NETWORK AVAILABILITY KPI

Option Assessment Report

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1. INTRODUCTION

Background and study objectives

1.1 The Office of Rail Regulation (ORR) requires a measure of the impact on railway users of possessions causing disruption to rail services. While Network Rail already produces possessions-related statistics on a four-weekly basis, these do not reflect their impact from the point of view of either rail operators or final customers. Steer Davies Gleave has been commissioned by the ORR, in partnership with Network Rail, to define a Key Performance Indicator (KPI) or group of KPIs that gives proper weight to the different characteristics of possessions, in particular:

- The location and length of the route affected, recognising that any given possession will typically affect a much larger section of the network than that actually subject to the engineering works; and

- Their timing, taking account of the fact that possessions during peak times will cause greater disruption to passenger services than at other times, while those at night are likely to affect freight services disproportionately.

1.2 To some degree, Schedule 4 of the Track Access Agreements between Network Rail and passenger operators already provides for the calculation of a weighted measure of possessions, expressed in terms of revenue compensation for the disruption caused. However, there is no clear consensus on whether the weightings and other parameter values applied in the calculation are appropriate in all circumstances. The Schedule 4 algorithm is subject to a parallel assessment to determine whether it can be improved as part of a wider rationalisation of the regulatory and contractual provisions governing both Network Change and possessions compensation.

1.3 The aim of this assignment is therefore to supplement the information on possessions compensation, which is confidential to the operators concerned, with one or more transparent Network Availability KPI(s) that provide all industry stakeholders with an understanding of how possessions are affecting the network as a whole. The need for such a measure arises as a result of:

- Concern among Train Operating Companies (TOCs) and Freight Operating Companies (FOCs), together with government, over a perceived increase in the extent of disruption to the rail network due to closures related to engineering works;

- A lack of appropriate metrics for measuring and monitoring the extent of disruption, inhibiting rational discussion of the issue;

- Network Rail's published ambition of moving to a '7-day a week' railway; and

- ORR's need for a mechanism to compare the value of alternative availability scenarios for regulatory purposes.

1.4 There may be a need for a single Network Availability measure covering both passenger and freight, however, it is recognised that it may also be appropriate to have

separate measures to capture the different requirements of user groups (e.g. passenger and freight) and additional measures to monitor against any potentially perverse incentives.

1.5 This paper sets out a number of proposed metrics that could be adopted to provide an industry measure of Network Availability, indicating trends in the effects on operators and users. It builds on earlier work to develop a 'long list' of possible metrics, derived from preliminary discussions and examination of industry data sources made available to us. A summary of our assessment of the 'long list' is appended to this paper (Appendix B).

Structure of this report

1.6 The subsequent sections of this report are organised as follows:

- Section 2 outlines our methodology and approach;
- Section 3 examines the range of potential metrics and issues concerning the practicality of their application;
- Sections 4 and 5 define, respectively, a suite of potential primary and secondary metrics that could be developed and adopted to enable the ORR and the industry to monitor Network Availability; and
- Section 6 provides a summary of our main conclusions and proposed next steps.

1.7 We also provide the following appendices to this report:

- Appendix A provides a glossary of industry abbreviations used;
- Appendix B provides a summary of the 'long list' of metric options considered; and
- Appendix C provides a summary of interviews conducted with industry stakeholders.

2. METHODOLOGY

Approach

2.1 Our approach to the specification of a Network Availability KPI is based on three main work streams:

- Identification of KPI options;
- Assessment of KPI options; and
- System specification.

2.2 This report summarises the outcome of the first two of these work streams and proposes a suite of KPI measures which are considered to best meet the assessment criteria set out below. The report includes detailed definitions of the proposed KPI's and identifies the data sources for the specification.

2.3 The system specification work stream is being undertaken partly in parallel, and the initial assessment of the industry data systems currently available has helped to inform the assessment of KPI options. Further work will involve a more detailed audit of the key systems, for example Network Rail's Possession Planning System (PPS) and the Schedule 4 Compensation System (S4CS) that will underpin the KPI(s). The specification will then be developed, taking into account how data can be drawn from different sources and how they should be formatted for the purpose of calculation and presentation of results.

Identification of KPI options

2.4 As noted above, the first stage of this study involved developing a 'long list' of possible metrics that could be used to reflect Network Availability. We gave consideration to a range of stakeholder objectives and aspirations for the measure and to the availability of potential data sources to facilitate calculation. Key steps involved:

- Preparatory work to review previous relevant work and consideration of synergies with other related projects (e.g. data collection), including the review of the Schedule 4 revenue compensation for possessions, which has been conducted in parallel to this study;
- Internal workshops with industry experts involving brainstorming and then challenging metric concepts;
- Interviews with a representative selection of industry stakeholders, including TOCs, FOCs, ATOC, DfT Rail, Passenger Focus and Transport Scotland., seeking comments concerning the impact of possessions on Network Availability (a summary of the key points arising from these interviews is provided in Appendix C): and
- Drafting a long list of possible metrics and an initial assessment against criteria reflecting the desired characteristics for a Network Availability KPI (a summary of

the potential metrics considered and our initial assessment is provided in Appendix B).

2.5 The range of options considered is discussed further in Section 3.

Option assessment

2.6 A 'short list' of metrics was drawn up from those measures included in the 'long list' that showed the most promising potential against the initial assessment criteria. These were grouped as either:

- 'Primary' metrics, where they scored particularly well against most of the criteria; or
- 'Secondary' metrics that were considered to have merit as supplementary measures that could be monitored as a check against potentially perverse behaviours that might arise from one or more of the primary metrics.

2.7 We then subjected the 'short list' of metrics to testing and feasibility analysis. This included the following activities:

a) Detailed metric definition;
b) Graphical projection of metrics and statistical testing with potential parameter weightings in order to examine historical trends;
c) A feasibility assessment involving examination of the practical issues involved in capturing the relevant data and developing routine reporting systems for the variable parameters;
d) Further consideration of how far the KPIs, as defined, meet the objectives of the monitoring and targeting process and the extent to which they result in perverse incentives; and
e) Verification of functional specification and determination of the appropriate calibration of fixed input parameter weightings.

2.8 It should be noted that following this process of testing and analysis, some of the metrics as proposed have been redefined from their original descriptions as shown in the long list in Appendix B.

Evaluation criteria

2.9 We adopted a two stage evaluation framework to facilitate the selection of the preferred KPIs.

2.10 The first stage involved assessing each of the metrics on our 'long list' against four criteria designed around the objectives of the ORR (a summary showing our assessment of these metrics is included in Appendix B). These stage one criteria are described below.

Stage 1 Criteria

(i) Ease of understanding and calculation

2.11 Any metric must be relatively easy to calculate such that the calculation process can be subject to automation and the result published on a regular basis. Moreover, industry stakeholders must understand and "buy-in" to the metric(s), and be able to draw clear conclusions from trends over time as to whether the impact of possessions is improving or deteriorating.

(ii) Alignment with rail network user requirements

2.12 The need for simplicity implied by the above criterion must be balanced against the need to ensure that the metric(s) adequately reflects the range of impacts on network users, according to the different characteristics of possessions. For example, as far as possible it should reflect the availability of diversionary routes and alternative/substitute modes as well as recognising different user characteristics (passenger and freight).

(iii) Use of existing data/systems

2.13 Any metric should make the best use of existing industry data sources and systems. Development of new systems can be time consuming and costly, and require additional resources to monitor and maintain.

(iv) Potential for disaggregation

2.14 Rail users will be more concerned with the performance/availability of those parts of the network that are relevant to their usual journey/service and less concerned with overall network performance, and therefore the ability to present a metric at an appropriate level of disaggregation is important.

Stage 2 Criteria

2.15 The second stage of the evaluation framework involved examining each of our preferred metrics on our 'short list' against a wider range of criteria, including those outlined above and the following additional considerations:

(v) Sensitivity of the KPI to changes in parameter values.

2.16 'External' factors which could influence the KPI (e.g. change in number of trains operated) need to be taken into account. It is important that such factors do not lead to significant deterioration in the KPI notwithstanding the beneficial impact of changes to the number, location or timing of possessions. Where necessary, effects of this kind can be addressed through appropriate normalisation of the chosen metric.

(v) Ability to update the KPI to take account of changes in rail strategy and policy

2.17 A number of changes in the broader regulatory framework are possible, not least changes to the Schedule 4 compensation mechanism following the current review. The chosen KPI(s) must be readily adaptable to reflect such changes.

(v) Robustness against potential for introducing perverse incentives on Network Rail

2.18 There is a risk that any one measure may incentivise Network Rail to adopt strategies that are counter to the objective of reducing the disruptive effects of possessions on operators and network users, or to broader objectives such as making the best possible use of existing rail capacity. For example, in principle and metric that deteriorated simply because of an increase in the number of trains operated, regardless of the underlying pattern of possessions, could discourage Network Rail from accepting additional services. Again, such incentives may need to be addressed through appropriate normalisation techniques as well as through companion measures reflecting the company's other objectives.

2.19 An assessment of each metric against these criteria is included in Sections 4 and 5 of this report.

3. METRIC OPTIONS

3.1 Many of the potential metrics included in our 'long list' addressed only some of the desired criteria for this study. For ease of understanding we have categorised the list under five potential ways of measuring Network Availability:

- Infrastructure availability;
- Train operator impact;
- Timetable impact – impact on train journey time;
- Passenger impact; and
- Level of predictability and reliability.

3.2 In this section we explain the key issues associated with each of these types of measure and the corresponding options considered in our 'long list', as described in Appendix B, are referenced by option number.

Infrastructure availability (options 1.1 and 1.2)

3.3 This approach builds on the KPI metric already developed by Network Rail, which records overall Network Availability at a national level. This KPI is based on a sum of all track-kilometres that are unavailable for service. This is subtracted from total track-kilometres to provide a measure of the network available for service, expressed as a percentage per period.

3.4 The limitation of this Network Rail KPI is that it does not reflect the value of that availability to passenger or freight operators or users of the network. There is no distinction between lost availability of track during a time when few or no trains are scheduled and the loss of a critical junction or intensively used section of track such as on a busy commuter route.

3.5 We have considered some alternative options (options 1.1 and 1.2) that weight the track-km available by the level of usage. One approach could be to weight by apportioned revenue. This would reflect the relative importance to the operator and could be taken as a proxy for importance to passengers. If revenue for freight operators were available on a comparable basis, it could be possible to create a combined passenger and freight metric. However, it would not reflect the direct impact, taking account of the time of day or the extent of disruption (extended journey time or cancellations). In the absence of usable freight revenue data to establish a combined metric, a passenger only metric on this basis would have limited value and could be better represented simply by a summary of the compensation payments to operators through Schedule 4.

3.6 An alternative approach could be to weight available track-km by scheduled train-km per period. This would have similar shortcomings in terms of not reflecting the direct impact on operators, but could more readily be provided as a combined freight and passenger metric. It would be a fairly coarse and simplistic measure, which would not

address the relative value of passenger train-km to freight train-km. However, it could offer a relatively straightforward improvement to Network Rail's current availability KPI.

3.7 Given the aspiration for a single metric encompassing the relative value to passenger and freight operations, we have proposed a derivation of this measure based on a weighting of possession-track km-hours by revenue at risk. The weighting is derived from the relative values of revenue associated with the Strategic Route Section on which a possession occurs. The metric is described further in Section 4.

3.8 During the interviews conducted with stakeholders, a number of respondents identified the importance to freight operators of the availability of a route between origin and destination. For many freight traffic flows, there are alternative routes available and thus a possession on one route can be mitigated by using a diversionary route. On the other hand, for some freight flows, especially containerised inter-modal traffic requiring the larger W10 loading gauge, the availability of diversionary routes can be very limited. It was suggested that there could be merit in a measure of route availability between key freight traffic nodes. As a general measure for all freight traffic, this would be problematic given the sheer number and complexity of origin and destination pairings. But for a core network of W10 cleared routes between key terminals, there could be some merit in such a measure, although it would only be of interest to the stakeholders in such inter-modal traffic.

Train operator impact (options 2.1 – 2.4)

3.9 The impact of possessions on operators manifests itself in a number of ways:

- **Loss of revenue due to interruption to passenger demand.** This can be an immediate effect and also a longer term impact, particularly where services are frequently interrupted (e.g. by weekend closures) or subject to change at short notice where passengers perceive the service to be unreliable. This can be particularly acute for late evening and weekend markets. In the case of freight operators, an inability to offer a reliable and predictable service can lead to lost accounts with freight shippers simply switching modes.

- **Additional costs of operation.** These are associated with additional train mileage (including track access charges), revised fleet maintenance schedules and training and resources to maintain a capability to operate over diversionary routes.

- **Additional costs of providing replacement bus and taxi services.** These vary considerably by operator, but can be very significant where, for example, diversionary routes are not available.

- **Costs of business disruption.** These include resources engaged in train planning, scheduling temporary timetables, publicity and the general level of management distraction from delivery of the original planned service.

3.10 Schedule 4 is already designed to compensate passenger operators for the loss in revenue for planned possessions. Whilst the effectiveness and efficiency of this mechanism has been the subject of review as part of a parallel study, in principle, the

Schedule 4 compensation mechanisms can be adopted as a metric to reflect the revenue impact on passenger train operators.

3.11 With the exception of possessions associated with enhancements ('Network Change') or where 'Significant Restrictions of Use' apply (where there are bespoke arrangements for compensation for additional costs incurred, agreed by negotiation), there is no compensation mechanism for freight operators affected by planned possessions (although we understand that at the time of writing, an extension of the terms for compensation payable to freight operators under Schedule 4 is being considered). In the absence of a systematic compensation regime for freight operators, there are no appropriate data systems on which to directly relate possessions and the impact they have on freight operators.

3.12 With the exceptions referred to in the paragraph above, there are no existing mechanisms for compensating TOCs or FOCs for the costs incurred as a result of possessions. We considered estimating operating cost as a function of train distance in order to provide a metric that reflected the relative impact of possession on TOC/FOC costs (Option 2.2). However, the problem with such a metric is that any increase in train-km (and thus costs), caused by diversions for example, can be offset by a reduction in train-km due to cancelled or curtailed services, thus making the underlying effect difficult to determine. Furthermore, in respect of freight, there are difficulties in capturing the change in train-km arising from possessions due to the complexity of freight schedules. This point is discussed further below under 'Timetable Impact'.

3.13 As noted above, the cost of replacement bus services is more significant for some operators than others. Where there are alternative tracks (e.g. fast lines and slow lines) or diversionary routes available, the extent to which rail replacement bus services are required when possessions take place may be quite limited (e.g. South West Trains), but where they are not prevalent, the level of replacement bus services can be considerable (e.g. ONE). Also, the nature of the market served and the relative yield per train-km varies considerably, such that for a given possession the cost of replacement buses may be relatively small compared to the value of revenue lost (for which compensation is paid through Schedule 4) for an Inter-city operator (e.g. Virgin West Coast), whereas the bus replacement costs are likely to make up a much larger component of a regional operator's costs (e.g. Scotrail).

3.14 The inconvenience to passengers of having to transfer between trains and replacement bus services, the poor quality of some of the buses provided and the increase in the resulting journey times were highlighted by some of the stakeholders interviewed. Furthermore, some stakeholder respondents commented that they had a concern that Network Rail was reluctant to exercise single line working, a measure that would reduce the need for replacement bus services.

3.15 We believe that a metric that reflects the extent to which rail replacement bus services are necessitated by possessions would serve as useful check on this component of operator costs and passenger disruption. We considered a metric based on bus costs as a function of replacement bus hours (Option 2.3) and have proposed that such a measure would be useful as a secondary KPI to supplement the primary Network Availability KPI(s).

3.16 Whilst a metric that reflects the net financial impact would be desirable, there are difficulties of practicality. We considered the concept of such a measure (Option 2.4), but the absence of data sources to reflect the true costs to operators prevents the net financial effect from being determined. The recently commissioned study to identify improvements to the current compensation regime for costs incurred by TOCs as a result of possessions is being undertaken in parallel to this study. In the event that the outcome of that study results in a mechanism, such as an extension of the Schedule 4 regime to incorporate a cost compensation component, we would recommend that our suggested metrics drawing on the S4CS should be reviewed to see if a cost component could be incorporated.

Timetable impact – impact on train journey time (options 3.1 -3.3)

3.17 In principle, the timetable impact on passenger train journey time is already captured quite comprehensively within the Schedule 4 regime. The process involves a manual comparison between the planned timetable (defined as the First Working Timetable) and the revised timetable for operation at the time of a relevant possession (defined as the Applicable Timetable). For each possession a manual judgement is made on whether the difference between these timetables is due solely to the possession or partly due to the possession and partly for other reasons (e.g. TOC request due to special event). The difference between the two timetables is measured within the timetable database system and a percentage attributed reflecting the extent to which the possession is considered responsible for the difference.

3.18 The timetable differences are measured in terms of a number of attributes including journey time, journey distance and calling points and the relevant percentage applied. These differences inform the NREJT and WACM values as applied in the Schedule 4 compensation regime. (Note that where possessions are already included in the First Working Timetable, a comparison is made with a Corresponding Day Timetable to reflect the typical timetable that would have been operated had the possession not been planned).

3.19 Whilst there is an element of manual intervention, this system seems reasonably robust for capturing the actual impact of possessions on passenger train journey time and the stopping points affected. We have considered options using this measure, applying an average revenue weighting in order to provide a measure that captures the impact on passengers, at least to some degree.

3.20 The measure is somewhat more problematic for freight trains. At present, freight trains are not included in the timetable comparison for S4CS purposes. However, since such trains have a similar coding structure it would be theoretically possible to include them and, by creating 'dummy' service groups and monitoring point weightings, operator specific or traffic specific flows could be reflected. The main difficulty arises from the lack of a stable freight timetable due to the variable nature of freight train operations. In particular:

- The relatively short planning horizon for freight operators means that there are a considerable number of additions, subtractions and alterations between the drafting of the 'First Working Timetable' (FWTT) and the period of currency of that 'base' timetable;

- The utilisation of timetabled paths varies considerably, where for some commodities (e.g. Coal) the actual utilisation of scheduled paths is less than 50%, while for others (e.g. Intermodal) it can be as high as 95%; and

- Many freight services are scheduled and operated at short notice (entered into the timetable by the 'spot bidding' process), where they may be scheduled even after a possession with a short notice period has been planned.

3.21 Freight access rights take one of three forms. Level 1 rights, Level 2 rights and Spot Bid rights. Level 1 rights give access to timed train slots at both the origin and destination of the traffic and are often route specific. Level 2 rights give access to a quantum of train slots between an origin and destination; these train slots can use any available route at a time which is determined when the relevant timetable is created. Spot Bid rights are available at shorter notice and allow the operator to gain access to spare capacity that is available on the network at short notice. Given that Level 1 rights are most likely to appear as route specific paths in the FWTT they could be more easily incorporated into a timetable based metric. Thus the metric could be developed to reflect availability for Level 1 freight paths. However, such a measure would exclude a very significant proportion of freight traffic. Most freight trains operated by the more recently established FOCs and freight train movements associated with newly acquired contracts are scheduled in paths acquired under Spot Bid arrangements.

3.22 Thus, if a similar approach to that used in Schedule 4 for passenger services were adopted for freight services, there would be considerable difficulty in determining timetable changes due to the variability of the 'base' timetable. In addition, differentiating timetable changes due to a possession from those induced by the operator, particularly in view of the sheer volume of operator-generated changes. We note, however, that there has been a trend towards increasing timetable stability in some freight flows and that further work could determine what changes would be needed to make such a process workable.

Passenger impact (options 4.1 – 4.3)

3.23 Given the desire to reflect the impact of possessions on the user, a measure that reflects the direct effect on the passenger is particularly important in meeting the ORR's and Network Rail's objectives for the KPI.

3.24 Again, the availability of data from S4CS means that the effect on passenger journeys can be sourced from the same factors that are used to derive the impact on passenger revenue. A reasonable representation of the impact on passenger-experienced journey time could be achieved by applying the average number of passengers per train by relevant Service Group to the 'NREJT + WACM' values derived from S4CS (Option 4.1). In principle, such a measure could be further refined to take account of the 'value' of notification given (as captured by S4CS), the relevant "Busyness Factor" for the period and the values of time of relevant users (e.g. according to the profile of Business, Commuter and Leisure passengers for each Service Group) (Option 4.2).

3.25 A coarser measure could be based on a count of passenger journeys affected by possessions, without reference to the magnitude of the impact or the relative value of

that impact to the passengers affected (Option 4.3). Whilst this would certainly be simpler to calculate, given the data readily available from S4CS, there seems little merit in such a measure compared to one which took account of different impacts across different types of service and groups of passengers.

Unified metric

3.26 A key challenge for establishing a single unified measure of Network Availability that reflects the relative values of both passenger and freight users is in finding a unit of value common to both modes. The only logical unit would seem to be an economic one. We considered the concept of combining the economic value of possession impacts on passengers, as described above, with an equivalent economic value of the impact on freight. Unfortunately this approach was constrained by:

- The limited availability of disaggregated data for freight traffic movements with respect to network geography (e.g. Strategic Route Section);
- The lack of data sources relating the effect of possessions on the operation of freight and services; and
- The absence of established economic values of time for rail freight commodities.

3.27 As a compromise, we considered a combined metric based on a common denominator such as train-km, but without any basis for the relative importance of passenger train-km compared to freight train-km this would seem to have limited merit.

3.28 We therefore propose an approach that aims to get closer to an economic value by identifying the 'revenue at risk' for both passenger and freight operators on different parts of the network and using this as a basis for a combined metric. There are, however, still some data issues to be addressed, particularly with regards to determining and disaggregating freight revenue.

Level of predictability and reliability (options 5.1 – 5.4)

3.29 A key issue for many of the stakeholders interviewed was the level and consistency of notice given for possessions. For long distance passenger operators, many customers book on line and require reservations. The ability to do this is constrained by the timing of uploads of timetable changes to the national timetable data base. Currently, the cut-off period for this is 12 weeks. Although only a relatively small proportion of customers require bookings and reservations further in advance than this. This weakness in the current system nonetheless compromises potential revenues, particularly on some high value routes where there is strong competition from air and on which airlines are able to offer reservations up to a year ahead.

3.30 For other operators, where advance reservations are less significant, the 12 week cut-off period is less important for sales, but having sufficient notice to be able to plan and organise resources and to ensure that publicity of the timetable change is properly provided remains important.

3.31 For freight operators, the predictability and level of notice given regarding possessions

was cited as a key issue by those stakeholders interviewed. There was also a perception that many possessions are notified and then amended or cancelled, thus exacerbating the planning workload.

3.32 The Notification Factor within the Schedule 4 regime provides a mechanism for reflecting the value of notice to the passenger and the effect this has on revenue. Whilst we see some merit in retaining this component in a Network Availability metric in that it provides some incentive to NR to plan possessions earlier and given that it is already captured in the S4CS data system. However, we note that this element is being subject to review as part of the parallel exercise to consider modifications to the revenue compensation mechanism in Schedule 4. In addition, inclusion of the Notification Factor will also complicate the metric and make it more difficult to interpret. For example, an improvement in the metric could simply reflect that notifications were taking place earlier without any material reduction in their actual impact. We examined the effects of including and excluding the Notification Factor and found that it had only a small effect on the results.

3.33 Recognising the importance of predictability to operators whilst noting the limitations of the Notification Factor within Schedule 4 and that it only addresses passenger revenue compensation, we believe that there could be merit in having other secondary metrics which would enable the reliability and predictability of possessions to be monitored. These could include:

- The percentage of possessions uploaded to the National Timetable database on or before the 12 week threshold (Option 5.1);
- The average notification period for possessions (Option 5.2); and
- The percentage of possessions amended or cancelled (Option 5.3)

3.34 There is a risk that a regulated target for Network Availability could lead to behaviours which have perverse consequences. For example, if more work is concentrated within possession periods, in order increase the time that the network is available, the risk of possession overruns could also increase. This could be particularly undesirable where such overruns disrupted morning peak services on busy commuter routes. We believe therefore that a measure of possession overruns (Option 5.4) would also be desirable. This would be relatively easy to draw out as a measure, since “possession overrun” is already a cause code used in recording delay minutes incurred by different operator operating over different parts of the network.

Other relevant key issues

3.35 Two other key issues have emerged during the course of this study. First, the ability to disaggregate possessions data derived from the S4CS geographically, and to assign certain parameters such as train-km, is dependent on mapping possession locations to a common geographic locator. We have proposed that Strategic Route Sections provide the most practical basis for disaggregation, since any smaller geographic unit would make the data handling task unwieldy. However, each possession location entered into PPS is described by reference to a start and finish point corresponding to so called Sectional Appendix descriptors. These descriptors are theoretically traceable

to Strategic Route Sections via CTS code descriptions.

3.36 On further investigation, we have found discrepancies in some of the descriptors as they appear in the S4CS output data files, such that automated mapping to Strategic Route Section codes has proved problematic. We have undertaken some illustrative plotting of some of our proposed metrics using historical data, but to do so has involved a considerable amount of manual manipulation of the location descriptors. We will need to explore this issue in more detail and examine the PPS and S4CS systems to determine how this issue can best be addressed.

3.37 Secondly, with no equivalent possession compensation regime for freight, there is a lack of existing data sources from which to derive the possession impacts on freight trains. The problems of discerning the impacts of timetable changes may not be insurmountable, but as discussed above need further investigation.

3.38 It appears that each freight operator employs their own bespoke systems to monitor possessions to furnish themselves with sufficient information to support claims and monitor trends. This will not aid automation of data collection and makes analysis of historical trends difficult if not impossible. However, having discussed this with some of the freight operators, we conclude that it may be more practical to develop a metric that is informed by data collated and submitted by the FOC, than for NR to design a new data monitoring system to fulfil this role.

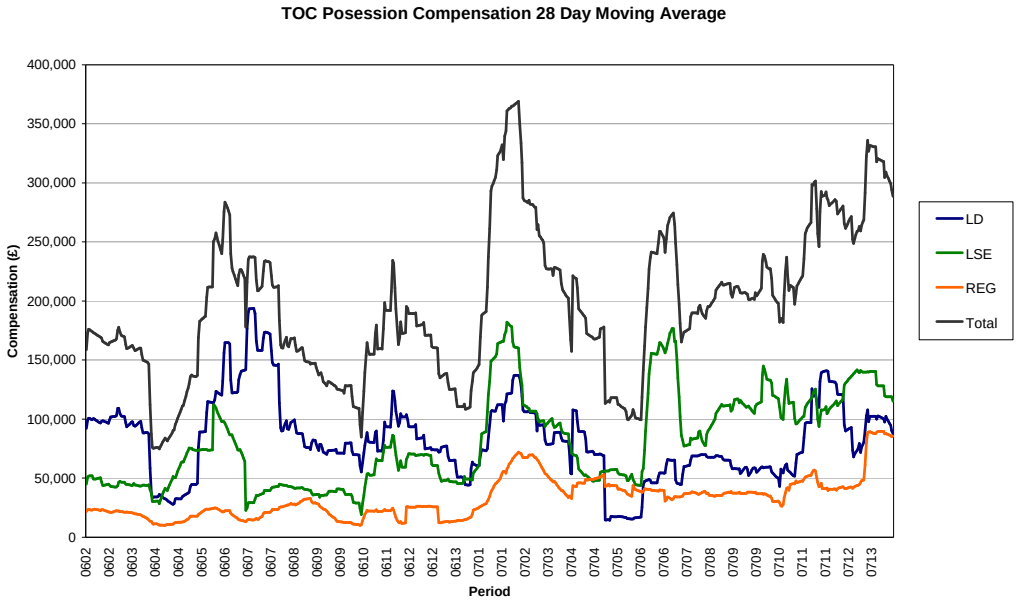
3.39 There is also a lack visibility of freight revenues. Tariffs are negotiated between operators and customers on a confidential basis. We have derived some generic values for freight in general based on the declared revenues in the published accounts of the major operators, but this does not give any indication of the relative values by commodity.

4. PRIMARY KPI's

Introduction

4.1 Schedule 4 compensation payments can be taken as an indicator of the trend in possession impacts on passenger operators. It is evident from a plot of the Schedule 4 compensation payments, as illustrated in Figure 4.1, that the impact of possessions has been increasing during the last two years.

FIGURE 4.1 SCHEDULE 4 COMPENSATION PAYMENTS TO TOCS



4.2 As already noted, this mechanism, whilst not without its imperfections, provides a reasonable indicator of the revenue impacts of possessions on TOCs. However, it does not necessarily fully reflect the economic value to passengers and takes no account of freight operators or their customers.

4.3 As discussed in Section 3, there are a number of issues that make a single Network Availability metric that reflects the value to all users particularly difficult to define and calculate. We have therefore proposed a 'short list' of 'primary' metrics (described in this section) that show how value of impacts on the user can be represented for passenger, freight and both combined. We also propose some 'secondary' metrics (described in Section 5) which could be used to monitor and discourage potential perverse effects. This potential suite of metrics meets most of the desired criteria as outlined in Section 2.

Passenger metric

Excess passenger journey time and weighted cancellation minutes (EPJ,) weighted by busyness, passenger journeys and user value of time (wVT)

Measurement unit: £/train-km representing the value of the excess journey time per train-km per period.

4.4 This metric measures the value of the impact of possessions on the excess journey time as experienced by passenger, normalised to total train-km. It takes account of the effect of cancellations and reflects the economic value of the additional journey time incurred.

4.5 The measure is calculated as follows:

$$EPJwVT = \frac{\sum_{SG}\left[\sum_{d}\left\{\left(NREJT_{SG,d} + WACM_{SG,d}\right) \bullet BF_{SG,d} \bullet PASS_{SG,d}\right\} \bullet VoT_{SG}\right]}{\sum_{SG} PT_{SG}}$$

4.6 The first part of the measure is derived from the outputs of S4CS where:

> $NREJT_{SG,d}$ is the average extended Journey Time per train as a result of a possession (Network Rail Restriction of Use) in respect of the relevant Service Group(s) calculated daily; and
>
> $WACM_{SG,d}$ is the weighted average of Cancellation Minutes per train for the relevant Service Group (s) calculated daily.

4.7 The values of NREJT and WACM are calculated as defined in Schedule 4, Part 3, paras 3.4 (c) and (b) respectively.

4.8 The second part of the measure represents a weighting to reflect the number of passenger journeys affected for the relevant Service Group(s).

Individual terms are defined as follows:

> $BF_{SG,\,d}$ is the busyness factor applicable to the relevant day and Service Group(s), as defined as in Schedule 4, Part 3, para 3.4 (d); and
>
> $PASS_{SG,\,d}$ is the average number of passenger journeys per day for the relevant Service Group(s).

4.9 The calculation for daily values is then aggregated for each Service Group by period.

4.10 In each case, the relevant calculation takes account of Monitoring Point weightings, as defined in Schedule 8 of the Track Access Agreements, and hence these measures reflect differing levels of passenger demand across individual Service Groups by location for the relevant day.

4.11 The aggregated daily values are then multiplied by the weighted value of time for the relevant Service Group(s) defined as follows:

> VoT_{SG} is the value of time for the relevant Service Group(s), reflecting the ratios of business, commuter and leisure traffic and associated values of time for each passenger group (as defined in DfT WebTAG appraisal guidelines).

4.12 The calculation is then normalised against changes in train service level by dividing the whole by the sum of scheduled passenger train-km across all Service Groups (shown in calculation as PT_{SG}). This normalisation will offset the tendency of the numerator in the expression to increase with the number of train services regardless of

any change in the underlying pattern of possessions. The metric nevertheless requires an explicit calculation of the total economic value of disruption caused by possessions in a given period or year.

4.13 Proposed sources for the data required for this measure are shown in table 4.1 below:

TABLE 4.1 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
$NREJT_{SG,d}$	Derived by Service Group for each day of each possession directly from S4CS	S4CS
$WACM_{SG,d}$	Derived by Service Group for each day of each possession directly from S4CS	S4CS
$BF_{SG,d}$	Derived by Service Group for each day of each possession directly from S4CS	S4CS
$PASS_{SG,d}$	Daily average of annual passengers per Service Group derived from LENNON	LENNON
VoT_{SG}	The value of time as defined in DfT Appraisal Guidance (WebTAG) is weighted by journey purpose (Business:Commuter:Leisure) for the relevant Service Group. The split by journey purpose is determined from NPS survey data which provides the split by journey purpose and ticket type for each TOC. The values for each TOC are then weighted to give values for each Service Group using the relative proportion of tickets sold by type for each Service Group and applying the journey purpose/ticket type ratio for the relevant TOC.	WebTAG NPS LENNON
PT_{SG}	Periodic average of total annual scheduled passenger train-km across all Service Groups.	Historic values from ORR National Rail Trends Current level derived from National Timetable Database

4.14 This metric can be expressed at a national network level or disaggregated by network geography down to TOC or even Service Group level (the latter would require a split of train kilometres by Service Group, which, while it is not available from National Rail Trends, could be obtained from the National Timetable Database). Using Service Groups, the measure could also be split by peak and off-peak to some degree. The data can also be arranged to give a comparison between days of the week (e.g. weekday/Saturday/Sunday). It might also be possible to disaggregate the measure by Strategic Route or even Strategic Route Section, depending on the availability of correspondingly disaggregated values for $PASS_{SG}$ and PT_{SG}.

4.15 This metric is illustrated in Figures 4.2 to 4.4 with a plot of possession data for the year 2005/6 for each of the three TOC sectors and compared against the profile of compensation payments made under Schedule 4. The graphs confirm that the metric delivers a similar profile to that of the corresponding compensation payments in all

three sectors. However, as the metric values represent economic values of disruption caused rather than operator revenue, they should not be subject to the same degree of commercial sensitivity, allowing them to be published at a greater level of disaggregation than would be possible in the case of compensation payments.

FIGURE 4.2 PASSENGER METRIC (EPJWVT) FOR LONG DISTANCE TOCS COMPARED TO SCHEDULE 4 COMPENSATION PAYMENTS

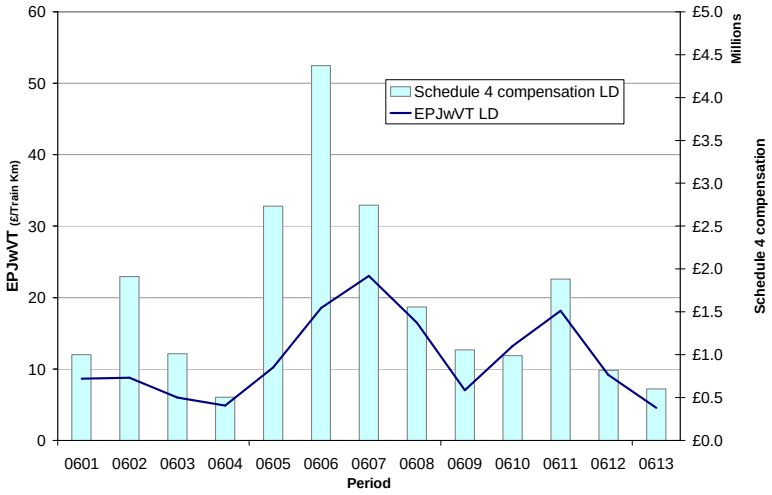


FIGURE 4.3 PASSENGER METRIC (EPJWVT) FOR LONDON AND SOUTH EAST TOCS COMPARED TO SCHEDULE 4 COMPENSATION PAYMENTS

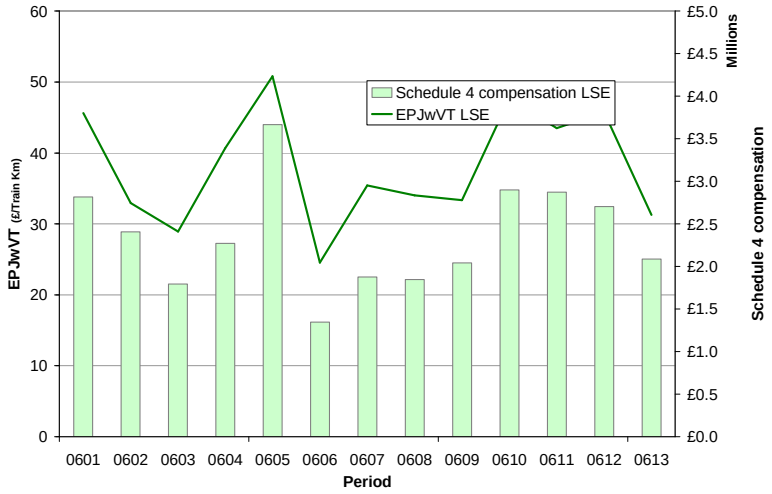
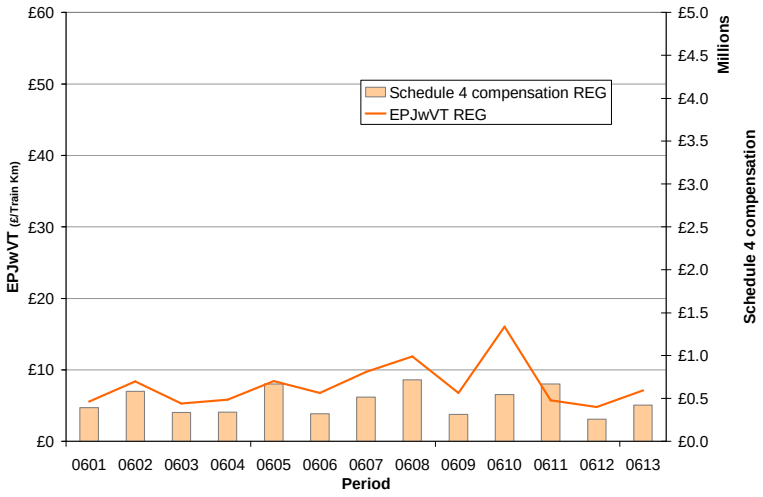


FIGURE 4.4 PASSENGER METRIC (EPJWVT) FOR REGIONAL TOCS COMPARED TO SCHEDULE 4 COMPENSATION PAYMENTS



4.16 As defined, the metric does not distinguish between different times of the day, except where Service Group definitions themselves distinguish between the peak and the off-peak. Hence, in the case of many services, neither the $PASS_{SG,\,d}$ or the VoT_{SG} term weights those possessions taken during peak hours relative to those taken in the off-peak. We therefore considered a further refinement by applying a weighting to reflect relative demand profiles by time of day (demand profiles were derived from MOIRA).

4.17 We found this to have little effect on the results (as illustrated for three sample Service Groups in Figures 4.5 to 4.7. This is likely to be due to the fact that few possessions affect the peak demand periods and most of those that do are blockades, affecting whole days, with a time of day weighting of 100%. Furthermore, as already noted, many intensive peak period operations (i.e. commuter services in the South East and the metropolitan areas) have separate Service Group definitions.

4.18 This analysis suggests that such a weighting would add to the complexity of the metric without improving the extent to which it captured the impact of disruption associated with possessions. However, while this observation may be true for the existing pattern of possessions, it might not hold for others having a greater impact on peak hour traffic. While we would not expect Network Rail to implement a possessions strategy involving significant disruption in the peak, it is clearly important that any such disruption is properly reflected in the KPI. We have therefore concluded that the inclusion of time of day profiles should be investigated further in the detailed definition of the metric prepared in the course of the technical specification.

FIGURE 4.5 PASSENGER METRIC (EPJWVT) FOR SAMPLE LONG DISTANCE SERVICE GROUP COMPARING WITH AND WITHOUT TIME OF DAY FACTOR

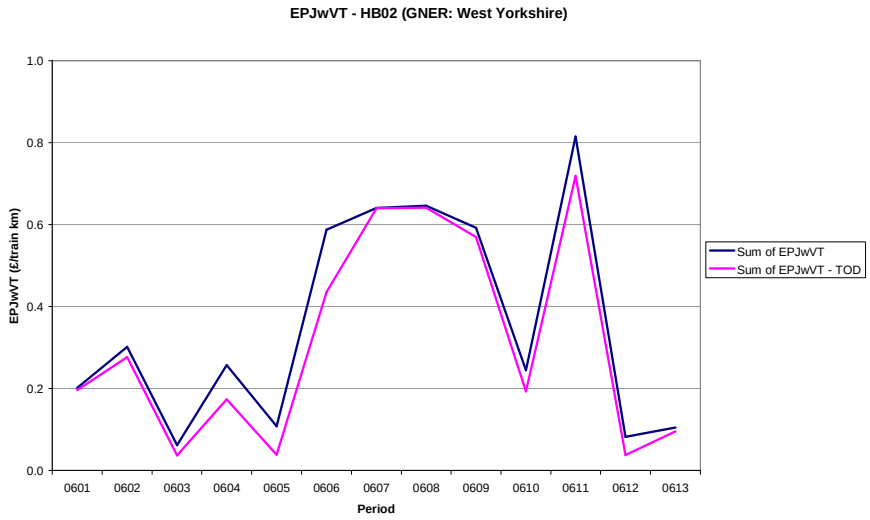


FIGURE 4.6 PASSENGER METRIC (EPJWVT) FOR SAMPLE LONDON AND SOUTH EAST SERVICE GROUP COMPARING WITH AND WITHOUT TIME OF DAY FACTOR

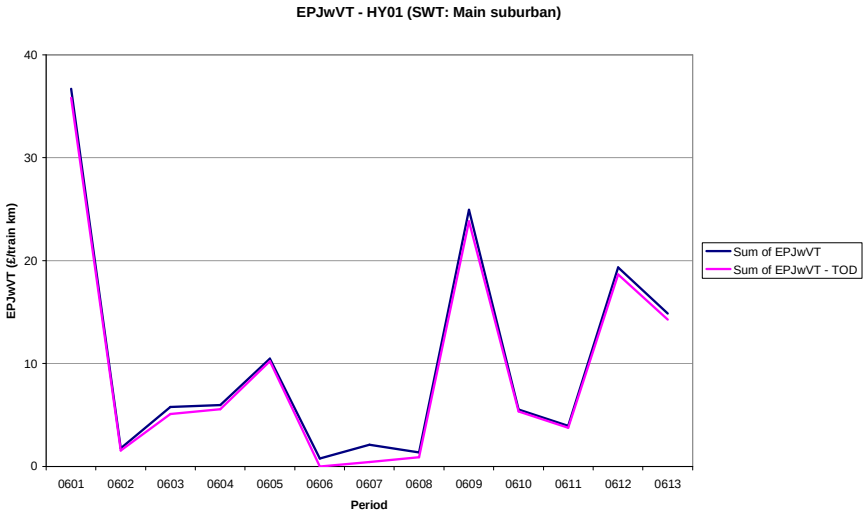
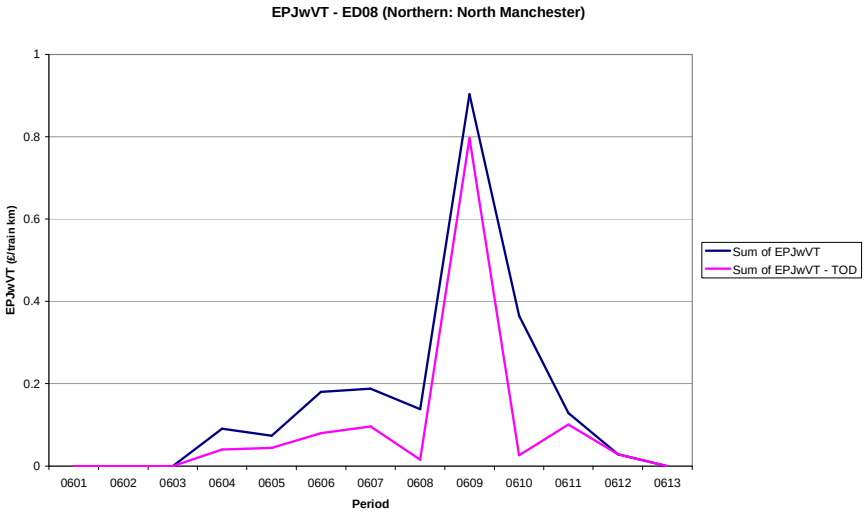


FIGURE 4.7 PASSENGER METRIC (EPJWVT) FOR SAMPLE REGIONAL SERVICE GROUP COMPARING WITH AND WITHOUT TIME OF DAY FACTOR



4.19 There is a further issue concerning the VoT_{SG} term, which is based on standard values of time used in the economic appraisal of transport schemes. These indicate that the value of commuting time is relatively close to that of leisure time, and substantially below that of work time. It is therefore possible that an off-peak Service Group used by a substantial number of business passengers could carry a greater weight than a heavily utilised peak commuter-based Service Group, encouraging Network Rail to take possessions in peak hours.

4.20 Taking the values of time as given, this would be justified in economic terms, since the disruption caused by taking the possession in the off-peak would be considered greater. However, in practice disruption to commuter services affecting the journey to work can affect the working day itself and result in associated costs to businesses and other organisations. While a review of the value of commuter time is beyond the scope of this study, it will be important to understand the resulting weighting of peak relative to off-peak services and test whether this is appropriate in the context of rail operations.

TABLE 4.2 SUMMARY ASSESSMENT OF PASSENGER METRIC (EPJWVT)

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Some basic understanding of the concept of Extended Journey Time and the economic value of time is required.	Fair
Ease of calculation given existing data sources and systems	Can be calculated from existing S4CS and pre-determined input parameters for passenger VoT weightings.	Good
Potential level of disaggregation	Can be expressed at operator and SG level, and potentially at SRS level.	Good
Sensitivity of the KPI to changes in parameter values	Analysis shows that the metric reflects a similar profile to Schedule 4 compensation payments. The metric is relatively insensitive time of day demand profiles, but is dependent on the demand factored Monitoring Point Weighting and Busyness Factors.	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Value of time reflected and weighting can be further refined to reflect daily, weekly and seasonal profiles. Inclusion of Busyness Factor also ensures that seasonality can be reflected.	Good
Ability to update the KPI to take account of changes in rail strategy and policy	The metric is dependent on the Schedule 4 regime and S4CS.	Fair
Robustness against potential for introducing perverse incentives on Network Rail	Doesn't incentivise against strategies which favour passenger services at the expense of freight. Doesn't incentivise against short term notification.	Fair

Freight metric

Track-km availability weighted by freight traffic level (TwF)

Measurement unit: Weighted percentage of track-km available per period

4.21 There is limited information available on the levels of freight traffic that can be mapped onto parameters associated with possessions recorded in PPS. Within these constraints, we propose a development of Network Rail's existing availability KPI.

4.22 This metric measures the availability of track-km weighted by the level of freight traffic operated over each Strategic Route Section. The measure takes the level of non-availability by Strategic Route Section and applies a weighting to reflect the intensity of freight traffic scheduled over that section on the relevant day of the week. It is calculated daily taking account of the proportion of freight traffic operating by day of the week and aggregated to give a measure per period.

4.23 The measure is calculated as follows:

$$TwF = 1 - \left[\frac{\sum_{SRS} \left\{ \sum_{d} \left(TU_{SRS,d} \bullet FTW_{SRS,d} \right) \right\}}{\sum_{SRS} \left\{ \sum_{d} \left(TT_{SRS,d} \bullet FTW_{SRS,d} \right) \right\}} \right]$$

Where:

$TU_{SRS,d}$ is the track-km hours unavailable due to possessions for the relevant Strategic Route Section on the relevant day;

$TT_{SRS,d}$ is the total track-km hours for the relevant Strategic Route Section for the relevant day;

$FTW_{SRS,d}$ is freight traffic weighting[1], calculated as:

$$FTW_{SRS,d} = \frac{DwFT_{SRS,d}}{\sum_{SRS} \sum_{d} DwFT_{SRS,d}}$$

Where:

$DwFT_{SRS}$ is the average daily weighted freight tonne-km attributed to the relevant Strategic Route Section calculated as the average scheduled freight tonne-km per day multiplied by a weighting of the relative proportion of freight train operations for the relevant day attributed to the relevant Strategic Route Section.

4.24 The values of $DwFT_{SRS,d}$ would be pre-determined as a fixed input, although these could be updated from time to time to reflect changes in freight traffic flows.

[1] Note that the value of $FTW_{SRS,d}$ varies by SRS and day, and is multiplied by the corresponding value of $TU_{SRS,d}$ or $TT_{SRS,d}$, as appropriate, before the summation across days and SRSs is applied.

4.25 Proposed sources for the data required for this measure are shown in table 4.3 below:

TABLE 4.3 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
$TT_{SRS,d}$	Derived from IMC* where the track-km for each ELR are aggregated by Strategic Route Section and multiplied by hours for the relevant day.	IMC*
$TU_{SRS,d}$	The track-km (derived from IMC*) for each ELR affected by possessions for the relevant day are multiplied by the duration of the relevant possession (derived from PPS) and aggregated for each Strategic Route Section. This measure is a proxy for the track-km unavailable for use as some ELRs may only be partly unavailable, whilst others not directly affected by the possession may be inaccessible as they are on an associated line of route.	IMC* PPS
$DwFT_{SRS,d}$	A predetermined value of the average scheduled freight tonne-km per day attributed to a relevant Strategic Route Section derived from ACTRAF. The value is then weighted by the number of freight trains operated for each day of the week for that Strategic Route Section and expressed as a ratio of the average number of daily freight trains operated. The weighting is also derived from ACTRAF.	ACTRAF
(* to be verified in specification of this metric)		

4.26 This metric can be expressed at a national network level or disaggregated by network geography down to Strategic Route Section.

4.27 It is noted that for any given possession the actual track-km occupied are not readily obtainable from PPS. The proposed measure of track-km unavailable is a relative measure of non-availability, since it is derived from the length of the ELRs that are either fully or partly affected by a possession. Track-km are derived from track-miles values for each ELR.

4.28 The actual track-km or route-km available for train operations will inevitably be different since a possession may also render some other track sections unavailable due to occupation of access routes. Furthermore, the availability of track-km does not necessarily reflect availability of capacity, since the capacity available due to the occupation of one track may vary considerably depending on the number of alternative tracks available and the capability of signalling system (e.g. whether fitted for bi-directional working). Also, depending on the location of a possession, other route sections may be rendered unavailable due to the possession blocking access to them.

4.29 Data required from IMC, PPS and ACTRAF to enable this metric to be plotted will be collected as part of the work associated with the system design specification for this metric. At the time of writing, we are also investigating with ORR whether time of day profiles for freight traffic can be assessed by reference to access rights specified in track access contracts between freight operators and Network Rail. These would allow the metric to be further refined through the inclusion of time of day weightings. If such an assessment is possible, and the resulting weightings are considered appropriate in terms of the incentives that they would create, it would be relatively straightforward to modify the metric accordingly.

TABLE 4.4 SUMMARY ASSESSMENT OF FREIGHT METRIC (TWF)

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Consistent with existing Network Rail availability KPI with a weighting for freight.	Good
Ease of calculation given existing data sources and systems	Requires data sourced from PPS, ICM and ACTRAF and verification of freight tonne-km by Strategic Route Section.	Fair
Potential level of disaggregation	Can be expressed by network geography down to Strategic Route Section level.	Fair
Sensitivity behaviour of the KPI to changes in parameter values	This metric would be sensitive to changes in the freight traffic weighting. An appropriate periodicity for the review of this pre-determined input will be determined in the design specification for this metric.	Fair
Ability to reflect relative user values by time of day, day of week and seasonality	These aspects are not reflected, although freight traffic variability by day of week is partly reflected.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	The basic measures of track availability should continue to be possible to determine, whatever the rail strategy or policy.	Good
Robustness against potential for introducing perverse incentives on Network Rail	As a complementary measure to a passenger metric, could act as a check against strategies which favoured passenger at the expense of freight.	Fair

Unified metric

Revenue at risk (RR)

Measurement unit: Weighted revenue (£) at risk per period

4.30 This metric aims to provide a single unified measure of Network Availability, weighted by passenger and freight user value. Given the lack of data to support compatible parameters for passenger and freight, we have adopted a measure of revenue at risk as proxy for user value. It is designed to utilise available data sources.

The metric measures the average operator revenue at risk due to possessions and is calculated daily and aggregated by period as follows:

$$RR = \sum_{SRS}\left[\sum_{d}\left\{TU_{SRS,d} \bullet RW_{SRS,d}\right\}\right]$$

Where:

$TU_{SRS\ D}$ is the possession track-km-hours calculated daily for the relevant Strategic Route Section;

$RW_{SRS,d}$ is the weighted revenue at risk for the relevant Strategic Route Section and the relevant day, calculated as:

$$RW_{SRS,d} = \frac{RF_{SRS,d} + RP_{SRS,d}}{TH_{SRS,d}}$$

$RF_{SRS,d}$ is the average daily freight revenue at risk for the relevant Strategic Route Section;

$RP_{SRS,d}$ is the average daily passenger revenue at risk for the relevant Strategic Route Section; and.

TH_{SRS} is the total track-km for the relevant Strategic Route Section multiplied by the hours per day.

$RF_{SRS,d}$ is calculated as follows:

$$RF_{SRS} = RFT \cdot FT_{SRS,d}$$

Where:

RFT is the average revenue per freight tonne-km; and

$FT_{SRS,d}$ is the average freight tonne-km weighted by day of week for the relevant Strategic Route Section and relevant day.

RP_{SRS} is calculated as follows:

$$RP_{SRS,d} = \sum_{SG} \left[RPT_{SG} \bullet PT_{SG,SRS,d} \right]$$

Where:

RPT_{SG} is the average daily revenue per passenger train-km for the relevant Service Group; and

$PT_{SG,SRS,d}$ is the average daily passenger train-km weighted by day of week for the relevant Service Group.

4.31 The values of RFT, FT_{SRS},d, $RPT_{SG,}$ $PT_{SG,SRS,d}$ and TH_{SRS} would be pre-determined as fixed inputs, although again these could be updated from time to time to reflect changes in freight and passenger traffic flows.

4.32 Again, time of day profiles discussed in the context of the previous two measures could be used to further refine the metric. These will be investigated further as part of the more detailed technical specification of the unified metric.

4.33 Proposed sources for the data required for this measure are shown in table 4.5 below:

TABLE 4.5 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
$TU_{SRS,d}$	The track-km (derived from IMC*) for each ELR affected by possessions for the relevant day are multiplied by the duration of the relevant possession (derived from PPS) and aggregated for each Strategic Route Section. This measure	IMC* PPS

Measure component	Description	Source
	is a proxy for the track-km unavailable for use as some ELRs may only be partly unavailable, whilst others not directly affected by the possession may be inaccessible as they are on an associated line of route.	
$TH_{SRS,d}$	Derived from IMC* where the track-km hours for each ELR are aggregated by Strategic Route Section and multiplied by hours for the relevant day.	IMC*
RFT	RFT is the calculated from an estimated aggregate national rail freight revenue (which could be sourced from the FOCs) divided by national freight tonne-km derived from ACTRAF (may also be sourced from ORR National Trends).	FOC accounts ACTRAF ORR National Trends
$FT_{SRS,d}$	A predetermined value of the average scheduled freight tonne-km per day attributed to a relevant Strategic Route Section derived from ACTRAF. The value is then weighted by the number of freight trains operated for each day of the week for that Strategic Route Section and expressed as a ratio of the average number of daily freight trains operated. The weighting is also derived from ACTRAF	ACTRAF
RPT_{SG}	Average annual revenue for the relevant Service Group is derived from LENNON. This is divided by the average annual train-km for the relevant Service Group sourced from the national timetable database.	LENNON National Timetable Database
$PT_{SG,SRS,d}$	Average daily passenger train-km attributed to a relevant Strategic Route Section is derived from NMF. The weighting for the relevant Service Group for each day of the week is sourced from the National Timetable Database.	NMF National Timetable Database

4.34 This metric can be expressed at a national network level or disaggregated by network geography down to Strategic Route Section.

TABLE 4.6 SUMMARY ASSESSMENT OF UNIFIED METRIC (RR)

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Some explanation of the definition of 'revenue at risk' will be required.	Fair
Ease of calculation given existing data sources and systems	Requires data sourced from PPS and ICM. Robust measures of RTF and FT_{SRS} may not be readily available and may need to be derived.	Fair
Potential level of disaggregation	Can be expressed by network geography down to SRS level.	Fair
Sensitivity behaviour of the KPI to changes in parameter values	This metric would be sensitive to changes in the freight and passenger traffic weightings. An appropriate periodicity for the review of this pre-determined input will be determined in the design specification for this metric.	Fair
Ability to reflect relative user values by time of day, day of week and seasonality	Doesn't capture revenue at risk varying by time of day, day of week and seasonality. Freight traffic flows could	Poor

Assessment of metric against key criteria	Comment	Rating
	be weighted by commodity or operator by creating dummy Service Groups.	
Ability to update the KPI to take account of changes in rail strategy and policy	Dependent on source of possession track-km-hours by SRS, but does not rely on any performance regime (e.g. Schedule 4).	Fair
Robustness against potential for introducing perverse incentives on Network Rail	Provides some incentive to recognise value of passenger and freight operations, but does not incentivise by time of day sensitivities.	Fair

5. SECONDARY KPI'S

Introduction

5.1 In this section we propose some 'secondary' metrics that could be monitored as a check against potentially perverse behaviours that might arise from application of one or more of the primary metrics.

Passenger metrics

Bus – hours operated due to possessions

Measurement unit: Bus-hours per period

5.2 Whilst the primary passenger metric reflects the impact on passenger journeys, it does not take account of the disruptive aspects of transfers to rail replacement bus services, nor does it reflect the significant costs to operators of operating such bus services. We therefore consider that a metric that monitors the extent to which possessions have necessitated the requirement for replacement bus services would also be useful.

5.3 This metric can be used as an indicator of an important component of additional costs to the operator. It will be influenced by the extent to which an alternative route is retained for the operator (e.g. by using Single Line Working or use of diversionary routes).

5.4 It can be measured by extracting bus service hours by Service Code from the National Timetable database. It will be possible to split the metric by Strategic Route or by TOC. However, it is noted that the metric only measures bus service hours and not bus vehicle hours. The latter would give a better indicator of magnitude cost to the operator, but this would be problematic to routinely report due to the lack of a suitable data source.

5.5 Proposed sources for the data required for this measure are shown in table 5.1 below:

TABLE 5.1 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
Bus-hours per period	Bus service hours derived each period from the relevant Service Codes in the National Timetable Data Base.	National Timetable Database

5.6 Further work in designing the specification for this metric will need to determine the extent to which any bus hours not resulting from causes other than possessions may need to be sifted from the data and the extent of any manual processes required. It is noted that where scheduled bus links (e.g. Woking to Heathrow) are included in the data base, these will be excluded to the extent that they have separate Service Codes.

TABLE 5.2 SUMMARY ASSESSMENT OF BUS HOURS METRIC

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Metric as defined is relatively simple and straightforward	Good

Assessment of metric against key criteria	Comment	Rating
Ease of calculation given existing data sources and systems	Subject to further investigation of the timetable database systems, this should be extractable on a routine basis.	Good
Potential level of disaggregation	It should be possible to disaggregate by TOC or Service Group	Fair
Sensitivity behaviour of the KPI to changes in parameter values	Not significant	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Does not differentiate by user value. It may be possible to routinely report by day of week.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	Subject to accessibility of the timetable database, this should not be a significant issue.	Good
Robustness against potential for introducing perverse incentives on Network Rail	Provides a check on extent to which partial route closure is favoured over total closure.	Fair

Percentage of Possessions included in T-12 timetable

Measurement unit: Percentage of possessions per period

5.7 As discussed in paragraphs 3.29-3.33, we consider that although there are some disadvantages of incorporating the Notification Factor within an availability metric, there is merit in having a separate metric which captures the extent to which Network Rail provides notification of possessions to the operator. As noted by some stakeholders, a key issue, especially to the passenger, is whether the timetable as published incorporates provisions for possessions.

5.8 The incorporation of the revised timetable resulting from a possession into the National Timetable Database 12 weeks in advance of the event was cited as an important issue by the operators that we interviewed. This helps ensure that most passengers are informed of the correct timetable when planning their journey. This is also important for on line reservations which are becoming increasingly popular. Thus a measure of possessions which are either incorporated in the First Working Timetable or are notified by the T-12 week cut off date for inclusion in the National Timetable Database would be useful in this regard. The T-12 threshold is also significant given its inclusion as condition in Network Rail's licence.

5.9 This metric is proposed to reflect the extent to which possessions are planned and notified in sufficient time to meet the 12 week timetable update.

5.10 The metric would be measured as the percentage of possessions (excluding those unplanned possessions which would be subject to Schedule 8 compensation) per period that are either incorporated into the First Working Timetable and or entered into the National Timetable database at least 12 weeks before the date of the possession.

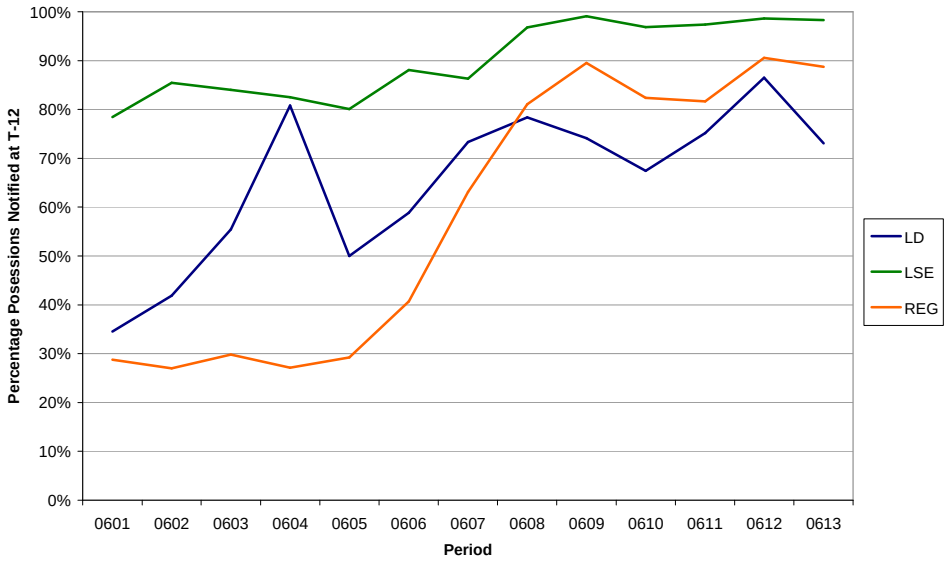
5.11 The data source for this metric would be the S4CS, where those possessions with a Notification Factor assigned in accordance with paragraph 4.2 (b) (i) of the Schedule 4 compensation regime would be determined as a percentage of all possessions included.

5.12 This metric can be expressed at a national network level or disaggregated by network geography down to Strategic Route Section or by operator down to TOC or Service Group. Using Service Groups, the measure could also be split by peak and off-peak. The data can also be arranged to give a comparison between days of the week (e.g. weekday/Saturday/Sunday).

5.13 This metric is illustrated in Figure 5.1 with a plot of possessions notified at T-12 or earlier for the year 2005/6 by TOC sector. The graph shows an improving trend for the London and the South East and Long Distance TOCs affected.

5.14 We also note that in the event that future modifications to Schedule 4 introduce other Notification Period thresholds, this metric could be adapted accordingly.

FIGURE 5.1 PERCENTAGE OF POSSESSIONS INCLUDED IN T-12 TIMETABLE BY TOC SECTOR



5.15 Proposed sources for the data required for this measure are shown in table 5.3 below:

TABLE 5.3 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
% of Possessions notified ≥ T-12 weeks	Possessions with a Notification Factor assigned in accordance with paragraph 4.2 (b) (i) of the Schedule 4 compensation regime expressed as a percentage of the number of notified possessions in a given period. Sourced from S4CS.	S4CS

TABLE 5.4 SUMMARY ASSESSMENT OF POSSESSIONS INCLUDED IN T-12 METRIC

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Metric as defined is relatively simple and straightforward.	Good
Ease of calculation given existing data sources and systems	Can be derived directly from S4CS.	Good
Potential level of disaggregation	Can be expressed by geography down to SRS level and operator to Service Group level	Good
Sensitivity behaviour of the KPI to changes in parameter values	Not significant	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Does not differentiate by user value.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	If policy leads to T-12 change to T-'x', measure can be adapted accordingly.	Good
Robustness against potential for introducing perverse incentives on Network Rail	Provides a check on level of predictability of timetable in advance of possessions.	Good

Unified metrics

Average notification period per possession

Measurement unit: Number of days expressed as a moving annual average

5.16 Whilst the preceding metric reflects whether or not possessions are accommodated in the public timetable, it would also be useful to monitor the trend in the average notification period, since this would be of value to both passenger and freight operators. It would also enable any behavioural change that may arise in the event of modification of the Notification Factors incorporated within the Schedule 4 possession compensation regime.

5.17 This metric would measure the average period of notification of planned possessions (which are not incorporated into the First Working Timetable) to the operator prior to their occurrence. It would be measured as a moving annual average notification period in days calculated in each 4 week period using data for the last 13 4 week periods.

5.18 Proposed sources for the data required for this measure are shown in table 5.5 below:

TABLE 5.5 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
Moving annual average of notification period for possessions	The notification date for each possession can be derived from PPS. Consideration in designing the specification for this metric will need to be given to the need to record all possessions including those that only affect freight traffic.	PPS

TABLE 5.6 SUMMARY ASSESSMENT OF AVERAGE POSSESSION NOTIFICATION PERIOD METRIC

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Metric as defined is relatively simple and straightforward.	Good
Ease of calculation given existing data sources and systems	Can be derived directly from PPS.	Good
Potential level of disaggregation	Can be expressed by geography down to SRS level.	Good
Sensitivity behaviour of the KPI to changes in parameter values	If policy leads to change to change in Notification Factors within Schedule 4, , measure could provide a useful monitor of effects.	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Does not differentiate by user value.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	Given simplicity of measure, this should not be a significant issue.	Good
Robustness against potential for introducing perverse incentives on Network Rail	Provides a check on extent of advance possession planning .	Good

Percentage of possessions exercised (PE)

Measurement unit: Percentage of possessions per period

5.19 The disruptive effects on service planning and abortive costs created by uncertainty was cited as an important issue by both passenger and freight operators. There was a perception that the number of possessions planned far exceeds the number that are actually realised as many are cancelled and/or rescheduled. This imposes additional demands on the operators' planning resources and limits their ability to provide assurance of service to their customers. This metric is designed to reflect the extent of these disruptive effects by measuring the number of planned possessions exercised as a percentage of those first notified.

5.20 Many possessions are amended before they are exercised. We understand that within the PPS these are normally dealt with by cancelling the original possession and entering the amendment as a new possession. Thus by capturing cancelled possessions, this metric will also reflect amended possessions.

5.21 The metric can be measured as:

$$PE = \frac{PS4}{PS4 + PSC} \%$$

Where:

PE is the percentage of possessions exercised;

PS4 is the number of possessions as entered into S4CS; and

PSC is the number of possessions cancelled that were previously notified to the operator(s).

5.22 The data source for this metric would be the Possession Planning System, although PS4 could also be sourced from S4CS.

5.23 This metric can be expressed at a national network level or disaggregated by network geography down to Strategic Route Section. The data can also be arranged to give a comparison between days of the week (e.g. weekday/Saturday/Sunday).

5.24 Proposed sources for the data required for this measure are shown in table 5.7 below:

TABLE 5.7 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
% Possessions exercised per period	Possessions cancelled would be derived from PPS. Possessions excercised would be derived from those recorded for compensation purposes into S4CS. In designing the specification for this metric, consideration will be given to the potential for determining possessions exercised on 'freight only' routes that are not otherwise recorded in S4CS.	PPS S4CS

TABLE 5.8 SUMMARY ASSESSMENT OF POSSESSIONS EXERCISED METRIC

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Metric as defined is relatively simple and straightforward.	Good
Ease of calculation given existing data sources and systems	Can be derived from PPS, subject to verification.	Good [tbc]
Potential level of disaggregation	Proposed as a network measure, although could be expressed by geographic area (e.g. route level)	Fair
Sensitivity behaviour of the KPI to changes in parameter values	Not significant	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Does not differentiate by user value.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	This should not be a significant issue.	Fair
Robustness against potential for introducing perverse incentives on Network Rail	Provides a check on planning workload placed on operators and potential lost business development opportunities.	Good

Delay minutes due to possession overrun

Measurement unit: Delay minutes per period

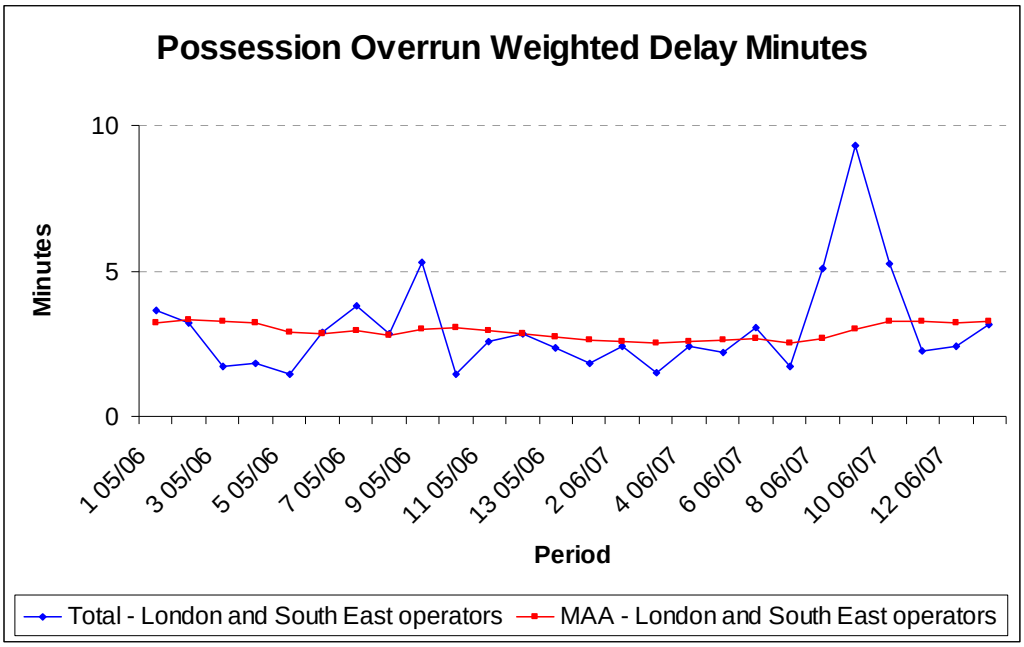
5.25 There is a risk that incentives on Network Rail to reduce the duration of possessions lead to strategies that result in a greater number of possession overruns. These can be highly disruptive to passengers and operators alike, especially on busy commuter routes such as those in the London and South East sector where an overnight or weekend possession overrun can impact on morning peak traffic. This metric provides a means of monitoring the effects of possession overruns and can be disaggregated by operator (including freight and passenger).

5.26 This metric is measured as total delay minutes attributed to possession over-runs, divided by scheduled train-km, and expressed per period by operator or Strategic Route or at a national level. The weighting by train-km is applied to normalise against changes in the level of services scheduled.

5.27 It is derived from delay data recorded within TRUST and can be extracted as delay minutes by operator attributed to the causation code (107A) for possession overruns.

5.28 This metric is illustrated in Figure 5.2 by the plot of possession overruns affecting London and South East TOCs weighted by scheduled train-km for the years 2005/6 and 2006/7.

FIGURE 5.2 POSSESSION OVERRUN IMPACTS ON LSE TOCS



5.29 Proposed sources for the data required for this measure are shown in table 5.7 below:

TABLE 5.9 PROPOSED DATA SOURCES FOR METRIC

Measure component	Description	Source
Total delay minutes attributed to	Delay minutes due to possession overrun can be directly accessed from TRUST (cause code NR 107) by location	TRUST

possession over-runs per train-km	and by TOC. Scheduled Train-km by TOC/FOC or Strategic Route Section can be derived from NMF

5.30 It is noted that this metric does not distinguish between the length and frequency of possession overruns (i.e. 100*1 minute is equivalent to 1*100 minutes), but any notable changes to the trend recorded by this metric could be easily analysed given that the data source (TRUST) enables diagnosis down to individual event level.

TABLE 5.10 SUMMARY ASSESSMENT OF POSSESSION OVERRUN METRIC

Assessment of metric against key criteria	Comment	Rating
Ease of understanding within the industry and across a wider group of stakeholders	Metric as defined is relatively simple and straightforward.	Good
Ease of calculation given existing data sources and systems	Can be derived from directly from TRUST.	Good
Potential level of disaggregation	Can be expressed by geography at route level and by operator to Service Group level.	Good
Sensitivity behaviour of the KPI to changes in parameter values	Weighting by scheduled train-km limits sensitivity to changes timetable intensity.	Good
Ability to reflect relative user values by time of day, day of week and seasonality	Does not differentiate by user value.	Poor
Ability to update the KPI to take account of changes in rail strategy and policy	Subject to continuation of the delay attribution process, this should not be an issue.	Good
Robustness against potential for introducing perverse incentives on Network Rail	Provides a check on intensification of activity during possessions leading to increased risk of possession overrun.	Good

Effective use of possessions

5.31 This study is concerned with measures of the availability of the network to operators and with secondary measures designed to address potential perverse incentives that could result from the proposed primary metrics. While we have proposed some metrics that address the effects of the way possessions are exercised (e.g. extent of cancelled possessions, notification period and possession overruns), the scope of this study does not extend to the efficiency or effectiveness of the work undertaken during possessions.

5.32 We nevertheless note that the National Audit Office, in their review of the modernisation of the West Coast Main Line, recommended that a KPI should be developed to reflect the extent of work undertaken during possessions. [2] Such a measure would need to take account of the wide ranging nature of the engineering activities undertaken during possessions and the inherent measurement complexities

[2] The Modernisation of the West Coast Main Line, National Audit Office, 22 November 2006.

that follow from this. In addition, we suggest that there will anyway be incentives on Network Rail to exercise possessions efficiently, not least the need to improve performance in line with the HLOS and the performance compensation arrangements within Schedule 8. We also note that the Network Rail Monitor already has a number of KPIs which monitor engineering activity levels, and these will complement the availability metrics proposed in this report.

6. CONCLUSIONS AND NEXT STEPS

6.1 No single metric has been identified which would meet all of the criteria satisfactorily, although we have proposed a single unified metric weighted by revenue at risk as a proxy for user value, should this be preferred over separate metrics for passenger and freight users.

6.2 We have proposed a suite of primary and secondary metrics to provide a more comprehensive measure of Network Availability. We believe that secondary metrics can provide a useful role as monitors to check against perverse behaviours by Network Rail that could otherwise be incentivised by one or more primary measures.

6.3 The absence of a systematic mechanism for capturing the costs of possessions to operators is an inhibitor to reflecting this component in a Network Availability metric. However, should revisions to Schedule 4 or other systematic mechanisms be implemented to compensate operators for costs arising from possessions, then it may be possible to incorporate a parameter linked to such a mechanism to reflect operator costs in a Network Availability KPI.

6.4 The absence of a compensation regime (other than Part G of the Network Code) for freight operators makes it difficult to develop metrics which reasonably reflect the impacts on rail freight. The opportunity to address this may, at least in part, depend on the willingness of FOCs to submit additional data.

6.5 The ability to weight possessions by certain parameters and to disaggregate geographically is dependent on being able to map the recorded possession location descriptions to a definable list of route sections, preferably Strategic Route Sections. This has proved problematic and further work in designing the specifications for the metrics will address this and examine how this process could potentially be automated.

6.6 The quest for a useful freight related metric could be significantly advanced if the effect of possessions on freight timetables could be easily discerned. This is currently not available. Although the problem may not be insurmountable, further investigation is required to determine what system changes may be necessary to enable this.

6.7 Whilst the proposed metrics are all output based, it was notable that a number of stakeholders interviewed expressed an interest in some input measures that would provide assurance of the efficiency and utilisation of possessions by Network Rail and the nature of the work carried out.

6.8 This report is submitted as a final draft and further work is planned to develop the specifications for the proposed metrics addressing how data shall be derived from the relevant systems (including S4CS, PPS, IMC and the national timetable database).

6.9 Following consultation with industry stakeholders and design of the metric specifications, a final encompassing report will be prepared.

APPENDIX A

GLOSSARY

ACTRAF	Actual Traffic Database (Network Rail)
ELR	Engineers' Line Reference
FOC	Freight Operating Company
FWTT	First Working Timetable (as defined in Schedule 4)
GJT	Generalised Journey Time
ICM	Infrastructure Cost Model
LENNON	The rail industry's central ticketing system
MRE	Marginal Revenue Effect
NMF	Network Modelling Framework
NF-mre	Notification Factor marginal revenue effect (as defined in Schedule 4)
NR	Network Rail
NREJT	Extended journey time resulting from a Network Rail Restriction of Use (as defined in Schedule 4 of the Track Access Agreements)
ORR	Office of Rail Regulation
PPS	Possession Planning System
S4CS	Schedule 4 Compensation System
SG	Service Group
SRS	Strategic Route Section
TOC	Train Operating Company
WACM	Weighted Average of Cancellation Minutes resulting from a Network Rail Restriction of Use (as defined in Schedule 4 of the Track Access Agreements)
WebTAG	Web Based Transport Appraisal Guidance

APPENDIX B

SUMMARY OF METRIC OPTIONS (LONG LIST)

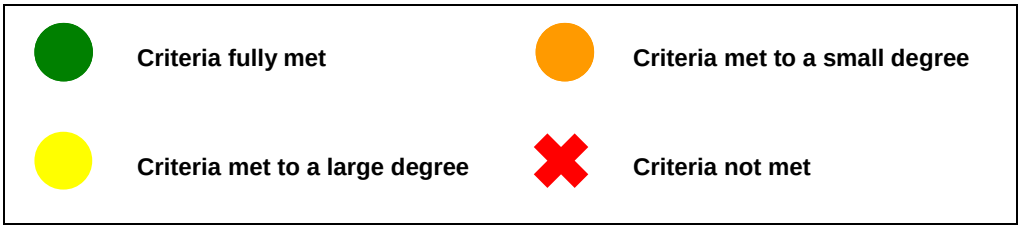
B1. METRIC OPTIONS – 'LONG LIST'

B1.1 From the industry information available to date, and drawing on our own experience, we have developed a number of possible metrics for consideration, either as single metrics or as a suite of related metrics that will satisfy the requirements of potential audiences/users.

B1.2 For each option we present:

- A description of the measure
- A discussion of how the measure might be normalised
- Required data sources
- The relevant stakeholder audience

B1.3 Each metric has been evaluated against the criteria described in Section 2 of the main report using the colour coding shown in the key below. The strengths and weaknesses against each criterion are also discussed.



Metric Options Based on Infrastructure Availability

TABLE 6.1 OPTION 1.1 – METRIC OPTIONS BASED ON INFRASTRUCTURE AVAILABILITY

Metric :	**Percentage of track-km available per period weighted by revenue**

Definition of Measure

For each SRS, actual track-km-hours operationally available per period as a percentage of potential total track-km-hours, then weighted by revenue attributable to that route section. Measured as percentage of track-km available aggregated to Strategic Route, Territory and Network.

Normalisation Considerations

Underlying changes in relative levels of revenue by SRS could influence this measure. If revenue sourced from NMF, periodic updates of NMF should address the relevant values.

Data Sources

It is anticipated, subject to confirmation, that planned and actual track-km available can be sourced directly from the Possession Planning System (PPS). Revenue by SRS would be a pre-determined fixed input sourced from NMF or MRE calibration.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓		✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation			Source of data and method of calculation to be determined. May be a little difficult to convey to a wider industry stakeholder audience.
Alignment with rail network user requirements		Gives a measure of infrastructure availability with some relativity to the importance to TOCs and passengers.	Does not: • reflect cost to operator; • address freight; • economic impact to customer; • reflect notification to customer.
Use of existing knowledge and data		Should be possible to source from existing data systems.	Depending on data source, may not be possible to automate inputs.
Scope for disaggregating measure		Should be possible to disaggregate by TOC, Service Group, network geography (SRS) or time of day/day of week.	Data source to be determined.

TABLE 6.2 OPTION 1.2 – METRIC OPTIONS BASED ON INFRASTRUCTURE AVAILABILITY

Metric :	**Percentage of track-km available per period weighted by SRS and train-km**

Definition of Measure

For each SRS, actual track-km-hours operationally available per period as a percentage of potential total track-km-hours, then weighted by train-km attributable to that route section. Measured as percentage of track-km available aggregated to Strategic Route, Territory and Network.

Normalisation Considerations

Underlying changes in relative train-km by SRS could influence this measure. Normalisation could be applied by indexing against annual change in train-km by SRS.

Data Sources

It is anticipated, subject to confirmation, that planned and actual track-km available can be sourced directly from the Possession Planning System (PPS). Train-km by SRS would be a pre-determined fixed input. Potentially this may be sourced from NMF.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation			Source of data and method of calculation to be determined. May be a little difficult to convey to a wider industry stakeholder audience.
Alignment with rail network user requirements		Gives a measure of infrastructure availability with some relativity to the importance to TOCs.	Does not: • reflect volume of passengers or revenue affected; • reflect cost to operator; • economic impact to customer; • reflect notification to customer. Availability of diversionary routes may dilute effect on freight operators and therefore mask relative significance of possessions to them.
Use of existing knowledge and data		Should be possible to source from existing data systems.	Depending on data source, may not be possible to automate inputs.
Scope for disaggregating measure		Should be possible to disaggregate by network geography (SRS) or time of day/day of week.	Data sources and scope for disaggregating by TOC/FOC to be determined.

Metric Options Based on Train Operator Impact

TABLE 6.3 OPTION 2.1 – METRIC OPTIONS BASED ON TRAIN OPERATOR IMPACT

Metric : **Revenue compensation to TOC**

Definition of Measure

A summary of revenue compensation payments made by Network Rail to TOCs for disruption caused by possessions under Schedule 4. Measured in total £ per period aggregated for all TOCs.

Nb. This measure already exists albeit that it is not widely reported. We include it here for completeness, but recognise that in itself it does not contribute anything new to the industry measures.

Normalisation Considerations

Underlying changes in the number of trains scheduled in the timetable (FWTT) would influence this measure. Normalisation could be applied by indexing against annual change in scheduled train journeys or scheduled stops at monitoring points either nationally, within geographic region or by TOC.

The total volume of possessions may also affect this metric. It may be appropriate to also normalise by indexing against annual changes in the total number of possessions.

Data Sources

Total compensation payment values to be sourced from Schedule 4 Costing System.

Stakeholder Relevance

Customer/User		Operator		Inf Manager	Government	
Passenger	Freight	TOC	FOC	NR	DfT	ORR
		✓		✓	✓	✓

Criteria		Strengths	Weaknesses
Ease of understanding and calculation		Relatively simple concept and calculation can be automated as a direct feed from S4CS.	
Alignment with rail network user requirements		Provides a measure of relative 'cost' to train operators which can also be taken as a proxy for disruption to passengers. Takes account of cancelled stops and reflects notification to operator.	Does not: • fully reflect economic impact on user; • reflect full cost to operator; • address freight.
Use of existing knowledge and data		Can be derived directly from S4CS.	May be subject to sensitivities over confidentiality.
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	Commercial confidentiality may be a practical constraint unless aggregated at a a national level or by Network Rail geography.

TABLE 6.4 OPTION 2.2 – METRIC OPTIONS BASED ON TRAIN OPERATOR IMPACT

Metric : Percentage of train-km lost due to possessions

Definition of Measure

Difference between train-km scheduled in Applicable Timetables and train-km scheduled in First Working Timetables (as defined in Schedule 4) expressed as a percentage of train-km scheduled in First Working Timetables. Measured as percentage of train-km lost per period by TOC, FOC or service group.

Normalisation Considerations

Underlying changes in the train-km scheduled in the timetable (FWTT) would influence this measure. Normalisation could be applied by indexing against annual change in scheduled train journeys or scheduled stops at monitoring points either nationally, within geographic region or by TOC.

Data Sources

Passenger train-km can be sourced directly from Schedule 4 Costing System. Freight train-km would need to be sourced separately or the SC4S system modified to include freight.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Simple concept and calculation for TOCs can be automated as a direct feed from S4CS.	S4CS does not calculate this measure for FOCs.
Alignment with rail network user requirements		Provides a proxy measure of relative 'cost' to train operators.	Additional train-km operated due to diversions may be offset by reduced train-km due to cancellations rendering measure of limited value. However, this may be less of an issue with freight operators, where cancellations are less significant. Also, not all scheduled freight paths are routinely used by FOCs and therefore the impact on their operations may be overstated.
Use of existing knowledge and data		Can be derived as an automated input directly from S4CS for TOCs.	Data source for changes in freight train-km due to possessions not yet identified.
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	

TABLE 6.5 OPTION 2.3 – METRIC OPTIONS BASED ON TRAIN OPERATOR IMPACT

Metric :	**Bus-km operated due to possessions**

Definition of Measure

Total road vehicle-km operated by rail replacement bus services necessitated by planned possessions. Measured as total annual bus-km.

Normalisation Considerations

Underlying changes in passenger demand could influence this measure. Normalisation could be applied by indexing against annual change in total rail passenger journeys.

Data Sources

Source of data for this measure to be determined. It is anticipated that this can be derived from the national timetable database.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓			✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept. No additional calculation necessary.	
Alignment with rail network user requirements		Provides a direct measure of the extent of bus replacement services generated by possessions and a proxy for trend in costs of such to operators.	Does not: • reflect volume of passengers or revenue affected; • address freight; • economic impact to customer; • reflect notification to customer.
Use of existing knowledge and data			Data source yet to be verified.
Scope for disaggregating measure			Data sources and scope for disaggregating by TOC to be determined.

TABLE 6.6 OPTION 2.4 – METRIC OPTIONS BASED ON TRAIN OPERATOR IMPACT

Metric : **Net financial Impact on TOCs**

Definition of Measure

This measure would reflect the net financial effect on TOCs of lost revenue and additional costs including provision of replacement bus services, staff deployment and planning and communications.

Normalisation Considerations

Underlying changes in the quantity of services operated would influence this measure. Normalisation could be applied by indexing by to train-km.

Data Sources

Determination of revenues could be achieved as in Option 3, but no current data source reflecting the true costs to the operator is available. However, studies recently commissioned by ORR to review the effectiveness of Schedule 4 in compensating TOCs for their revenues and costs could lead to revisions to the S4CS such that a useable data source becomes available in the future, particularly if a formulaic approach to compensating TOCs for costs is introduced.

The recently commissioned study to identify improvements to the current compensation regime for costs incurred by TOCs as a result of possessions is being undertaken in parallel to this study. There may therefore be benefits to this analysis to have early sight of the findings and emerging proposals of that study.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓		✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Expressed as net financial impact provides a relatively straightforward concept.	Lack of a suitable current data source and process for calculation.
Alignment with rail network user requirements		Provides a measure of net 'cost' to train operators. This could also be taken as a proxy for disruption to passengers.	Does not: • fully reflect economic impact on user; • address freight.
Use of existing knowledge and data			No current data source available which fully reflects the costs to operators, although planned improvements to the Schedule 4 compensation mechanism may yield a useful input for this metric.
Scope for disaggregating measure			Lack of current data sources. If revised S4CS became available then may be good potential to disaggregate.

Metric Options Based on Timetable Impact (Train Journey Time)

TABLE 6.7 OPTION 3.1 – METRIC OPTIONS BASED ON TIMETABLE IMPACT (TRAIN JOURNEY TIME)

Metric :	**Excess train journey time**

Definition of Measure

Total excess train journey minutes due to possessions derived from REJT calculation for Schedule 4 purposes. Measured in total minutes per period.

Normalisation Considerations

Underlying changes in the number of trains scheduled in the timetable (FWTT) would influence this measure. Normalisation could be applied by indexing against the annual change in scheduled train journeys or scheduled stops at monitoring points either nationally, within geographic region or by TOC.

Data Sources

REJT values to be sourced from Schedule 4 Costing System.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept and calculation can be automated as a direct feed from S4CS.	
Alignment with rail network user requirements		Provides a meaningful measure of impact to passenger train services.	Does not: • reflect volume of passengers or revenue affected; • fully reflect user economic impact of substitute bus or taxi services; • reflect cost to operator; • include cancelled stops; • address freight; • reflect notification to operator user
Use of existing knowledge and data		Can be derived directly from S4CS.	
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	

TABLE 6.8 OPTION 3.2 – METRIC OPTIONS BASED ON TIMETABLE IMPACT (TRAIN JOURNEY TIME)

Metric :	**Excess train journey time plus weighted cancellation minutes**

Definition of Measure

As Option 3.1 but with the weighted average of Cancellation Minutes (WACM) added to excess train journey time before application of the revenue weighting factor. Measured in total minutes per period.

Normalisation Considerations

Underlying changes in the number of trains scheduled could be addressed as in Option 3.1.

Data Sources

REJT and WACM values to be sourced from Schedule 4 Costing System.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively straightforward concept and calculation can be automated as a direct feed from S4CS.	Addition of WACM complicates the measure and may be more difficult to communicate to a wider industry stakeholder audience.
Alignment with rail network user requirements		Provides a meaningful measure of impact to passenger train services.	Does not: • fully reflect economic impact on user; • reflect full cost to operator; • address freight; • reflect notification to operator or user.
Use of existing knowledge and data		Can be derived directly from S4CS.	
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	

TABLE 6.9 OPTION 3.3 – METRIC OPTIONS BASED ON TIMETABLE IMPACT (TRAIN JOURNEY TIME)

Metric :	**Excess train journey time plus weighted cancellation minutes weighted by revenue**

Definition of Measure

As Option 3.2 but with the weighted average of Cancellation Minutes (WACM) added to excess train journey time before application of the revenue weighting factor. The weighting factor could include MRE derived directly from S4CS or a predetermined revenue weighting assigned to each SG or SRS sourced from NMF. Measured in total minutes per period.

Normalisation Considerations

Underlying changes in the number of trains scheduled could be addressed as in Option 3.1. If MRE is used, the indexing as referenced in Schedules 4 and 8 would be applicable. Revenue sourced from NMF would need to be a pre-defined fixed input, which would need to be updated periodically to reflect changes in pricing or demand patterns.

Data Sources

REJT WACM and MRE values to be sourced from Schedule 4 Costing System.

Revenue apportioned by Service Group of TOC could be sourced from NMF.

Stakeholder Relevance

Customer/User		Operator		Inf Manager	Government	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		Strengths	Weaknesses
Ease of understanding and calculation		Relatively simple concept and calculation can be automated as a direct feed from S4CS Reflects relative value of revenue affected.	Revenue derived from MRE is not very transparent.
Alignment with rail network user requirements		Provides a meaningful measure of impact to passenger train services including the effect of cancelled trains/stops.	Does not: • fully reflect economic impact on user; • reflect cost to operator; • address freight; • reflect notification to operator or user.
Use of existing knowledge and data		Can be derived directly from S4CS and weighting from NMF.	
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	

Metric Options Based on Passenger Impact

TABLE 6.10 OPTION 4.1 – METRIC OPTIONS BASED ON PASSENGER IMPACT

Metric : Excess passenger journey time plus weighted cancellation minutes

Definition of Measure

As Option 3.2 but with weighting for number of passengers affected. This would apply average passengers per train derived for relevant route section or service group to journey time. Measured in total minutes per period.

Normalisation Considerations

Underlying changes in the number of passenger journeys would influence this measure. Normalisation could be applied by indexing against annual change in passenger journeys either nationally or by TOC. Periodic updates of NMF could address the change in average passengers per train but would need to use only one of these normalisation factors to avoid double counting.

Data Sources

REJT and WACM values to be sourced from Schedule 4 Costing System. Average passengers per train sourced from NMF or MRE calibration.

Stakeholder Relevance

Customer/User		Operator		Inf Manager	Government	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		Strengths	Weaknesses
Ease of understanding and calculation		Relatively simple concept and part of calculation can be automated as a direct feed from S4CS. Passengers per train parameter could be taken from NMF as a pre-fixed input.	Average passengers per train is not a direct output of NMF but can be readily determined from No. of trains and passengers within each SG.
Alignment with rail network user requirements		Provides a meaningful measure of impact experienced by passengers.	Does not: • reflect revenue affected; • fully reflect economic impact on user; • reflect cost to operator; • include cancelled stops; • address freight; • reflect notification to operator or user.
Use of existing knowledge and data		Can be derived directly from S4CS and NMF.	

Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week. By Service Group would enable peak and off-peak split.	

TABLE 6.11 OPTION 4.2 - METRIC OPTIONS BASED ON PASSENGER IMPACT

Metric :	**Excess passenger journey time plus weighted cancellation minutes and weighted by notification and user value of time**

Definition of Measure

As Option 4.1 but with weighting for notification and value of time by user type. The notification weighting would involve application of a delay multiplier that can be determined on the basis of the Schedule 4 notification factor (e.g. a NF of 0.4 would imply a delay multiplier of 1; a NF of 0.8 would imply a delay multiplier of 2). The user weighting would be a fixed input derived from DfT guidelines for economic value of time by user type. The user type and value would be determined as a pre-defined fixed input for each service group.

This may be problematic. Values of time are defined by DfT split by business, commuter and leisure journey purposes. The values of the latter two are very similar and therefore a business/non business split may be appropriate. Journey purpose data by service group are not available directly. They would need to be derived from an interpretation of passenger journeys by fare type, which are recorded in Lennon. However, business users are not readily distinguishable by fare types since there is some overlap in full fares with commuters.

Normalisation Considerations

As Option 4.1

Data Sources

REJT, WACM and NF-mre values to be sourced from Schedule 4 Costing System. Average passengers per train sourced from NMF or MRE calibration. Ticket types sourced from Lennon.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Part of calculation can be automated as a direct feed from S4CS. Passengers per train parameter could be taken from NMF as a pre-fixed input.	Complex measure. Average passengers per train is not a direct output of NMF but can be readily determined from No. of trains and passenger journeys within each SG. Determining the split by journey purpose by Service Group may be problematic.
Alignment with rail network user requirements		Provides a meaningful measure of impact experienced by passengers and reflects their economic value of time.	Does not: • reflect cost to operator; • address freight.

Use of existing knowledge and data		Variable part of measure could be derived as an automated link from S4CS.	Even with access to Lennon, a bespoke method for translating journeys by ticket type to journey purpose would be required.
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS) or time of day/day of week. By Service Group would enable peak and off-peak split.	Problem of determining value of time by journey purpose by service group needs to be solved.

TABLE 6.12 OPTION 4.3 - METRIC OPTIONS BASED ON PASSENGER IMPACT

Metric :	**Number of passenger journeys incurring journey time alteration and/or extension**

Definition of Measure

Number of trains with amended schedules in Applicable Timetable compared to First Working Timetable multiplied by Average passengers per train for Service Group. Measured in passenger journeys affected per period.

Normalisation Considerations

Underlying changes in the number of passenger journeys would influence this measure. Normalisation could be applied by indexing against annual change in passenger journeys either nationally or by TOC.

Data Sources

A source for the number of trains with amended schedules has not yet been identified (subject to further investigation of S4CS and PPS). Average passengers per train would be a pre-determined fixed input sourced from NMF tbc.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓			✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept.	Calculation may not be straightforward.
Alignment with rail network user requirements		Reflects impact on passengers.	Does not: • fully reflect economic impact on user; • reflect cost to operator; • address freight; • reflect notification to operator or user.
Use of existing knowledge and data			Data may not be readily extractable from existing data systems.
Scope for disaggregating measure			Uncertainty on data source.

Metric Options Based on Level of Predictability and Reliability

TABLE 6.13 OPTION 5.1 – METRIC OPTIONS BASED ON LEVEL OF PREDICTABILITY AND RELIABILITY

Metric :	**Percentage of possessions included in T-12 timetable**

Definition of Measure

The percentage of possessions (which are not incorporated into the First Working Timetable and excluding those unplanned possessions which would be subject to Schedule 8 compensation) that are entered into the train service database at least 12 weeks before the date of the possession. Measured as percentage of planned possessions per period.

Normalisation Considerations

Underlying changes in the total number of possessions could influence this measure. Normalisation could be applied by indexing against annual change in total planned possessions.

Data Sources

Notification of possessions can be sourced directly from the Schedule 4 Costing System. Also, an alternative source (e.g. PPS) may be required to pick up all possessions affecting freight.

Nb. The recently commissioned studies to identify improvements to the current compensation regime for possessions may recommend changes to the notification arrangements and as such this metric might well need to be adapted to reflect them.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept and no additional calculation required.	
Alignment with rail network user requirements		Provides evidence of the extent to which operators and users receive advance notice of possessions.	Does not: • provide any granularity of notice periods less than 'T-12 • reflect volume of passengers or revenue affected; • fully reflect economic impact on user; • reflect cost to operator.
Use of existing knowledge and data		Can be sourced directly from S4CS in respect of passenger services.	Data for all freight possessions may not be readily extractable from existing data systems.
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week.	

TABLE 6.14 OPTION 5.2 – METRIC OPTIONS BASED ON LEVEL OF PREDICTABILITY AND RELIABILITY

Metric : **Average notification period per possession**

Definition of Measure

The average period of notification of planned possessions (which are not incorporated into the First Working Timetable) to the operator and entry into the train service database prior to their occurrence. Measured as a moving annual average notification period in days calculated in each 4 week period using data for the last 13 4 week periods.

Normalisation Considerations

Underlying changes in the total number of possessions could influence this measure. Normalisation could be applied by indexing against annual change in total planned possessions.

Data Sources

Notification of possessions can be sourced directly from the Schedule 4 Costing System. An alternative source (e.g. PPS) may be required to pick up all possessions affecting freight.

Nb. The recently commissioned studies to identify improvements to the current compensation regime for possessions may recommend changes to the notification arrangements and as such this metric might well need to be adapted to reflect them.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept and no additional calculation required.	
Alignment with rail network user requirements		Provides evidence of the extent to which operators receive advance notice of possessions.	Does not: • reflect volume of passengers or revenue affected; • fully reflect economic impact on user; • reflect cost to operator; May mask proportion of possessions for which short notice is given.
Use of existing knowledge and data		Can be derived directly from S4CS as an automated input.	Data for all freight possessions may not be readily extractable from existing data systems.
Scope for disaggregating measure		Can be disaggregated by TOC, Service Group, network geography (SRS tbc) or time of day/day of week.	

TABLE 6.15 OPTION 5.3 – METRIC OPTIONS BASED ON LEVEL OF PREDICTABILITY AND RELIABILITY

Metric :	**Percentage of booked possessions exercised**

Definition of Measure

The percentage of possessions as first notified to operators by Network Rail which are subsequently amended or cancelled. Measured as percentage of planned possessions exercised as first notified.

Normalisation Considerations

Underlying changes in the total number of possessions could influence this measure. Normalisation could be applied by indexing against annual change in total planned possessions.

Data Sources

Notification and subsequent amendment of possessions may potentially be sourced from the Schedule 4 Costing System. Alternatively it may be necessary to access the Possession Planning System (PPS).

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
		✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept.	Source of data and method of calculation to be determined.
Alignment with rail network user requirements		Provides evidence of the dependability of the possession planning and notification to operators and potentially to end users.	Does not: • reflect volume of passengers or revenue affected; • reflect cost to operator; • economic impact to customer; • reflect notification to customer.
Use of existing knowledge and data		Should be possible to source from existing data systems.	Depending on data source, may not be possible to automate inputs.
Scope for disaggregating measure		Should be possible to disaggregate by TOC, Service Group, network geography (SRS tbc) or time of day/day of week.	Data source to be determined.

TABLE 6.16 OPTION 5.4 - METRIC OPTIONS BASED ON LEVEL OF PREDICTABILITY AND RELIABILITY

Metric :	**Delay minutes due to possession overrun**

Definition of Measure

Total delay minutes attributed to possession over-runs, expressed per period by TOC, Strategic Route, Network Rail Territory or at national level.

Normalisation Considerations

Underlying changes in train-km could influence this measure. Normalisation could be applied by indexing against annual change in total train-km by TOC, Strategic Route, Network Rail Territory or at national level as appropriate.

Data Sources

Data can be directly accessed from TRUST (cause code I5) or PALADIN.

Stakeholder Relevance

Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓	✓	✓	✓	✓	✓	✓

Criteria		**Strengths**	**Weaknesses**
Ease of understanding and calculation		Relatively simple concept. No additional calculation necessary.	
Alignment with rail network user requirements		Provides a direct measure of impact to trains operated as a result of possession overruns. Relevant to passenger and freight operators. Can be easily extracted from existing data systems.	Does not reflect initial impact of planned possessions and excludes those which do not overrun.
Use of existing knowledge and data		Uses existing output of TRUST or PALADIN.	
Scope for disaggregating measure		Can be disaggregated by TOC, FOC, Service Group, network geography (SRS) and day of week (Nb with Service Groups, peak and off peak can be differentiated).	

Metric Options – Suggested Qualitative Measures

TABLE 6.17 OPTION 6.1 – SUGGESTED QUALITATIVE MEASURES WHICH WOULD COMPLEMENT A NETWORK AVAILABILITY KPI TO DEMONSTRATE PASSENGER PERCEPTIONS

Metric :	**Quality of information provided to passengers giving advance notice of possessions**
Definition of Measure	
Percentage of passengers surveyed responding as 'satisfied' or 'good' to 'the helpfulness of information about alterations to train services due to engineering work'.	
Normalisation Considerations	
Normalisation factor unlikely to be necessary.	
Data Sources	
This measure would be determined by incorporation of the question outlined above into the National Passenger Survey (NPS) as administered by Passenger Focus.	

Stakeholder Relevance						
Customer/User		**Operator**		**Inf Manager**	**Government**	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓		✓	✓	✓

TABLE 6.18 OPTION 6.2 – SUGGESTED QUALITATIVE MEASURES WHICH WOULD COMPLEMENT A NETWORK AVAILABILITY KPI TO DEMONSTRATE PASSENGER PERCEPTIONS

Metric :	**Quality of information provided to passengers about the nature of the work carried out during possessions**

Definition of Measure

Percentage of passengers surveyed responding as 'satisfied' or 'good' to 'the helpfulness of information about the nature of and reason for engineering work affecting the running of train services'

Normalisation Considerations

Normalisation factor unlikely to be necessary.

Data Sources

This measure would be determined by incorporation of the question outlined above into the National Passenger Survey (NPS) as administered by Passenger Focus.

Stakeholder Relevance

Customer/User		Operator		Inf Manager	Government	
Passenger	**Freight**	**TOC**	**FOC**	**NR**	**DfT**	**ORR**
✓		✓		✓	✓	✓

Initial Conclusions Reached

B1.4 No single metric has been identified which would meet all of the criteria.

B1.5 It may therefore be appropriate to develop a suite of metrics to provide a useful measure of Network Availability.

B1.6 The absence of a systematic mechanism for capturing the costs of possessions to operators is an inhibitor to reflecting this component in a metric.

B1.7 The studies being undertaken in parallel to this assignment to review the effectiveness of Schedule 4 in compensating TOCs for their revenues and costs could lead to revisions to the compensation regime which in turn may provide useful potential data sources for a Network Availability KPI. It will be helpful to gain early sight of the emerging findings of these studies.

B1.8 The absence of a compensation regime (other than Part G of the Network Code) for freight operators makes it difficult to develop metrics which reasonably reflect the impacts on rail freight. The opportunity to address this may, at least in part, depend on the willingness of FOCs to submit additional data.

B1.9 The work to date is preliminary and will be developed further as we get greater visibility of the SC4S and PPS systems, explore potential attributes of the NMF, together with feedback from the stakeholder representatives.

APPENDIX C

SUMMARY OF STAKEHOLDER INTERVIEWS

C1. INTRODUCTION

C1.1 This appendix provides a summary of stakeholder interviews undertaken to inform the development of a Network Availability KPI. We have extracted common issues and themes from our interview notes most relevant to the development a KPI. It should be noted, these interviews were not intended to supplant a formal consultation that we understand will be undertaken by the ORR, most likely in conjunction with the Periodic Review.

C1.2 The objectives of the interview process were to:

- Understand the key issues faced by industry stakeholders as a result of disruptive rail possessions;
- Understand user perceptions of trends over time in the impact of possessions and the causes of these;
- Identify potential industry data sources;
- Understand industry requirements for a Network Availability metric, and canvas views on the construction of such a metric; and
- Achieve buy-in to the KPI development process and facilitate future buy-in to metrics that may be proposed.

C2. STAKEHOLDER REPRESENTATION

C2.1 A list of the stakeholders interviewed is presented below. The interviewees represent a cross section of the industry, including passenger and freight operators in each major sector, with a good representation of operating characteristics. Contact details, and meeting dates with each of these stakeholders is presented in Section C4.

- Government
  - Network Rail
  - Department for Transport
  - Transport Scotland
- Train Operators (TOCs)
  - ONE Railway
  - Northern Rail
  - Virgin West Coast
  - First Scotrail
- Freight Operators (FOCs)
  - EWS
  - Freightliner
- User Representatives
  - Rail Freight Group
  - ATOC
  - Passenger Focus

C3. SUMMARY OF STAKEHOLDER VIEWS

Stakeholder perceptions

Level of disruption

C3.1 The perception of a general increase in the level of disruption caused by possessions on the rail network was confirmed by many of those interviewed.

C3.2 No consistent data source was identified that could verify this, and interviewees differed in how actively they monitored the impact of Network Rail's activities on their business. Some examples given that support this perception include:

- Passenger operators reported increases in the total level of Schedule 4 compensation received.
- One operator monitors planned trains versus trains run, and has seen a four-fold increase in the number of 'temporary' trains (trains not in the FWTT) run. Similarly, EWS monitor trains amended within the timetable and have seen an increasing trend.
- A shortage of train planning resources required for planning temporary timetables. This is one of the only corporate functions in the industry that has not seen a reduction in headcount, despite improvements in planning and optimisation software.

C3.3 That said, all stakeholders accepted the need for engineering access in order to maintain, renew and develop the rail network. As one freight operator put it "perhaps we recognise the need to maintain the railway more than NR recognise the needs of customers'.

C3.4 Passenger Focus were of the view that passengers generally accept the need for engineering works, but they value being given sufficient notice of disruption, and good information about the benefits of works that have caused the disruption.

Underlying Causes

C3.5 Three broad themes emerged out of the interviews as to potential causes of increases in disruption to planned services.

C3.6 **In-efficient planning processes** within NR was commonly sighted. Interviewees commented on a lack of confidence in possession lengths proposed by NR and the need to negotiate every possession with NR from a 54 hour starting point commonly taken. One freight operator specifically commented on the current cyclic maintenance policy, which in their view, causes unpredictability in possessions, as cycles change with track usage, resulting in many permutations of possession patterns for sections of track. This makes planning diversionary routes in advance very difficult. One operator also suggested that replacing weeknight and Sunday timetable white space that is often not used with later services, but a regular (say 1 in every 3 weeks) night of reduced services to allow for a long, more efficient possession. In general, greater planning certainty was desired.

C3.7 **Poor communication** within NR and with TOCs was mentioned on a number of occasions. Examples given included a passenger operator who, on the day before a NR planned diversion, discovered the passing loop that facilitated the diversion did not exist as it had been removed 2 years prior, but not recorded or communicated within NR; possessions often planned to occur simultaneously on the main routes, and all suitable diversionary routes for key services requiring repeated negotiation by TOCs to enable one route to remain open to enable services to run. This includes both main Inter-City routes on a regular basis. ATOC would like to see possession patterns agreed between NR and TOCs.

C3.8 **Less efficient work practices** due to more stringent health and safety obligations, or more risk averse engineering practices. In particular, there was a common perception of a reduction in, and adversity to, planning possessions around Single Line Working (SLW) or Bi-Directional Working as this creates a more difficult working environment. Increasing the amount of single line working was generally seen as desirable by operators.

C3.9 One freight operator perceived an increase in emergency possessions, stating three potential causes; either they are easier to obtain approval for through NR internal process, they are directly related to the introduction of the ultra-sonic rail inspection train, faults identified by which are required to be remedied within 36hrs; or they are simply a result of poor planning (for example, not planning sufficient slots for engineering trains to deliver raw materials).

C3.10 It was suggested that the current situation can be partially attributed to the last Access Charges Review, where NR was charged with reducing costs, but not incentivised to minimise impacts on rail users. The focus was on more resource efficient possessions, not less disruptive possessions.

C3.11 One Freight operator noted that the current network change compensation regime may act as a disincentive to network improvement as NR is liable to pay more compensation under this process, than simply re-instating the same network capability under the regular maintenance and renewals possessions regime.

Key issues

C3.12 The key impacts of disruptive possessions identified by operators were the loss of revenue from cancelled services (particularly for freight services); the longer term demand impacts of unreliable services; and costs of planning and operating diversionary services and/or bus replacement services. Long distance operators were more concerned with the revenue impacts of diversions.

C3.13 The over-riding view, for both passenger and freight operators, was that it was **better to run a train**, rather than have it cancelled, or in the case of passenger operators, to run a bus replacement service. This is contrary to the opinion held that NR would rather cancel a train than delay one under the current performance regime. Operators desire a greater emphasis on single line working for possessions.

C3.14 Common issues and concerns of interviewees that could potentially be addressed by a Network availability KPI and should be considered during development include:

C3.15 **Notification** - A key issue for many of the stakeholders interviewed was the level and consistency of notice given for possessions. For long distance passenger operators, many customers book on line and require reservations. The ability to do this is constrained by the timing of uploads of timetable changes to the national timetable data base. Currently the cut off period for this is 12 weeks. Although only a relatively small proportion of customers require bookings and reservations further in advance than this, this weakness in the current system nonetheless compromises potential revenues, particularly on some high value routes where there is strong competition from air and on which airlines are able to offer reservations up to a year ahead. There was also a perception that many possessions are notified and then amended or cancelled, thus exacerbating the planning workload. Minimising this additional workload would be beneficial.

C3.16 **Diversionary Routes** - Freight operators identified the importance of the availability of a route between origins and destinations. For many freight traffic flows, there are alternative routes available and thus a possession on one route can be mitigated by using a diversionary route. On the other hand, for some freight flows, especially containerised inter-modal traffic requiring the larger W10 loading gauge, the availability of diversionary routes can be very limited.

C3.17 Each of the above would result in greater planning certainty for operators and passengers alike and reduce industry costs.

C3.18 **Efficiency of Possessions and minimisation of overruns** – Operators and the public alike should be assured that the best possible use of possessions is made, and that booked possessions are actually used. While over-runs are generally not seen as problematic outside conurbations, it was felt that where over-runs occur, greater emphasis should be placed on planning for contingencies rather than providing earlier notice for over-runs, in the form of standard plans that can be quickly implemented by TOCs to minimise disruptions.

Support for a measure

C3.19 Stakeholders were generally in favour of the development of a Network Availability KPI, and the use of an appropriate measure as a regulated output target. Although the focus should be on finding the best way to achieve the desired output, rather than developing KPIs.

C3.20 Some of those interviewed were aware of the existing measures published by NR, but generally found these to be meaningless with respect to their interests. It was acknowledged that the existing regime does not encourage NR to focus on the impact of its activities on customers and end users.

C3.21 This support was not unconditional, and it is clear that stakeholders would like to be further consulted on a final measure.

The 7 day railway.

C3.22 All interviewees were supportive of the increase in Network Availability implied by the 7-day railway concept. VWC noted that they were already contractually guaranteed a '6 ½ day railway'.

C3.23 Most saw changes in demand patterns as the driver of this (i.e. the weekend market is now being suppressed due to unreliable and limited rail services). Passenger operators see a need for possessions planning to move away from the historic 5 day railway patterns to better reflect current markets and demand. In particular, freight operators see an opportunity to target supermarkets if a reliable Sunday service could be provided. The key is the provision of a reliable service.

C3.24 Some noted the need to further define this concept, differentiating between a '100% railway' at peak times and a '50% railway' at times of low demand. Stakeholders, particularly funders, identified the need to clearly understand the costs and benefits of this concept at a disaggregate level in order to ensure value for money.

C3.25 A number of those consulted, both passenger and freight operators, viewed increasing the practice of Single Line Working when undertaking possessions as a potential way of achieving improved availability.

Possible measures

C3.26 The following points were raised as important considerations for the development of any new metric or KPI.

- Any KPI/metric, particularly one informing a regulatory output target should not create perverse incentives for Network Rail, perpetuate existing undesirable practice, or lock in existing service or operational patterns.
- The metric should be meaningful to those it is intended for.

C3.27 Most stakeholders recognised the difficulties inherent in developing a single meaningful measure of availability that would meet the needs of all interested parties and were supportive of the development of a 'suite of metrics' targeting different market sectors or different components of availability.

C3.28 Stakeholders were consistent in their view that any KPI would need to be able to reflect possession impacts at different levels of aggregation including:

- Geographic location possibly be region or route.
- Operator (both passenger and freight) and service.
- NR region to encourage competition within NR

C3.29 A route classification of Primary, Secondary, Regional and Freight was also suggested.

C3.30 The need to weight any KPI developed by the importance of a particular route or location to end users/services was generally acknowledged, including access to depots, which is often overlooked.

Efficiency/Supply Measures

C3.31 The following measures were suggested as a means of monitoring the efficiency of possession activity

- Number of possession overruns;
- Engineering output based measure based on historic maintenance and renewal activities on a particular track section taking into account changes in network usage;
- Infrastructure out of use – capturing potential availability;
- Productivity of a possession – i.e. multiple works undertaken – possibly recorded at source in PPS via categories reflecting optimised, normal, sub optimal possessions;
- Length of time taken to complete standard works against benchmarks;
- Number of possessions under single line working;
- Proportion of booked possessions used, by type of possession (i.e. maintenance and renewal);
- % of network open at a given time.

Impact Measures

C3.32 The following measures or considerations were suggested that relate to the impact on customers or end users of possession activity.

- A measure should focus on 'usable access', i.e. be weighted by demand for the network.
- A measure should reflect changes to the functionality of the network, for example, the network may be returned after a possession with a speed restriction, or non-operational passing loop or cross-over that might otherwise be required;
- Cancellations should be weighted higher than delays;
- Proportion of traffic with diversionary routes or weighting by the availability and quality of diversionary routes;
- A common suggestion was to focus any freight measure on a Strategic Freight Network as identified within the Freight RUS. This would capture the most important freight flows, and include routes cleared to higher gauge standards.

Industry data sources

C3.33 We asked interviewees if they were aware of any data sources that may be of use in developing this metric in addition to the existing S4CS and NR PPS systems. We were particularly interested in understanding the nature and format of freight data available. Responses confirmed that very little additional data is available in a form that would facilitate automated calculation of a KPI.

C3.34 Freight operators maintain their own bespoke systems to record the impact of possession and facilitate compensation claims where appropriate. Traffic data also does not appear to be captured in a consistent format.

C3.35 The following data sources were identified in addition to the existing S4CS and PPS systems.

- Automatic count data from trains could be made available through ATOC to enable calculation of weighting factors. Northern have this data over a two year period.
- ONE offered to provide bus replacement data.
- Network rail possession bid-offer records.

Summary and conclusions

C3.36 In summary, all industry stakeholders interviewed were supportive of the development of a Network Availability KPI or suite of metrics that could serve to incentivise a reduction in the impact of possessions on rail users, and were generally in favour of the idea of setting a regulated output target.

C3.37 Stakeholders perceive the level of disruption to be increasing, and expressed a range of views on why this may be.

C3.38 Due to the differing impacts of possessions on freight and passenger users, stakeholders acknowledged the difficulty in development of a single metric that would meet the objectives of all parties, and hence would support the development of a number of related metrics, some or all of which could be set as regulatory targets.

C3.39 While stakeholders were not able to propose possible metrics in any detail, the key issues and considerations recorded have been useful in developing and evaluating a long list of metrics within the constraints of existing data sources.

C4. STAKEHOLDER MEETINGS AND CONTACT DETAILS

Stakeholder	Contact Name(s)	Address	Phone/ Email	Meeting Details
Government				
Network Rail (NR)	Lucy Pitcher Project Manager Operations and Customer Services	Network Rail	D: 0207 557 8190 M: 07786 338 621 Lucy.pitcher@networkrail.co.uk	Client Group Also met with: Gordon Dudman (S4CS), Chris Myers (PPS), Jason Bird (Freight Access) and Paul Stanford (Freightliner account executive)
Transport Scotland	Jonothan Pugh *Head of Rail Regulation and Standards*	Buchanan House 58 Port Dundas Rd Glasgow G4 0HF	M: 07968 120185 Main: 0141 272 7100 Jonothan.pugh@transportscotland.gsi.gov.uk	Tuesday 31 July 10am Via Video Conference
	Fiona Donald		D: 0141 272 7559 M: 07825011492 Fiona.donald@transportscotland.gsi.gov.uk	
Department for Transport (DfT)	Andrew Nock *Franchise Sponsor*	Great Minster House 76 Marsham Street London SW1P 4DR	T: 0207 944 5925 M: 07990 796203 Andrew.nock@dft.gsi.gov.uk	Friday 20 July, 10:00 DfT, Great Minster House, London (also attended by Geoff Appleby)
Train Operators				
ONE	Ben Rule *Head of Performance and Planning*	ONE Railway, 1 Olivers Yard, London	Ben.rule@onerailway.com	Monday 16 July, 12.30 ONE, 1 Olivers Yard, London
Northern (Regional)	Chris Nutton	Northern Rail Ltd	D: 01904 568460	Thursday 19 July, 17:00

Stakeholder	Contact Name(s)	Address	Phone/ Email	Meeting Details
	Performance Strategy Manager	4th Floor, Northern House 9 Rougier St York YO1 6HZ	M: 0777 1832211 Chris.nutton@northernrail.org	Thistle Hotel, Euston
First Scotrail	Mike Price *Head of Development* Bil McGregor *Contracts Manager*	First ScotRail Atrium Court 50 Waterloo St Glasgow G2 6 HQ	T: 0141 335 4217 Mike.price@firstgroup.com	Tuesday July 17 Steer Davies Gleave
Freight Operators				
EWS	Nick Gibbons *National Planning Manager*	EWS Lakeside Business Park Carolina Way Doncaster DN4 5PN	T: 0870 140 5129 M : 07801 905617 Nick.gibbons@ews-railway.co.uk	Thrusday19 July, 15:00 SDG, London
Freightliner	Lindsay Durham *Head of Rail Strategy*	Freightliner Group Ltd 3rd Floor, The Podium 1 Eversholt St London NW1 2FL	D: 0207 200 3912 M: 07793 369 583 durhaml@freightliner.co.uk	Wednesday 25 July, 14:00 Freightliner, Euston
First GBRF	*Kevin Crane*		*Kevin.crane@firstgroup.com*	*No meeting resulted*
User Representatives				
Passenger Focus	Mike Hewitson	Whittles House 14 Pentonville Rd	D: 0207 713 2700	Monday 9 July 15:00 Passenger Focus, Whittles House, London

Stakeholder	Contact Name(s)	Address	Phone/ Email	Meeting Details
		London N1 9HF	Mike.hewitson@passengerfocus.org.uk	
Rail Freight Group	Alan Bennett (Director General)	Rail Freight Group 17 Queen Annes Gate London SW1H 9BU	M 07947 137 578 Tel 0207 233 3177 alan@rfg.org.uk	Tuesday 17 July, 09:00 RFG, Queen Anne's Gate
ATOC	Jim Morgan Director, Passenger Development, Rail Chair, Industry Possessions Steering Group.	First Group 15-25 Artillery Lane London E1 7AH	D: 0207 313 1418 *M: 07799 718 212* Jim.morgan@firstgroup.com	Friday 20 July 12:30 Euston Station
	Alec McTavish	Association of Train Operating Companies 3rd Floor 40 Bernard Street London WC1N 1BY	T: 0207 841 8006 Alec.mctavish@atoc.org	Thursday 05 July, 14:00 Phone discussion.

CONTROL SHEET

Project/Proposal Name:	NETWORK AVAILABILITY KPI
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