

**Periodic Review 2013 –
Consultation on the capacity charge**

July 2012



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EXECUTIVE SUMMARY

The capacity charge allows Network Rail to recover additional costs beyond the Schedule 8 baseline associated with the increased difficulty of recovering from incidents of lateness as the network becomes more crowded. In so doing, the charge helps neutralise the increased Schedule 8 risk to Network Rail of accommodating additional traffic. A secondary objective of the charge is to provide appropriate incentives and price signals to train operators and funders to make efficient use of network capacity.

The charge was introduced in June 2002. Since then, it has become an important income source for Network Rail, and a significant cost to operators. Network Rail's income from franchised operator capacity charges in 2010-11 was £158m, more than variable usage charge and electrification asset usage charge income combined. This results in a commensurate saving on fixed charges.

Despite this, the capacity charge has not been updated to account for traffic growth and changes in the way traffic is managed since its inception. ORR has therefore asked Network Rail to revisit and recalibrate the charge for CP5. We will commence work to recalibrate the charge later this year and commission the recalibration work from external consultants in order to ensure independence and transparency.

The chief purpose of this document is to seek stakeholders' views on the capacity charge in advance of starting the recalibration work. The document is also intended to provide information and clarify issues relating to the charge.

Structure of the charge

We do not propose making radical changes to the structure of the capacity charge in CP5, although we do believe that a small number of refinements can be made that will help improve its cost recovery and incentive properties. We consider that the level of granularity of charging for movements at different *times* – including the weekend discount – is appropriate. However, moving to a more granular charging system across *geography* provides an opportunity to strengthen and improve the suitability of the incentives implied by the charge. We therefore propose that capacity charges are applied at the level of train service code rather than train service group in CP5. We propose that the *de minimis* arrangements currently in place should be retained broadly in their current form. For freight, we believe that the present system – whereby all operators pay the same single capacity charge tariff which includes a discount on the passenger rate – is broadly the right one.

Recalibration of the charge

Our proposed methodology for calculating the charge for CP5 is similar to that applied previously. Whilst this approach is complex, it has worked well in the past.

An important issue is the metric used to measure available capacity, which underpins the charge. Whilst we recognise that there are a number of possibilities, we propose using the Capacity Utilisation Index, or CUI, as the basis for the PR13 capacity charge recalibration. This proposal is based on the following:

- Our testing indicates that the CUI offers a reasonable measure of capacity utilisation;
- It can be readily calculated using standard industry programmes; and
- It is consistent with the approach taken previously.

In order to improve the precision of the capacity charge recalibration, we propose inviting consultants bidding for the work to suggest a methodology and data sources to account for other determinants of reactionary delay as part of the analysis.

Changes in the capacity charge in CP5

It is not possible to estimate changes in individual capacity charge tariffs in advance of the recalibration. However, it is likely that capacity charge tariffs will typically increase in CP5. This is primarily as a result of:

- Increases in passenger revenue; and
- Increases in capacity utilisation across the network on average.

Whilst it is important that the capacity charge is recalculated so that it helps allocate capacity most effectively, we recognise that operators may be concerned by the prospect of increases in charge rates in CP5. As part of the recalibration exercise, we will ask bidders to propose a methodology for explaining – at a high level – the differences between the old level of charge income and the new one.

Industry engagement and milestones

We are committed to working with stakeholders in striving for the successful translation of technical work into a charging structure that is fully transparent, practicable to administer and reflects reality on the ground. To date, we have taken the following steps to engage with stakeholders and promote transparency in relation to the capacity charge in PR13:

- Presented our latest thinking – along with the methodology for computing the capacity charge – at the VTACs Development Meeting on 30 May 2012;
- Met operators on a bilateral basis to discuss specific concerns; and
- By means of this document, sought to fully articulate the purpose and process for calculating the capacity charge.

We need to continue our engagement with stakeholders to help ensure that the capacity charge is well-understood and has the confidence of the industry in CP5. Going forward, among other things, we will:

- Seek stakeholders' views at the VTACs Development Meeting on 22 August 2012;
- Share a draft Invitation to Tender for the recalibration work with ATOC, RFOA, ORR and funders for comment; and
- Investigate the industry's appetite for a capacity charge 'working group', which will meet regularly to discuss and inform the recalibration of the capacity charge.

The milestones for the capacity charge review are set out in the table, below.

Principal milestones	
July 2012	Capacity charge consultation
September 2012	Conclusion of methodology and issue ITT
October 2012	Recalibration work starts
March 2013	Draft pricelists made available
December 2013	Final pricelists made available
April 2014	Implement new capacity charge

We would welcome stakeholders' views on any aspect of this consultation. Details on how to respond are set out below.

1. INTRODUCTION

1.1. Background

The capacity charge is paid by franchised passenger, open access and freight operators. The main objective of the charge is to allow Network Rail to recover additional Schedule 8¹ costs associated with the increased difficulty of recovering from incidents of lateness as the network becomes more crowded. In so doing, the charge helps neutralise the increased Schedule 8 risk to Network Rail of accommodating additional traffic. A secondary objective of the charge is to provide appropriate incentives and price signals to train operators and funders to make efficient use of capacity on the network.

The capacity charge was first introduced in June 2002, following the Access Charges Review 2000. It has become an important source of income for Network Rail, and a significant cost to train operators. Network Rail's income from franchised operator capacity charges in the year 2010-11 was £158m – more than the variable usage charge and electrification asset usage charge combined (see Table 1, below). Around 97% of total capacity charges are paid by franchised passenger operators.

Table 1 – Network Rail access charge income from franchised passenger operators, 2010-11

Variable usage charge	137
Traction electricity net of cost	218
Capacity charge	158
Electrification asset usage	8

Source: Network Rail Regulatory Accounts

Unlike the variable usage charge, the capacity charge does not vary by vehicle type, but instead by geographical area and time (there is a 25% discount for weekend running), and is levied per train-mile. In 2010-11, the charge was on average around £0.54 per train-mile for passenger services, and around £0.14 per kgm for freight services.

1.2. The capacity charge and PR13

In its decision document *Periodic review 2013: setting the financial and incentive framework for Network Rail in CP5*², ORR confirmed that it continues to support the rationale for the capacity charge. ORR has asked Network Rail to revisit and recalibrate the charge for CP5, and will support Network Rail with this work.

We will commence work to recalibrate the capacity charge later this year. We see the recalibration of the capacity charge as a very important piece of analysis. The capacity charge has not been updated to account for traffic growth and changes in the way traffic is accommodated since the inception of the charge over a decade ago. There is mounting anecdotal evidence suggesting that the capacity charge is no longer fulfilling its objectives as well as it could be. For example, concerns have been raised that the charge does not always fully compensate Network Rail for the increased performance risk associated with accommodating new services. The

¹ Schedule 8 of the track access agreements between Network Rail and train operators provides the basis for compensation to train operators for the impact of lateness and cancellations on their revenues.

² Available at: <http://www.rail-reg.gov.uk/upload/pdf/financial-incentive-framework-cp5.pdf>.

recalibration will help ensure that the capacity charge mirrors the most up-to-date situation on the ground, and we believe will form a significant part of the industry's efforts to make more efficient use of capacity.

We will commission the recalibration work from external consultants in order to ensure independence and transparency. As we set out in detail below, we want to encourage engagement from across the industry in the development of the charge.

We note that ORR may use this analysis to inform its own work on a new capacity utilisation charge, which may be introduced during CP5. Moreover, the Planning Oversight Group (POG) is currently considering the development of a change control mechanism, which will allow appropriate adjustment of CP5 targets to reflect trade-offs between outputs (for example between capacity, journey times and performance). Whilst the POG's work is ongoing, it could influence – or be influenced by – the capacity charge recalibration. Going forward, Network Rail and the rest of the industry will need to be mindful of any possible interaction between POG's work and the recalibration of the capacity charge.

1.3. Purpose of this document

The first purpose of this document is to seek stakeholders' views on the capacity charge in advance of starting the recalibration work. In particular, through this consultation we want to gather views relating to:

- the structure of the capacity charge (e.g. the level of aggregation for charging purposes and weekend discounts); and
- how the charge should be recalibrated (e.g. how capacity should be measured and how the relationship between capacity and congestion related reactionary delay should be estimated).

In terms of what it is trying to achieve, together with the way in which it is calibrated, the capacity charge is among the most complex of all access charges. It is, however, very important that the charge is well understood so that its incentive effects are felt and that access decisions can be made based upon it. Recognising this, a second purpose of this consultation is to provide information and begin to demystify the capacity charge.

1.4. Structure of this document

This document firstly outlines the purpose of the capacity charge. It then examines the main issues and options in relation to the structure of the charge, before moving on to consider issues around recalibration. It then considers how the quantum of the capacity charge might change in CP5. Finally, it sets out our plans for industry engagement and principal milestones leading up to the start of CP5.

1.5. Responding to this consultation

This document sets out a number of specific consultation questions, which are summarised in Appendix 1. We would welcome responses to these questions, as well as comments on any other aspect of the capacity charge work programme as part of PR13. The closing date for this consultation is **Thursday 6 September 2012**. This provides six weeks for consultation.

We intend to make responses public, including sharing them with the ORR and listing them on our website, so please indicate if you wish all or part of any response to remain confidential.

Please address any responses and/or queries to:

Joel Strange
Senior Regulatory Economist
Network Rail
Kings Place
90 York Way
London
N1 9AG

Email: Joel.Strange@networkrail.co.uk
Tel: 020 3356 9319

This consultation can be downloaded from our website³.

1.6. Wider consultation on charges

This consultation on the capacity charge is the first of a series of consultations which will be issued by Network Rail in relation to charging over the coming months. We will aim to provide reasonable consultation periods for all of these, although timings may be constrained by the timescales of the periodic review. We would be keen to hear your views on the process of stakeholder engagement more generally, and invite you to contact us if you have issues that you would like to discuss.

³ Available at: <http://www.networkrail.co.uk/PeriodicReview2013.aspx>.

2. PURPOSE OF THE CAPACITY CHARGE

Some stakeholders have raised concerns that the underlying rationale for the capacity charge has not been well articulated. This section therefore reviews the underlying purpose of the capacity charge. Whilst this section is intended primarily for information, we would welcome stakeholders' views on any aspect of the discussion.

2.1. Network Rail cost recovery

As noted in the introduction, the chief role of the capacity charge is to allow Network Rail to recover additional Schedule 8 costs associated with the increased difficulty of recovering from incidents of lateness as the network becomes more crowded. These costs arise because additional services reduce Network Rail's ability to recover from incidents and increase the chance of reactionary delays, both of which increase Network Rail's expected costs from the performance regime. Technical box 1, below, illustrates why Network Rail's expected Schedule 8 costs rise as a result of increased difficulty in recovering from incidents as the network becomes busier.

It should be emphasised that, prior to the introduction of the capacity charge, these costs were recovered by means of case-by-case negotiations in advance of the introduction of new services. The capacity charge, in contrast, is a formulaic liquidated sums regime and has proven to be highly effective in reducing the transaction costs and administrative burden associated with the former arrangements.

2.2. Network Rail incentive effects

Beyond simply recovering costs, the capacity charge is intended to have behavioural features that encourage Network Rail to allocate capacity efficiently. By compensating Network Rail for the increased Schedule 8 costs as the network gets closer to capacity, the capacity charge helps neutralise the risk faced by Network Rail in accommodating additional traffic on the network. It therefore guards against Network Rail being disincentivised from accommodating increased traffic.

2.3. Operator and funder incentive effects and price signals

A further purpose of the capacity charge is to send appropriate price signals – and provide economically correct incentives – to both operators and funders, so that they take account of the costs of increased delay in their decision making process. This is intended to promote efficient use of capacity on the network. In practice, this means that the charge helps avoid unnecessary performance risk unless it can be justified by the benefits of the service.

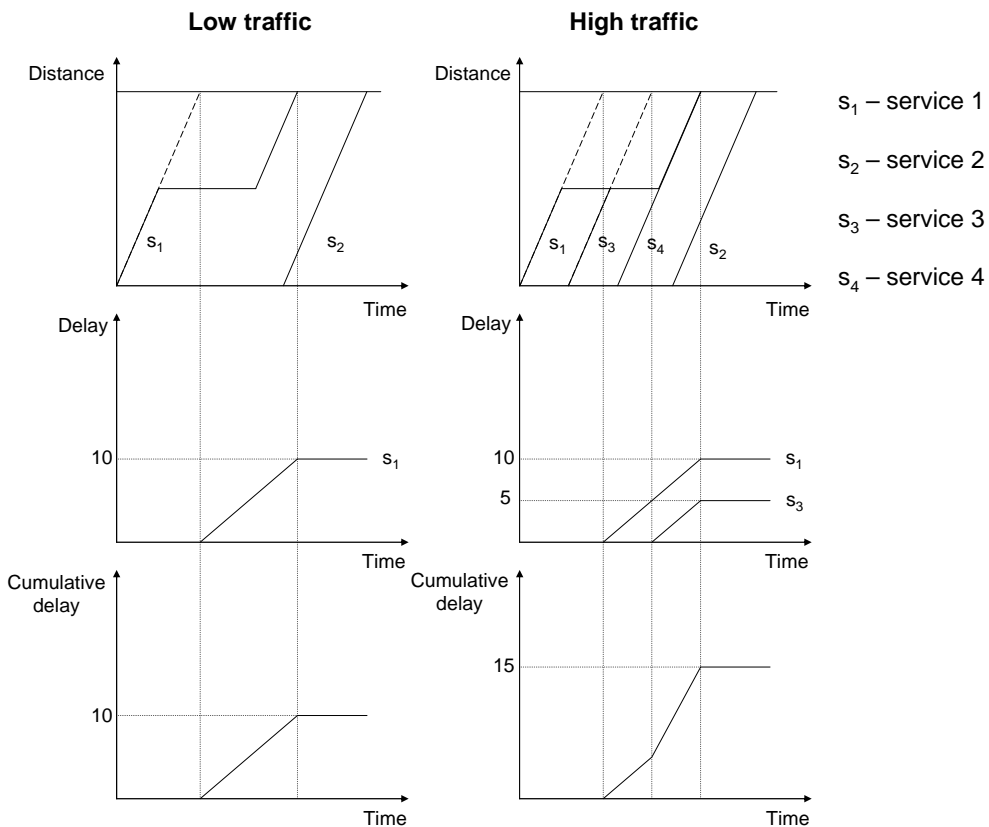
Technical box 1 – Reactionary delay under different traffic volumes

The diagram, below, illustrates how, as the network becomes busier, a particular incident caused by Network Rail results in more delay and therefore higher Network Rail Schedule 8 costs. The top graphs are simple train diagrams, showing services' planned and actual progress through their journeys. The middle diagrams show delay – defined for simplicity as the amount of time behind timetabled arrival time trains actually arrive – for each service. The bottom diagrams simply 'add up' the delay for all services, and show cumulative or total delay.

Suppose that traffic was initially light, shown on the left hand side of the figure as the 'low traffic' scenario. An incident which causes a delay of 10 minutes to the first service has no impact on the following service. This is because sufficient headway exists for no reactionary delay to occur. Therefore the total delay resulting from the incident is 10 minutes, as shown in the middle and bottom diagrams.

In contrast, suppose the network becomes busier and moves to the 'high traffic' scenario on the right of the figure below. The same incident which causes an initial delay of 10 minutes also causes delay to the following train, which incurs a delay of 5 minutes. Therefore the same initial incident causes a cumulative delay of 15 minutes.

From this simple example it can be seen that delay can multiply very quickly on a route with a high volume of traffic. Solely by virtue of the network becoming busier, any initial delay caused by Network Rail will have a larger impact on reactionary delay and therefore on Schedule 8 costs. It is this increased cost that the capacity charge is designed to recover.



2.4. ORR's position on the purpose of the capacity charge

In its document *Periodic review 2013: setting the financial and incentive framework for Network Rail in CP5*, ORR recognised that work on charging is fundamental to the better alignment of incentives through the industry. It said that it is taking a number of steps to improve the extent to which charges reflect the cost involved in providing services. It also stated that it wishes to expose Network Rail's customers more effectively to these costs with the aim of improving incentives for the more efficient provision and usage of those services. Overall, ORR considers that risks should be allocated to the party best able to manage those risks.

Against this backdrop, ORR confirmed that it continues to support the rationale for the capacity charge. ORR recognised that the capacity charge recovers genuine costs incurred by Network Rail and has desirable incentive properties, in that it ensures that operators pay the full costs they impose. ORR considers that the capacity charge ensures that costs and risk associated with using the network more intensively rests with organisations which benefit from more intensive use. In its presentation to the VTACs Development Meeting on 30 May 2012, ORR reiterated its view that PR13 presents an important opportunity to improve the price signals that the capacity charge sends in relation to making efficient use of capacity.

3. STRUCTURE OF THE CHARGE: ISSUES AND OPTIONS

This section examines a number of issues that have been raised by stakeholders in relation to the *structure*, or overall operation, of the capacity charge.

3.1. Cost recovery

Some stakeholders have raised concerns that Network Rail appears to raise funds from the capacity charge that are in excess of the sums at risk through the compensation regime. Stakeholders have noted that it is only *incremental* trains that impose additional costs on Network Rail, whereas the capacity charge is applied to *all* services. This, some stakeholders have suggested, results in excessive cost recovery.

Network Rail understands this argument. However, we strongly believe that the current approach of charging all trains is appropriate. This is for the following reasons:

- The approach implies that all trains are exposed to their full marginal cost, and are therefore subjected to the economically correct incentives and price signals.
- Moreover, and in contrast to a regime which only charged incremental traffic, the existing structure means that there are incentive effects on both the upside and the downside. That is to say, under the current structure, operators and funders benefit from cost savings if a service is withdrawn, in the same way that they pay more when a service is added.
- In addition, there are sizeable administrative benefits associated with levying the capacity charge on all trains. If the charge was levied on a subset of traffic, it would be necessary to define what constitutes incremental traffic – a cumbersome and barbed process in itself – and then distinguish between existing and incremental services for tracking and billing purposes.
- Related to this, only charging additional trains could create disincentives which would frustrate the timetable responding to market demand. This is because timetable changes could be regarded as ‘new services’ and therefore exposed to additional capacity charge costs.
- Existing operators stand to benefit from related Schedule 8 payments caused by reactionary delay, so that there would be a ‘free-riding’ problem if all services were not subject to the charge.

As ORR has emphasised in its recent decisions document, Network Rail does not benefit financially from imposing the charge on all services. This is because the income would otherwise be recovered by means of fixed charges. In effect, through the current mechanism, in exchange for levying the capacity charge on *all* traffic, a discount is given to operators on fixed charges. Put another way, if the capacity charge was applied to incremental traffic only, fixed charges would be commensurately higher. Charges are best regarded as a package, and it is important not to see charges in isolation.

Freight and open access operators

As noted above, approximately 97% of capacity charge income is paid by franchised passenger operators. Nevertheless, freight operators do pay the capacity charge.

Since freight operators only pay marginal costs, they do not benefit from commensurately lower fixed charges.

At the VTACs Development Meeting on 30 May 2012, ORR noted that it has proposed a freight-specific charge that would be set, in broad terms, to recover freight avoidable costs associated with the market segments to which it is charged. At the meeting, ORR confirmed that revenue from the capacity charge would be 'netted off' the calculation of freight avoidable costs.

We consider that ORR's proposed approach is broadly appropriate. We note that further consideration will need to be given to how this 'netting off' procedure will work in practice, particularly since only certain freight commodity types will be exposed to these new charges.

Whilst open access operators do not pay fixed charges at present, they may do so in future. At the appropriate time, it would be useful to consider the interaction between the capacity charge and any fixed charge that may be levied on open access operators in future.

3.2. Incentive effects

The capacity charge is currently levied at a fairly aggregated level across both time and geography. Accordingly, it is sometimes suggested that the incentive and price signalling effects of the capacity charge are relatively weak. Some stakeholders have gone further, and suggested that the lack of granularity in the charge means that its incentive effects are *inappropriate* in some cases – a 'one size fits all' charge could mean that the tariff is too high in some cases, and too low in others, to ensure the optimum incentive effects. PR13 affords an opportunity to refine the charge so that it reflects capacity utilisation at more focussed temporal and geographic levels. At the same time, it is important that any move towards more granular charging does not impose an inappropriate level of complexity or induce perverse incentive effects.

Disaggregation across time

In its current guise, the capacity charge differentiates across time in two distinct ways. Firstly, a 25% discount is offered for weekend services. Secondly, and more subtly, the charge levied on each service group reflects the *mix of traffic* across time for that service group⁴. Some stakeholders have suggested that a more granular structure – with charges reflecting the particular time of day or day of the week that the service is running – would have more powerful and appropriate incentive properties.

Whilst we understand this argument, we are concerned that disaggregation by time period beyond what is currently in place would introduce considerable additional complexity into the charging structure. Past experience has exposed the difficulty in introducing charging across time at a granular level. Equally importantly, industry systems require that charges are based on departure times, so that this could result in services becoming clustered just before and just after differently priced time bands.

⁴ That is to say, all services in a particular service group pay the same capacity charge tariff (with a few exceptions). However, the tariff for the service group reflects the *mix* across time of services within that the service group. So for example, a service group containing a large number of services in the peak – when capacity is most constrained – will typically have a higher capacity charge tariff than a service group with a relatively small number of services in the peak.

This perverse effect could have detrimental impacts on both rail users and network utilisation.

A further issue would arise with regard to contractual flex if further disaggregation by time was pursued. In particular, if trains were to be flexed into a time band in which a higher charge applied, the operator would incur additional cost. In the longer term, operators might seek tighter contractual rights to avoid their services being flexed into time bands where higher charges would apply. This could result in more protracted track access negotiations and would be detrimental to the optimal use of capacity across the network.

We are not convinced that moving to a more granular charging structure across time would be beneficial overall. Beyond the arrangements that are currently in place, we do not propose introducing capacity charge tariffs which vary across time.

Network Rail position

Beyond the arrangements that are currently in place, we do not propose introducing capacity charge tariffs which vary across time.

Consultation question 1

Do you agree that, beyond the arrangements that are currently in place, capacity charge tariffs that vary across time should not be introduced?

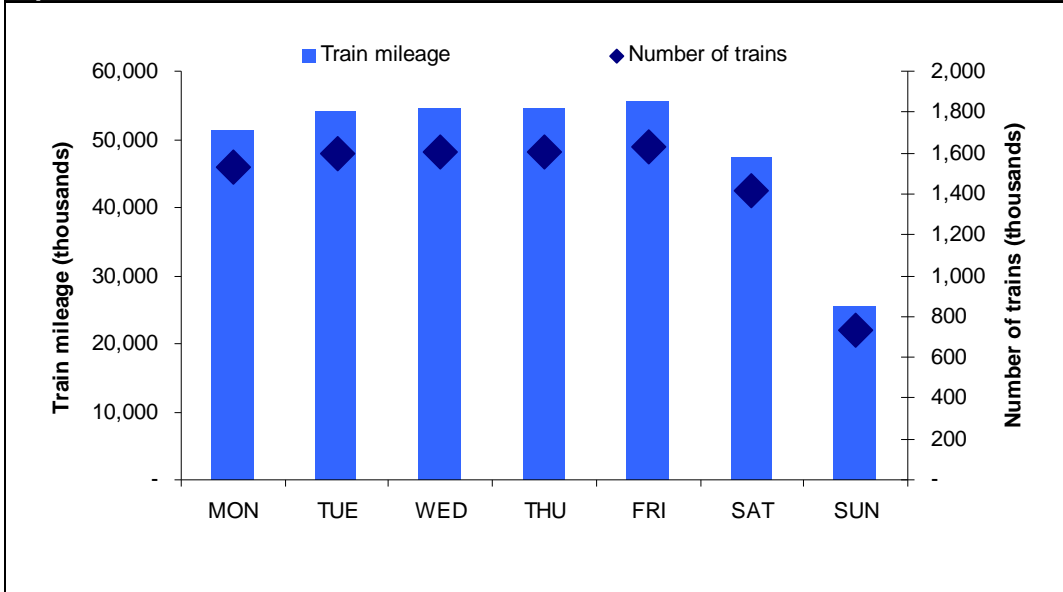
As noted above, a principal way in which the capacity charge currently distinguishes across time periods is by means of the weekend discount. Introduced in CP4, this provides a 25% reduction to capacity charges, for both passenger and freight, on Saturdays and Sundays. The rationale for the discount is that historically lower levels of traffic at weekends mean that there is less scope for reactionary delay.

Figure 1, below, presents recent data relating to the number of trains and train-miles by day of the week⁵. It is evident that weekend traffic levels continue to be significantly lower than those on weekdays on average, suggesting that a weekend discount is likely to remain appropriate in CP5. We therefore propose that the weekend discount should remain in place. However, we consider that the magnitude of the discount should be revisited, and informed by analysis undertaken as part of the capacity charge recalibration exercise⁶.

⁵ These statistics include the London commuter market, and as such may tend to amplify the difference between weekend and weekday traffic.

⁶ It is noteworthy that traffic levels on Saturdays are actually similar to those on weekdays, whilst Sunday traffic is considerably lower. On the face of it, based on the statistics these statistics, it might seem logical to offer a larger discount on Sunday rather than a discount for the weekend as a whole. However, Sundays are particularly important days for possessions, and incentivising higher traffic on levels on Sundays could frustrate possession planning.

Figure 1 – Chargeable train movements by day of the week, 2009-10, all train operators



Source: Network Rail

Network Rail proposal

We propose that the weekend discount should remain in place. However, we consider that the magnitude of the discount should be revisited, and informed by analysis undertaken as part of the capacity charge recalibration exercise.

Consultation question 2

Do you agree that the weekend discount should remain in place? Do you agree that the magnitude of the discount should be revisited, and informed by analysis undertaken as part of the capacity charge recalibration exercise?

Disaggregation across geography

With a few exceptions, charges are currently administered at the level of train service group, of which there are approximately 130. A move to charging by train service code rather than service group, with an increase to approximately 600 units for charging, offers a greater degree of granularity without a substantial redesign of the industry billing system. It provides an opportunity to give sharper price signals and may incentivise the use of route sections where capacity is more plentiful.

A move to a level of disaggregation finer than service code level would require an overhaul of the industry billing system. Not only would this create considerable extra costs, but bring with it significant risk of problems arising. We suggest that this option should not be taken forward at this time.

Overall, and subject to dealing with a small number of difficulties which we discuss below, we propose that the capacity charge should be disaggregated to service code (rather than service group) level in CP5.

Network Rail proposal

We propose that the capacity charge should be disaggregated to train service code (rather than train service group) level in CP5.

Consultation question 3

Do you agree that the capacity charge should be disaggregated to train service code (rather than train service group) level in CP5?

3.3. Applying new rates in CP5

We recognise that charging by service code may be associated with difficulties. Operators may, from time to time, make changes to service codes and reallocate trains between them. Left unchecked, this could have financial effects for both Network Rail and operators because different service codes would be likely to attract different levels of capacity charges. This was not an issue at service group level as operators could not redefine service group content.

To counter this, we propose the development of a tool which would generate the appropriate capacity charge tariff for new or changing service codes. This would ensure that operators always paid the right tariff, and minimise operator and Network Rail exposure to financial risk from changing service code definitions. This tool could also be used to establish the appropriate capacity charge tariff for new open access operators in CP5. We propose that this tool would be produced by independent consultants as part of the recalibration process. It may be appropriate to incorporate this into Network Rail information management systems in order to ensure consistency, stability and integrity.

If this approach was to be pursued – so that prices could, in effect, change within a control period – arrangements would need to be put in place to ensure that new tariffs could be readily accommodated contractually. For example, this could be dealt with by means of supplemental agreements to Schedule 7. This is a generic issue that applies to a number of charges. Further work will be needed in relation to this matter, and we would welcome stakeholders' views in this regard.

Consultation question 4

What are your views on developing a tool to calculate capacity charge tariffs for new or amended service codes? How could this be best accommodated contractually?

3.4. Disaggregation for freight

With the exception of the weekend discount, all freight operators currently pay a single capacity charge rate, regardless of location and time of day. We recognise that this does not provide the same degree of granularity as that applied to passenger operators.

However, Network Rail has considerable flexibility in terms of how it accommodates freight traffic. For example, Network Rail can often path freight traffic in a way which avoids capacity bottlenecks and particularly busy periods. This flexibility is important to the efficient running of the railway, and especially efficient use of capacity. In light of this flexibility, it is important that a single rate for freight is maintained so that freight operators are not made to pay different rates as a result of Network Rail decisions.

Moreover, due to the relatively high levels of flex that Network Rail may apply in the timetabling of freight services, the capacity charge calculations for freight includes a 10% discount compared to the capacity charge rates for passenger train operators. We consider that the level of this discount is broadly appropriate.

We propose that – as is currently the case – all freight operators should pay the same single capacity charge tariff in CP5.

Network Rail proposal

We propose that – as is currently the case – all freight operators should pay the same single capacity charge tariff in CP5.

Consultation question 5

Do you agree that all freight operators should pay the same single capacity charge tariff in CP5? What are your views on the level of the discount applied to freight services?

3.5. *De minimis* threshold

Administering the capacity charge imposes a clerical burden on both Network Rail and operators. Recognising this, the charge is currently not applied to services that would otherwise be subject to very small capacity charge tariffs. In CP4, the capacity charge is not applied to approximately 10% of service codes.

We consider that this level of exemption has worked well to date, and that it would be appropriate for similar arrangements to apply going forward. We therefore propose a *de minimis* threshold for applying the capacity charge in CP5. We propose that this threshold is set such that a similar proportion of service codes as in CP4 with the lowest implied capacity charge tariff (determined on the basis of the PR13 recalibration) do not pay the capacity charge. We also consider that it will be appropriate to ‘sense check’ the analysis on a case-by case basis, to ensure that the application of the *de minimis* threshold is appropriate.

Network Rail proposal

We propose that this threshold is set such that a similar proportion of service codes as in CP4 with the lowest implied capacity charge tariff (determined on the basis of the PR13 recalibration) do not pay the capacity charge.

Consultation question 6

Do you agree with Network Rail’s proposals in relation to the *de minimis* threshold?

3.6. Arrangements for handling large timetable changes in CP5

A number of large projects, such as Crossrail and electrification, will come into fruition during CP5. As a result, CP5 may see substantial timetable changes in certain parts of the country, which could affect the relationship underpinning the capacity charge.

We do not believe that these considerations undermine the rationale for updating the capacity charge during PR13, especially in light of the length of time that has elapsed since the original calibration. However, we need to be mindful of such changes, and

would welcome stakeholders' views in relation to how such changes might be accommodated in CP5.

Consultation question 7

What are your views in relation to arrangements for handling large timetable changes in CP5?

4. RECALIBRATION OF THE CAPACITY CHARGE: ISSUES AND OPTIONS

This section considers methodological issues in relation to the recalibration of the capacity charge for CP5.

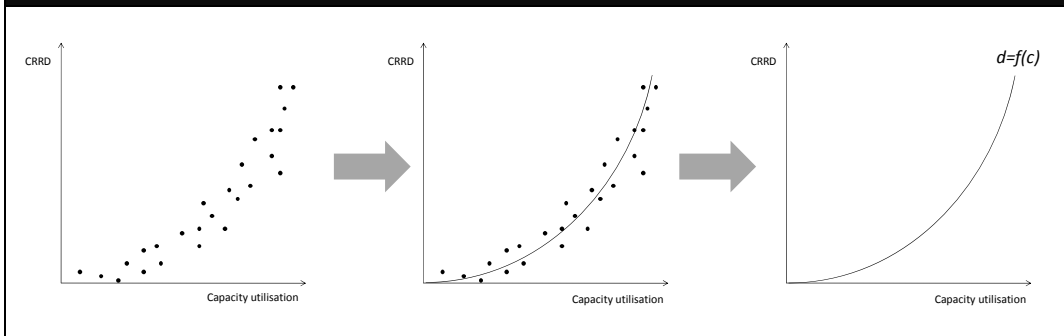
4.1. Proposed methodology

The proposed methodology for calculating the capacity charge for CP5 is broadly similar to that applied previously. Whilst this approach is quite complex, it has worked reasonably well in the past. We will commission independent consultants to undertake this work.

The process for recalibration is set out in detail in Appendix 2. The first step will be to gather data on reactionary delay, capacity utilisation and potentially other variables that affect reactionary delay (see below). Data will be collected for a number of geographic sections and time bands, the precise definitions of which will be proposed by consultants. We expect to measure reactionary delay using the Congestion Related Reactionary Delay (CRRD) measure used in previous calibrations. We propose measuring capacity utilisation using the Capacity Utilisation Index or CUI (see below).

With the data in place, regression analysis will be undertaken to find the relationship between capacity utilisation and CRRD. An illustration is provided in Figure 2, below. A key step in the analysis is the selection of the appropriate mathematical form, discussed further below.

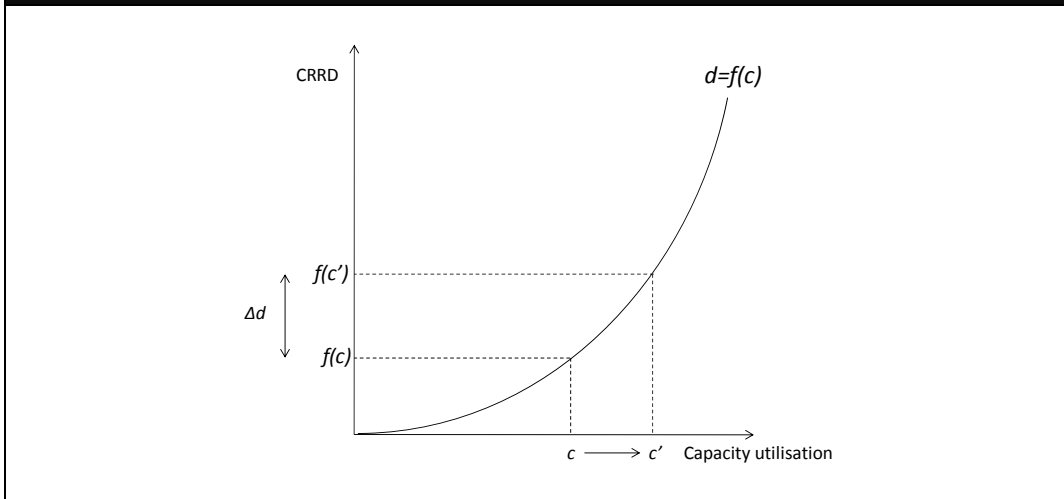
Figure 2 – Estimating the relationship between reactionary delay and capacity utilisation



Using this estimated relationship, the impact of adding an extra train on reactionary delay can be estimated. This is illustrated in Figure 3, below. With capacity utilisation initially at c , the extra train results in an increase in capacity utilisation to c' . This gives rise to an increase in CRRD, via the relationship estimated in step 2. The increase in the CRRD as a result of the extra train is denoted Δd .

The next step is to convert these delay impacts into financial costs to Network Rail, for which up-to-date Schedule 8 figures will be used. Finally, the figures are aggregated to a service group or service code level, as appropriate, to give the capacity charge tariff.

Figure 3 – Estimating the impact of an additional service on reactionary delay



Consultation question 8

Do you consider that the proposed methodology for recalibration of the capacity charge described above and detailed in Appendix 2 is appropriate?

4.2. Metrics

There are, in broad terms, two types of metric that are typically used to measure capacity. The first is trains per hour (or similar), which, if compared to theoretical or planning headways, can give a 'point measure' of utilisation. The second is the CUI, which measures the extent to which the timetable can be 'compressed' in time while respecting planning headways.

The CUI takes account of speed mix and stopping patterns, and is therefore in some ways a better measure. However, the CUI is measured using, and is a function of, the existing timetable structure. It is therefore unable to indicate where a restructuring of the timetable may enable more services to be accommodated. It is also a function of the section of route over which one chooses to calculate the index. A route as a whole may have a high CUI, but individual sections of the route may have lower CUIs.

We have undertaken detailed analysis over recent months in order to guide the choice of capacity measure underpinning the capacity charge. Whilst we recognise that there are a number of possibilities, each with its own advantages and disadvantages, we propose using the CUI as the basis for the capacity charge recalibration as part of PR13. This proposal is based on the following factors:

- Our testing indicates that the CUI offers a reasonable measure of capacity utilisation, and seems no worse a measure of capacity than available alternatives;
- It can be readily calculated using standard industry programmes; and
- It is consistent with the approach taken previously.

Network Rail proposal

We propose retaining the CUI as the basis for capacity charge recalibration as part of PR13.

Consultation question 9

Do you agree that the CUI should be used as the basis for capacity charge recalibration as part of PR13?

4.3. Accounting for other determinants of reactionary delay

The CUI measures capacity on the network, and forms the basis of the capacity charge. Whilst capacity utilisation is a chief driver of reactionary delay, it is not the only one. For example, constraints at junctions and limitations of movements in the throat of stations can also influence reactionary delay. These and other determinants of reactionary delay have not been accounted for as part of previous calibrations of the capacity charge. This has caused two issues:

- Past regression analyses have been characterised by a large amount of statistical ‘noise’, which may have aggravated the identification of the relationship between reactionary delay and capacity utilisation; and
- To the extent that factors not included in the regression analysis may be correlated with capacity utilisation, there is a risk that the estimated impact of capacity utilisation on CRRD may be subject to biases.

Subject to appropriate data being available and the development of a suitable methodology, we are keen on addressing these problems as far as possible through the PR13 calibration process. We propose to invite consultants bidding for the recalibration work to suggest an appropriate methodology and data sources to account for other determinants of reactionary delay. Such a methodology could be statistical or operational. However, we recognise that this process will be challenging, and we would emphasise the need to be pragmatic in this regard – the emphasis must be on ensuring that the analysis and the resulting capacity charge tariffs are roughly right rather than precisely wrong.

Network Rail proposal

We propose to invite consultants bidding for the recalibration work to suggest an appropriate methodology and data sources to account for other determinants of reactionary delay.

Consultation question 10

What are your views about accounting for other determinants of reactionary delay as part of the CP5 recalibration of the capacity charge?

4.4. Functional form

Reflecting the ‘domino effect’ nature of reactionary delay, the relationship between reactionary delay and capacity utilisation is expected to be increasing, with the slope becoming more acute as capacity utilisation increases, as illustrated in Figure 2, above. Whilst we can be confident that the relationship is of this general ‘shape’, it will be necessary to choose a particular mathematical form to underpin the capacity charge. Although this issue is quite technical, the decision is likely to have considerable implications for individual capacity charge tariffs. It is therefore appropriate that stakeholders have the opportunity to comment in advance. Technical box 2 sets out some of the options that will be available.

Broadly speaking, there may be a trade-off between theoretical and/or statistical ‘purity’, and ensuring that the ‘range’ of the capacity charge tariffs is kept within tight limits (see Technical box 2, below).

We do not have a preference between options at present. We consider that the choice of function should be based on statistical testing and careful judgement. We recognise that the exponential form may have continuity benefits, having been used as the basis for the capacity charge until now.

Network Rail proposal

We consider that the choice of function should be based on statistical testing and careful judgement.

Consultation question 11

What are your views about the functional form used to model the relationship between reactionary delay and capacity utilisation?

Technical box 2 – Choice of functional form

We would expect the appropriate relationship to be upward sloping and convex, in that each additional unit increase in capacity utilisation would result in a larger increase in reactionary delay than the previous one.

A number of possible functional forms will need to be investigate including, inter alia:

Exponential:

$$d = \alpha e^{\beta c}$$

Constant elasticity:

$$d = \alpha c^{\beta}$$

Asymptotic:

$$d = \frac{\alpha}{(c^{max} - c)^{\beta}}$$

where d is the measure of reactionary delay, c is the measure of capacity utilisation, c^{max} is maximum capacity (which is unknown), and α and β are parameters to be estimated.

As noted above, there may be a trade-off between theoretical and/or statistical ‘purity’, and ensuring that the ‘range’ of capacity charge tariffs is kept within tight limits. For example, the asymptotic function described above has strong theoretical underpinnings. However, it is likely to result in capacity charges that are modest for sections of the network with low and moderate levels of capacity utilisation, but significantly higher charges for the most crowded sections of the network. The exponential function, on the other hand, will result in a more gradual increase in capacity charge tariffs as capacity utilisation rises.

It may also be appropriate to investigate the use of nonparametric methods, which would avoid the need to choose among specific functional forms. The viability of using such techniques will depend on the quality and granularity of available data.

4.5. Analytical risk

In practically any transport context – be it rail, road, air or whatever else – the notion that higher capacity utilisation gives rise to more reactionary delay is virtually beyond question. This phenomenon has been examined by means of innumerable theoretical studies and computer simulations of transport systems. Similarly, there is an abundance of empirical evidence underpinning this relationship. Equally importantly, and in the context of the GB rail network, day-to-day experience has repeatedly shown that reactionary delay proliferates as the network becomes more crowded.

In recalibrating the capacity charge, the central challenge is estimating the *precise nature* of this relationship on the GB rail network. By working with the industry to develop a robust methodology – and allowing time for consultation and debate – we are making every effort to maximise the likelihood that the recalibration exercise is successful in isolating the relationship between reactionary delay and capacity utilisation. However, a **small residual risk** will always remain that the technical work does not identify the relationship with the required degree of confidence – not because the relationship does not exist in the first place, but because of methodological or data limitations.

It is therefore important that we plan for a situation – however unlikely – in which the analytical work is not sufficiently robust to underpin some or all capacity charge tariffs in CP5. In this situation, a number of alternative avenues are likely to be open to the industry, including *inter alia*:

- Reverting to PR08 tariffs, updated for RPI;
- Reverting to PR08 tariffs, updated for changes in Schedule 8 payment rates;
- If the recalibration has been successful for some parts of the network but not others, extrapolating results from the successful parts to the unsuccessful parts; and/or
- Using operational judgement to arrive at new capacity charge tariffs.

If such a situation was to arise, we consider that each of these approaches – or a combination of them – could have merit, depending on the precise nature of the results. Moreover, we will ask consultants bidding for the technical work to put plans in place to:

- Maximise the likelihood of the methodology described above being successful; and
- Recommend capacity charge tariffs by means of an alternative approach in the unlikely event that the recalibration is unsuccessful.

In the unlikely event that the statistical ‘plan A’ methodology is unsuccessful, as an overarching principle we would emphasise that tariffs should be set in a way such that they will be roughly right rather than precisely wrong. Moreover, faced with an unsuccessful recalibration, we believe that the alternative process for arriving at new rates should be consultative, open and transparent. We invite stakeholders’ views on how capacity charge tariffs should be set in CP5 in the unlikely event that the recalibration work is wholly or partially unsuccessful.

Consultation question 12

How do you think the industry can guard against analytical risk in the capacity charge recalibration? In the unlikely event that statistical recalibration approach described above is not fully successful, how should we proceed to secure a capacity charge which is fit for purpose in CP5?

5. CHANGES IN THE CAPACITY CHARGE IN CP5

The capacity charge has not been systematically updated in real terms since its inception following the Access Charges Review 2000. For this reason, it is likely that both individual capacity charge tariffs, together with the average tariff, will change in CP5 as the recalibration seeks to reflect the most up-to-date information on the ground. Whilst it is not possible to estimate changes in individual capacity charge tariffs in advance of the recalibration, it is possible to provide an indication – albeit a highly tentative one – in relation to the possible change in the average capacity charge tariff.

As the capacity charge is recalibrated to take account of the most recent position of the railway, the tariffs could change for a variety of reasons. Two of the most important sources of change are likely to be:

- Changes in passenger revenue; and
- Changes in capacity utilisation.

5.1. Changes in passenger revenue

Passenger revenue is a crucial determinant of capacity charge tariffs. This is because the capacity charge is based on Network Rail's Schedule 8 payment rates, which in turn are driven by TOC revenue. TOC revenue has increased by approximately 55% nationally over the relevant period. It would be reasonable to expect a similar increase in the typical capacity charge tariff as a result of this increase in passenger revenue.

5.2. Changes in capacity utilisation

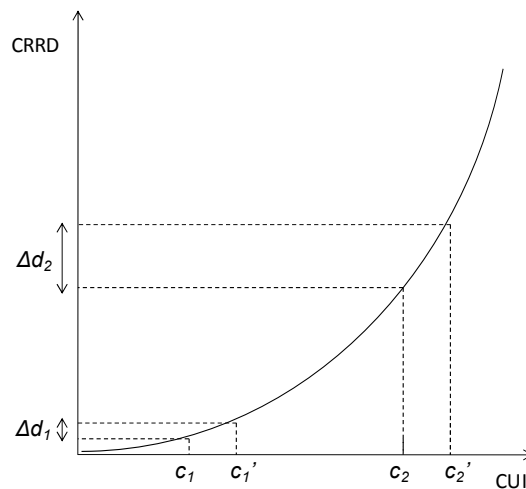
Changes in capacity utilisation will also drive the new capacity charge rates. On a localised basis, enhancement and other schemes have often managed capacity very effectively. The fact remains, however, that on an aggregate basis capacity utilisation is likely to have increased over time. This higher level of capacity utilisation means that reactionary delay will typically proliferate more readily, which implies further upward pressure on the average capacity charge tariff for CP5. This is illustrated in Technical box 3, below. It is not possible to quantify this effect in advance of the recalibration itself, but it should be borne in mind this upward pressure on capacity charge rates will be *in addition to* increases as a result of passenger revenue growth.

Technical box 3 – Changes in capacity utilisation

The diagram, below, illustrates how growth in capacity utilisation – as has been the case since the last calibration of the capacity charge – will result in higher reactionary delay, and therefore higher capacity charges all else equal. This follows from the fact that the relationship between reactionary delay and capacity utilisation increases at an increasing rate.

Suppose that capacity utilisation was initially at c_1 . As noted above, the capacity charge for this level of capacity utilisation is calculated by adding an additional service, which takes capacity utilisation to c_1' . This translates into additional reactionary delay of Δd_1 , which is then turned in to a financial value by means of the Schedule 8 payment rates.

Now suppose that capacity utilisation grows to c_2 . Adding an extra service now results in a much larger increase in reactionary delay of Δd_2 . When this larger amount of reactionary delay is monetised via Schedule 8, the resulting capacity charge tariff will be larger.



Whilst it is important that the capacity charge is recalculated so that it allows recovery of costs and helps incentivise efficient use of capacity effectively, we recognise that operators may be concerned by the prospect of increases in the charge in CP5.

As part of the recalibration exercise, we will ask bidders to propose a methodology for explaining – at a high level – the differences between the old level of the charge and the new one. We consider that this will provide assurance to operators, ORR and Network Rail alike. Moreover, we are keen to hear from operators as to how changes in the charge rates could be best managed as we move in to CP5.

Consultation question 13

How should changes in the capacity charge between CP4 and CP5 be managed?

6. INDUSTRY ENGAGEMENT AND MILESTONES

We are conscious that the cost of congestion-related delay is a complex area. Furthermore, the numbers involved are not trivial. Increased reactionary delay as a result of crowding represents a substantial cost to Network Rail, and as such we need to ensure suitable recovery of it, in a fair and transparent way. We understand the commercial implications that access charges have for our customers. For this reason, we are committed to working with train operators in striving for the successful translation of technical work into a charging structure that is fully transparent, practicable to administer and reflects reality on the ground.

6.1. Lessons learnt from previous periodic reviews

We are keen, where possible, to draw on our experiences from past reviews. We understand that during PR08, many stakeholders were critical about continuing with the capacity charge in CP4. We think this may have been due to the perceived complexity of the charge, which made it difficult to understand and effectively challenge it. Through dialogue and consultation with industry – of which this document is an important part – we will try to ensure that the purpose and calculation of the charge is as transparent as possible. We feel this may help stakeholders to provide useful suggestions for its review.

In the past, we carried out substantial work to disaggregate the capacity charge. However, it later came to light that a simplified version was more appropriate. Unfortunately, this resulted in quick revision of the charge rather late in the process. We feel that these short timescales compromised our ability to carry out ample consultation, effective stakeholder engagement and clear documentation. For this reason, we would like to consult on the methodology for the review as early as possible, which may reduce the risk of a substantial ‘rework’ towards the end of PR13.

6.2. Our approach to industry engagement in PR13

To date, we have taken the following steps to engage with stakeholders and promote transparency in relation to the capacity charge:

- Presented our latest thinking – along with the methodology for computing the capacity charge – at the VTACs Development Meeting on 30 May 2012.
- Met operators on a bilateral basis to discuss specific concerns.
- By means of this document, sought to fully articulate the purpose and process for calculating the capacity charge to the industry and other stakeholders.

However, we recognise that we need to continue our engagement with stakeholders to help ensure that the capacity charge is well-understood and has the confidence of the industry in CP5. Going forward, we will:

- Seek views from stakeholders on the consultation questions and other issues presented in this consultation at the VTACs Development Meeting on 22 August 2012.
- Share a draft Invitation to Tender (ITT) for the recalibration work with ATOC, RFOA, ORR and funders for comment.
- Seek ORR’s views in relation to the non-commercial aspects of the responses received to the ITT.
- Investigate the industry’s appetite for a capacity charge ‘working group’, which will meet regularly to discuss and inform the recalibration of the

capacity charge. While we envisage membership being optional, we would expect this group to include our consultants; train operators; ORR; Network Rail and possibly funders.

- Ask bidders to propose a methodology for providing a broad explanation of changes in capacity charge tariffs between CP4 and CP5.
- Ask the consultants to present their methodology and draft price lists to the VTACs Development Meeting in early 2013.
- Consult on draft capacity charge rates in the first half of 2013.

Consultation question 14

Do you support the creation of a capacity charge working group? How do you consider that its membership should be decided? What should be its remit?

Consultation question 15

Do you have any further views or suggestions about our approach to stakeholder engagement in relation to the capacity charge?

6.3. Principal milestones

The principal milestones for the capacity charge review are set out in table 2, below.

Table 2 – Principal milestones	
July 2012	Capacity charge consultation
September 2012	Conclusion of methodology and issue ITT
October 2012	Recalibration work starts
March 2013	Draft pricelists made available
December 2013	Final pricelists made available
April 2014	Implement new capacity charge

6.4. Further consultations

This consultation on the capacity charge is the first of a series of consultations which will be issued by Network Rail in relation to charging over the coming months. We would be keen to hear your views on the process of stakeholder engagement more generally. Your suggestions in this area can be used for setting our stakeholder engagement process for all charges reviews for CP5.

Consultation question 16

Do you prefer fewer and longer consultations or more regular and shorter consultation?

Consultation question 17

Do you have any further views or suggestions about our approach to stakeholder engagement in general?

7. CONCLUSION

The capacity charge is an important source of income for Network Rail, and a significant cost to train operators, accounting for more than the variable usage charge and electrification asset usage charge combined.

In its decision document *Periodic review 2013: setting the financial and incentive framework for Network Rail in CP5*, ORR asked Network Rail to revisit and recalibrate the charge for CP5. We will commence work to recalibrate the capacity charge later this year and see the recalibration of the capacity charge as a very important piece of work. The recalibration will help ensure that the capacity charge mirrors the most up-to-date situation on the ground, and we believe will form a significant part of the industry's efforts to make more efficient use of capacity.

We are keen to hear stakeholders' views about the structure and recalibration of the capacity charge for CP5. This consultation is the principal forum for stakeholders to express their views before technical work commences. This document sets out a number of specific consultation questions, which are summarised in Appendix 1. We would welcome responses to these questions, as well as comments on any other aspect of the capacity charge work programme for PR13.

APPENDIX 1 – CONSULTATION QUESTIONS

1. Do you agree that, beyond the arrangements that are currently in place, capacity charge tariffs that vary across time should not be introduced?
2. Do you agree that the weekend discount should remain in place? Do you agree that the magnitude of the discount should be revisited, and informed by analysis undertaken as part of the capacity charge recalibration exercise?
3. Do you agree that the capacity charge should be disaggregated to service code (rather than service group) level in CP5?
4. What are your views on developing a tool to calculate capacity charge tariffs for new or amended service codes? How could this be best accommodated contractually?
5. Do you agree that all freight operators should pay the same single capacity charge tariff in CP5? What are your views on the level of the discount applied to freight services?
6. Do you agree with Network Rail's proposals in relation to the de minimis threshold?
7. What are your views in relation to arrangements for handling large timetable changes in CP5?
8. Do you consider that the proposed methodology for recalibration of the capacity charge described above and detailed in Appendix 2 is appropriate?
9. Do you agree that the CUI should be used as the basis for capacity charge recalibration as part of PR13?
10. What are your views about accounting for other determinants of reactionary delay as part of the CP5 recalibration of the capacity charge?
11. What are your views about the functional form used to model the relationship between reactionary delay and capacity utilisation?
12. How do you think the industry can guard against analytical risk in the capacity charge recalibration? In the unlikely event that statistical recalibration approach described above is not fully successful, how should we proceed to secure a capacity charge which is fit for purpose in CP5?
13. How should changes in the capacity charge between CP4 and CP5 be managed?
14. Do you support the creation of a capacity charge working group? How do you consider that its membership should be decided? What should be its remit?
15. Do you have any further views or suggestions about our approach to stakeholder engagement in relation to the capacity charge?
16. Do you prefer fewer and longer consultations or more regular and shorter consultation?
17. Do you have any further views or suggestions about our approach to stakeholder engagement in general?

APPENDIX 2 – PROPOSED RECALIBRATION METHODOLOGY

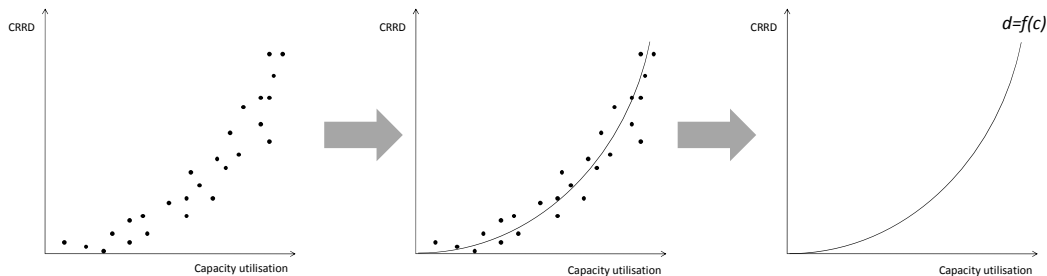
This appendix provides details of the proposed methodology for recalibrating the capacity charge as part of PR13. The process is set out in a series of steps.

Step 1 – Data gathering

The first step will be to gather data on reactionary delay, capacity utilisation and potentially other variables. Data will be collected for a number of geographic sections and time bands, the precise definitions of which are yet to be decided. We expect to measure reactionary delay using the Congestion Related Reactionary Delay measure used in previous calibrations. We expect to measure capacity utilisation using the Capacity Utilisation Index or CUI.

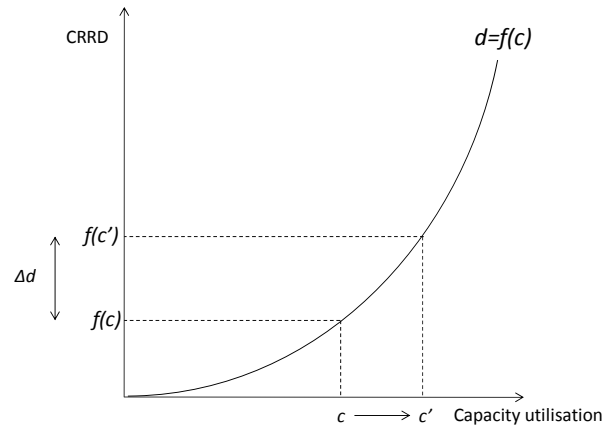
Step 2 – Estimate the relationship between reactionary delay and capacity utilisation

With the data in place, the regression analysis can take place. The data will show an approximate relationship between capacity utilisation and delay. Regression analysis will be undertaken to find a curve or function that best fits the data. An illustration is provided in the diagram below. This results in a mathematical expression that converts capacity utilisation into reactionary delay. In general, the relationship can be written as $d=f(c)$, where d is CRRD, c is CUI, and f is a function. This step will involve choosing a particular mathematical form for the function f (unless nonparametric methods are employed).



Step 3 – Estimate the impact on reactionary delay of an extra train

Using the estimated relationship derived in step 2 will then be necessary to calculate, for each section and time band, the impact on delay of adding an extra train onto the network. This is illustrated in the diagram, below. With capacity utilisation initially at c , the extra train results in an increase in capacity utilisation to c' . This gives rise to an increase in CRRD, via the relationship estimated in step 2. The increase in the CRRD as a result of the extra train is denoted Δd .



Mathematically, the additional CRRD as a result of the extra train can be expressed as,

$$\Delta d = f(c) - f(c')$$

where c is the measure of capacity utilisation on the section in a particular time band and c' is the level of capacity utilisation with an extra train added.

Step 4 – Calculate the financial cost to Network Rail for each section and time band

Steps 2 and 3 give an estimate for the impact, in terms of minutes of delay, of adding an additional train for each section and time band. The next step is to convert these delay impacts into financial costs to Network Rail.

Step 4a – Converting delay to lateness

The CRRD is a measure of delay. However, Schedule 8 payment rates are defined for minutes of lateness. Therefore a set of ratios must be applied to convert minutes of delay into Schedule 8 lateness. The factor is the historic ratio of total lateness to total delay,

$$L = \frac{\text{Total lateness on a section and timeband}}{\text{Total delay on a section and timeband}}$$

Step 4b – Computing the cost of delay

Schedule 8 payments apply at the level of the service group. A given section of track or time band will potentially have multiple service groups running over it. Therefore, in order to arrive at a Schedule 8 payment rate for each section and time band, an average of the payment rates for the service groups will need to be computed, weighted by the historic delay on each service group. This gives rise to a payment rate P for each section and time band.

Step 4c – Network Rail fault percentage

Finally, a factor must be applied to scale the cost down to the proportion of delay for which Network Rail is responsible. We denote the historic proportion of delay on a given section and route by F .

Step 4d – Calculation of the capacity charge by section and time band

Finally, Δd is multiplied by these factors, together with the number of trains per mile, to give the Capacity Charge tariff per mile for each geographic section and time band,

$$T = \Delta d \times L \times P \times F \times N$$

where N is the number of trains per mile on each geographic section and time band.

Step 5 – Convert tariffs to service codes/groups

Finally, the figures for the charge for each section and time band are aggregated to a service group or service code level, as appropriate. The charge per service group or service code is computed as a weighted average of the section and time band tariffs, with the weights determined by historic train-miles.