tentatively. The vertical axis represents a continuum from public transport as a subsidised utility to travel marketed as a commodity. The horizontal axis represents a similar continuum from a coherent network to a loose collection of territories and lines. Particular organisations are then located according to their characteristics in the two dimensions.

3.1.5 Thus British Rail was in the lower-left quadrant, but over time policy moved it up and to the right. Privatisation continued this process, although different conditions affect each franchise. Virgin is the apotheosis of high-intensity marketing of its own services and limited concern for the rest of the network, Northern necessarily has a more ambiguous spot. Conversely Switzerland

<sup>30</sup> Despite my brazen attempt to design single-handedly a 'perfect' timetable I do not claim to fill this role ! At the National Railway Museum on 13 June Professor Mark Casson will argue that a lack of central planning in the nineteenth century led to a chaotic expansion of Britain's railway system and Clare Moriarty, Director General of the Rail Executive at the Department for Transport, will look at harnessing a 'guiding mind' to bring an appropriate degree of order to future developments in the privatised system. This should be an interesting event.

<sup>31</sup> The concept was first presented by the author in a seminar for the Institute for Transport Studies in the University of Leeds on 6 February 2013. I am grateful to that audience and others since for their comments.

stands for a strong emphasis on the network and treatment of its system as a utility justifying both revenue support and considerable capital funding. The Netherlands and the German Länder are in the same quadrant, but Japan is more commercially oriented and Amtrak, though subsidised, is chiefly a collection of lines.

3.1.6 The essential argument of this paper is that the case for moving the British system to the left and using timetabling to focus the network needs to be objectively examined<sup>32</sup>. At the same time, political, social and environmental factors are likely to move it down at least to some degree toward public-utility concepts. How to do this while maintaining and improving efficiency and commercial acumen will be the big challenge for the industry and the new Government in 2015.

## 3.2 The arguments for integrated timetabling

3.2.1 Three powerful arguments seem to me to point toward the development of an integrated approach to timetable planning for a public-interest railway in Britain:

- ⇒ the need to optimise the utilisation of capacity;
- ⇒ the importance of providing a service that will attract even more travellers and thus help to justify the public funds invested in the railway; and
- ⇒ the reasonable and understandable expectation that services connect with each other.

We review each of these in turn but first need to define the term 'integrated' and to explain why that term is preferred to 'coordinate'.

3.2.2 Contemporary railway management is integrated to a degree: it has to be by the nature of a railway. Examples are the complex rules that determine the characteristics of rolling stock so that the interaction between vehicles and infrastructure is safe, reliable, smooth and efficient, and the management of operations in real time where numerous factors have to be considered simultaneously to ensure that the network functions effectively even when some elements may be degraded or incidents have disrupted the timetable. However, components that concern this paper are not as well integrated as we believe they need to be:

- ⇒ the Network Rail process for managing infrastructure projects includes a notional timetabling element, but this is divorced from the way in which services are planned once the enhanced infrastructure is in place;
- ⇒ each Train Operating Company [TOC] plans its own timetable, with limited reference to the timetables of other TOCs, and there is no overall plan for the national network – which is quite different from what happens in many European countries;
- ⇒ there are no standards or criteria for connectivity and no long-term vision for what may be needed in future; and
- ⇒ planning and marketing for multi-modal journeys using both rail and other modes remains very limited.

3.2.3 In each of these areas stronger integration is likely to yield benefits, either in the planning process or directly for travellers. The latter will incorporate improved *coordination* between operators over timetables and fares, but *integration* is used to emphasise the larger picture,

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<sup>32</sup> The concern of this paper is with the timetable in the sense of the structure and timing of services. However the presentation of 'the timetable' in the sense of printed and on-line marketing material is vitally important and presently often extremely poor. See for example Barry Doe's recent commentary on the dreadful lack of attention to detail and the ill-disciplined behaviour of the TOCs [*Rail*, 749, 28 May – 10 June 2014, pp. 68-73].

including physical arrangements, long-term planning – and presentation such that users perceive a single system more strongly than they perceive its providers (*vide* London Buses).

3.2.4 **Capacity.** Railways are (relatively) more complex systems than roads. Hence the idea on which European Union [EU] policy is based that access to them can be organised on a similar basis is a fallacy. Interactions between road vehicles are of course a factor in determining the capacity of a road, but because trains are typically heavier and faster their movements must be planned in advance and more precisely controlled in real time. In particular, since the cost of infrastructure limits provision for trains to overtake each other the careful sequencing of trains through a section of track is critical. On an urban metro high frequencies are achieved because successive trains have identical characteristics and stopping patterns, but on most of the British system a mix of services is required and has the effect of reducing capacity below the theoretical maximum.

3.2.5 In this situation it is generally accepted as self-evident that random paths with different features and specifications will be counter-productive because they cause disproportionate disruption of other paths. Instead, priorities have to be set and then in almost all circumstances adhered to in standard patterns throughout the day. The EU concept that a freight train should have access to the railway in the same manner as a lorry can join a motorway must therefore be tempered by a methodology that provides paths for freight within the pattern and offers them to the market in a 'catalogue'. The popular call for more freight on rail needs to recognise this<sup>33</sup>.

3.2.6 **Public service.** Most railways depend on government support which is justified by the wider social, economic and environmental benefits that are identified as accruing from the availability of a railway network. The generality of this argument is (thankfully) now largely beyond political division in Britain, but the scale of the funding allows ultra-orthodox market economists to continue arguing for a more rigorous approach. The case is understandable to the extent that the use of some lines and especially some stations is so modest that questions need to be asked whether there are not more economical means of achieving the benefits. In too many cases services have become fossilised by political and managerial reluctance to face this matter, and a new approach to timetabling should provoke fresh analysis.

3.2.7 Equally importantly, we have reached a strange position whereby neither DfT nor the industry seems at all concerned about where the growth in traffic is coming from. Thus a promotion that creates a long-distance shopping trip of limited social value counts the same as, say, a clutch of short inter-urban journeys transferring from cars because a service has become more frequent and regular<sup>34</sup>. It is time to review this policy, given the Government's stated environmental aims, and devising a clear timetabling strategy is one way to do that. This is all the more significant in that many routes where an improved offer is most obviously needed are ones where spare capacity tends to be available, for example on urban and most secondary services off-peak and on long-distance services where load factors thin out with distance from London.

3.2.8 Another aspect of this issue is the apparently huge discrepancy in rail's modal share across different markets. It is a worrying commentary on the superficiality of government transport policy and on the narrow perspectives of the rail industry that this topic is rarely raised as a question of strategic interest and that as a result we do not even have reliable and relevant data

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<sup>33</sup> See §3.4.

<sup>34</sup> While these paragraphs were being written Virgin staged a promotion (using its trademark sexual imagery) that offered cheap tickets for long-distance (predominantly big-city) journeys provided that they were purchased within a three-day window starting four days from the first announcement and for journeys restricted to a later 39-day period. This not only begs questions about Virgin's load factors (why are 1.9 million seats available for this type of sale ?) but highlights the focus on trip-creation: plainly a few journeys that would have been made anyway might happen to fit the rules, but the promotion was designed to prompt short-notice trips that can only realise some rather modest consumer satisfaction, such as shopping in A instead of B. This contrasts with poor connectivity between a number of places on Virgin routes that arises from the London-oriented form of the West Coast timetable.

with which to study it. What is known in broad terms is that rail's share of the London commuting market is substantial while it is modest and in some cases bordering on the trivial in most other significant centres of employment. Similarly, for longer-distance journeys it is clear that rail has a large share to/from London (probably approaching saturation on the best routes) but that it performs poorly on most non-London relations: with a few exceptions such as Edinburgh <> Glasgow and York <> Leeds the share is probably in single figures.

3.2.9 To some extent this is inevitable. The circumstances of travel – factors such as the housing market and road congestion – in London give rail a huge advantage (though this is being replicated in parts of the northern conurbations). Conversely, it is difficult for rail to compete for the many journeys outside London that are not between the centres of places. Nonetheless, given at the least the urgency of reducing congestion and carbon emissions, it should surely be a theme for research (including international comparisons) to investigate whether the gap between high and low market shares could be narrowed and if so by what means and with what benefits. That seems to me to be quite as important as excitable sales of bargain tickets, and it means considering the characteristics of the timetable that would appeal to the relevant markets<sup>35</sup>.

3.2.10 **Connectivity.** Finally, the third argument for a fresh look at timetabling refers to connectivity. This has become a fashionable term but not one that is properly specified. It covers the speed and frequency of services between pairs of places, but if the concept of a *network* is to have real substance then every *pair* has to be considered<sup>36</sup>. That is not happening at present. Poor connections at junctions and poor links between buses and trains have been a topic of concern (and resignation and jokes) for too long.

3.2.11 Regrettably, the franchising regime has made the situation worse. This is partly caused by the sequential nature of the process: a TOC mobilising for a new franchise is constrained in meeting its timetable aspirations by all the pre-existing access rights of other TOCs. More important, though, are the institutional and cultural factors. The Department for Transport has no defined or effective policy (as distinct from platitudes and the occasional local project), and Network Rail has no remit, since it is only responsible for knitting together the TOCs' diverse applications for paths. ORR does have a duty but has chosen to ignore it in its preoccupation with competition<sup>37</sup>. And the TOCs are so focussed on cultivating their own businesses that the managerial effort to organise better connections with other companies' trains (compounded by the cumbersome timetabling process itself) is usually deemed unjustifiable.

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<sup>35</sup> One gap, so it would seem, in our knowledge is the extent to which choice of rail is inhibited by a traveller needing to 'double-back' to a central station served by longer-distance trains because no forward connection by a suburban service is available. In the West Midlands for example anyone wanting to go north-east from Sutton Coldfield or south-west from Redditch has little option but to go via Birmingham New Street. This is why in the ECML case we attach importance to the Stevenage stop [¶4.2.17 and footnote] and to the proposed Dunbar local service [¶4.2.23-26].

<sup>36</sup> No publicity from the industry displays a matrix of journey-times and frequencies between a selection of centres to illustrate that Britain already has the making of a convenient quality network, despite all its weaknesses. Such matrices are commonplace in road atlases. They were used in Switzerland to emphasise the nationwide benefits of *Bahn 2000* (when the overnight revision of the timetable was introduced in 2004) and they support the arguments of HSUK for an alternative high-speed strategy to that of HS2 [see <http://www.highspeeduk.co.uk/home.html>]. In the Network Rail report on ECML capacity there is a reference [footnote 4, p.34 - see the link at our footnote 53] to a gravity model that would appear capable of shedding light on this issue, but it does not seem to have been developed for wider applications.

<sup>37</sup> Clause 4(1)(e) of the Railways Act 1993 specifies the duty "to promote measures designed to facilitate the making by passengers of journeys which involve use of the services of more than one passenger service operator", and other duties can be construed as complementing this. Quite why ORR has been allowed largely to ignore these clauses while focussing on the competition clause [4(1)(d)] is one of life's mysteries.

3.2.12 Thus the prevailing culture, never much interested, is not conducive to action. The commercial imperative is to sell discounted tickets for journeys within the TOC territory<sup>38</sup>. The operating imperative is to meet the performance targets, so that, in order to protect the punctuality record, in the real-time management of train running a connecting train may not be held for a late arrival<sup>39</sup>. The policy issue is not one that the corporations owning the TOCs are interested in because it is unlikely to have much impact on their profits – and might even be detrimental. Nor do they seem to see it as a topic for the Rail Delivery Group, despite the evidence of public concern about mediocre connections (examples of trains just missed and of lengthy waits abound) and the sometimes risible failure to provide good inter-modal links.

3.2.13 These three arguments – capacity, public service and connectivity – set the context for integrated timetabling. It may be that it is impossible to achieve it in a marketised railway. It may be that the advantages of franchising and competition outweigh those of integration. Maybe we can afford not to use capacity in the most effective manner. We may wish to muddle along with often unclear priorities and sometimes a pandering to noisy ‘stakeholder’ groups. But I insist that before continuing as we are we should in all conscience research the alternative: evidence-based policy is preferable to ideology.

### 3.3 The principles of integrated timetabling

3.3.1 The principles that secure the integration of the timetable<sup>40</sup> are these:

- ⇒ thorough analysis of each line of route should highlight the priorities;
- ⇒ journey time (and speed) are important, but they should be perceived in a broad context;
- ⇒ the principal interchange nodes of the network should be identified;
- ⇒ the frequency of each component service should reflect the relevant market;
- ⇒ the pattern should repeat hour-by-hour; and
- ⇒ the timings in the two directions should be symmetrical.

The following paragraphs develop each of these points.

3.3.2 Incremental change has delivered significant improvements on many lines, despite multiple constraints, but numerous examples exist of patterns validated only by history and of uneasy compromises. In some cases it is arguable whether certain facilities really justify financial support: provision of railway services cannot be the only sector that is immune to change. Moreover, in tandem with strong secular growth, the plethora of ideas for new services and stations is putting unprecedented strains on capacity, and it is important to be clear about the strength of each proposal. Thinking through priorities is one advantage of a ‘clean-sheet’ exercise. I hasten to add that my choice of priorities in the next chapter is just that. A wider debate with fuller data might

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<sup>38</sup> Advanced-purchase tickets are available only for selected relations involving more than one TOC (hence the practice of buying separate tickets for different stages of a journey, the need for which irritates travellers and obscures true patterns of demand), while almost all internet promotions are for within-territory relations. See also note 34.

<sup>39</sup> It is of course perfectly proper to break a connection in many circumstances where the overall good management of a complex system requires it. What is wrong is that some decisions are plainly not in travellers’ interests (eg. long taxi rides late at night), that the decision-making is fragmented and often obviously so in the wording of announcements and that the monitoring of performance does not identify the impact of broken links.

<sup>40</sup> We refer to the combination of these features as a ‘regular-interval’ and sometimes as a ‘standard pattern’ timetable. The term ‘clockface’ is avoided because it is not specific about the structure (and certainly does not necessarily embrace integration) and because it is not commonly understood outside the railway community.

well come to different conclusions, but it is important to be wary of the present tendency to imply (for political reasons) that the railway can take on every task<sup>41</sup>.

3.3.3 Journey-time is a central factor in competition with the car and, where relevant, with planes<sup>42</sup>. Planning for the minimum feasible time on all relations is therefore a central objective. However integrated timetabling introduces some qualifications. First, minimum times must be tempered with a sensible margin to allow for perturbations [see further at ¶4.2.5-7]. Second, clear prioritisation and reference to the agreed ideal frequencies must ensure an appropriate distribution of calls between services so that fast timings for principal relations are not achieved at the expense of the desirable service at intermediate and interchange stations.

3.3.4 Third, and most importantly as a novel element in British thinking, the planner of an integrated timetable should be aware of a key principle underpinning the Swiss concept of a network: “as fast as necessary, not as fast as possible”. What this means is that between the primary nodes of the network running times should support the grand interchanges around xx:00 and xx:30 by being set at or reduced to about 55-57 or 25-27 minutes [see below for a fuller explanation]. If they are cut any further then A-to-B travellers will benefit but those requiring connections may lose any gain on the trunk sector in extended waiting times. Sometimes the balance of demand will justify that, but equally it may be that accelerations should be redirected from sectors that already fit the ideal nodal pattern to those that do not – as has been the consistent policy in Switzerland.

3.3.5 It follows that the hierarchy of interchange nodes needs to be specified through the use of quality data, a sense of sound service geography and a willingness to challenge accepted practice. That is not to say that many nodes are not self-evident, but the fact is that data is not good enough and that historic indifference toward interchange may have undervalued some locations where better schemes would tap new markets<sup>43</sup>.

3.3.6 Appropriate frequencies do not get the attention they merit. This can be seen in between-train gaps that are patently too lengthy and in erratic intervals arising from poor pathing and random variation. Even more significant is the apparent absence from DfT thinking of any sense of minimum standards, other than those laid down in Service Level Commitments that do no more than perpetuate the existing timetable<sup>44</sup>. I therefore propose the general plan set out in Table I [on the next page]. It rests on the fundamental point that rail’s prime competitor is the infinitely-flexible and ever-available private car, and that, even where inherent advantages in speed and

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<sup>41</sup> For a discussion of the background and an example in East Lothian and the Scottish Borders see ¶4.2.27-31.

<sup>42</sup> I could hardly argue otherwise, given that my research yielded the first measurement of time-elasticity (in the MONICA model that paved the way for MOIRA).

<sup>43</sup> The principal problem – largely ignored by the industry – is that ticket data no longer record the origin and destination stations because of the widespread practice of using multiple tickets that is encouraged by the fares structure and sales systems. And of course even tickets do not tell us about the real start and finish points of journeys. Integrated timetabling with defined strategic objectives needs construction of a reliable matrix of total (all-mode) demand between an appropriate number of geographic zones from which credible targets for rail share can be derived. A classic example of an important interchange at which timetable integration is negligible is Peterborough – and it is also one where multi-ticketing probably hides the true demand and where the potential is poorly researched.

<sup>44</sup> One detail is particularly concerning. In specifications of the TSGN timetable a footnote states that “The frequency of service may be reduced to one train per hour [from two] in up to two hours of the day ... to allow for pre-existing freight services to operate”. That would reduce confidence in its regularity and convenience and, for those who have not spotted the gap, it could be irritating. In another of the TSGN documents it is stated that “it may be necessary to retime a couple of standard pattern Bedford-starting trains to depart Bedford up to 5 minutes earlier than the normal pattern”. That would be a cardinal offence. See [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/253637/tsr-minimum-specification-tables.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253637/tsr-minimum-specification-tables.pdf) and [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/253636/itt-addendum.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253636/itt-addendum.pdf).

comfort predispose people to choose rail, modern lifestyles depend upon a high degree of convenience and flexibility and hence upon attractive frequencies<sup>45</sup>.

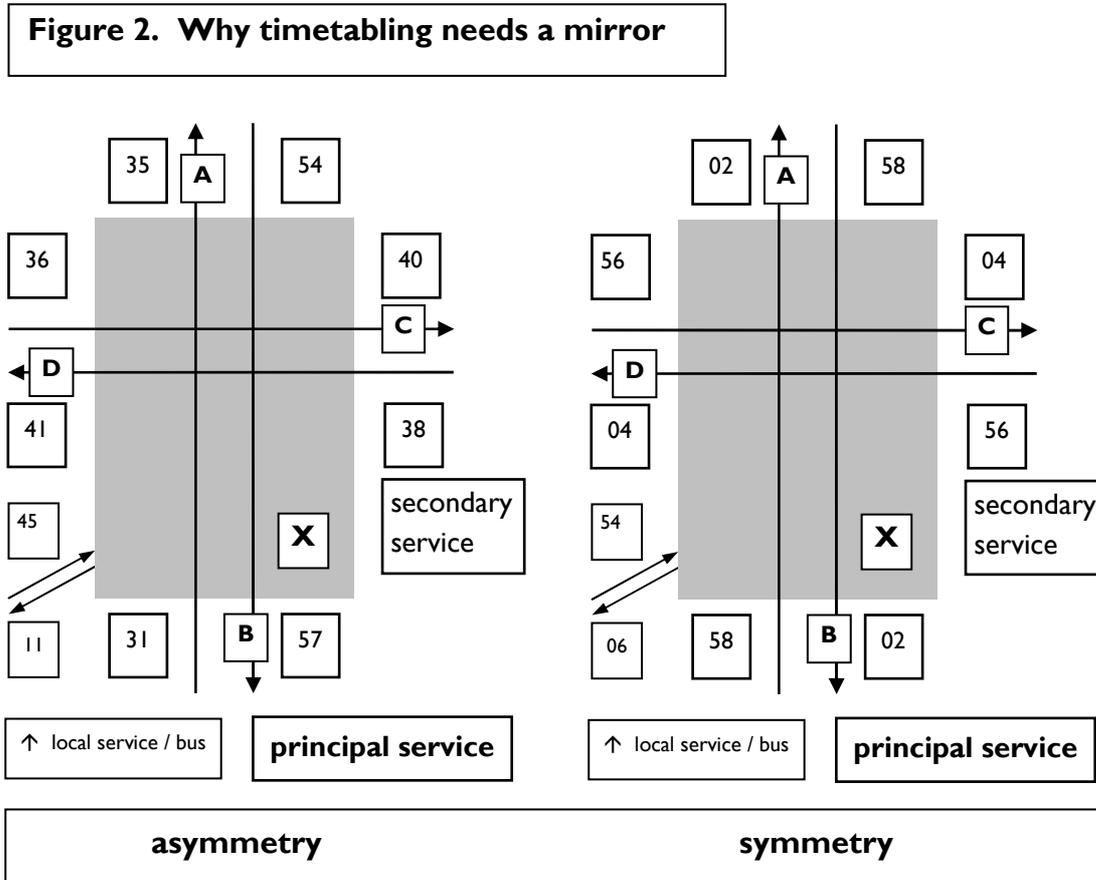
<b>Table I</b>		
<b>Suggested future standards for frequency of service</b>		
type of relation	direct trains	complementary service with one change
major conurbations <> London	hourly, half-hourly, quarter-hourly – depending on distance, time of day	--
other principal stations <> London	hourly, half-hourly – depending on distance, time of day	may cover the half-hourly requirement
places not justifying direct London services	--	hourly or half-hourly depending on market size
major non-London inter-urban relations	hourly, half-hourly, quarter-hourly – depending on distance, time of day	
other significant non-London inter-urban relations	hourly, half-hourly – depending on distance, time of day	may cover the half-hourly requirement
lesser non-London inter-urban relations	hourly if service geography permits	to ensure a journey-opportunity at least every hour
suburban services	every 30, 15 or 7½ minutes as appropriate (rarely > 30 min)	rarely applicable
secondary lines	at least hourly	desirable in busier cases
services in areas of low population	preferably at least two-hourly, never less than three-hourly	rarely applicable
Note. The standards assume that all connections minimise interchange-time. See ¶3.3.7 for peak provision.		

3.3.7 There are two mutually-reinforcing reasons for patterns to repeat every hour: the negative effect on capacity of not doing so [see ¶3.2.4-5], and the well-established fact that travellers respond positively to easily-memorised and unvarying departure (and arrival) times. It is accepted that in some cases limitations of the infrastructure inhibit maintenance of the pattern through the peak periods, but wherever possible this should be avoided or only the outer parts of a route should be adjusted. Preferably, the peak should be catered for by increasing standard frequencies (eg. 30 minute intervals becoming every 15 minutes) or by superimposing additional trains that perhaps make fewer calls than the regular service. There is of course nothing to prevent services being thinned at times of low-demand, provided that this does not jeopardise connectivity<sup>46</sup>.

<sup>45</sup> In the fashionable enthusiasm for social media it is sometimes suggested that timetables are becoming obsolete since people can so easily find both planned and real-time information about the service that best fulfils their needs. This may be true in high-frequency urban situations (although even there I would assert that memorable patterns will always have a marketing appeal), but for less frequent services and longer journeys readily-accessible information cannot of itself turn a poorly-designed timetable into an attractive proposition.

<sup>46</sup> If hourly connections are made with every other train in a 30-minute pattern then the one without the connection is the one to remove. This may seem self-evident, but cases occur where different operators make separate decisions to suit their own interests with precisely this effect. The last evening services from Harrogate to

3.3.8 Finally the critical function of symmetry must be emphasised – in its own right and because it is not properly understood in Britain. Figure 2 illustrates the issues. The left-hand section shows an asymmetrical timetable, the right-hand a symmetrical, or ‘mirror-image’, timetable.



3.3.9 At an important junction, or node, X in the network a principal north <-> south service (A <-> B) runs every 30 minutes, alternating between a schedule with few stops and one with additional stops. A secondary service on the east <-> west axis (C <-> D) runs hourly. The junction also has an hourly local service on another line. The arrival and departure times in the boxes are the minutes past the standard off-peak hour. For the most important interchanging flow, from C to B, the connectional time is 19 minutes, a little too long but acceptable. In the reverse direction the timings are xx:31 to xx:40, one minute more than the minimum specified at this large station. However the X to B stage is by the faster train (departing at xx:57) while the return from B to X is by the slower train, which typically takes about 19 minutes longer (arriving at xx:31).

3.3.10 Other connections are equally variable by direction. For a journey from A to C most travellers would use the other, slower service (not shown) rather than have a 46-minute wait (xx:54 to xx:40), while in the reverse direction the arrival at xx:38 connects with the faster service. In the case of the local service the standard arrival at xx:45 means a 55-minute wait for a train to C, whereas from C the wait is 33 minutes. For the more important link with B the connections are with the faster service in both directions, with similar wait times.

Hull take about 45 minutes longer than the typical daytime schedule because Northern and TransPennine abandon their normal paths, with the result that a wait of nearly an hour at Leeds is imposed on travellers.

3.3.11 If it were possible to rearrange the times as shown in the symmetrical part of the diagram it can be seen that the connections would always have the same interchange time for the two directions. For journeys on the A<>B axis the secondary and local services would always connect either with the fast or with the slower train in the half-hourly cycle. This last point also tidies up the pattern for intermediate stations on the way from/to A and B which in the asymmetrical version is very variable because of the different stops of the two trains. It will also be noted that all pairs of arrival and departure-minutes sum to 60 in the symmetrical version, eg. xx:58 + xx:02. It is because the three services are on different symmetries in the initial case that connectional times vary (88/89 for A<>B, 77/78 for C<>D and 56 for the local line)<sup>47</sup>.

3.3.12 It may be thought that this is all very abstract. In fact X is York, A is Edinburgh (or Newcastle), B is London, C is Scarborough, D is Leeds and beyond and the local service is the Harrogate line. Each operator (East Coast, TransPennine and Northern) can claim that its timetable is based on standard hours, but there are numerous detailed variations and the erratic connectional schemes mean that journey times vary markedly by direction for many relations<sup>48</sup>.

3.3.13 This is the consequence both of the process of designing each franchise timetable in a silo and of a failure to understand the benefits of symmetry. Moreover, what happens at York is replicated at many other places, and it does seem extraordinary that the industry has never properly researched the gains that could be made with an integrated national symmetrical timetable. They could be large.

3.3.14 One corollary and two downside qualifications should be recognised here before the application of the symmetry rules is discussed. In order to ensure that connections are optimised all frequencies must be the factors derived from successive halving of 60, ie. 30, 15 and 7½ minutes and not 20 or 10 minutes. If a 30-minute cycle connects with a 20-minute cycle (as now at Welwyn Garden City) waiting times will be, say, 5 minutes followed by 15 minutes, which is undesirable for shorter journeys. The wait will not be a problem with 30 + 10 cycles, but pathing may need care where capacity is at a premium or the 10-minute trains serve more than one route.

3.3.15 Making the timings in the two directions a mirror-image of each other does mean that turnrounds are determined by this relationship rather than by resource-led diagramming considerations. However, lengthy turnrounds can be found in current plans for similar if not so rigorous reasons of achieving the best overall solution, and experience suggests that any loss of efficiency in this respect may be offset by gains where existing timetables have little pattern and become regular. We therefore start from a presumption in favour of mirror-image, endeavour to consider the implications when designing the master-scheme and reserve the possibility of 'derogation' if a particularly difficult problem presents itself.

3.3.16 The second qualification is that the interlocking nature of the timings in an integrated plan means that a key pathing decision at the start fixes all other paths that are linked by desirable connections or operating constraints. This could mean the entire national network (as will be mentioned when our ECML proposals are described [§4.2]). Here we seek to optimise that route

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<sup>47</sup> Note that it is the *differences* that matter. In theory any symmetry-minute around which the times revolve could be chosen, but the convention for European integrated timetables is to choose the 'zero-minute' because of its presentational simplicity, as in 58 – 00 – 02.

<sup>48</sup> The times shown in the diagram are off-peak median values. One egregious example of the random impacts of variation concerns connections from the Harrogate line for ICEC-served stations north of York. For most of the day arrival times at York give perfect interchanges of 8 to 10 minutes with the faster Edinburgh trains, but in the evening the feed to the 16:00, 17:00 and 18:00 from King's Cross is broken by a few minutes because, for the first two, pathing time delays the local arrival and, for the third, the ICEC departure is slightly earlier than normal. This has been happening ever since the May 2011 timetable was introduced, but despite minor fiddling with each update the anomaly has not been addressed. As a result journey-times are unnecessarily extended, ICEC loses revenue to CrossCountry and travellers may well be confused by being offered routeing via Leeds at a higher fare.

and leave to later analysis the possibility that the working of, say, Portobello Junction in Edinburgh or the timings of ICEC trains at York may not result in optimal solutions when trans-Pennine trains are extended to Manchester Piccadilly, cross-country trains to Birmingham New Street or Cambridge semi-fasts to Brighton. Nonetheless work to date on other case-studies indicates that the challenges are not insuperable.

3.3.17 Implementation of the principle of focussing connections on ‘general post’ interchanges around xx:00 and xx:30 depends on circumstances. It is not absolute and in any case cannot be universally achieved because between-calls running times can only be adjusted within limits and gradually and because other considerations may be more important. Decisions must therefore be pragmatic and related to the specifics of what is ideally required at each node. Table 2 sets out some East Coast examples. They will be developed in more detail later [¶4.2.9-18]. In particular it will be noted that the timing of the secondary service will be influenced by whether it can only call briefly (because through traffic is significant), whether it can take an extended dwell (because such traffic is less important than all-directions connections) or whether it is turning round at the interchange (when time for that may have to be allowed in any case).

node	flow between	and	xx:00 and xx:30 timings	commentary
Edinburgh Waverley	all places north and west	ECML	highly desirable	size of station means extended interchange time, but present 10 minutes could perhaps be reduced
Newcastle upon Tyne Central	Tyne Valley	ECML south	highly desirable	if optimised for journeys to/from south will also work for journeys to/from north
Darlington	Teesside service	ECML south	highly desirable	some deviation from 00/30 may be acceptable since there has to be an adequate turnround time
York	Scarborough line	ECML south	highly desirable	as for Newcastle
York	Harrogate line	ECML south	highly desirable	as for Newcastle
York	ECML north	Leeds and beyond	not essential because of frequency	but avoid gratuitous ‘near misses’ if possible
Peterborough	ECML north Stamford line	Norwich and Cambridge ECML south	both highly desirable	but holding the east <> west trains for 8-10 minutes may not be justifiable and thus a compromise will be required
London King’s Cross	ICEC	all other services	not relevant	other services are either too frequent for connections to need to be planned or involve trains at other terminals which cannot reasonably be planned on the basis of King’s Cross timings

### 3.4 Provision for freight trains

3.4.1 Freight traffic is important to the railway, is underpinned by a public desire for transfers from road to rail and is supported by the aims of EU directives. Nonetheless it should be

considered objectively in a strategic context and not treated as sacrosanct, as is sometimes implied by the stances taken by commercial interests and campaigners<sup>49</sup>. I have four reservations.

3.4.2 The first concerns the too-easy assumption that because goods are being conveyed by rail rather than by road therefore sustainability criteria are satisfied. It is probably the case (though not established beyond doubt) that the energy inputs, carbon outputs and other environmental measures for rail haulage are more favourable than for lorries. Yet what will ultimately matter is whether the goods themselves are sustainable in a world that will be increasingly constrained by ecological limits. And on this count some traffics must be suspect: the long-distance movement of bottled water may in future be seen as an act of folly, while global models of production with concomitant inter-continental transport will be challenged, particularly when they involve short-life goods destined for an early end in landfill or ethically dubious practices. Hence forecasts of a tripling of containerised imports through Britain's ports should be treated with scepticism<sup>50</sup>.

3.4.3 Second, as noted earlier [¶3.2.5], the concept behind the EU directives that seeks to make access to a railway as similar as possible as that to roads is profoundly mistaken technically – but eagerly adopted by the railfreight industry. This must be questioned, both for reasons of capacity-optimisation and because the future appeal of passenger services will depend fundamentally on their perceived characteristics of frequency and regularity. The only possible policy in my view is the incorporation of standard freight paths into the same framework as the patterned passenger paths and the selling of these options to freight operators. This approach was adopted by the Swiss railways, especially for the Alpine transits, and appears to be an accepted feature (and not one that has been legally opposed) of the way freight trains run,

3.4.4 Third, several consequences follow. One is that existing access rights to specific paths must be removed where they disrupt the proper recasting of passenger timetables – the blocking effect that caused difficulties for the ECML 2011 timetable is hard to defend. Another is that freight companies cannot be allowed to hold rights that are rarely used – they must be required to surrender paths more firmly than presently appears to happen. And the idea that rail must jump to attention when the ultimate customer (the shipper) claims to have exact timing requirements needs more often to be queried – just how demanding are they and what is the wider cost to the railway of meeting them?<sup>51</sup>

3.4.5 Fourth is the big and longer-term issue of pricing. Freight now pays only its identifiable marginal cost (for understandable political reasons at the time the charging regime was introduced), but as volume and hence pressure on capacity grow a fresh appraisal is called for. It is possible that some freight paths are more valuable (subject to the first reservation above) than the more marginal passenger services, and we undoubtedly need a sharper evidence-base to assist decisions, but where the sum of aspirations is leading toward large infrastructure projects it is important to evaluate the impact of the freight demand and to consider whether it should necessarily be met unless the traffic concerned can bear at least some of the capital cost<sup>52</sup>.

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<sup>49</sup> And by the general public – but how much of that is because people want the motorways freed of lorries so that their journeys by car can be faster?

<sup>50</sup> The forecasts are produced for Network Rail by a leading freight consultancy. I do not challenge its integrity, but dependence on just one forecast and seemingly no scenario-painting (which NR has used elsewhere) does seem odd. One particular point to note is that in the last few years a number of British companies have announced the return of manufacturing to Europe from Asia, and one can envisage circumstances where this trend may accelerate.

<sup>51</sup> The railfreight lobby sometimes forgets that there would be no railway for them without the passenger business.

<sup>52</sup> This of course begs many questions about market distortions caused by a general failure to charge for externalities. If full-cost, 'polluter-pays' pricing were introduced there could be profound effects on production and distribution leading to lower transport demand, a possibly higher modal share for rail and a question mark over whether the state should pay for the freight element of infrastructure schemes.

3.4.6 Because of these reservations this plan is for a passenger railway. We have borne in mind the need to secure capacity for freight where it is clearly required, though without adopting extravagant forecasts of growth. Detailed provision will be considered later.

## **4. An integrated timetable for the East Coast Main Line**

### **4.1 The Network Rail Review of Capacity**

4.1.1 In December 2010 Network Rail published a review of the capacity of the East Coast Main Line after extensive consultation with a range of stakeholders<sup>53</sup>. Necessarily this was conducted in accordance with the procedures and rules within which NR must work, and it did not set out to assess the merits of an integrated timetable as we have defined it. Nevertheless, following a quite detailed if at times cumbersome analysis, its conclusions were highly significant.

4.1.2 The task started with a call to each potential applicant for access rights to specify its aspirations for paths over and above what they would operate in the base timetable, the then-imminent May 2011 plan. Because of the competitive framework the details were deemed to be commercially confidential, but from what is documented and what has come into the public domain since it is possible to deduce the origin of most items in the list. The mix of franchised and open-access paths did however complicate NR's attempts to evaluate the relative economic merits of the various proposals.

4.1.3 It is evident that one or more OA operators submitted plans to multiply the number of through trains between off-route towns and London. Thus there were to be four or more London trains/day in each direction for Sunderland, Saltburn, Middlesbrough, Bishop Auckland, Scarborough, Hull, Harrogate, Skipton, Bradford, Huddersfield, Cleethorpes, Lincoln, Skegness and Nottingham (via Grantham) and relevant intermediate stations<sup>54</sup>; some of these may have been new initiatives or defensive moves by publicly-owned Directly Operated Railways as franchisee.

4.1.4 In addition, gaps in the 2011 timetable were to be filled, in particular the unsatisfactory truncation of the York all-stations service at Newark in every other hour (following the muddle over serving Lincoln) would be addressed, some Newcastle services would be extended from/to Edinburgh, and some entirely new non-London services were proposed such as Glasgow <> Hull and Glasgow <> Nottingham. Finally the freight companies made their bids for paths too, with selected flows taken as representing the general picture.

4.1.5 The prevailing regime requires Network Rail to treat every such proposal equally without discrimination, but following painstaking analysis of the plausible capacity on each section of ECML NR makes it clear that accommodating more than a minority of these schemes is impossible within the bounds of any credible level of expenditure on the infrastructure, even after completion of the upgrades committed in CP4 – removal of the Holgate Junction constriction at York, the new flyover at Shaftholme Junction, major works on the GN+GE Joint Line via Lincoln, additional platforms at Peterborough, the Hitchin Flyover to eliminate the conflict between Cambridge-bound trains and up ECML expresses, and the uplifting to full passenger status of the second slow line in both directions between Alexandra Palace and Finsbury Park.

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<sup>53</sup> East Coast Main Line 2016 Capacity Review : An addendum to the East Coast Main Line Route Utilisation Strategy. See: <http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/east%20coast%20main%20line/east%20coast%20main%20line%202016%20capacity%20review/east%20coast%20main%20line%202016%20capacity%20review.pdf?cd=1>.

<sup>54</sup> The fact of so many proposals, and the plainly speculative nature of some of them, illustrates the way in which the system encourages gaming and embroils NR in extensive exercises with ultra-marginal elements.

4.1.6 The most serious remaining constraints identified in the study came as no surprise to those familiar with the route, and the possible solutions are equally well known:

- ⇒ the two-track section between Newcastle and Northallerton – this will continue to impose undesirable flighting of passenger services unless the relatively frequent freight trains can be diverted to a reopened Leamside line (via Washington) and/or the Stillington line between Ferryhill and Northallerton via Stockton;
- ⇒ the similar section between Doncaster and Peterborough – unless virtually all freight can be diverted to the Joint Line;
- ⇒ station working at York and Doncaster, and Newark Flat Crossing;
- ⇒ the single up line between Fletton Junction just south of Peterborough and Huntingdon North Junction – which could be relieved by extending the slow line back toward Peterborough (on the down two tracks already run further north, to Holme Junction); and
- ⇒ Welwyn Viaduct – regarding which NR explained that the popular solution of doubling is unlikely to be cost-effective since any resulting nominal increase in capacity could not be exploited because the mix of trains on the fast, slow and (new) second slow south of Welwyn Garden City leaves very little effective capacity unused.

Reducing the planning headway from 3 to 2½ minutes was listed as an option that ‘needs to be assessed’, but this seems not to have been pursued [p.14].

4.1.7 Before summarising the conclusions it is worth commenting briefly on a comparison of this exercise with what follows in the next section.

- ⇒ NR had to accept the structure of the imperfect 2011 timetable – we have the luxury of a clean sheet.
- ⇒ NR had to accept the estimates of demand for freight paths and to tread carefully regarding the contentious issue of low take-up of some paths – we adopt a different approach, the rationale for which is explained above [§3.4]; in the same way the idea of standard (‘catalogue’) paths for freight was floated but immediately qualified by reference to ‘customer requirements’ [p.17].
- ⇒ Likewise NR tested extending the practice of flighting in order to secure sufficient freight paths – whereas we regard an attractive spread of passenger services as paramount.
- ⇒ NR was prepared to contemplate decelerating and disrupting the regular frequencies of the London suburban services in the search for extra paths (though these ideas were effectively rejected) – brisk timings are vital, and we treat the need for regularity as near-absolute in order to protect perceptions of convenience.
- ⇒ Similarly, NR mentions leaving gaps in standard-hour services to make way for occasional freight [p.24] – which is anathema in an integrated timetable [see also footnote 44].
- ⇒ NR considered skip-stop schemes that would remove or render infrequent opportunities to travel [OTTs] by rail between pairs of some smaller stations, especially on the Doncaster ... Peterborough stretch – we believe that a public-interest railway should secure attractive frequencies for such relations unless overwhelming difficulties supervene<sup>55</sup>.
- ⇒ NR thinks in terms of incremental changes to frequency – while recognising diminishing returns as more trains are added we prefer to emphasise perceptions of convenience<sup>56</sup>.

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<sup>55</sup> See the trade-off explained in the paragraph starting “The capacity assessment ...” on p.47.

<sup>56</sup> The figure [3.6, p.46] illustrating this is slightly absurd since it shows a curve of increased benefits and revenue only flattening off at frequencies that would not be reached in real life.

- ⇒ NR could only tentatively address the problem of OA operators wasting capacity by occupying paths with shorter trains than the franchisee by suggesting joining and splitting and then noting [p.53] that agreement between different companies might be difficult – we have no such inhibitions.
- ⇒ NR, as ever, makes no reference to the concept of symmetry and its effect on pathing, nor is there any mention of the knock-on consequences for connections of attempting to maximise the use of capacity on the main line<sup>57</sup> – it might of course be benign, but in our approach connections are a natural element in a timetable conceived systematically.

4.1.8 Nevertheless, despite what we regard as significant weaknesses in the approach – amounting in effect to making it highly abstract – NR did reach some interesting conclusions. It became apparent that the increment available for additional long-distance services would be limited to one extra train/hour south of Peterborough, or eight in total. That in turn led to an attempt (for the first time, and with sensitive policy overtones) to evaluate the relative economic and social value of each aspiration and the cost of meeting it. NR admits to imperfections in the calculations (which in part arise from the presence of two types of operator), but the message is reasonably clear and broadly plausible:

- ⇒ that the Leamside and Stillington schemes will be required if a better spread of (slightly more frequent) passenger services is to be achieved;
- ⇒ that ways must be found of persuading the freight companies to route their trains via Lincoln, even though this extends journey-times, since otherwise the impact on the capacity for passenger trains on the main line via Newark will be hugely restrictive<sup>58</sup>;
- ⇒ that there is probably a good case for reinstating the up slow line for about four miles north of Huntingdon;
- ⇒ that many of the aspirations would yield little economic or social benefit, especially those involving smaller places and non-London flows;
- ⇒ that the commitment to the linking of suburban services north and south of the Thames will introduce further constraints, together with the planned increase in some frequencies;
- ⇒ that increasing the frequency of calls at Peterborough and Stevenage is the most valuable aspiration [p.5]; and
- ⇒ that significant benefits could be realised if the additional long-distance services could call at the second-order stations instead of the principal franchise services, thereby enabling these to be accelerated for the major markets between Edinburgh, Newcastle, York and Leeds and London<sup>59</sup>.

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<sup>57</sup> Discussion of the role of connections is preempted by the status accorded to the OA applications. The study did reveal [p.5] that the optimal frequency of these services for any one place is two-hourly, but it could not assess the extent to which well-timed and more frequent connections with the principal long-distance services might overall make better use of capacity than less frequent direct trains.

<sup>58</sup> See p.30, paragraph beginning “A base assumption ...” and also the last paragraph on p.45, the first on p.47 and the third on p.53. It is characteristic of the separation of track from trains that the costly Joint Line project seems not to have been specified with a firm idea of what trains might use the route on its completion. It is also noted [p.31] that the strategy, together with the possible use of the Leamside and Stillington lines, could be at odds with the aim of increasing the use of electric traction for freight.

<sup>59</sup> The Alliance bid for a fast Edinburgh service is prefigured in a discussion [first paragraph, p.48] of removing Darlington and York stops from the faster Scottish service, but the credibility of this scheme would depend on alternative services having relatively few stops – before we even discuss the corollary of market fragmentation.

4.1.9 The last two points are immensely important for this study because they implicitly question the basic premise of contemporary timetable planning, namely that Network Rail's task is essentially the passive one of arranging paths for disconnected applications. They highlight inter-dependencies between different services and between paths and capacity which the open-access companies would prefer to ignore in pursuit of their own agendas, namely, in this context, limited generation of traffic at off-route places coupled with abstraction of revenue from the franchise by running fast on ECML itself.

4.1.10 Surprisingly, NR went on to state the need in the circumstances it had identified for a 'holistic' approach to planning the timetable if best use is to be made of constrained capacity and if further enhancements of the infrastructure are to be designed and managed efficiently:

“The conclusion of this further analysis is that a holistically planned timetable will generate a higher level of socio-economic benefits and revenue than a series of new services as an increment to an existing base ECML timetable. The work required to conclude the most appropriate way to do this is well beyond the scope of this capacity review: a holistic timetable would need to be developed, to optimise the mix of final destinations, service frequencies and stopping patterns. The resulting package then would be built into an overall business case. [New] services would require assessment under ORR's 'Not Primarily Abstractive' test. It could be necessary to review the methodology employed in this test to enable it to recognise the benefits of a holistic package of services with a higher overall value over a series of incremental aspirations. [A] holistically planned timetable operated by a collection of competing operators may not be achievable without some fundamental changes to the industry's current approach to capacity allocation and access charging to encourage both collaboration and competition. Noting the complexities involved, the East Coast Main Line 2016 Capacity Review recommends that the industry works towards compiling a holistically planned timetable in order to maximise the economic value of the route.” [pp.48-49, and see also the last paragraph on p.52].

4.1.11 This of course is precisely what the present project is attempting to do, albeit with more limited resources and data than the industry can command. Note however that NR has no remit to consider the impact on passengers of the complexities in ticketing and train-choice introduced in a multi-operator system, whereas we assume no such features.

4.1.12 A study is all the more desirable because, as far as I am aware, nothing has come of the NR proposition<sup>60</sup>. Instead the documents for the ScotRail, ICEC, Northern, TransPennine and Thameslink franchises all present largely self-contained service specifications<sup>61</sup>, leaving the bidders to conceive their own patterns and to attempt some coordination in due course (which the process does not make easy), while the OA companies continue with their own business models and cocky access applications. Neither DfT nor NR nor ORR has asserted the public interest in an integrated approach, even at the level of an initial assessment of its potential advantages.

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<sup>60</sup> The vagaries of railway planning are graphically shown in a slightly despairing remark at the end of the report: “There would be a good business case to implement the further infrastructure capability charges [sic] in Control Period 5. However, implementation is not recommended within a particular time period as under the current industry structure Government would be unlikely to fund this infrastructure unless it were required for franchised passenger or freight services, and it is not clear how these will materialise” [p.54]. None of the projects are yet firm commitments during CP5: see the cautious references in Network Rail [April 2014]. Delivering a better railway for a better Britain: Route Specifications 2014 - London North Eastern and East Midlands [<http://www.networkrail.co.uk/publications/network-specifications/2014/london-north-eastern-and-east-midlands.pdf>].

<sup>61</sup> The ITT for Thameslink specifies a sequence of paths for (Class 91 + Mark 4 !) ICEC services at Woolmer Green Junction and prescribes that these may be moved around the clockface (the detail of the text reveals the lack of understanding of the mirror-image rule), but the status of this is not at all clear since no equivalent specification appears in the ICEC ITT [see: <https://www.gov.uk/government/publications/thameslink-southern-and-great-northern-2013-invitation-to-tender>, pp.66,67,72]. Nor is there any reference to securing good connections with ICEC.

## 4.2 The PTN scheme

### *Framework, procedures and conventions*

4.2.1 Previous sections have outlined the context of timetable planning and the principles which guide an exercise in integration. This section explains the detailed thinking about ECML services and the issues that have surfaced as we have worked on implementing the principles. The results are illustrated in a number of charts, but it is emphasised that they do no more than represent the best solution we can identify (while abiding by NR's Timetable Planning Rules). We shall welcome evidence in support of alternative solutions or useful tweaks, but bear in mind that multiple interdependencies, some possibly more dispensable than others, create hard choices.

4.2.2 Appendix A summarises the items that have to be considered and explains the extent to which each has so far been addressed. It is acknowledged that a great deal of detail needs checking, but this is more likely to be a matter of adjustments than of any fundamental reappraisal. For simplicity the discussion refers to southbound journeys and trains, on the standard assumption that northbound services will be an exact mirror-image.

4.2.3 This is a plan for 2020, although it may be hoped that if large benefits are identified (as have been foreshadowed in previous exercises) interim adjustments can be made. For 2020 we assume

- ⇒ doubling of Portobello Junction (east of Edinburgh) [see ¶4.2.20];
- ⇒ catalogue rather than random paths for freight trains, and alternative routeing where necessary and for which infrastructure works may be required;
- ⇒ squadron operation of the IEP fleet on all ICEC services and on the King's Lynn<> Cambridge <> London service (some ideas may not be entirely compatible with its presently-proposed configuration);
- ⇒ electric operation of the cross-country services; and
- ⇒ Use of new or up-rated electric multiple units on all services running on sections of ECML, with journey-times reduced largely by means of improved acceleration and braking.

4.2.4 Our sectional running times have been derived from those presently used by Network Rail, from detailed analysis of the observations deposited in the archive of the Railway Performance Society<sup>62</sup>, from my own records and from best estimates of the accelerations that are thought achievable. This approach was adopted partly because the file of NR SRTs includes values that are plainly inaccurate and partly because a long-term plan should be based on evidence of what happens in daily operations. Pathing and graphing has been conducted with the Swiss *Viriato* timetabling software that was developed specifically for integrated and rigorously-regular schemes based on the *Taktfahrplan* concept<sup>63</sup>. Note that unlike NR but in line with Swiss practice we time in tenths of a minute, which seems more appropriate than half-minutes for a precision railway.

4.2.5 Contemporary Working Time Tables [WTTs] contain no less than five types of allowance, or time added to certain calculated running times, often at designated timing points: (1) for "temporary speed restrictions and other engineering work" (shown by [x] in WTTs); (2) for "pathing requirements" (when a clear path cannot be found, shown by (x)); (3) another to "offset delays and may also cover some engineering work" (shown by <x>); (4) adjustments to the

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<sup>62</sup> Permission to use this large database for the present purpose is acknowledged with gratitude – and with appreciation of all the RPS members who devotedly record the running of the railway. Deep analysis suggests surprising variability in running times and highlights particular types of delay.

<sup>63</sup> This is an opportunity to once again publicly record my gratitude to colleagues and friends at SMA in Zürich for granting me a special *Viriato* licence, for training me in the principles of integrated timetabling and for their patience while I have been making the case in Britain. My appreciation extends too to a number of other Swiss friends.

working time to give the public time (shown by notes and rounding, and in at least some cases designed to massage performance statistics); and (5) amounts that the NR software seems to hide by varying SRTs without explanation [see also footnote 4].

4.2.6 This situation is a mess<sup>64</sup>. In particular, the rather arbitrary distribution of the allowances means that trains tend to arrive out of course at critical points. Random events will disrupt the precise functioning of even the best timetable, but because their location and scale varies it is impossible to design a perfect arrangement of allowances. However, we have cut through the present scheme by adopting the mainland European practice of adding a percentage distributed more or less evenly throughout the schedule of each service.

4.2.7 This was calculated in three stages. First a mean time was measured from the available data. Then the value of one standard deviation was added so that the time could be expected not to be exceeded in 84% of all runs<sup>65</sup> and in a higher proportion when aggregated and smoothed across a series of SRTs. Next this sum was checked against the minimum realistically- and properly-achievable observation (ie. excluding exceptional cases) and if necessary adjusted so that in broad terms the final figure includes an all-purposes allowance of about 5% over the minimum.

4.2.8 We use certain conventions to describe the proposals. Geographically we generally report from east to west and north to south (thus avoiding the London-centric phrasing of DfT and NR documents). A ... B refers to the route between A and B. A <> B means the flow of travellers or the public-transport service in both directions between A and B (occasionally A > B is used where the point relates just to that direction).

### ***The Edinburgh <> London service and its ramifications***

4.2.9 At present East Coast runs 22 trains/day between Edinburgh and London<sup>66</sup>, ie. an hourly service with extra trains at most intermediate times as northern extensions of what otherwise would start at Newcastle. The fastest time is 4 hours by the early southbound 'Flying Scotsman' which calls only at Newcastle. This is the only train that overtakes a slower service (and thereby offers a fast London service with a change for Berwick-upon-Tweed, Alnmouth and Morpeth passengers). The median time of the faster trains is 4 h 21, normally calling at Berwick, Newcastle, Darlington and York. Those with additional stops at Durham, Doncaster, Newark North Gate and Peterborough, and Alnmouth in lieu of Berwick, typically take 4 h 43 minutes.

4.2.10 Demand has been growing, and it appears that rail's share of the air + rail market is creeping up as rail improves in quality and offers keen prices for advance tickets and as air travel suffers from a great deal of hassle. There are however weaknesses in the current pattern:

- ⇒ 261 minutes is still not good enough to make serious inroads into the air market;
- ⇒ in order to achieve even that the faster trains do not call at Peterborough, which is deleterious for connections between Scotland and North East England and East Anglia;
- ⇒ the intermediate East Coast and CrossCountry calls between Edinburgh and Newcastle follow no strong pattern and offer a very poor service for journeys within that sector<sup>67</sup>; and

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<sup>64</sup> There is some evidence that both this and the inaccurate SRTs are difficult or at least painfully slow to change because the relationship between Network Rail and the TOCs is so legally contractualised and subject to the interplay of vested interests being protected.

<sup>65</sup> This presupposes a normal distribution, which appears to be what occurs in most circumstances.

<sup>66</sup> The first of the day starts at Berwick-upon-Tweed (and is overtaken), and the last runs to Leeds.

<sup>67</sup> There is only one journey-opportunity from Berwick to Alnmouth during the day between four early-morning trains and four evening trains – which is no way to create a sense of rail's relevance.

⇒ some trains are very busy, especially from Newcastle and south thereof.

4.2.11 This is the situation that Alliance wishes to exploit, and, whatever may have been said earlier [¶2.2] regarding its application, the point about the potential value of accelerations is important. IEP could knock 18 minutes off today's Edinburgh > London time<sup>68</sup>. That will undoubtedly attract some journeys from air at the margin, but an even faster time might achieve a significant transfer, with clear environmental benefits. If we consider a combination of factors – the best possible IEP timing, secular growth in the market, the effect of better services for the intermediate stations and enhanced connectivity generally – it seems reasonable to think in terms of three different London services being justified by a horizon date of 2020 and hence a pattern based on three interrelated paths/hour (possibly with some paths not used in some hours initially).

4.2.12 Our proposal is thus:

- ⇒ an hourly Edinburgh > Newcastle > London path, timed initially for the best performance that is likely to be available from an IEP train (referred to as Anglo-Scot 1);
- ⇒ an hourly path with calls at Berwick, Newcastle, Darlington, York and Peterborough (Anglo-Scot 2); and
- ⇒ an hourly path with calls as Anglo-Scot 2 plus Dunbar, Alnmouth, Morpeth, Durham, Doncaster and Stevenage (Anglo-Scot 3).

4.2.13 The thinking is this:

- ⇒ if Edinburgh and Newcastle traffic grows as predicted and is boosted by capture from air and by the acceleration then a service exclusively for those markets (including connectional opportunities) will be justified;
- ⇒ Alnmouth (for Alnwick) and Berwick-upon-Tweed both merit an enhanced service, while Dunbar, in its own right and with a connection from the eastern suburbs of Edinburgh [see ¶4.2.19-26] and Morpeth, a County town, are relatively neglected places and railheads that should be tested for enhanced services;
- ⇒ Anglo-Scot 3 should be overtaken by Anglo-Scot 1 in order to offer Dunbar, Berwick, Alnmouth and Morpeth travellers the option of an hourly through service or a fast opportunity with a change (this will be at Newcastle but for path-spacing reasons the pass is at Darlington);
- ⇒ this also transforms the service-offer for the shorter-distance pairs of places and is a more practical proposal than running a separate Scottish regional service between Edinburgh and Berwick, or even Newcastle;
- ⇒ Anglo-Scot 2 then provides for a large proportion of the many intermediate journeys;
- ⇒ Anglo-Scot 2 + Anglo-Scot 3 will form the desirable half-hourly pattern for the Darlington and York <> Peterborough and London markets;
- ⇒ since Anglo-Scot 3 has to stand at Darlington while Anglo-Scot 1 passes the possibility arises of using the extra time to attach / detach a portion from/to Teesside – this would seem to be a sensible use of the 5-car IEP sets; and

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<sup>68</sup> This was quoted in the press release dated 18 July 2013 announcing the decision to proceed with the project [[www.gov.uk/government/news/government-gives-green-light-for-more-state-of-the-art-intercity-trains](http://www.gov.uk/government/news/government-gives-green-light-for-more-state-of-the-art-intercity-trains)] but was qualified by the phrase “once detailed timetables have been drawn up”. By the time of the announcement that funding is in place on 16 April 2014 the Edinburgh acceleration had become “up to 15 minutes, subject to timetable” [see <https://www.gov.uk/government/news/government-confirms-27-billion-deal-to-build-new-state-of-the-art-trains> (our emphasis)]. I do not regard this vagueness as responsible management of a £2.7 billion deal for the premier main line.

⇒ if the Glasgow > Plymouth cross-country path can be arranged to provide a decent connection out of Anglo-Scot 3 at Newcastle then its stops at Alnmouth should be removed in order to reduce its running time too.

4.2.14 We leave aside at this stage the sensitive issue of extensions north of Edinburgh, and we deliberately do not time Anglo-Scot 1 for a tilting train since that possibility is best studied separately when the basic pattern has been established and the impact of further acceleration can be more clearly identified. Provisionally however we are sceptical since passing a third time – the graph shows how it passes other services at Darlington and Retford – is undesirable in performance terms, and the benefits of tilt could only be realised on the curved sections north of Newcastle (which would enable a slightly later departure from Edinburgh).

### **Relationships between ICEC trains and the pattern at principal stations**

4.2.15 Specifying an ideal group of services is a relatively easy task. More difficult is spacing them to secure a useful frequency for at least the key flows. If for any A to B flow there are two trains in each hour but the faster in each pair arrives at B immediately behind the slower one then the offer is greatly diminished. Maximum convenience is realised if the difference in running time is spread equally: if the faster train leaves at 08:00 the slower train should leave  $(30 - (D/2))$  minutes later, where D is the difference in running time. The corresponding arrivals would be at, say, 10:00 and  $(30 + (D/2))$  minutes later<sup>69</sup>.

4.2.16 Such neat patterns cannot easily be achieved in practice, particularly with a group of trains like that proposed here, but it is helpful to have it as an aim. A further consideration, however, is that each of the services will be calling at key nodes where the timings matter for connectional reasons, as summarised in Table 2. After examining a number of options we propose the plan summarised in Table 3. This introduces the Leeds trains, which it will be seen complement the Scottish trains in a coherent pattern (this was first suggested in my *Taktfahrplan* alternative to the NR and East Coast 2011 development and I make no apology for recycling it). Whether the Leeds and West Yorkshire business might justify a third train is discussed later [see ¶4.2.43], as is how best to serve Retford, Newark North Gate and Grantham [see ¶4.2.32-45].

4.2.17 The determining feature is the arrangement of the two slower Scottish trains and the two Leeds trains. They are paired in half-hourly flights between Doncaster and London. In one half-hour Anglo-Scot 2 calls at Peterborough and is followed by the slower Leeds. In the other it is the 2-stop Leeds that calls only at Peterborough, to be followed by Anglo-Scot 3. This secures common paths south of Doncaster and a standard 30-minute cycle at Woolmer Green Junction [see ¶4.2.58-59]; the mandated 4-minute headway between Doncaster and Peterborough and the 3 minutes south thereof (by making effective use of the new island-platform layout in both directions for close flighting and easy interchange); half-hourly OTTs between all northern stations and Stevenage<sup>70</sup>, alternating through and by changing; and good intervals for the substantial flows between Peterborough and London and Stevenage and London.

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<sup>69</sup> In the current East Coast timetable departures from York are at roughly 26/34-minute intervals, which results in the slower train typically arriving at King's Cross only about 9 minutes ahead of the next fast. The same pattern applies in reverse. This is the outcome of a belief in the importance of round-number, evenly-spaced departures from principal stations (which of course breaks the mirror rule): we are not convinced that this has any evidential support and would argue that even spacing with regularity securing memorable minutes-past is likely to yield better results.

<sup>70</sup> The current timetable has two calls/hour at Stevenage, but one is in the York or Newark all-stations (which disadvantages north of York travellers) and southbound the calls are within 5 minutes of each other. The ICEC ITT specification would allow a reduction in calls, which understandably is controversial in the town. The proposal here is based on a conviction that the Stevenage market plus its potential railhead function for surrounding towns and by connection with the Great Northern suburban network justifies it being well and constructively served.

4.2.18 The differences in running time ('D' at ¶4.2.15) are such that the departures of the slower trains from Newcastle and York are only about 3 minutes adrift from the 'ideal' spacing, although for Newcastle this is strictly only relevant for intermediate destinations since the Scottish fast takes the London traffic and inevitably follows Anglo-Scot 2 into King's Cross only 10.2 minutes later. We have chosen to place the Anglo-Scot 2 around the zero minute at York in order to optimise the Scarborough and Harrogate connections. Its clock times at Newcastle and Darlington are quite good for the Tyne Valley and Teesside interchange requirements, although other aspects are less good, such as the spacing at Berwick. How good the connections at Peterborough will be will depend on decisions about the best scheme for the east <> west services, but it should be noted that further acceleration, Swiss-style, between York and Peterborough would bring the latter's times closer to the xx:00/30 position.

<b>Table 3</b>						
<b>Proposed times of ECML services at principal stations</b>						
station	Anglo-Scot 2	Leeds 4-stop	Leeds 2-stop	Anglo-Scot 3	Anglo-Scot 1	cross-country
Edinburgh Waverley	xxx – 42.5			xxx – 47.2	xxx – 09.2	xxx – 19.3
Berwick-upon-Tweed	19.8 – 21.3			28.7 – 30.2		35.6 – 38.1
Newcastle Central	03.1 – 06.1			20.3 – 22.8	27.2 – 30.2	39.9 – 41.9
Darlington	30.4 – 32.4			50.6 – 57.0	<i>passes L3</i>	08.2 – 10.2
York	58.5 – 01.5			26.7 – 29.7		36.2 - xxx
Leeds		to be planned	to be planned			
Doncaster		20.6 – 22.6		50.6 – 52.6		
Peterborough	03.7 – 06.7	07.7 – 09.7	33.7 – 36.7	37.7 – 39.7		
Stevenage		38.4 – 39.9		08.4 – 09.9		
London King's Cross	52.7 – xxx	59.9 - xxx	22.7 – xxx	29.9 – xxx	02.9 – xxx	

### **Regional and local services on the Scottish section of ECML**

4.2.19 In developing the arrangement just described it was essential to pay close attention to the section between Edinburgh Waverley and Dunbar. In addition to the three London services and the cross-country the plan has to accommodate (a) the forthcoming Borders Railway between Edinburgh and Tweedbank (which will subsume the existing park + ride shuttle as far as Newcraighall), (b) the North Berwick suburban service and (c) an improved service for Dunbar in line with the aspirations of Transport Scotland [TS]. We discuss the issues raised by each of these and then propose a comprehensive solution that is compatible with the long-distance plan.

4.2.20 The Borders Railway will run for 57 km (from Waverley) and will have about 35 km of single line. This is not going to make reliable operation of a half-hourly service easy, and the problem is compounded by the layout at Portobello Junction, 5.4 km from Waverley. The single lead means that trains cannot move on and off the branch simultaneously. It seems surprising that Network Rail has no firm plans to remove this constraint, but it is assumed that doubling is essential for performance although not strictly required for the timetable. This is not just a matter

affecting the Borders trains: the main line is going to be busy (including the need for southbound Borders trains to cross the path of Edinburgh-bound ECML trains), and although a grade-separated junction is unlikely to be justified it would be most undesirable for problems on the Borders line to be exacerbated by a single-lead junction and then to disrupt the main line<sup>71</sup>.

4.2.21 On the assumption of the need for a short turnaround at Tweedbank and of course of zero-minute symmetry the only possible paths for Borders trains are at xx:00.5 and xx:30.5 from Edinburgh, with return arrivals therefore at xx:29.5 and xx:59.5 (this implies 31-minute turnarounds at Waverley unless the trains are linked with another service<sup>72</sup>). The second gives an ideal 9.7 minute interchange with the fast London (which should please TS and the Borders campaigners) and also feeds the cross-country train, while the wait on the other half-hour for Anglo-Scot 2 and Anglo-Scot 3 is about right. The Borders timetable itself is absolutely regular with all trains calling at all stations, and the timings at Tweedbank should facilitate good bus connections.

4.2.22 At present the North Berwick service is unusual in that it runs hourly Mondays to Fridays, with some peak extras, but half-hourly on Saturdays. Whether this is a genuine consequence of greater demand for capacity for other trains on weekdays or an historic anomaly arising from sclerosis in the planning system is uncertain, but in a long-term study it needs review. Our judgment is that ideally the frequency should be half-hourly daily (except perhaps for part of Sunday): serving the suburban stations on the main line east of Edinburgh and North Berwick, a prosperous little town with a good number of commuters and seaside traffic, merely hourly is no longer sufficient in terms of convenience and flexibility against the car and local buses.

4.2.23 However the issue is complicated by the aspirations for Dunbar, similarly prosperous, similarly popular for commuting and similarly implicated in peak congestion on the A1 and A199 on the eastern side of Edinburgh. The current situation is that long-distance trains call at Dunbar in a not very orderly pattern (and in the peak on some trains a large number of short-distance commuters conflict with inter-city passengers), and that TS has filled most of the gaps with *ad hoc* services calling only at Musselburgh. We consider that in the long term the best way to look after Dunbar is to serve it hourly with the Anglo-Scot 3 train and to secure its southward links by interchange with the fast London and the cross-country at Newcastle, as described above.

4.2.24 The complementary step would then be to run alternate local trains to Dunbar rather than North Berwick, thereby providing a feed to all points to the south that would avoid travellers from the eastern suburbs having to start a rail journey by going west to Waverley [see footnote 35]. This would also provide Dunbar with a range of local travel opportunities that are not presently available. The one downside is of course the exclusion of North Berwick itself from the half-hourly scheme. However there is some scope for peak extras, probably running fast to/from Drem, and in addition it would be desirable for the regular bus service on the A198 coast road to connect well with trains at Longniddry.

4.2.25 This is all predicated on an overhaul of the layout at Dunbar. At electrification the down platform was removed and crossovers installed to enable down trains calling there to cross the up fast line to the single platform on the up loop line. Such an economy may have been clever in the cost-cutting agenda in 1991, but subsequent growth has belied it and the layout is now a severe constraint on serving Dunbar adequately and on ECML capacity generally. Reinstating a second

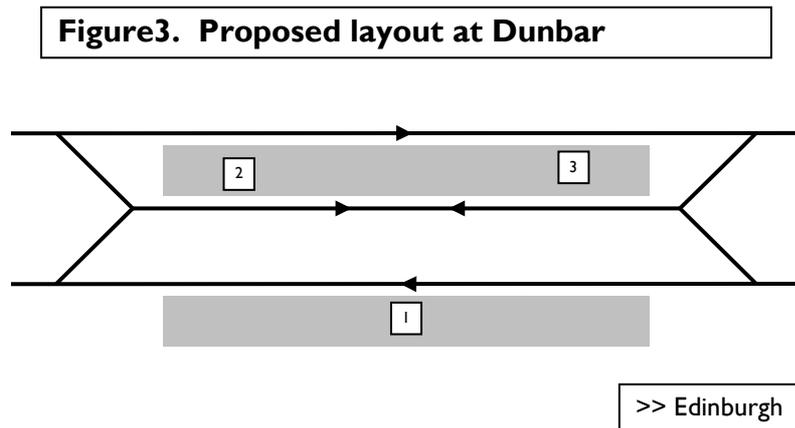
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<sup>71</sup> For an informed account of the background to this situation see: Spaven, D (2014). *Bordering on too much single track*. *Modern Railways*, May, 71 (no.788), pp. 51-55. This article mentions the argument for every other train to run semi-fast, omitting some stations: we will investigate the idea later.

<sup>72</sup> By 2020 the only suitable diesel-worked service may be the Fife Circle, and combining two problem-prone timetables may not be operationally wise, even though there are market attractions in a cross-Edinburgh scheme.

platform is therefore in NR's programme although not yet committed, which allows us to propose a scheme that would suit our train-plan but also, we believe, be flexible in other circumstances.

4.2.26 The design shown as Figure 3 has the up fast realigned to serve the existing platform (this assumes that the speed limit imposed by the curvature of the line through the town would not have to be further reduced) and an island platform built to serve the down fast and a reversible line between the fasts. The way it is envisaged this would work is illustrated by the planned timings shown in Table 4. The timings are admittedly tight, but there is a nice 11.9-minute, same-platform interchange between the local and Anglo-Scot 3 trains.



	arrive	platform	depart / pass
Plymouth > Edinburgh		3	xx:21.9
down Anglo-Scot 1		3	xx:32.0
down Anglo-Scot 3	xx:51.8	3	xx:53.3
Edinburgh > Dunbar local	xx:56.3	2	
down Anglo-Scot 2		3	xx:58.7
up Anglo-Scot 2		1	xx:01.3
Dunbar > Edinburgh local		2	xx:03.7
up Anglo-Scot 3	xx:06.7	2 (or 1)	xx:08.2
up Anglo-Scot 1		1	xx:28.0
Edinburgh > Plymouth		1	xx:38.1

4.2.27 The final point to be discussed in this section is the campaign by local groups and East Lothian and Scottish Borders Councils for two new stations, at East Linton and Reston. It seems to me that a rather difficult situation has been allowed to develop. Firstly, the political failure to implement any serious system of charging directly for the use of roads, despite copious evidence of the many benefits, has made containing congestion difficult. Instead governments and especially

local authorities have come to believe that rail can provide an answer. At the same time Network Rail and the TOCs have shown themselves keen to offer rail-based 'solutions' because of the potential of extra traffic and the corporate advantage of being seen to be positive and cooperative.

4.2.28 These schemes have then been abetted by enthusiastic local campaign groups motivated by some mix of regeneration arguments, self-interest and nostalgia for closed lines and stations. In some circumstances this may obscure the possibility that better value might well lie in tackling the congestion directly, for example by road pricing, by securing absolute priority for buses even if it means restraining the use of cars and by drastic measures to cut carbon emissions.

4.2.29 Now I do not mean to denigrate all such proposals, but other reservations must be registered too. Some have plainly been successful, others have struggled, which suggests the need to be cautious about possibly exaggerated claims. Even more importantly, stakeholders must be clear about the impact on capacity (and the cost of enlarging it) and hence about priorities and about whether rail really is the most appropriate solution. I am not sure that the country has the proper objective mechanisms to assess the cases dispassionately and to identify the best role for the railway. The stations under review illustrate the dilemmas very nicely, and my own assessment is offered for debate. The two proposals differ markedly.

4.2.30 East Linton is a modest but growing settlement that once had a station on the main line. It could generate useful extra traffic and offer some relief to road congestion at peak times. It must be recognised however that there is no conceivable case for stopping long-distance trains there, and its reopening is therefore wholly dependent on the proposed extension of every other suburban (ie. hourly) train to Dunbar. That then interacts with the question of overall capacity since, as the train graph and Table 4 show, the local is tightly timed to leave Waverley just after the cross-country and to clear the up fast at Dunbar just ahead of Anglo-Scot 2. In other words there is no scope for an additional stop, assuming that our (already-ambitious) scheduling of the Class 380 electric unit is correct. The only solution if East Linton is to open would appear to be for the Dunbar trains not to call at Drem, which is a much smaller place, although even this would be subject to adequate arrangements at commuting times.

4.2.31 The campaign for Reston is a different matter. The place itself is small, and even if commuting is developing it seems improbable that rail could attract sufficient people to make a discernible impact on congestion (in any case, on sustainability grounds long-distance commuting should not be encouraged by any mode). A station there would serve as a railhead for Eyemouth (which once had its own short branch), but the geography is such that its attractiveness would be limited for journeys in the Edinburgh direction and marginal for those in the Berwick direction (that much better served railhead is only 14.3 km away with at-least-hourly buses). And finally, there could of course again be no question of stopping inter-city expresses at Reston while extension of the local service for some 28 km from Dunbar would be both costly and wasteful of capacity for a small market. We judge that any plan for reopening Reston should be rejected.

### ***Serving off-route towns and Retford, Newark and Grantham***

4.2.32 Open-access initiatives and local pressure have made the idea of through services between off-route towns and London a strong theme in plans for the East Coast Main Line [see for example the list at ¶4.1.3]. Some caution is required. The players concerned (and their consultants) have an interest in exaggerating the putative benefits. The association between a direct London service and economic activity is not proven, given the numerous other influencing factors. The thesis has not been properly tested against the alternative of well-organised connections that would normally offer more frequent OTTs than can realistically be offered by through trains<sup>73</sup>. Incumbent ECML

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<sup>73</sup> Where 'well-organised' means quality trains on the feeder line, easy physical interchange, through fares that do not discriminate against the interchange option, strong real-time management and convincing marketing.

operators have investigated some of the possible links and found them wanting for more solid reasons than the sometimes-alleged disinclination to bother [see footnote 22 for the financial results of one operator]. And of course it is physically impossible to meet all the claims for paths.

4.2.33 We propose a solution that is related to our plan for the three stations between Doncaster and Peterborough and that also takes advantage of the eighth path in each hour which is expected to be available as the infrastructure enhancements are completed. The structure outlined above [see the summary in Table 3] shows the relationship between the two of the three Scottish and the two Leeds trains that forms a half-hourly cycle – which offers the most appropriate means of managing the sequence of trains through the two-track section between Woolmer Green and Digswell Junctions. There is then a third path in each half-hour together with the match for that used once an hour by the Scottish fast (Anglo-Scot 1).

4.2.34 It is desirable to accelerate the Scottish and Leeds trains, and since the traffic between stations north of Doncaster and Retford, Newark North Gate and Grantham is relatively small compared with the London traffic it can be argued that none of those four should make calls south of Doncaster other than the carefully-organised scheme for Stevenage [see ¶4.2.17 and footnote 70]. Instead the three intermediates can have a more coherent and more frequent London service (and much-enhanced connectivity between themselves and with many other ECML stations) if they are served every half-hour by an ‘all-stations’ train starting at York or Doncaster, calling at all three towns and Peterborough and then running non-stop to King’s Cross (a connection for Stevenage is available at Peterborough).

4.2.35 This proposition is only credible if the interchanges are brisk. That was therefore a key objective in defining the overall pattern, and it has been achieved: 6.1 minutes at York or 6.9 at Doncaster. The pairing will be alternately with Anglo-Scot 2 at York to secure a Doncaster connection for that train and with Anglo-Scot 3 at Doncaster. Both paths have a 6-minute dwell at Retford, the York starter to allow Anglo-Scot 1 to pass and the Doncaster starter whatever uses that path on the opposite half-hour. It has to be admitted that one outcome of this is that Peterborough > London services are bunched together: three leave in 6 minutes, followed by a 24-minute gap (but note that the present timetable is no better, particularly northbound).

4.2.36 The next question is what can be done with these trains – and the eighth fast path – north of those locations. In North East England the off-route towns need a fast service if they merit through trains at all and so should only be considered for the fast path. Some sequence of Sunderland via Newcastle (if good connections and the Metro are deemed inadequate), the Durham Coast and Teesside might be justified, although Yorkshire has claims too and the suggestion of portion working every hour for Teesside (the largest of the three in population-potential terms) may be superior [¶4.2.13]. Saltburn would be a detail for the Teesside scheme, and realistically a good local service connecting well at Darlington will suffice for Bishop Auckland.

4.2.37 An hourly stopping service from York could very well start back alternately from Scarborough and Harrogate: both are sizeable with market characteristics that would seem to support through trains. The NR study found evidence that a two-hourly pattern would be appropriate for such places. However, many travellers value speed and frequency more than a two-hourly offer, and it would be essential to secure good connections between the other services on the two lines and Anglo-Scot 3 at York and preferably also by timing the through train to arrive in York ahead of Anglo-Scot 2 and thereby afford passengers a choice of staying on the through train or switching to the fast<sup>74</sup>.

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<sup>74</sup> This would depend on assiduous analysis of platform occupation, especially because of the restrictions on the platforms that Scarborough trains can use. Apart from that the idea does point to a way of addressing the unsatisfactory feature of a merely hourly frequency on both lines, but in the Harrogate case it would require careful meshing with the aspirations for an improved local service and the probable need to double some sections of the line.

4.2.38 Hull presently has the successful Hull Trains service of seven trains/day at roughly two-hour intervals stopping at Retford and Grantham but not at Newark or Peterborough. This is one of the absurdities of the prevailing process, and one might expect a city like Hull, for all its well-known singularities, to justify some fast services. It may therefore be a candidate for the eighth path, with interchange at Doncaster covering links with the intermediate stations on the main line.

4.2.39 West Yorkshire raises a number of issues. Following upgrading of the power supplies and trans-Pennine electrification it would be possible to serve Skipton, Bradford Forster Square and Huddersfield rather well by selective extensions of the Leeds trains, although this probably depends on whether paths can be woven into the busy mesh of local services (which many travellers would continue to use, particularly with improved interchange times) and also on whether the idea is compatible with IEP formations (working 9-car sets through would be clumsy and extravagant so the question arises of the practicability of portion operation of 2 x 5-cars sets).

4.2.40 Bradford Interchange, Halifax, Brighouse, Mirfield, Wakefield Kirkgate and Pontefract Monkhill are served by Grand Central with four trains/day that run non-stop between Doncaster and London (these places were not listed in the NR review). The area is populous and there are regeneration arguments, but a limited service on a tortuous route is unlikely to have much impact beyond the promotion of excursion traffic. The first four stations have local services to Leeds, though not as fast or frequent as might be desired, and Wakefield Westgate will have the accelerated half-hourly London trains. It is therefore the Pontefract – Castleford – Knottingley area, historically much neglected in connectivity terms, that needs attention: an hourly local train to/from Doncaster and perhaps some fast through services may be the best option.

4.2.41 Cleethorpes, Grimsby and Lincoln plainly merit attention, but there is a dilemma with the proposed pattern: the integrity of connections up and down ECML would be compromised if certain of the 'all-stations' paths were truncated north of Newark and diverted to serve the Lincolnshire towns. In our pathing there is no time for joining/splitting at Newark, and in any case even 5-car sets might be larger than necessary. Despite Lincoln's obvious claims to a through service it may be more practical and fit better in the overall scheme to design a really good shuttle between Lincoln and Newark North Gate, perhaps to run a through train to/from King's Cross in the eighth path once a day and to consider securing a regular direct link with London by satisfying the eminently reasonable aspiration for a new, faster and hourly Lincoln <> Newark Castle <> Nottingham service and linking it with one of the Nottingham <> St. Pancras trains<sup>75</sup>.

4.2.42 Whether a Lincoln service should be extended to South Humberside across the somewhat sparsely-populated area via Market Rasen is probably arguable. A better alternative might be for a Doncaster 'all-stations' to run from/to Cleethorpes, with the added advantage of calling at Scunthorpe and Thorne that have otherwise been left out of the list of off-route places. Like Network Rail we reject the suggestion of competition for the Nottingham traffic with a service via Grantham as it would be a waste of precious ECML capacity and of little value compared with the post-electrification Midland service. Similar reasoning and a limited market apply in the case of Skegness and Boston, which will best be covered by good connections at Grantham.

4.2.43 Finally we deal with one other campaign we are aware of, namely the aspiration by local bodies in Leeds for three trains/hour. The evidence for benefits is thin, and it may be suspected of owing something to jealousy of what Virgin provides for Manchester<sup>76</sup>. We are unconvinced that that provision is justified by current or future off-peak loadings – and of course it falls foul of the

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<sup>75</sup> This is subject to three qualifications: whether paths can be found across Newark Crossing (pending a flyover), whether Midland electrification will include bi-mode units and whether a path determined by the crossing is compatible with the Midland pattern.

<sup>76</sup> Having argued the 'turn-up-and-go' appeal of a 20-minute frequency with a train always ready at Piccadilly and Euston, Virgin has undermined it by its policy of high on-the-day fares and heavily-discounted advance tickets.

integration rule against 20-minute cycles [¶3.3.14]. Two trains/hour and fast peak extras are probably a smarter solution. Having made that point, however, there remains the desirability of connectivity between Leeds and Wakefield and the three stations south of Doncaster.

4.2.44 Bearing all these considerations in mind the scheme we propose is set out in Table 5. It is of course provisional since it is unavoidably based on incomplete data and subjective judgments, however much they are made on a best-possible basis. In sum Middlesbrough (and perhaps the Durham Coast by reversal there) and Hull would have fast London trains in every other hour. Scarborough and Harrogate would have alternating ‘all-stations’ trains, preferably with a layover at York to allow passengers who so wished to transfer to the faster London train. South Humberside and Leeds would have a similar arrangement, with transfer at Doncaster. If portion-working is feasible (given the constraints at Doncaster station) then the plan could include serving Leeds hourly and running through from West Yorkshire via Pontefract two-hourly in addition to the suggested hourly connecting service.

<b>Table 5</b>						
<b>Proposed allocation of the ‘all-stations’ and ‘eighth’ paths</b>						
	hour 1		hour 2		hour 1	hour 2
	‘York’ all-stations	‘Doncaster’ all-stations	‘York’ all-stations	‘Doncaster’ all-stations	eighth path	eighth path
Durham Coast						?
Teesside						✓
Scarborough	✓					
Harrogate			✓			
York	✓		✓			✓
Hull					✓	
South Humberside				✓		
Leeds		✓		?		
Halifax ... Mirfield		??		??		
Pontefract area		?		?		
Doncaster	✓	✓	✓	✓	✓	✓?
Retf'd, Newark, Grantham	✓	✓	✓	✓		
Peterborough	✓	✓	✓	✓		
London King's Cross	✓	✓	✓	✓	✓	✓

For an explanation of the combinations and the judgments behind the question marks see ¶4.2.44

4.2.45 A critical final point must be made. This scheme is derived from a concept of what is right for the ECML as a whole when the dominant concern is to maximise the public benefit (this does not presuppose that every detail is right). No presumption is made about what organisation will operate the services or about the role, if any, of open-access companies. The essential feature is the integrated form of the timetable and its advantages for the great majority of journeys on and associated with ECML and the importance of not compromising that with the complications of operator-specific tickets. If two or more organisations were to run elements of the complete ICEC service it is also important to note that there may be consequences for diagramming resources: in a previous exercise with a similar pattern efficient turnrounds at King's Cross would have required an incoming Hull train to return to Scarborough under a different brand.

### **Great Northern services**

4.2.46 At present the Great Northern services comprise the half-hourly non-stop trains between Cambridge and London King's Cross (with alternate trains starting from / running to King's Lynn), the outer-suburban semi-fast and stopping trains between Cambridge or Peterborough and King's Cross, and the Welwyn Garden City and Hertford Loop <> London Moorgate service. All run to a regular pattern off-peak, but there is significant variation to cater for peak levels of demand.

4.2.47 The semi-fasts from Cambridge call at Royston, Baldock, Letchworth Garden City, Hitchin and Stevenage and then run non-stop to Finsbury Park. From Peterborough the arrangement is all stations to Stevenage and then Finsbury Park. The stopping trains also call at Knebworth, Welwyn North, Welwyn Garden City, Hatfield and Potters Bar, and on the Cambridge line at every station. The Moorgate line plan is for a service alternating between Welwyn and Hertford North, in both cases calling at all stations. One Hertford train in each hour starts from Letchworth.

4.2.48 Each of the outer-suburban services runs every 30 minutes, and they are so arranged that in one half-hour the Cambridge semi-fast precedes the Peterborough stopper at Stevenage while in the opposite half-hour the reverse operates (with a mirror-image plan northbound). This secures for Knebworth to Potters Bar inclusive half-hourly connectivity with Cambridge, Royston, Letchworth and all stops on the Peterborough line, alternately by through train and by changing. This is an admirable and well-executed pattern, but strangely it does not seem to be promoted. First Capital Connect [FCC] printed timetables do not display it clearly, the frequency is not strongly advertised, and above all the FCC network map misleadingly fails to distinguish between the semi-fast and stopping services<sup>77</sup>. This weakness has been carried through into descriptions of how the services will change with the inauguration of Thameslink.

4.2.49 A major feature of the Thameslink Project [TLP] is that, in addition to the increase in frequency of trains between the Midland Main Line and the Southern network via St. Pancras International (low-level platforms), the ECML will also be connected to enable some Great Northern services to run via the central tunnel to and from various places south of the Thames. The link, currently under construction, will run from the slow lines at Belle Isle Junction on the approach to King's Cross to Canal Tunnel Junction just to the north of St. Pancras. The latter was built as a flying junction as part of the reconstruction of St. Pancras station, but Belle Isle will be a flat junction, with southbound trains crossing the path of northbound services coming from King's Cross (a flying junction would have been extremely difficult to build and is perhaps not critical).

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<sup>77</sup> See [http://www.firstcapitalconnect.co.uk/static/pdf/network\\_route\\_map.pdf](http://www.firstcapitalconnect.co.uk/static/pdf/network_route_map.pdf). The diagram in Appendix 2B of the TSGN ITT is similar: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/245041/invitation-to-tender.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245041/invitation-to-tender.pdf).

4.2.50 However, on the more general issue of the operational resilience of the Thameslink project, DfT appears to have some concerns, for the following remarkable paragraphs appear in the report of the consultation on the TSGN franchise:

“Developing the timetables that will operate from 2018 will be a highly complex task. The increase in the number of services operating through the core means that there will be much greater inter-dependency between services operating north of London and those operating south of London. For example, decisions about the timetable for the East Coast Main Line will now affect, and be constrained by, the timetable decisions that are taken for the Brighton Main Line. This means that, if the Department specifies highly detailed requirements about the future Thameslink service pattern (for example specifying exactly how many trains must run from each potential origin north of London to each potential destination south of London, or specifying detailed calling patterns for each service), bidders would have little or no meaningful flexibility to develop a set of timetables that maximises overall passenger benefits. On the other hand, too loose a specification presents the risk of not fully securing the anticipated benefits of the TLP. In the ITT and TSR, the Department has therefore sought to strike an appropriate balance – specifying many of the key locations that must receive Thameslink services following completion of the Thameslink Programme, but leaving a reasonable degree of flexibility for bidders to determine the detailed service patterns”<sup>78</sup>.

4.2.51 I find this unconvincing. In all the Department’s ITTs a plethora of specifications constrain what bidders can offer, but its ideological certainties lead it to a belief that somewhere out there an entrepreneurial company will identify an offer that no one has previously thought of. There is little evidence to support this. And it leads to the preposterous situation that enormous funds are being spent by bidders on designing timetables for discrete bits of the national network which, following the franchise awards, Network Rail will have to mesh together – with a high likelihood of messy compromises because commitments have been made outwith an overall plan. For example, if East Coast is deemed to have priority large parts of the Southern system will be dependent on it, with side effects on the Midland too, but the opposite could cause acute problems. And has anyone told Transport Scotland that Brighton and Thurso will be umbilically connected? *No stronger argument could be made for a national timetable plan.*

4.2.52 There is then the question of day-to-day operation. Whether this was studied when Thameslink was being designed I do not know, and it may be that the undoubted advantages of a highly-connected regional network in south-east England were considered to outweigh any concerns. Even so, it is clear that there will be some sensitive decisions because any degradation of services through the Thameslink core could cause trouble on a densely-used ECML, and *vice versa*. For the present purpose however we do no more than try to design patterns and margins on ECML that are reasonably robust.

4.2.53 So far as the pattern goes it has been noteworthy that specifications for Thameslink have been in constant flux and often vague, and so far the successful bidder for TSGN (Govia) has not made any detailed announcements. Our scheme therefore follows the published outline as well as it can be discerned. This has two semi-fasts from each of Cambridge and Peterborough running onto Thameslink in each hour, together with two trains from Letchworth, which we assume will be the Cambridge stopper doubled in frequency. However this interpretation leaves an anomaly: no off-peak service between Finsbury Park and King’s Cross. Whether that is the intention (Great Northern trains will of course be calling at St. Pancras) must await clarification. Note too that Hertford Loop trains will no longer run north of Stevenage once the turn-back platform is built there to enable a half-hourly frequency for the extensions from Hertford North.

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<sup>78</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/245205/consultation-responses-tsgn.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245205/consultation-responses-tsgn.pdf), ¶4.59 and 4.60.

4.2.54 The recently-completed upgrade of the third line in each direction between Alexandra Palace and Finsbury Park to full passenger status will permit an increase in frequency on each branch of the Moorgate service. Off-peak this will be from three to four trains an hour, thereby meeting a long-held aspiration of London TravelWatch and its predecessors but also removing the 30/20-minute anomaly. However this is another example of ill-coordinated planning since no platforms have been provided on the third track at the two intermediate stations (Hornsey and Harringay), much to the concern of local residents in the absence of definite plans for future frequencies. Unless and until platforms are built (which probably can be done) some trains will have to run non-stop from Alexandra Place or north thereof to Finsbury Park on Slow Line 2.

4.2.55 There is also some ambiguity about which Moorgate trains will be switched to Thameslink. Some sources say all four Welwyns off-peak and emphasise that Hertford <> Moorgate will become a self-contained service, but others suggest only two Welwyns. That would create an awkward problem of uneven and undesirably long gaps between Finsbury Park and Moorgate (15-minute intervals on each branch would mean a 7½ - 15 cycle, which could possibly be remedied by inserting a Gordon Hill <> Moorgate twice an hour). A final complication is that the DfT has stipulated numerous peak-hour variations to these patterns.

4.2.56 At this stage we have not addressed the peak timetabling questions, especially in view of the complication that the morning and evening periods differ. This arises because the inbound commuting peak is sharper but happens to allow extra flexibility because it largely precedes the arrival of the peak ICEC trains, whereas outbound in the evening the commuting and long-distance peaks more or less coincide. The former is also more spread out than in the morning for reasons related to working hours and leisure activities. Similarly we have not included any timings south of Belle Isle Junction or discussed destinations south of the Thames – that is all for further work.

4.2.57 Because of the connectivity advantages we have timed the two Peterborough trains (both now semi-fast) to precede the Cambridge all-stations through Stevenage, a plan that we trust Govia will be following despite its current low profile (the doubled frequency on the Cambridge side renders the opposite part of the scheme redundant). This is only one of a number of factors that have determined our overall plan:

- ⇒ the desirability of securing good connections between ICEC trains and the outer-suburban service at Peterborough (the interchange time for each batch of three ICEC trains is 19.1 minutes from the first to the Great Northern departure and 11.1 for the third);
- ⇒ the two-track section between Fletton Junction, south of Peterborough and Huntingdon North Junction;
- ⇒ the fact that no overtaking is possible between Cambridge and Hitchin, which constrains the timing and sequence on the branch (the Cambridge fast comes through Cambridge Junction only 3.6 minutes behind the semi-fast and overtakes it near Stevenage: enabling the non-stop to run direct onto the Up Fast rather than have to run Slow Line through the platform to Hitchin South Junction would ease this manoeuvre);
- ⇒ the routing of trains from and to the Cambridge line through Hitchin – this is simpler now that the flyover is available in the down direction, but the weaves from slow to fast (up) or fast to slow (down) remain an issue;
- ⇒ the sequence and timing of trains through the two-track section between Woolmer Green Junction and Digswell Junction, just north of Welwyn Garden City;
- ⇒ the need for the stopping service to run Fast Line between Potters Bar and north of Finsbury Park in order to overtake an inner-suburban train; and
- ⇒ the desirability of brisk interchange between outer- and inner-suburban routes at Welwyn Garden City (bearing in mind that southbound passengers have to cross the footbridge).

4.2.58 The dominant factor is of course Welwyn Viaduct and how the merging at Woolmer Green is planned. The half-hourly outer-suburban cycle (which merits absolute status both for passengers' benefit and for operational reasons in the Thameslink core) and the advantages of pairing ICEC trains [see ¶4.2.17] make a half-hourly cycle at Woolmer Green logical and fit with the imperative of maximising utilisation of its capacity. Full advantage then has to be taken of the 3-minute headway between fast services and of the rule that permits trains entering the section from the slow line to do so only 2 minutes after a fast has passed. Allowing for two trains/hour to stop in section at Welwyn North and for a resilience margin it is generally accepted that the maximum sensible throughput is 18 trains/hour in the peak and 16 off-peak.

<b>Table 6</b>		
<b>Proposed southbound sequence in each hour at Woolmer Green Junction</b>		
service	pass Woolmer Green Junction  xx:~~	notes
peak extra	01.2	Peterborough fast or ICEC
York all-stations	04.2	
Leeds 2-stop	07.2	
Peterborough > Thameslink semi-fast	09.7	
Anglo-Scot 3	14.4	the 4.7 minute gap is explained by spacing north of Peterborough and the Stevenage stop in this train
the 'eighth' path [see Table 5]	17.4	non-stop York or Doncaster > London
Cambridge all-stations	19.4	
Cambridge > London non-stop	23.3	3.9 because of spacing at Hitchin Cambridge Junction
Cambridge > Thameslink semi-fast	25.8	precedes Cambridge non-stop and is overtaken while on Slow Line
peak extra	31.2	5.4 minute recovery window; see 01.2
Doncaster all-stations	34.2	
Anglo-Scot 2	37.2	
Peterborough > Thameslink semi-fast	39.7	
Leeds 4-stop	44.4	see 14.4
Anglo-Scot 1	47.4	non-stop Newcastle > London
Cambridge all-stations	49.4	
Cambridge > London non-stop	53.3	see 23.3
Cambridge > Thameslink semi-fast	55.8	see 25.8
<i>cycle repeats</i>	01.2	5.4 minute recovery window

4.2.59 The plan is summarised in Table 6. The cycle is rigorously maintained, and, given the demands on capacity and all the constraining factors, we believe it retains a reasonable recovery window. As Network Rail has demonstrated our analysis confirms (as also did earlier exercises) that quadrupling the Woolmer Green section (at great expense) would not alone solve the supposed problem since the constraints to both north and south are strong and would also have to be resolved in various equally expensive ways. It is unlikely that growth will reach the scale that would justify this. Moreover, a combination of maximising the capacity of each train, of orderly and reliable presentation of trains at the Junction<sup>79</sup> and of ERTMS signalling will resolve most of the present difficulties. They should also be sufficient to nullify the politically-hyper-sensitive idea of closing Welwyn North station.

4.2.60 Our design for the ICEC timetable is based, as we have explained, on a large set of considerations ranging geographically from Edinburgh Waverley to London King's Cross. It has necessarily ignored DfT's convoluted stipulations in the ICEC and TSGN ITTs, since they represent the worst aspect of its approach – neither central timetable planning nor much flexibility for bidders.

4.2.61 Moreover some of the details are odd or legalistic. For example, the TSGN ITT originally contained a statement [p.66] about the spacing of the ICEC paths at Woolmer Green, but a later amendment<sup>80</sup> withdrew this and replaced it with a note about the general pattern of services (ie. TSGN bidders should outline their East Coast assumptions while separate ICEC bidders are designing *their* preferred timetables !). This amendment also mentions the obsolete idea of xx:00 and xx:30 departure-times from King's Cross (though it does say they are “desirable but not essential”) and seems prescriptive about calls at Stevenage.

4.2.62 Interestingly the timetable we propose also seems to cast doubt on whether any quadrupling north of Huntingdon is essential. If a Class 4 freight can depart from Peterborough just after the outer-suburban and run to Langley Junction (just south of Stevenage, before taking the Hertford Loop) in about 52 minutes it can do so without conflicting with other trains on the Slow Line. Whether certain work would facilitate robust operation is another matter, as is whether an expensive project is justified solely for the peak. We also note that the present frequency of day-time freights on this section is less than hourly, even if every 'Q' (as required) path is occupied daily.

4.2.63 That completes the commentary on the work done so far. There is much more to do. If these proposals to illustrate a vision for the East Coast Main Line in 2020 are broadly endorsed by the informed audience to whom they are addressed I shall hope to build on them and to extend them in order to offer a means of creating an even better railway for Britain.

4.2.64 The final pages display the timetabling decisions in graphic form:

- ⇒ an outline of how the public timetable would look for a standard hour.
- ⇒ a 'Netgraph' summarising the plan in a form that stresses the interconnections; and
- ⇒ three conventional train-graphs (an overview, Peterborough ... King's Cross and Cambridge ... Welwyn).

In all these purple represents the very fast train, green the ICEC services, red regional services and blue suburban services.

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<sup>79</sup> It could be that the lack of a clear pattern in the current peak timetable and the widespread use of pathing allowances are not conducive to smooth working. One of my Swiss colleagues once expressed surprise at the attention paid to 'the Welwyn problem', implying that SBB would take such a constriction in its stride.

<sup>80</sup> This is on the DfT website at the same page as the main ITT, see footnote 77.

**Appendix I****Summary of strategies, associations between services, conflicts and timetabling issues – and of work status**

<b>location</b>	<b>services: strategies and associations</b>	<b>operations, conflicts and timetabling</b>	<b>work status and comments</b>
Edinburgh Waverley	connections from/to north and west very important	other services to/from west end frequent and largely self-contained, hence excluded for now	concepts for Inverness and Aberdeen lines prepared in outline
Edinburgh Waverley	through services to/from ECML		not yet considered in present exercise
Edinburgh Waverley	linking local services across Edinburgh	Fife Circle + Borders, Stirling and/or Bathgate + North Berwick and Dunbar ??	may be desirable for connectivity but operational risks because of tight ECML and Borders pathing
Edinburgh Waverley		platforming, turnrounds, east-end conflicts at Abbeyhill Junction	not yet considered (diagramming is complicated by likelihood of different IEP configurations)
Craightinny Depot		ECS workings	not yet considered
Powderhall Branch and Portobello Junctions		freight movements, including Leith <> Niddrie and Millerhill Yard	check but frequency makes problems unlikely
Portobello Junction		redoubled junction assumed, but up Borders / down ECML conflicts will remain	possible problem, to be checked – nb. constraints on Borders paths and connections at Waverley
Monktonhall Junction		up freights / down ECML	check but frequency makes problems unlikely
Drem		up ECML / down North Berwick conflicts	tight with up Dunbar, tweak with care
North Berwick		turnrounds	good as drafted but limited flexibility
Dunbar	provision for ECML stops and feed to/from proposed regular local service	reconfiguration necessary but cost a constraint because of limited benefits	new island platform proposed – see Figure 3 and Table 4 for operational plan
Oxwellmains and Torness	freight movements		check but problems unlikely
East Linton and Reston	proposed new stations	profound implications for capacity	need careful appraisal relative to benefits (nb. cases differ) – see ¶4.2.27-31
Berwick-upon-Tweed	bus connections for the Borders		draft timings conducive (ie. near xx:00/30)

Alnmouth	bus connections for Alnmouth town and Alnwick		timings not ideal (c. xx:51 southbound, c. xx:09 northbound)
Chathill, Acklington, Widdrington, Pegswood	exiguous local service only used for about 40 journeys/day		there is no conceivable justification for retention of this service and the stations should be closed
Morpeth	bus connections for Ashington and Pegswood and (northbound) for Blyth		timings acceptable (c. xx:07 southbound, c. xx:53); local service to be planned
Newcastle upon Tyne Central	Tyne Valley connections a priority, also Sunderland to/from south and Scotland <> Durham Coast	any passenger-flow problems from ECML trains coinciding ?; local services have mostly conflict-free routes	connections not yet planned in detail, but proposed key ECML timings are supportive
Darlington	Tees connections important (even with through IEPs), also Bishop Auckland services and Richmond buses	conflicts between down Scottish fast and all up services calling; practicability of joining/splitting IEP Middlesbrough portions of Scottish service; Tees local services conflict when crossing at south end	key London train close to xx:30; slight conflict with Edinburgh > Plymouth, other paths can be kept clear; Tees provision to be decided
Northallerton		down Tees trains / up ECML	trans-Pennine paths to be determined
Skelton Bridge Junction		up slow crosses to west of fast lines	sufficient provision required for freights
Skelton Junction		Harrogate trains must use (reversible) fast lines	potential pathing problem – proposed rerouteing via slow lines to/from south end of station ?
York	Scarborough and Harrogate connections north and south a priority, also north <> Hull	allocation of platforms to optimise passenger convenience and connections needs consideration, especially given routeing of Scarborough trains	occupation to be determined in detail, but principal ECML London paths are close to xx:00 and xx:30
York	cross-country and trans-Pennine paths integrated with ECML		work yet to be undertaken
Hambleton North Junction		down Hull > York / up ECML conflict	York <> Hull timetable to be determined
Templehirst Junction		down London > Hull / up ECML conflict	probable Hull paths outlined south of Doncaster, still to be determined from/to Hull
Shaftholme Junction		up Pontefract / down ECML conflicts	probable paths outlined south of Doncaster, still to be determined from/to West Yorkshire

Marshgate Junction		up Leeds / down York ECML conflicts	significant issue, not yet resolved in detail (long-term possibility: route up trains onto the Adwick Junction ... Stainforth Junction line and then via a south curve onto ECML near Shaftholme)
Doncaster	Humberside <> ECML north and south connections important, also Wakefield and Sheffield lines locals with ECML	Humberside routes <> Sheffield services require regular crossing moves, also southbound cross-country trains toward Sheffield	detailed pathing yet to be undertaken (Doncaster station is a well-recognised problem but cost-effective solutions are not obvious)
Retford	minor connections with low-level line		low priority
Newark Flat Crossing	Lincoln <> Nottingham service crossing ECML	ECML pathing constrains timetabling of this service	two paths available each hour (one needed for freight ?) –little flex in ECML structure
Newark Northgate	through services and/or connections for Lincoln (and possibly Grimsby)	up ECML / through down Lincoln trains conflict; practicality of joining / splitting IEP units	relationship of possible Lincoln shuttle with proposed half-hourly ‘all-stations’ service yet to be resolved, but note calls are close to xx:00/30
Grantham	fairly important connections with Skegness <> Nottingham trains	no conflicts since Allingham Curve opened	Skegness <> Nottingham not yet timed, ECML calls are at xx:10/40 up, XX:20/50 down
Werrington Junction	freight trains crossing from / to the GN+GE Joint Line	conflict between ICEC trains and freight to/from East Anglia or northbound from ECML	flyover under consideration, but hugely expensive and disruptive – ICEC gaps may be adequate
Peterborough ... Werrington Junction	reasonable connections for Spalding line services	use of bi-directional up slow	to be planned
Peterborough	high-priority connections between north and East Anglia, also Stamford line <> London	but limit dwells for Liverpool <> Norwich and Birmingham <> Stansted services; no significant conflicts but platforming needs careful planning	considered within ECML overall structure, detail yet to be developed
Peterborough ... Huntingdon	connections between ECML and outer-suburban / Thameslink services	extension of up slow from Huntingdon back toward Peterborough is envisaged, but extent ought to depend on timetabling	outlined in overall ECML structure, detail yet to be confirmed – may depend more on freight paths than passenger
Hitchin Flyover	down Cambridge line services	assumed all use the new flyover	within ECML plan
Stevenage	ECML services <> outer-suburban services	preferably brief connections	planned as far as practicable within overall ECML scheme
Woolmer Green Junction ... Digswell Junction	all services	sequence-optimisation essential up to 18 trains/hour in peak (? 20 in am peak)	planned as key element within overall ECML scheme, using 2 x half-hour cycles

Welwyn Garden City	outer suburban <> inner suburban connections	minimise wait if at all possible	Cambridge semi-fasts run fast-line between Potters Bar and Finsbury Park to pass Inners
Potters Bar	Cambridge semi-fast services	crossing between slow and fast lines	in proposed scheme but may need tweaking
Alexandra Palace	merging of Hertford Loop and Welwyn services onto Up Slow 1 (or US2 if any in peak to omit Hornsey and Harringay)	needs careful timing	provisionally provided for
Hertford Loop	increased frequency proposed, following creation of Up Slow 2	decisions on systematic skip-stop pattern (present timetable reveals little pattern)	not yet examined
Finsbury Park	all suburban services	ideally all Outers should use Slow Lines 1 and all Inners Slow Lines 2	provisionally planned but needs checking, especially the parallel moves between Fast and SL1 lines and between SL1 and SL2 lines
Thameslink	proposed services from/to GN (but public documents somewhat vague)	pathing at new flat crossing at Belle Isle Junction may be a problem	services planned in principle within ECML scheme but detail needs to be developed (nb. working assumption that ECML determines Thameslink)
London King's Cross	all services	potential conflicts in throat	platforming detail not yet studied, but Platform 0 and transfers to Thameslink offer relief

## Appendix 2:

### Outline of a Standard Hour (as it might appear in public timetables)

#### The 'Netgraph' for the ECML

#### Train-graphs : ECML overview, Peterborough ... King's Cross and Cambridge ... Welwyn

## A Strategic Plan for an Integrated Regular-Interval Timetable : draft proposals for the East Coast Main Line

### Outline of a Standard Hour

<b>EDINBURGH</b> Waverley	09:22		09:42					09:47	09:52	10:09					10:19					
4 suburban stations	✓								✓											
Drem	09:47								10:17											
Dunbar	09:56							10:08	to											
Berwick-upon-Tweed			10:21					10:30	North					10:58						
Alnmouth								10:51	Berwick											
Morpeth								11:07												
<b>NEWCASTLE UPON TYNE</b>			11:06					11:22		11:30				11:41						
Durham								11:35					<<	11:54						
<b>DARLINGTON</b>			11:32					>>					11:57	12:11						
Northallerton													12:07							
<b>YORK</b>			12:01									12:05		12:29	12:40					
<b>LEEDS</b>															✓					
<b>DONCASTER</b>			11:57		12:22							12:28	12:50	12:52		13:04				
Retford			12:15									12:45								
Newark North Gate			12:28									12:58								
Grantham			12:41									13:11								
<b>PETERBOROUGH</b>			13:03	13:06	13:09			13:18				13:33	13:36	13:39		13:48				
Huntingdon								13:32								14:02				
St Neots								13:39								14:09				
Sandy								13:46								14:16				
Biggleswade / also Arlesey								13:50								14:20				
<b>CAMBRIDGE</b>	12:32	12:48				13:25		13:02	13:18						13:55					
Hitchin	13:08	13:15						13:38	13:45	14:01						14:31				
Stevenage	13:13	13:22			13:39			13:43	13:52	14:06				14:09		14:36				
Knebworth	13:17							13:47												
Welwyn North	13:21							13:51												
Welwyn Garden City	13:25		13:12					13:27	13:55		13:42		13:57							
Hatfield	13:29		13:16					13:31	13:59		13:46		14:01							
2 suburban stations				✓					✓											
Potters Bar	13:35		13:25					13:40	14:05		13:55		14:10							
7 suburban stations				✓					✓											
Finsbury Park	13:44	13:41	13:46					14:01	14:14	14:11	14:16	14:25	14:31			14:55				
<b>LONDON</b> King's Cross	13:49	*	*	13:49	13:52	13:59	14:09	*	14:19	*	*	*	*	14:02	14:19	14:22	14:29	14:39	*	14:32

\* toThameslink

# SPiRiT -- A Strategic Plan for an Integrated, Regular-Interval Timetable for the East Coast Main Line

NETGRAPH 2020

