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The Impact of a Reservation Charge

Final Report for the Office of Rail Regulation

NERA
Economic Consulting

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Executive Summary

This report, by NERA Economic Consulting for the Office of Rail Regulation (ORR), examines the likely impact of a reservation charge. The aim of such a charge would be to promote the efficient holding of access rights by each train operator, and its impact would be limited to train operators, primarily (though not exclusively) freight operators, that do not use their track access rights all of the time.

It is common for freight operators to use certain access rights for only part of the time. Seasonal, infrequent or unpredictable customer demand is one important reason for this, sometimes leading to variations in the origin or destination of flows as well as the number of times a particular train runs. These are often accommodated by so called “Q” or “Y” paths. The need for diversionary paths to avoid Network Rail engineering works (possessions) is also important. This operational need for flexibility in the holding of rights is commonly referred to as “headroom”. But train operators may also retain more paths than they need in order to ensure that they can use the paths again if demand for their services picks up. It is also possible that operators may retain excess paths to frustrate the aspirations of their competitors.

Our base case assumes that the reservation charge is £20 per unused path. Even though a rebate scheme is proposed that will ensure that the charge is cost neutral for rail freight as a whole, we assume that operators respond to the “headline” rate, rather than the much lower effective rate that might result from the operation of particular refund schemes.

While the way in which individual operators would respond to the reservation charge is not entirely clear cut, there are two main ways in which such a charge is likely to free up paths:

§ the financial incentive provided by the charge may encourage train operators to review their current rights holdings, and consider whether they can continue to provide their existing services with a smaller portfolio of rights (ie reduce the size of their rights portfolio without losing any traffic). This outcome would reflect two possible situations: either the rights were entirely unused; or the rights were used but there were surplus holdings above what was required for operational reasons by the operator. While this could free up some paths for use by other operators, this is most likely to occur at uncongested parts of the network. Despite the introduction of a reservation charge, operators may decide for strategic reasons to retain the rights that would be most useful to other operators - this is most likely to occur in the congested parts of the network;

§ by increasing the cost of running certain services, the reservation charge may have the unintended consequence of pricing some traffic off the rail network as the operator seeks to pass on the costs of the reservation charge to the customer. Even though commodity-specific “headroom” allowances could adjust for the main differences between average path utilisation rates for different types of traffic, there will still be an impact on particularly price-sensitive traffic or on specific flows that have below average path utilisation rates for their particular commodity group. Therefore, in these circumstances operators reduce their holding of rights but at the expense of some lost traffic.

There is little evidence available about the first of these categories, which is the objective of the charge, though we consider it unlikely that a non-punitive charge would lead to many paths being freed up that could be usefully and profitably taken up by other operators. Where unused paths are freed up but not taken up by other operators, this will not generate any additional benefits or any additional costs. Our estimates are mainly based therefore on the second type of impact, for which there are more data available. We also consider in a sensitivity test the case where the first type of impact does lead to some potentially useful paths being surrendered. Even in this case, however, it is possible that train operators could retain certain traffic, even though the reservation charge takes away some or all of the margin on that traffic, because of the strategic advantages of retaining particular access rights (for example, from blocking competitors from gaining the access rights or preserving a right for potential future traffic).

To estimate the possible impact of a reservation charge, we have looked at three main questions:

§ how will individual train operators be affected by the charge? We have used information from the Freight Route Utilisation Strategy (RUS) on path utilisation rates, and from a recent report for ORR by MDS Transmodal on train operator costs, to estimate the change in each operator's costs as a result of the charge. This is also sensitive to the way that headroom allowances are set – for our base case, we assume that the headroom allowance for each commodity group is set at 10 percentage points below the average path non-utilisation rate for that commodity, subject to a maximum of 50 per cent;

§ how will train operators respond to these cost changes? For our base case analysis, we have used MDS Transmodal's estimates of the price sensitivity of different types of traffic. We also carry out sensitivity tests which show the impact of higher or lower price elasticities, and also the case where a number of unwanted train paths are returned without any loss of traffic (including some that are useful to other operators);

§ what benefits will be generated by the freed up paths? Our discussions with some industry participants[1] suggest that there are relatively few (and perhaps very few) cases where traffic is excluded from the network because of operators retaining poorly used paths (as opposed to genuine capacity constraints). Although there have been cases where operators have had some difficulty getting traffic on the network, the problem has usually been resolved by using existing administrative mechanisms, or by giving operators less than ideal paths. Some new services might be accommodated, and some existing services might be able to move to "better" train paths that allow more efficient operations. But this will only happen if paths are freed up in areas (and at times) where existing traffic volumes mean that there are no suitable paths already available. And any benefits generated may be offset by the loss of value from traffic that leaves the network as a result of the reservation charge.

While the reservation charge has a strong impact on the costs of coal and construction traffic (both of which have relatively low utilisation rates), more than 80 per cent of the paths freed up are from construction flows. MDS Transmodal's estimated elasticities suggest that construction traffic is very price sensitive, whereas the demand for coal traffic is much less affected by possible cost increases.

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1 Principally EWS, Freightliner and Network Rail.

On the whole, these paths are unlikely to be located in parts of the network that are subject to capacity constraints and where there is significant unsatisfied demand for freight paths. This reflects both the nature of paths that might be freed up, and the risk that train operators will retain those paths that might be useful to other operators, despite the introduction of the reservation charge, for strategic reasons.

Table 1 summarises our base case results. Note that this includes only those benefits we have been able to quantify; there also may be additional benefits related to competitive effects or delaying enhancement spending, but we would expect these to be relatively small. We estimate that almost 1,500 train paths per year will be freed up, but assume that only 5 per cent of them will be re-used by other train operators. If anything, we think this assumption may be too optimistic due to the apparent low levels of latent demand in locations where paths are likely to be freed up.

The benefits generated by the reservation charge are very much smaller than the expected costs of administering the scheme. This is despite that fact that we have adopted the cost estimates for a simplified scheme, as proposed by Freightliner, as opposed to a systemised approach that is linked to Network Rail's train management and billing systems. The set-up costs alone for the latter are estimated to be £450,000.

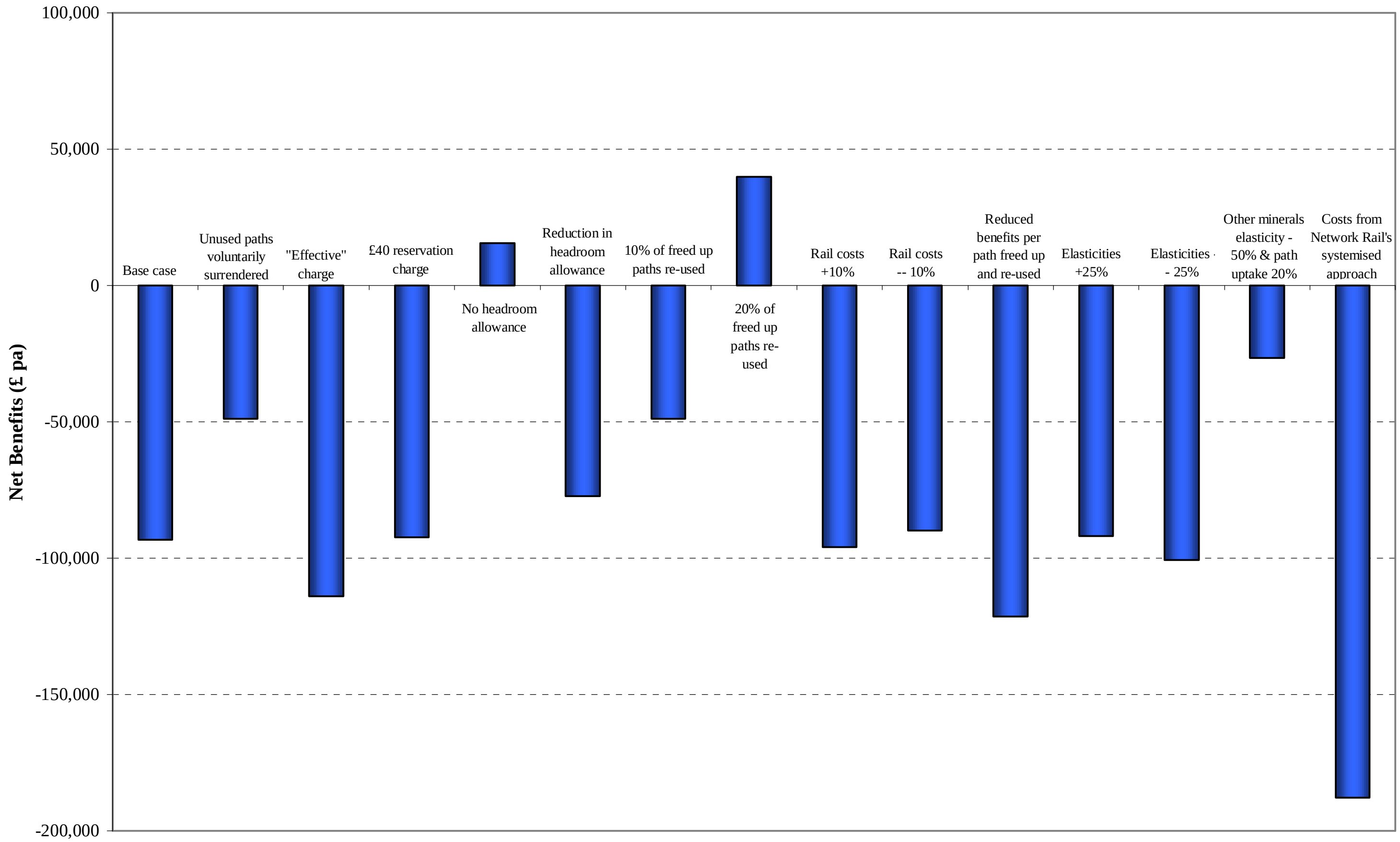
Table 1
Summary of Net Benefits (£ per year)

Benefits from freed up and used train rights	44,381
Value lost from given up train rights	-14,516
Total benefits	**29,866**
Annualised set-up costs	-3,075
Ongoing administration cost	
Network Rail	-95,000
Freight operators	-25,000
Total Costs	**-123,075**
Net Benefits	**-93,210**

We also considered a scheme that is restricted to parts of the network that are classified as "Congested Insfrastructure" and a possible tightening up of the current Use It Or Lose It provisions of Part J of the Network Code. We expect the impact of each of these to be very small indeed, and in the former case would again be outweighed by the expected costs of administering the scheme.

Figure 1 summarises the outcome of a number of sensitivity tests. Only in two cases - where a very much higher proportion (20 per cent) of freed up paths are re-used, or where there is no headroom allowance at all in the reservation charge scheme – generate positive net benefits, in each case of less than £50,000 per year.

Figure 1
Sensitivity Tests - Net Benefits (£ per year)



A further important feature of the reservation charge, as proposed by ORR, is that it could lead to a significant redistribution of income between train operators. In the base case, we estimate that EWS would suffer a net loss of about £114,000 per year, whereas Freightliner would enjoy a net gain of almost £100,000 per year. In some other cases, the redistributions are higher than this. Among other things, this means that any specific proposed scheme might be vigorously contested by the operators that expected to lose out as a result. We have not included the costs of this further implementation work in the costs estimates described above.

More promising measures are likely to be those that include a subjective element. This might include:

§ regular rights reviews by Network Rail, which aim to identify cases where rights are no longer required, though this is likely to require an element of subjective judgement about the number of paths that an operator really needs to serve a particular customer or group of customers; and

§ close scrutiny by ORR of proposed access contracts, included a detailed analysis of issues such as whether the access rights being sought are all essential, whether they are defined in an appropriate way, and whether there should be any provision for further reviews during the life of the contract.

A more rigorous approach to approving freight track access contracts could be complemented by a more proactive approach from Network Rail, for example in challenging rights that may be superfluous. If such initiatives can be made to work, they have the important advantage of being able to focus intervention on situations where there are potential benefits to be delivered, rather than the much blunter approach of industry-wide incentive schemes (which may be least effective where they are needed most).

1. Introduction

NERA Economic Consulting has been engaged by the Office of Rail Regulation (ORR) to conduct an analysis of the costs and benefits of implementing a reservation charge for access rights that are reserved but not used.

ORR is concerned that the existing administrative provisions designed to promote efficient use of rights under Part J of the Network Code are insufficient, and that further improvements may be possible through the implementation of a pricing mechanism that financially penalises operators for the inefficient use of reserved network capacity reserved through access rights.

The outcomes from this study will inform ORR's decision about whether to continue work on the more detailed development of a reservation charge for implementation in CP4.

1.1. Scope of this Study

The scope of this study encompasses the assessment of the costs and benefits of two alternative specifications of a reservation charge, and a third model that focuses on augmenting the current administrative mechanisms. The first model involves the generic application of a flat rate reservation charge to all unused train rights on the network. The second model targets specific locations that have been defined as congested by Network Rail. The third model looks at a tightening of the existing Part J 'use it or lose it' ('UIOLI') provisions.

For the purpose of conducting this assessment we have been instructed by ORR to assume the following:

§ the costs and benefits are to be assessed with reference to the status quo, ie no reservation charge and the existing UIOLI provisions;

§ the charge applies to freight operators and non-franchised passenger services only;

§ the reservation charge is revenue neutral for the industry as a whole, and is revenue neutral within the freight and passenger sectors such that there is no transfer between the two;

§ no adjustment is to be made for paths that cannot be used as a result of engineering works or as a result of other factors that are outside operators' control;

§ adjustments are made for cordon caps;

§ there is a 'grace period' of one year, such that the reservation charge is not implemented until the second year of CP4; and

§ adjustments are to be made for commodity-specific headroom.

1.2. Overview of Our Approach

A thorough assessment of a policy intervention requires a detailed assessment of the costs and benefits associated with that policy. In a number of cases these costs and benefits may not be quantifiable. However, where possible, the main impacts should be quantified. In this report we analyse the main costs and benefits associated with implementing a reservation charge. We also consider the potential impact of adjustments to the existing administrative mechanisms.

Our analysis of the first reservation charge model suggested by ORR consists of a quantitative assessment of the main costs and benefits associated with implementing a reservation charge over the entire network. We also include a qualitative discussion of the wider costs and benefits that are difficult to quantify (see section 5). Our analysis of the second and third models (ie location specific charges and a tightening of the existing administrative mechanisms) has been limited to a more qualitative discussion, although we do provide broad estimates of the potential benefits that may arise from the second model.

The main potential benefits of the reservation charge will flow from the freeing up of paths that were previously used inefficiently or for marginal traffic.[2] The size of the total benefits will depend on the number of paths freed up, the number of those paths that are then taken up by either new or existing traffic, and the size of the benefits that accrue from a freed up path being re-used. These total benefits are also off-set to some degree by the loss of some value from traffic leaving the network due to the charge.

The other costs of the reservation charge are primarily associated with the initial set-up costs incurred by Network Rail to augment its billing system, and ongoing administrative costs to both Network Rail and train operators. There may also be a number of wider costs related to increased network congestion.

The final step is to compare the size of the benefits with the costs, taking into consideration any wider impacts from the reservation charge, to determine the net impact of the policy. We have also undertaken a range of sensitivity analyses to test the robustness of our results. The outcomes from this analysis will then be used by ORR to determine the applicability of the reservation charge as an appropriate approach to improving the efficiency of capacity allocation on the network.

1.3. Structure of the Report

The remainder of the report is set out as follows:

- section 2 provides background on the reservation charge, as well as identifying some key issues that are central to analysing the impact of such a charging scheme;
- section 3 outlines our approach to modelling the benefits of the reservation charge;

[2] While some of these paths might be taken up, in theory at least, by more valuable traffic we note that this is an unintended consequence rather than an objective of the reservation charge.

- section 4 provides a discussion of the costs associated with the implementation of a reservation charge;
- section 5 presents our estimates of the total benefits of a charge;
- section 6 provides a description of how we modelled the rebate of the reservation charge to ensure revenue neutrality for the freight industry as a whole, as well as discussing the incentive implications of the charge;
- section 7 describes the sensitivity analysis we performed on the benefits estimation and presents the results;
- section 8 considers the impact of a location-specific charge;
- section 9 discusses the role of administrative mechanisms and explores the potential impact of changing them;
- section 10 discusses the policy implications of the results; and
- the attached appendices provide details of the estimation of the main modelling inputs.

2. Background

2.1. Introduction

Demand for access to the rail network is forecast to continue to grow strongly into CP4. The network already faces capacity constraints in some areas, such as the West Coast Main Line, and at particular times of the day, so further growth will only serve to compound pressure on an already constrained network. Relieving congestion can be achieved through two approaches:

- network enhancement and expansion; and/or
- the more efficient use of the existing capacity.

Network enhancement is costly and, in many cases, involves significant lead times. Therefore, achieving more efficient use of the existing infrastructure is an attractive alternative to, or will at least serve to delay, costly enhancement or expansion. Achieving an efficient holding of access rights is one component of achieving a more efficient use of the network. Improving the efficiency of access rights holdings can be achieved in a number of ways, but the principal approaches are:

- the use of price incentives – the infrastructure manager could impose charges for the reservation of capacity in general or for the use of particularly congested parts of the network; and
- the use of administrative mechanisms – these mechanisms could involve a range of options and initiatives including the on-going reviews of capacity reserved through access rights by operators or refinements to the timetabling process.

Although there are existing administrative and planning mechanisms that are designed to increase the efficiency of capacity allocation, some stakeholders have argued that, as they currently exist, the administrative mechanisms are not adequate to provide the desired level of efficiency. These mechanisms include the 'use it or lose it' (UIOLI) provisions contained in Part J of the Network Code, which allow paths to be freed up where they are not used at least once within a specified period of time.

While it is primarily a long-term planning tool, the purpose of Network Rail's ***Freight Route Utilisation Strategy***[3] is to identify and resolve potential capacity constraints on the network or route augmentation in order to promote "the effective and efficient use and development of the capacity available".[4] It therefore acts as an additional instrument to supplement administrative approaches to improve the efficiency of rights holdings.

Other initiatives are currently being undertaken to develop alternative administrative mechanisms for improving network efficiency. This includes an Industry Steering Group study of what amendments could be made to the Network Code, including allowing Network

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[3] Network Rail, *Freight Rail Utilisation Strategy*, March 2007.

[4] Quoted from ORR's *Guidelines Strategies in Network Rail's Freight RUS*, p.12.

Rail to adjust rights such that those rights may be allocated more efficiently between operators.[5]

ORR's concern is that none of these administrative mechanisms provide operators with a financial incentive to ensure that their holding of access rights is efficient. In contrast, the reservation charge will ensure that operators will incur financial penalties where they do not hold their rights efficiently, which ORR believes will give greater impetus to operators to reserve access rights at an efficient level.

2.2. Network Utilisation

The average utilisation of timetabled paths for freight operators is low. As Table 2.1 from the Freight Route Utilisation Study shows, while there is wide variation between the commodities, average path utilisation rates for the coal and construction traffic are below 50 per cent.

Table 2.1
Path Take-Up by Key Commodities, 2004/05

Commodity	Take-up
Intermodal	95%
Petroleum	56%
Metals	51%
Coal	45%
Construction	37%
Channel Tunnel	21%

Source: Freight Rail Utilisation Strategy, March 2007, page 26, Table 3.9

There are several reasons why freight paths may not be highly utilised. Understanding these reasons is important in designing the reservation charging scheme, but also in examining both the intended and unintended consequences of the scheme. Central to this understanding is drawing a distinction between those circumstances where low utilisation is inefficient, and those when it can be efficient.

Low path utilisation rates do not necessarily imply an inefficient use of path rights. It may arise because of a genuine business need to meet customer demand. Different commodities exhibit very different characteristics which have important implications for the number of paths that operators must hold, and also their utilisation rates. Servicing coal customers, for example, requires significantly more flexibility in terms of logistics than intermodal customers.[6] This flexibility requirement originates from the variation in demand from customers, both in terms of time and geography. Demands for energy vary from week to week, and therefore so do the demands for coal. However, also importantly, the required source of coal can vary from week to week depending on the nature of competition in the coal market (ie where it is cheapest) but also the calorific demands of the energy companies.

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5 ORR, *Periodic Review 2008, A Reservation Charge: Consultation on Issues and Options*, December 2006.

6 We note that the particularly low utilisation rate for Channel Tunnel traffic reflects the decline in intra European traffic of recent years.

These different characteristics imply considerable variation between commodities in the utilisation of timetabled paths. This flexibility is referred to as 'headroom'.

More specifically, EWS in a submission to ORR in 2006 explained that 'headroom' is required to address the following:[7]

- *to accommodate trains which only run on certain days, including 'Y' and 'Q' paths. A 'Y' path is one with multiple origins, multiple destinations or both with an 'either/or' element being used as required on different days. A 'Q' path runs when required;*
- *to accommodate dated trains (eg MWO);*
- *to accommodate seasonal demand (eg ESI coal) which is not required for a full timetable period;*
- *to accommodate additional 'one off' trains or trains which only run for a short period of time which are not known about when the annual timetable is developed. These paths are used by many customers such as the engineering, weed-killer and track recording trains run for Network Rail;*
- *to accommodate trains which need to be retimed on a temporary or occasional basis;*
- *to accommodate customer requirements;*
- *to permit trains to be diverted on alternative routes to accommodate Network Rail's engineering needs;*
- *for engineering trains to accommodate changes in Network Rail's engineering plans often at short notice;*
- *to accommodate trains running 'out of course' for any reason; and*
- *to accommodate growth until it can be incorporated as specific permanent train paths in the working timetable when the next timetable development cycle is completed.*

These requirements mean that headroom should not necessarily be considered an inefficient use of capacity. However, there may also be some situations where this is not the case. Inefficiency may result from two primary sources:

- paths may continue to be held despite non-use, or continue to be used inefficiently, as a result of inertia. Where paths have been held for some time by a legacy rights-holder, or a service has been run for several years, it may not be obvious to an operator to drop or reorganise those paths, particularly where there is no penalty for retaining them; and
- some operators may keep paths for strategic reasons. This could be because an operator believes the paths will be of use in the future, and so is reluctant to give them up. Alternatively, or perhaps in combination, the retention of paths may serve to prevent competitors obtaining capacity on the network, and so forces those competitors either to not provide a service on that path or to use a less efficient, and therefore more costly, route.

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[7] EWS, Letter to ORR, *Reservation/Scarcity Charging*, 17 July 2006.

2.3. Existing Mechanisms

Operators' access rights are detailed as part of their access contracts. These contracts, which are agreed between Network Rail and the operator, are time-limited. The most recent EWS access contract is valid for ten years. Once agreed by the operator and Network Rail, the access contracts are then approved by ORR.[8] Both Network Rail and ORR therefore have the opportunity to review the specification of the proposed access rights at each renewal of the contract.

In the absence of any charge-based incentives, once rights have been allocated, the existing approaches used by the industry for improving allocative efficiency are based on planning and administrative mechanisms, including:

- the use of Route Utilisation Studies (including the Freight RUS) to indicate areas in which route capacity could be more efficiently allocated;
- the use of Part D of the Network Code to promote the efficient use of infrastructure through the timetabling process;
- the use of regular rights review meetings between Network Rail and operators; and
- the use of Part J of the Network Code to reallocate capacity from one operator to another.

The use of Route Utilisation Studies and the Part D provisions are important for the longer term strategic planning of the use and allocation of network, and should be extensively used in the future.[9] In the context of considering unused reserved capacity and how to improve the efficiency of its holding, the Part J provisions are most relevant. Not only do the Part J provisions represent a mechanism in their own right, they are an important underpinning of any voluntary rights review meetings as they provide the foundation for Network Rail's negotiating position with the operators.

2.3.1. Provisions under Part J of the Network Code

Part J of the Network Code contains three key provisions related to changes in reserved capacity:

- the 'use it or lose it' (UIOLI) rules related to reserved but unused capacity contained in Conditions J4 and J5;
- the transfer of reserved capacity from one freight operator to another in the event that existing freight traffic is competed away from the incumbent contained in Condition J7; and

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8 In the event that an operator cannot reach an agreement with Network Rail, the operator can apply to ORR under section 17 of the Railways Act to intervene. ORR has the ability to enforce access to Network Rail's railway facilities under certain conditions detailed within section 17, by requiring Network Rail to enter into an access contract with the operator.

9 We note that the use of the Freight RUS, in conjunction with the review of rights undertaken as part of the access contract negotiation, could be particularly helpful in addressing the efficiency of rights allocation.

- the surrender of rights following a formal Rights Review Meeting, in accordance with Condition J9.

In the context of these provisions reserved capacity is considered to be the train operator's access rights as detailed in the access contracts.

2.3.1.1. UIOLI provisions

The UIOLI provisions are set out in Conditions J4 and J5 of the Network Code.

Part J4 gives Network Rail the power to initiate a process to examine the use of access rights where an operator fails to exercise its train right for the 'Use Quota' over the 'Use Period', potentially resulting in the loss of rights.[10] Network Rail, however, is not obliged to undertake this process.

The Use Quota and Period are determined outside of the Network Code by ORR and are published in Network Rail's Network Statement. Currently the Use Quota is set at one while the relevant Use Period has been determined as being:

> *(a) for a train slot which is included in the working timetable from Monday to Saturday inclusive, 78 consecutive days on which such train slot is included in the working timetable;*
>
> *(b) for a train slot which is included in the working timetable*
> *(i) from Monday to Friday inclusive; or*
> *(ii) from Tuesday to Saturday inclusive, 65 consecutive days on which such train slot is included in the working timetable; and*
>
> *(c) for a train slot which is included in the working timetable on single days of the week, 13 consecutive such days on which such train slot is included in the working timetable.*[11]

This determination is interpreted within the industry as implying that operators must exercise their path rights at least once every 90 days.

In its determination on these matters in January 2005, ORR ruled that a train movement will count toward the Use Quota if:

- *its arrival and departure times at each of the start and end points (and at any intermediate points) correspond to those of the relevant train slot, ignoring any delays that may occur in the train movement; and*
- *it is not made with the sole purpose of achieving the Use Quota for that train slot.*[12]

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[10] Network Rail, *The Network Code: Part J*, October 2006, J1.

[11] Network Rail, *The 2008 Network Statement*, October 2006, page 30.

[12] Network Rail, *The 2008 Network Statement*, October 2006, page 31.

This provision means that the Use Quota cannot be satisfied by a train company running an empty train (a so-called "ghost train") with the sole intention of ensuring that it does not fall foul of the UIOLI provisions.

Part J5 provides train operators with the opportunity to access path rights in "congested infrastructure"[13] where another operator owns those rights but has not met its Use Quota (ie one train) over the Use Period (ie 90 days). In this situation, an operator seeking to use a train path may approach Network Rail, which is then obliged to require the surrender of the relevant path if the rights to that path have not been exercised within the relevant timeframe.

While Part J makes it clear that failure to use a right for the Use Quota over the Use Period would empower Network Rail to request for that right to be surrendered, the train operator may object to the surrendering of the right if it has 'a reasonable on-going commercial need' for the right.

2.3.1.2. Freight transfer mechanism

Condition J7 of the Network Code contains a provision to allow for the transfer of rights from the incumbent freight operator to another freight operator (referred to as the 'applicant') following the competing away of freight traffic from the incumbent to the applicant.

Specifically, Condition J7 applies if Network Rail receives an application from the applicant which:

> *…requests a Quantum Firm Right for the provision of transport services to a third party that the Applicant will…replace the Incumbent in providing.*[14]

As with the UIOLI provisions, the incumbent rights holder can counter a request to surrender the rights by proving that it has a reasonable on-going commercial need for the rights.

2.3.1.3. Formal Rights Review Meetings

Condition J9 provides for a system of formal Rights Review Meetings, which may be scheduled by Network Rail at six-monthly intervals, or requested by a train operator.[15] In advance of this meeting, Network Rail can identify access rights (or cordon caps) which it requests that the operator surrenders, along with the reasons for this request.

If the train operator simply agrees to Network Rail's request, then the Rights Review Meeting need not take place. However, the train operator may object to this request, if it has evidence of a reasonable on-going commercial need for some or all of the rights.

If, after the Rights Review Meeting, Network Rail and the train operator still disagree about the need for these rights, then:

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13 See section 2.5.1 for a definition of "congested infrastructure".

14 Network Rail, *The Network Code: Part J*, October 2006, J37, para 7.1.2.

15 A train operator may request that Network Rail holds a Rights Review Meeting with another train operator.

- the matter may be referred to the relevant ADRR Panel in accordance with the Access Dispute Resolution Rules; and
- if either party is dissatisfied with the Panel's decision, it can refer the matter to ORR for a further determination.

2.3.2. Evidence on the successful use of administrative approaches

To date there has been mixed success in the use of administrative approaches to improve the efficiency of capacity allocation. Discussions held with the industry on this issue suggest that the use of Part J powers has been largely reactive, in that Network Rail has primarily focused on the Condition J5 requests from other operators.

An example of a successful application of Part J5 relates to a request made by an operator to Network Rail earlier this year. The applicant had sought to operate a new service beyond Daventry to Hams Hall Intermodal Terminal during the day. However, a lack of space between existing timetabled services prevented the train from running. An approach was made to the incumbent rights holder, who held an unused path over the West Coast Main Line. The incumbent agreed to surrender the path, allowing the applicant to operate its new service.

Despite its historically reactive approach, we have been informed that Network Rail's Customer Relationship Executives are now engaging in regular rights reviews and timetable cleansing exercises with the larger operators. These meetings aim to encourage improved rights management by the operators, in particular the legacy rights-holders with largest rights portfolios, and the voluntary surrender of unused paths.

Network Rail informs us that up to the third week in June, 800 EWS train paths have been removed from the timetable since the start of 2007. Furthermore, each week since April 2007 an EWS train service group has been reviewed, with unused paths and associated access rights removed. It is reported by Network Rail that this process will continue throughout the year and thereafter to ensure that paths and rights which EWS hold match their needs.

NERA has also been informed by Network Rail that a similar process has been undertaken with Freightliner Heavy Haul since spring 2007 and is expected to generate a minimum of 100 train paths being removed from the timetable in the coming weeks. Again, Network Rail states that this review process will be repeated at regular intervals through successive timetable periods to better match path rights with requirements.

2.4. Incentive Mechanisms

The Railways Infrastructure (Access and Management) Regulations 2005 allow for two types of price-based incentive mechanism:[16]

- *a scarcity charge: as part of the congested infrastructure process set out in regulations 23, 24 and 25 the infrastructure manager, Network Rail, may levy a*

[16] ORR, *Periodic Review 2008 Structure of track access and stations long term charges*, June 2006, p.30.

charge to reflect the scarcity of capacity of identifiable segments of infrastructure during periods of congestion; and

- *a reservation charge: a charge levied to capacity that is requested but not used. The regulations do not specify whether the use of capacity refers to rights or timetabled paths.*

The primary distinction between a full scarcity charge and a reservation charge is that, whereas the level of a reservation charge is unlikely to vary between paths,[17] a full scarcity charging system would involve levying charges that more accurately reflect the opportunity costs for each path. Therefore, in circumstances where capacity is highly constrained and valuable traffic is blocked from using the network, a scarcity charge would be significantly higher than a reservation charge. But in areas where there is sufficient spare capacity and low levels of demand for capacity, the scarcity charge would be very low.

While in its simplest form (ie one flat charge across the network) a reservation charge cannot reflect differences in value between paths, efficiency outcomes may be improved to some degree by applying the charge only during certain time periods or to certain geographical routes that have high levels of latent demand. In these cases the reservation charge would take on some of the characteristics of a scarcity charge by more closely aligning the underlying opportunity costs of paths with the reservation charge.

ORR has previously raised the possibility of implementing a fully-fledged scarcity charge. However, it has noted that although a scarcity charge is theoretically attractive, it would be very complex to implement,[18] and suggested that a reservation charge may be a less complex first step towards a more fully developed scarcity charge.

While the reservation charge may be a simpler mechanism to implement than a fully-fledged scarcity charge, the cost of this simplicity is that reservation charge provides considerably blunter incentives than the scarcity charge. The failure of the reservation charge to reflect the value of a path means that some valuable traffic could be inefficiently priced off the network.

2.4.1. Reservation charging models under consideration by ORR

The purpose of the reservation charge is to encourage more efficient use of the rail network by imposing a financial penalty on operators that reserve capacity but do not use it, thereby preventing other operators from taking advantage of that capacity. It will provide a financial incentive for operators to reduce the amount of capacity they reserve where that capacity is superfluous or marginal to their needs. An increased amount of free capacity may increase efficiency by allowing freight operators to provide additional, profitable services on the network where that capacity was not previously being used efficiently.

The concept of scarcity and reservation charging was explained in ORR's June 2006 consultation document on the *Periodic Review 2008: Structure of track access and station*

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17 We note that a reservation charge may vary to some extent with geography and/or time and so between paths, however a basic reservation charge may be as simple as a flat rate charged across the whole network.

18 See, for example, ORR, *Periodic Review 2008 Structure of track access and stations long term charges*, June 2006, p.30. para 3.14.

long term charges. In December 2006 ORR issued a separate consultation document focussing on a reservation charge.[19] In this consultation, ORR suggested two alternative models for applying the reservation charge:

- the first model is a flat rate, generic charge applying to all capacity that is reserved but not used, irrespective of its location specific or the level of constraints on the network; and
- the second model is restricted to certain sections of the network that are considered to be congested.

The two reservation charge models are essentially identical other than the differences in the geographies to which they apply. Importantly, both models assume that there will be a flat rate charged for unused reserved capacity. ORR has expressed a preference for the charge to be low, citing evidence from Switzerland that a low charge is sufficient to induce operators to use their reserved capacity more efficiently. To this extent ORR has suggested a charge in the vicinity of £20 to £40 per unused path.

In principle the reservation charge would apply to all users of the rail network. While there may be instances where a timetabled passenger train does not run, this is unlikely to occur on a consistent or frequent basis. Therefore, the impact of the reservation charge on passenger services, in particular franchised passenger services, is likely to be very small. In practice the charge will therefore primarily affect freight operators.

2.4.2. Ensuring a revenue-neutral charge

Both models for the charge suggested by ORR are based on the assumption that any revenue derived from the reservation charge will be rebated in full to freight train operators, such that the scheme is revenue-neutral for the freight industry as a whole. To the extent that passenger operators are also impacted by the reservation charge, the rebate will apply within each industry, ie the reservation charge will be revenue neutral in total, and revenue neutral within each industry group.

The inclusion of a rebate scheme could have important implications for the incentives that result from the reservation charge. Although the precise impact on incentives depends on the approach adopted for allocating the rebate, the approach suggested by ORR, which depends on the operator’s share of total industry used paths, potentially could result in significantly weaker incentives for operators to reduce their path holdings. These impacts on incentives are explored in detail in section 6.

2.4.3. The impact of using a charge to free up paths

To the extent that paths have low utilisation as a result of inefficiency, the reservation charge is intended to provide operators with sufficient incentive to free up such paths. However, the application of a flat, network-wide charge, or even a location specific charge, to target inefficiently held paths has its limitations.

There are two different ways that paths can be freed up:

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[19] ORR, *Periodic Review 2008, A Reservation Charge: Consultation on Issues and Options*, December 2006.

- the financial incentive provided by the charge may encourage train operators to review their current rights holdings, and consider whether they can continue to provide their existing services with a smaller portfolio of rights (ie reduce the size of their rights portfolio without losing any traffic). This outcome would reflect two possible situations: either the rights were entirely unused; or the rights were used but there were surplus holdings above what was required for operational reasons by the operator. While this could free up some paths for use by other operators, this is most likely to occur at uncongested parts of the network. Despite the introduction of a reservation charge, operators may decide for strategic reasons to retain the rights that would be most useful to other operators - this is most likely to occur in congested parts of the network;
- by increasing the cost of running certain services, the reservation charge may, as an unintended consequence, price some traffic off the rail network as the operator seeks to pass on the costs of the reservation charge to the customer. Even though commodity-specific "headroom" allowances could adjust for the main differences between average path utilisation rates for different types of traffic, there will still be an impact on particularly price-sensitive traffic or on specific flows that have below average path utilisation rates for their particular commodity group. Therefore, in these circumstances operators reduce their holding of rights but at the expense of some lost traffic.

The first of these is difficult to assess in practice, as it requires a subjective judgement about whether poor utilisation reflects the genuine nature of the underlying business, or a mixture of inefficiency and holding onto paths to frustrate potential competition or to reserve for possible future use. The available evidence on this issue is anecdotal and limited. In addition, while train operators might, in theory, give up a large number of unwanted paths following the introduction of a reservation charge, we would expect these to be mainly (and quite possibly exclusively) in areas where there are no significant shortages of capacity as a consequence of strategic behaviour. The benefits generated from these paths would be very small since the paths freed up are unlikely to be taken up by other operators. If the reservation charge simply leads to operators giving up unwanted paths that then remain unused, this will not add to either the costs or the benefits of the reservation charge. We therefore have not included any estimates of these benefits in our base case, but do include sensitivity analysis on our results to illustrate how different assumptions could affect the estimated benefits (see section 7). To the extent that further data were available on the first issue, and especially if it appeared that some valuable paths might be surrendered as a result, the model could analyse the impact of the reservation charge in more detail.

The second type of impact relates to those paths that are used, but used infrequently and the operator is not able to rearrange its service pattern to free up paths. It is this impact that has been the focus for our benefits estimation. In this case, paths are freed up because the reservation charge increases operators' costs and this leads to traffic being priced off the network. While the use of headroom allowances will help to mitigate against this impact, to the extent that some paths are necessarily used less than the average level of utilisation, the traffic associated with them could still be at risk. We are able to estimate these impacts using estimates of how traffic levels might be affected by an increase in costs (ie cost elasticities).

In circumstances where this traffic that would be priced-off the network is blocking more profitable traffic from getting onto the network, the use of a reservation charge could in theory result in a more efficient outcome. However, if there are no alternatives (or those alternatives are less profitable) to the traffic that is priced off, the outcome is inefficient.

While the intended impact of the reservation charge relates to the first of the two types of impact (ie operators giving up spare rights in excess of those they need), the underlying problem with the mechanism, or indeed any incentive mechanism, is that it is difficult to target inefficiency without jeopardising existing valuable traffic flows which may not be replaced.

In essence, the intent and design of the reservation charge is such that it cannot be focused on particular situations where operators are holding on to potentially valuable paths. The reservation charge is therefore a simplified solution to a complex issue, and may be limited in its effectiveness. Although the charge may free up some train rights on the network, it could result in unintended consequences such as the loss of valuable traffic.

2.5. Targeted Incentives

As a system of reservation charges cannot ensure that the charge for an unused path is aligned with the opportunity cost of that path, a more promising approach in theory may be to focus the reservation charge on those areas where the opportunity cost is greatest. In doing so, the costs of inefficiently pricing traffic off the network can be minimised, while targeting the areas where the gains in allocative efficiency would be greatest. Such areas would be those where there is excess demand and poor path utilisation.

This is the rationale for ORR's second reservation charging model. However, it is not straightforward to identify the specific areas where the reservation charge should be applied. ORR suggested that, as a minimum, we should consider a restricted reservation charge scheme that would only apply to parts of the network defined as "Congested Infrastructure" in Network Rail's Network Management Statement. While this definition is not ideal,[20] we are not aware of any further objective, transparent criteria that could be applied to identify a more suitable set of locations.[21,22]

When considering the issue of congestion, it is important to distinguish between situations where an operator cannot gain access to the network because the network is capacity constrained, and those where an operator cannot gain access because another operator holds the rights but does not exercise them. Only the latter is of relevance to this study. Where genuine capacity constraints exist, a reservation charge will not free up space because the charge does not apply where paths are used, which is likely to be the case on constrained parts of the network. Capacity constraints are a separate issue, and one which is beyond the scope of the reservation charge.

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20 The Congested Infrastructure measure was developed for a different purpose, and does not necessarily coincide with those areas which are generally recognised as being congested (eg the WCML) and would reflect more accurately the intended locations for the charge.

21 It is important that the criteria are transparent and objective, not least because of the likelihood of objections from operators that expect to lose out if certain areas are included within the scope of the charge.

22 While measures such as the *Capacity Utilisation Index* also exist, difficulties arise in defining the cut-off point for when a route would become subject to the reservation charge.

2.5.1. "Congested Infrastructure"

The Railway Infrastructure (Access and Management) Regulations 2005 (Regulation 23) require Network Rail to declare areas of infrastructure to be congested when it is constrained in its ability to meet competing demands for infrastructure capacity. Specifically, the Regulations detail two situations where Network Rail is required to make such a declaration:[23]

- *Where, after the co-ordination of requests for capacity and consultation with the applicants, it is not possible for the infrastructure manager to satisfy requests for infrastructure adequately, the infrastructure manager must declare that element of the infrastructure on which such requests cannot be satisfied to be congested.*
- *Where, during the preparation of the working timetable for the next timetable period, the infrastructure manager considers that an element of the infrastructure is likely to become congested during the period to which that working timetable relates, he must declare that element of the infrastructure to be congested.*

The declaration of Congested Infrastructure forms part of the Network Statement. In October 2006, when Network Rail published its 2008 Network Statement, it listed three areas of rail infrastructure that had been declared as congested in accordance with these regulations:[24]

- Reading to Gatwick Airport;
- Gospel Oak to Barking; and
- the Glasgow and South Western route (ie Barassie Junction/Kilmarnock/Newton Junction/Mauchline Junction to Gretna Junction).

While the Reading to Gatwick Airport route has been declared as "Congested Infrastructure", it is dominated by passenger services. Therefore, as the reservation charge is unlikely to affect these services on this route (due to passenger services having very high path utilisation rates), we do not include it in our analysis.

2.5.2. Gospel Oak to Barking

The Gospel Oak to Barking route is a two-track line which, for the most part, is run on embankments and viaducts through North London. The route links the North London Line with North Thameside and provides links to the Great Eastern line, East Coast Main Line, Midland Mainline, and the West Anglia line.

Passenger services on the line are operated by Silverlink. On weekdays, Silverlink operates between 2 and 3 trains per hour (3 tph services are in the peaks). Network Rail declared the route as being "congested" in October 2006 because Silverlink would like to run 3 trains per

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[23] Network Rail, *Gospel Oak to Barking Congested Infrastructure Capacity Analysis*, April 2007, page 3.

[24] See Network Rail's website: http://www.networkrail.co.uk/aspx/4088.aspx

hour (a 20-minute interval service) throughout the day and Network Rail is unable to satisfy this demand.[25]

Data supplied by the main operators on a confidential basis suggests that, of the freight trains timetabled on the route (of which there are a significant amount), the overwhelming majority of services relate to the hauling of aggregates (ie construction materials) or other general wagonload services (including a very small amount of Ministry of Defence traffic).

Although North London is a key area for their container business, none of this traffic uses the Gospel Oak to Barking route due to gauge clearance limitations.[26] The container traffic uses the North London line instead.

2.5.3. Glasgow and South Western

The Glasgow and South Western (G&SW) area covers the route from Kilmarnock to Gretna Junction, plus the single lines from Barrhead to Kilmarnock, Barassie to Kilmarnock and Newton to Mauchline. In addition to the single track branch lines, the main route has sections of single line at either end (ie Kilmarnock to Barrhead and Annan to Gretna).[27]

Passenger services run on the route are operated by First ScotRail and are run from Glasgow Central to and from Carlisle, as well as Stranraer/Ayr to and from Carlisle.

As with Gospel Oak to Barking, the G&SW route has considerable freight flows. The freight traffic consists of:[28]

- nuclear flask trains to and from Hunterston Nuclear Power Station;
- services linking the coal facilities at Hunterston, Falkland Yard, New Cumnock, Greenburn, Knockshinnoch and Killoch with the various coal-fired power stations in England; and
- china clay to and from the Paper Processing plant at Irvine and Burngullow.

Much of this freight traffic, particularly coal, uses the single track branch lines. Network Rail's inability to provide additional through pathways for coal trains using the G&SW route lead to its declaration as "congested".

Information supplied by the main freight operators suggests that nearly all the freight trains timetabled on the route are related to coal for power stations, with a small minority relating to china clay and chemicals/petrol.

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25 Network Rail, *Gospel Oak to Barking Congested Infrastructure Capacity Analysis*, April 2007, page 8.

26 We note that on 25th July 2007 the Department of Transport announced that it would make a Transport Innovation Fund grant available to fund the upgrade of the Gospel Oak to Barking route to W10 loading gauge (http://www.dft.gov.uk/press/speechesstatements/statements/statebarkingtogospeloak). The announcement followed on from commitments made by the government with regard to the route in the July 2007 White Paper (page 89).

27 Network Rail, *Glasgow and South Western Route Congested Infrastructure Capacity Analysis*, April 2007, page 7.

28 Network Rail, *Glasgow and South Western Route Congested Infrastructure Capacity Analysis*, April 2007, page 8.

3. Modelling the Benefits

3.1. Introduction

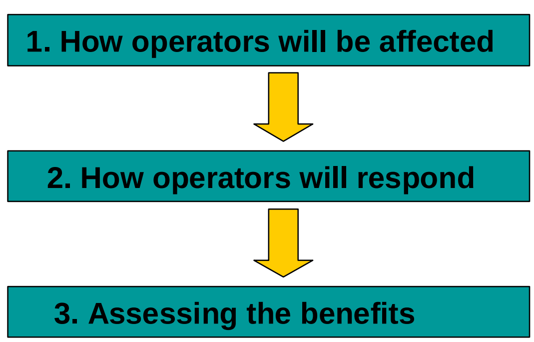
As discussed in section 1.2, the first step of the analysis is to assess the benefits associated with implementing a reservation charge. In this section we present our methodology for modelling the benefits to the industry arising from this charge. The focus is on the main benefits that can be readily quantified, although we do also discuss other non-quantifiable benefits in section 5.

While our modelling framework is equally applicable to both of the ways that paths will be freed up by the reservation charge, as we note in section 2.4.3, we expect most of the unwanted paths that are freed up to remain unused by other operators and therefore contribute to neither the costs nor the benefits of the reservation charge. The modelling therefore focuses on estimating the benefits associated with those paths freed up as a consequence of traffic being priced off the network.

The purpose of the reservation charge is to encourage more efficient use of the rail network. The benefits of implementing a reservation charge are therefore those that arise from freeing up space in the timetable to allow other operators to utilise those slots where they would not otherwise be used or would be used inefficiently. The benefits arising from any freed up paths may be of two forms: benefits associated with new traffic utilising the network, and benefits associated with existing traffic accessing lower cost routes.

Our approach to estimating these benefits involves three distinct but related stages, presented in Figure 3.1.

Figure 3.1
Approach to Modelling the Benefits of a Reservation Charge



The extent to which operators[29] are affected by the charge will determine how they respond to the financial incentives it induces. The number of rights that freight operators then give up, and the extent to which those rights are used by other operators, both feed into the assessment

[29] We present results for the four largest freight operators: EWS (ie both domestic and international), Freightliner (ie Freightliner Ltd and Freightliner Heavy Haul), DRS and First GBRF.

of the benefits of the reservation charge. The remainder of this section discusses each of these stages in turn, briefly outlining how we modelled each impact and detailing the main data and assumptions that were used. Appendices A and B provides a more detailed description of the modelling process for the key inputs into the model (ie train rights and operating costs).

The effect of the reservation charge is estimated for 14 commodity groups. Different commodities display different market characteristics, such as operating costs and elasticities. Because these characteristics can vary widely between commodities, we can expect the impact of the charge to vary widely also. This is discussed in more detail below.

The focus year for our analysis is 2004/05 as it is the latest year for which we have complete consistent data. However, we discuss further in section 5.6 how our results might change over time, specifically over CP4.

3.2. How Will Operators be Affected?

In determining the likely benefits arising from the reservation charge, the first important question to ask is what impact the proposed charge would have on operators. The effect will ultimately be a change in operating costs incurred by each of the operators, determined by the extent to which operators hold paths that they do not use, and the level of the reservation charge. The first step in our analysis of the main benefits therefore requires examining the existing level of costs, estimating how many train rights are currently unused, and applying the reservation charge to those train rights to determine the extent to which operators' costs will change.

To determine the number of paths held but not used by each operator we started by estimating the number of trains run. Using path utilisation factors and adjustments for headroom, in combination with our estimate of the number of train run, we were able to estimate the total number of train rights held but not used by commodity and operator. By multiplying this estimate of unused train rights by the reservation charge (ie £20), we estimated the total reservation charge liability (before any rebates) for each commodity and operator.

The definition of 'rights' is central to the concept of reservation charging. The models highlighted by ORR in its consultations have focussed on charges that are levied against access rights set out in operator access contracts.[30] This focus on contractual rights raises difficulties relating to the treatment of level three, or spot bid, rights. ORR has suggested that

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[30] Train operators can be awarded three different types of access rights in their Access Agreements:

- Level one rights – "firm rights in respect of quantum, origin and destination, equipment, etc. and also timing (subject to Network Rail's right to flex this) and, in some cases, routing";
- Level two rights – "firm rights, which are like level 1 rights except that they do not specify the timing of a service, Network Rail's flexing rights or the route to be taken. Instead, they entitle the train operator to a quantum of train paths, either per day, per week or both, with Network Rail otherwise having freedom over the timing of the trains in question and the routes they must use"; and
- Level three rights – "rights can share the same service characteristics as level 2 rights, but unlike level 1 and 2 rights are not firm rights. Instead, level 3 rights are contingent upon Network Rail being able first to satisfy bids for use of track capacity".

Network Rail, *Network Statement 2008*, October 2006, page 30.

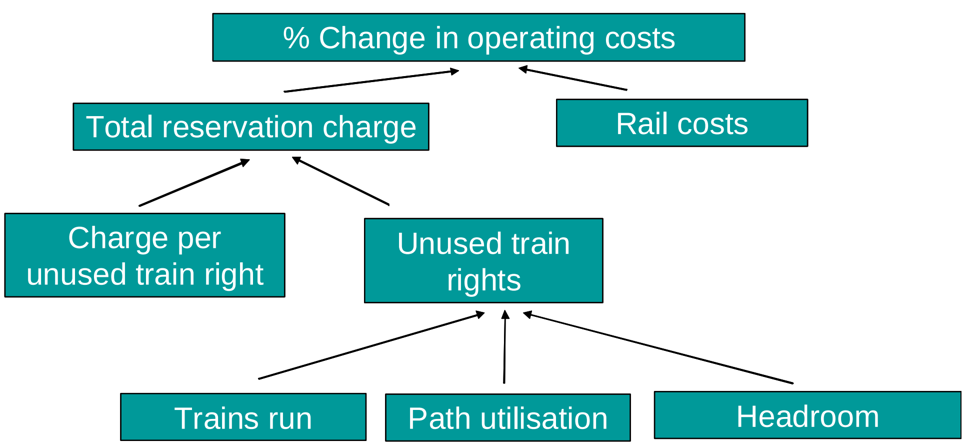
rights associated with spot bids should be added up and included in the total rights for each billing period (because otherwise this could create an incentive to move from using firm rights to a greater use of spot bids, causing uncertainty).[31] However the existence of these different categories of rights causes difficulties in the design of the reservation charge and its implementation within Network Rail's billing system.

For the purposes of our modelling we focus on 'train rights' in a generic sense, and abstract away from any definition of rights based on specific contractual provisions. Our 'train right' concept is an estimate of the number of rights required, given the estimates of path utilisation in the Freight RUS, to facilitate the number of freight train journeys needed to haul the total volume of commodities shifted by rail freight. In simple terms it assumes that the operator requires one right for the train journey itself but, as a consequence of headroom and other factors (including any inefficiencies), it also requires a number of additional rights. Therefore, in so much as spot bid rights are used to acquire paths, they are included in our analysis.[32]

The final step in determining how operators will be affected by a reservation charge requires an estimate of the percentage change in operating costs imposed on each operator by the reservation charge. Note that we focus on rail costs rather than total operating costs (ie excluding overheads and fixed costs) as these are the relevant costs for decision making. The total rail costs are determined by combining our estimate of the total reservation charge payable by each operator (before any rebate is given) with total rail costs net of the charge. Rail costs are estimated based on train costs per tonne and average load weights. A more detailed description of the way in which we calculated rail costs is contained in Appendix B.

The steps described above are summarised in Figure 3.2.

Figure 3.2
Modelling the Effect on Operators



31 ORR, Reservation Charges Consultation Document, December 2006, para 3.8.

32 This approach also overcomes a further difficulty that some trains may use several different paths (as defined in the relevant access contract) on a single journey.

3.2.1. Train rights and trains run

The first data to consider are on the number of paths held by each operator. To estimate this we:

- obtained data on the number of millions of tonnes of freight lifted in 2004/2005, set out in MDS Transmodal's report;
- then divided this freight lifted by the average cargo weight per train, obtained using data provided by Network Rail. Both data sets were divided into commodity categories, but not by operator. The resulting estimate provides an indication of the total number of trains run on the network, by commodity;
- factored up the estimate of the total trains run by the utilisation rate for each commodity, in order to estimate the number of train rights held for each commodity; and
- applied an estimate of market share per operator by commodity, obtained from Network Rail data on net tonne miles, to provide an estimate of the number of paths held by each operator, by commodity.

This approach is described in more detail in Appendix A.

3.2.2. Path utilisation

Path utilisation is an important input into our modelling, as it is used in combination with the headroom allowance to derive our estimate of the number of train rights held but not used by operators. It is this estimate of unused train rights, combined with the reservation charge per path, which determines the absolute value of the charge operators will be liable for, and ultimately the benefits derived from the charge. The base data on path utilisation are sourced from Network Rail's Freight RUS (see Table 2.1), which we then mapped to the larger set of commodity groupings we have used for our analysis.[33] The resulting assumed utilisation rates are shown in Table 3.1.

[33] Note that we have adopted the more disaggregated set of commodities used in the MDS Transmodal report as compared to the five commodity groups in the Freight RUS.

Table 3.1
Utilisation Rates (2004/05)

Commodity: NERA Mapping	Take-up	Commodity: Freight RUS
Containers: deep sea	95%	Intermodal
Containers: short sea	95%	Intermodal
Coal: power station	45%	Coal
Coal: other	45%	Coal
Metals	51%	Metals
Ore	51%	Metals
Other minerals	37%	Construction
Auto	51%	Metals
Petroleum & chemicals	56%	Petroleum
Waste	51%	Metals
Domestic intermodal	95%	Intermodal
Nuclear	95%	Intermodal
Own haul (Network Rail)	37%	Construction
Channel Tunnel	21%	Channel Tunnel

Source: Freight Rail Utilisation Strategy, March 2007

Note: We have mapped the commodity groupings from the Freight Rail Utilisation Strategy onto the commodity groupings we have adopted from MDS Transmodal's report.

It is important to note that these utilisation rates are *industry averages* and thus individual operators may have higher or lower utilisation rates than those presented above. We would expect new traffic to exhibit higher utilisation rates, since train rights would only be acquired as the new business was won. In contrast it would be reasonable to expect a well-established operator to have maintained train rights, even where traffic could be reorganised and so operate more efficiently, simply because of inertia.

3.2.3. Headroom

The level of headroom applicable to each commodity is a matter for policy makers to determine when finalising the details of any charging scheme. It would need to be determined on the basis of the efficient path utilisation rate for each commodity but could be derived and applied in a number of different ways.

As we have discussed in section 2.2 the application of headroom allowances is important in determining the impact of the reservation charging scheme. If headroom allowances are set at a low level, a greater proportion of unused paths will be liable for the reservation charge than would be the case with a high level of headroom. This will result in a larger cost increase for the operator and, therefore, a larger number of paths being freed up compared to a scheme with higher headroom allowances.

For the purposes of our analysis we have allowed headroom of 10 percentage points less than the unused proportion of train rights, up to a maximum of 50 per cent.[34] For example, the utilisation rate for coal is 45 per cent. Thus, the proportion of unused paths is 55 per cent. Subtracting 10 percentage points, derives headroom of 45 per cent. Table 3.2 sets out the resulting headroom allowances for each category. Note that while this is a largely subjective assumption, we have undertaken a sensitivity analysis to examine the effects of changing this approach, the results of which are presented in section 7.5.

If the headroom allowance is set too close to the current average proportion of unused rights for each commodity group, this could well mean that some train operators will already be operating within the headroom allowance for particular commodities and therefore not face any incentives at all. On the other hand, if headroom allowances are a long way away from current non-utilisation rates, this could lead to much larger transfers of revenue between operators, and might be viewed as unfair because commodity groups with high utilisation rates will have much less exposure to the charge. The allowances set out in Table 3.2 provide, in our view, a reasonable compromise between these different impacts.

Table 3.2
Headroom Allowances

Commodity	Utilisation rate	Headroom
Maritime containers: deep sea	95%	0%
Maritime containers: short sea	95%	0%
Coal: power station	45%	45%
Coal: other	45%	45%
Metals	51%	39%
Ore	51%	39%
Other minerals	37%	50%
Auto	51%	39%
Petroleum & chemicals	56%	34%
Waste	51%	39%
Domestic intermodal/wagonload	95%	0%
Nuclear	95%	0%
Own haul (Network Rail)	37%	50%
Channel Tunnel	21%	50%

Sources: Utilisation rates: Freight Rail Utilisation Strategy, March 2007; Headroom: NERA.

34 We note that this is just one approach to setting headroom that allows us to illustrate the potential impact of the reservation charge. Both the approach to defining headroom and the level set could differ.

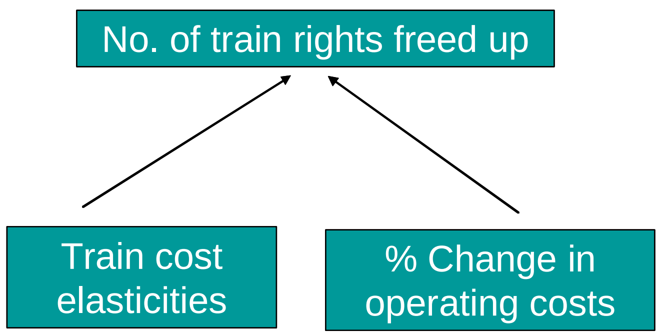
3.2.4. Reservation charge per unused right

Finally, as discussed in section 2.2, ORR has indicated its intention to consider a relatively small reservation charge, in the vicinity of £20 to £40. For the purpose of our analysis we have assumed a base case scenario involving a charge of £20; however we have carried out sensitivity tests to examine how the impact on operators changes with a change in the magnitude of the reservation charge. These sensitivity tests are presented in section 7.4.

3.3. How Will Operators Respond?

The second step in our analysis is to determine how operators will respond to the reservation charge or, more specifically, to the resulting change in operating costs. In particular we are interested in determining how many train paths operators will free up in response to the financial incentive. As is shown in Figure 3.3, we have estimated the number of train rights that will be freed up for each commodity and by operator by applying rail cost elasticities to the change in operating costs.

Figure 3.3
Modelling Operators' Response



The estimation of the impact on train costs is explained in the previous section. In this section we therefore focus on the cost elasticities assumed for each commodity, which we have sourced from the same MDS Transmodal report used for our rail cost assumptions. These elasticity estimates are provided in Table 3.3.

The elasticities show the impact of a percentage change in rail costs on tonne kilometres. For example, they imply a 1 per cent increase in the rail costs for “other minerals” will result in a 4.1 per cent reduction in traffic for that commodity. In applying these elasticity estimates we implicitly assume that path rights vary proportionately with traffic levels. These elasticity estimates only relate to the second of the two types of impact we identify in section 2.4.3.

Table 3.3
Elasticity of Tonne Kilometres With Respect to Rail Cost

Commodity	Elasticity
Maritime containers: deep sea	-2.6
Maritime containers: short sea	-2.3
Coal: power station	-0.1
Coal: other	-0.3
Metals	-0.7
Ore	0.0
Other minerals	-4.1
Auto	-1.0
Petroleum & chemicals	-1.2
Waste	0.0
Domestic intermodal/wagonload	-1.8
Nuclear	0.0
Mail/premium logistics	-1.2
Own haul (Network Rail)	
Channel Tunnel	-1.0
Total	**-1.3**

Source: MDS Transmodal Ltd, Impact of track access charge increases on rail freight traffic, November 2006, Table 6. Note that rail costs used to determine the elasticities include handling and terminal costs.

The estimates indicate that coal is very inelastic, while other minerals are highly elastic. Coal has historically been transported by rail and consequently has high levels of rail connectivity at both collieries and power plants. Many of the current flows cover relatively long distances, thus further increasing the attractiveness of rail. In contrast, as MDS Transmodal notes:[35]

> *… few flows of aggregates are rail connected at both ends of a trip so that a road distribution leg is normally involved. Given that road is already used for part of the journey a relatively small increase in TAC may lead to a significant switch from rail to road.*

Elasticities are central to our analysis of how many paths will be freed up. A high elasticity implies that even small changes in rail costs are likely to impact on the level of freight traffic for that commodity. So, for example, we would expect coal users to be relatively insensitive to changes in costs, and so less likely to respond to the reservation charge. In contrast, the high elasticity associated with other minerals suggests that increases in rail costs are likely to induce a reduction in the level of freight shifted for these commodities, and so a fall in the number of associated paths held.

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[35] MDS Transmodal, *Impact of track access charge increases on rail freight traffic*, November 2006, p.19.

3.4. Estimating Total Benefits

The final step pulls together estimates of the number of train rights freed up and applies an estimate of the overall benefits associated with those freed up train rights to generate an estimate of the total benefits derived from the reservation charge. This total comprises:

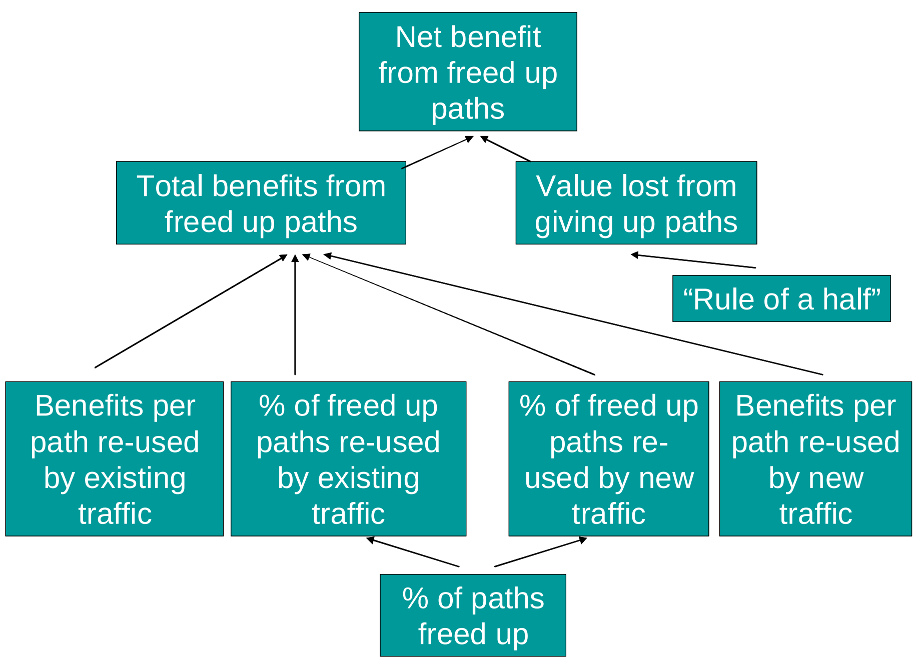
- the increased value arising in cases where freed up paths are used by other train operators;
- *less* the loss of value that results when paths are freed up because of traffic leaving the network (ie services that cease running because of the increase in train operators' costs).

The methodology for calculating the benefits generated by the reservation charge requires combining the output from the previous section, which establishes how many train rights would be freed up, with an assumption about what proportion of train rights freed up will then be re-used by other operators.

Some of the freed up train rights may be taken up by new traffic, while other rights may be acquired by existing operators seeking to improve the efficiency of their timetables (ie acquire path rights that produce a more cost efficient timetable). These alternatives will have different associated benefits, and so it is important to distinguish between the two for the purpose of calculating total benefits.

Finally, applying the "rule of a half" gives us an estimate of the size of the value lost to operators from giving up paths. This process is depicted in Figure 3.4 below.

Figure 3.4
Calculating the Net Benefit From the Reservation Charge



3.4.1. Take-up by new services

The proportion of freed up paths that are taken up (and used) by other operators is an important assumption that helps to determine the estimated benefits generated by the reservation charge. These paths may be used to operate new services or to improve the efficiency of existing services – the latter is discussed in section 3.4.3 below.

There is little firm evidence available to inform our assumptions about the number of paths likely to be taken up by other operators. However, there are a number of factors that suggests to us that the proportion of paths taken up is likely to be low, and quite possibly very low indeed. These include:

- a lack of evidence that there is significant underlying demand for rail freight that is being frustrated, at present, by poor path utilisation (rather than "genuine" capacity constraints or lack of commercial viability). In recent years, Network Rail and the operators concerned have generally been able to find appropriate solutions, sometimes through changes that are agreed by all the operators concerned, and sometimes by finding acceptable alternative timings or routes;[36]
- the likely locations of at least some of the paths freed up, which do not necessarily affect the most congested parts of the network or those where freight demand might be frustrated at present. In section 5.3 below, we report that over 80 per cent of the paths freed up by traffic losses are paths that we used by "other minerals" traffic, mainly construction flows. There is some traffic that uses congested routes (in and around London for example) where some freed up paths might be re-used. But if a large number of paths are freed up, as the assumed elasticity would suggest, then it is likely that these will also include paths on routes (such as the Midland Main Line,[37] or routes from the Peak District) which are much less likely to be re-used.[38] In section 7.10, we carry out a sensitivity test to show the impact of a lower assumed impact on traffic, but a higher take-up of those paths that are freed up;
- the additional disincentives for operators to give up paths at congested or strategically important locations. Compared to other parts of the network, train operators may be less inclined to give up paths in response to a given change in costs.[39] Instead, they may recognise the benefits of retaining paths so that they are better able to meet rising demand in future, and also the disadvantages of giving up potentially valuable paths that might be taken up by their direct competitors.

Our base case assumption is that 2.5 per cent of paths freed up as a result of the reservation charge are taken up by other train operators in order to run new services. While our

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[36] While it is possible that latent demand has been suppressed because operators are aware of the capacity constraints (and therefore have not approached Network Rail), no evidence or examples of this were given by those organisations we spoke to.

[37] Construction traffic using the Midland Main Line includes services from Mountsorrel, Bardon Hill and Croft.

[38] None of the key capacity gaps identified in the Freight RUS is on the Midland Main Line. While other construction traffic uses the eastern end of the Great Western Main Line, which is more congested, these include the MendipRail "Jumbo" trains and associated flows, which we might expect to be less price sensitive than some other construction flows.

[39] This applies equally to paths that are freed up either with or without a corresponding loss of traffic.

discussions with some industry participants regarding the existence of latent demand lead us to believe that this may err on the high side, we recognise that there is little evidence on which to base this assumption and we cannot rule out the possibility of an even greater take-up. Section 7 describes the results of sensitivity tests that adopt different assumptions.

3.4.2. Benefits from new services

Much of the growth in rail freight traffic that is forecast over the next few years is expected to come through increases in intermodal (both deep sea and domestic traffic) and construction flows. In total, these categories account for more than 80 per cent of the increase in rail freight traffic forecast by MDS Transmodal over the period to 2014.[40]

In the case of construction traffic, we would expect at least some of the growth to be accommodated through increased utilisation of existing train paths, and perhaps also some use of longer trains. In any case, where additional train paths are required to accommodate new services, we would expect that these will often cover parts of the network that are less likely to be subject to significant capacity constraints.

Intermodal and logistics traffic, in contrast, already has a high path utilisation rate and therefore has less scope to grow in the absence of additional paths. And this traffic frequently runs over congested parts of the network (such as the West Coast and East Coast Main Lines). To estimate the benefits generated by any new services, therefore, we have assumed that such services are most likely to be intermodal flows, or at least to have similar characteristics to intermodal flows.

As a proxy for the benefit for each additional service accommodated on the network, we have used an estimate the average profit per train associated with intermodal services. Specifically, we have taken the difference between:

§ the average revenue per train, estimated by dividing Freightliner's total haulage income for intermodal services (as stated in its Annual Report and Accounts) by our estimate of the number of trains operated by Freightliner;

§ the estimated rail cost per intermodal train, as derived from the MDS Transmodal data.

This gives a value of £723 per train. We have applied this value to each freed-up path that is used to provide a new service. There are several reasons why we believe this might overstate the benefits per path that might be delivered in practice, but we consider it appropriate to err on the side of optimism. These reasons include:[41]

§ we might expect new services to be less profitable, on average, than existing services, While there will be some exceptions to this, we would expect some new services to be

[40] See Table 1 of MDS Transmodal's report.

[41] A further approximation is that we have used total rail costs per train whereas, ideally, we should use the marginal cost per train. To the extent that some rail costs are fixed and do not vary with traffic levels, we may have underestimated the profit per train. But if there are non-rail costs that are also variable, this could mean that we have overestimated the profit per train.

carrying traffic that has recently been captured from other modes of transport, and therefore might attract lower margins than established "core" traffic flows;

- we have not made any adjustment for the fact that our estimated average revenue per train figure includes some non-rail revenue; and
- we have not made any adjustment for the path utilisation of the new service. In effect, therefore, we are assuming that new services achieve 100 per cent path utilisation.

In section 7.8 we show the impact on our results of adopting a lower assumption.

3.4.3. Take-up by existing services

While there appear to be few (if indeed any) cases where potential new services have been excluded from the network altogether because of an inability to access poorly utilised paths that are assigned to other operators, we are aware of several cases where particular services have been forced to run at suboptimal times, or diverted over longer routes. If the reservation charge leads to some of these poorly used paths being surrendered, therefore, it is possible that existing services could be retimed or given more direct routes, thus leading to lower costs and/or better customer service.

For similar reasons as discussed in section 3.4.1, however, we would not expect many of the paths that might be freed up by a reservation charge to be at congested locations (or times) on the network. This reflects both the likely location of paths that might be freed up from price sensitive traffic leaving the network, and also the poorer incentives for operators to give up paths which they might not be able to get again in future and which, if given up, would benefit their direct competitors.

Our base case assumption, therefore, is that 2.5 per cent of freed up paths are re-used by other operators to improve the efficiency of existing services. We also carry out sensitivity tests to show the impact of alternative (higher) assumptions.

3.4.4. Benefits from existing services

In the short term, the immediate cost savings from improved train timings or a more direct route could be relatively modest, for example simply the saving in fuel and staff costs. In the longer term, however, such efficiency savings might allow operators to retain a smaller fleet of locomotives and wagons, or a smaller workforce.

We have therefore based on our assumptions on the total rail costs for intermodal trains, even though some of these might not be variable in the short term. Focusing on the case of shorter journey times, MDS Transmodal's cost assumptions imply a total cost per hour of train crew, locomotives and wagons of £167.24.[42] We have assumed a cost saving of £500 for each path re-used by an existing service, which is the approximate long run cost saving that might be associated with a journey time reduction of three hours.

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[42] See Appendix 1 of the MDS Transmodal report. This cost estimate includes annual depreciation and interest payments on locomotives and wagons, plus maintenance costs, train crew costs and a mark up for overheads. The total is based on a cost of £146.13 per hour for locomotives/crew, and a cost per unit of £0.938 per hour for wagons, assuming an average load of 22.5 units.

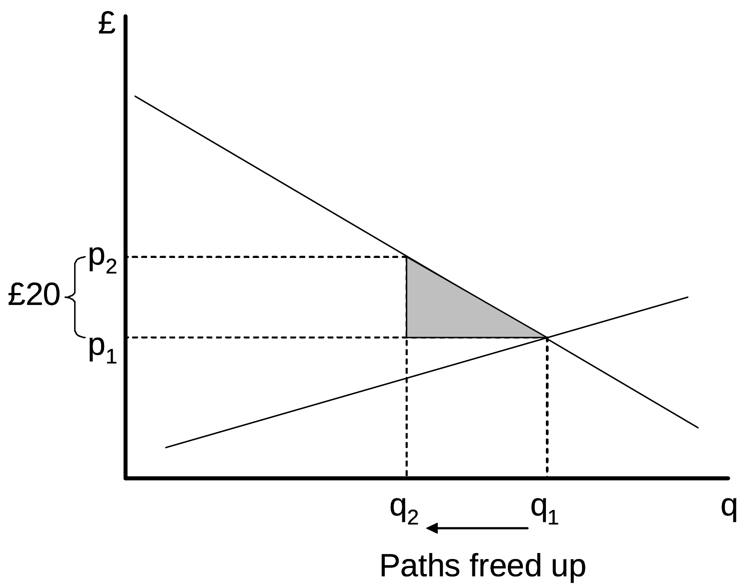
Especially if the number of paths affected is small, however, it is not clear that these longer term cost savings will occur in practice. In section 7.8, therefore, we show the impact of an alternative assumption, that the benefit per path freed up is only £100. On the basis of MDS' Transmodal's cost assumptions, this is the potential staff cost saving from a 2.5 hour reduction in journey time.

3.4.5. Loss of existing traffic

It is important to recognise that while there is a benefit to those operators that acquire freed up paths, there is also a cost to those operators that shed paths. This cost arises because the reservation charge induces the operator to give up little used paths. While these paths are only little used, they will still generate profits for the operator. Therefore, by giving them up, the operator experiences a loss in economic rent.

This concept of lost value is demonstrated in Figure 3.1. At the existing price ("p_1" in the figure below), operators can profitably hold a given number of paths ("q_1"). However, following a rise in price as a result of the reservation charge (to "p_2"), the cost of holding paths will increase and some of the paths will no longer be profitable. This "dead weight loss" represents the value lost to the market from the loss of those profitable paths. This loss is depicted by the shaded area in Figure 3.5.

Figure 3.5
Value Lost From Giving Up Paths



The "rule of a half" is a standard method of estimating the value lost to the market from a rise in price. The rule states that the value lost is approximately equal to ½ x change in price x change in quantity. The change in price is the value of the reservation charge (ie £20), and the change in quantity is the total number of paths freed up by the operators.

4. Implementation Costs

4.1. Introduction

In section 3 we discuss our approach to calculating the benefits associated with the implementation of a reservation charge. In this section we discuss the associated potential costs. Understanding the nature and potential order of magnitude of the costs of a reservation charge is critical to forming an assessment of the value of implementing the policy.

The total costs of a reservation charge will include both direct financial costs to the industry and indirect costs incurred by the economy as a whole. This section focuses on the direct quantifiable costs to the industry. We discuss other potential indirect and unquantifiable costs in section 5.7.

While the exact balance of costs between the various industry parties will depend on the scheme design and the allocation of responsibilities between the parties (ie who deals with day-to-day administration, who deals with disputes, etc), all parties involved in the freight industry will incur some costs. For example:

§ Network Rail will be required to adjust its billing systems in order to administer the charge, incurring capital costs in addition to ongoing operational costs;

§ freight operators are likely to incur costs primarily associated with checking and verifying payments and rebates. If there are disagreements, then the operators will also incur costs in contesting the charges; and

§ ORR will also potentially incur costs, both in its role overseeing the industry and potentially as an arbiter in the case of disagreements.

While there may be some limited scope for these to decline over time (perhaps through learning effects), they seem unlikely to reduce significantly, certainly within CP4.

These costs can generally be classified into two main categories,[43] which we explore in more detail in the remainder of this section:

§ set-up costs; and

§ on-going costs.

As passenger services are unlikely to be significantly affected by the reservation charge, for reasons previously discussed, it is unlikely that they will experience any significant cost impacts from the scheme. However, in so much as the majority of the costs will be imposed on Network Rail (as the scheme administrator), and these costs are recovered from the industry as a whole and not just freight operators, there may be some wider financial impacts, on both the passenger operators and their funders.

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[43] As we have shown in section 6.3, for individual operators the introduction of a reservation charge may result in substantial costs associated with the net reservation charge liability. But, for the industry as a whole the reservation charge is expected to be revenue neutral and, as such, does not impose an economic cost; these payments are merely transfers.

4.2. Set-up costs

4.2.1. Scheme design

Even before the reservation charge can be implemented, a substantial amount of additional work will have to be carried out by ORR and other industry parties in order to finalise the design of the charging scheme. Important tasks will include, among other things:

- deciding on the overall approach to be adopted – as noted in section 4.2.2 below, Network Rail has expressed doubts about feasibility and timing of a fully systemised approach and Freightliner has suggested a simpler approach, based on a simple comparison between train miles and "rights miles";
- deciding on the adjustments to be made to the charge, particularly to take account of headroom, but also other factors (such as cordon caps);
- deciding on the level of the charge;
- designing the rebate scheme that ensures the overall impact on freight operators is neutral. As discussed in section 6, this may distort the effective incentives faced by individual operators; and
- defining the legal and contractual implementation of the scheme.

These tasks are complex and are likely to be controversial. Even though the scheme is intended to be revenue neutral for freight as a whole, it could result in significant transfers between individual train operators. The decisions in relation to headroom and the rebate scheme, in particular, will go a long way to deciding which operators will "win" or "lose", and the relative size of the transfers. Any decision is therefore likely to be very strongly contested by the operators that appear likely to lose out as a result.

We have not included any explicit allowance for the costs of further work in our overall assessment of the likely costs and benefits. But there are likely to be costs for both ORR and train operators.

4.2.2. Billing systems

Although the individual operators may need to make some adjustments to their accounting systems, the most significant set-up costs will be incurred by Network Rail in adjusting its billing and train management systems to enable it to charge operators for rights that they do not use.

Network Rail provided an initial indicative range of costs of £75,000 to £250,000, quoted in the December 2006 consultation documents.[44] It noted that these figures were a very initial estimate based on the incremental changes required, and that the figure could be higher depending on the specifications of the solution adopted.

[44] ORR, *Periodic Review 2008, A Reservation Charge: Consultation on Issues and Options*, December 2006, page 26.

Subsequent analysis has led Network Rail to suggest that the required system changes could in fact be in the order of £450,000, with a tolerance of plus or minus 40 per cent.[45] The primary drivers of these higher costs stem from the inability of Network Rail's existing billing and train management systems to map access rights to trains run, and so identify which rights have not been used.

Network Rail's proposed solution involves assigning each access right a unique reference number that can be added to the train schedules. The code can then be used to accurately map access rights to trains run. However, the implementation of this systemised solution would require substantial initial set-up costs to implement and test. Furthermore, Network Rail has suggested that the complexity of the issues involved implies that "implementing a reservation charge as envisaged in ORR's December 2006 consultation by April 2009, would be highly unlikely".[46]

Network Rail has provided us with a breakdown of the predicted cost requirements associated with developing, implementing and testing its suggested systemised solution. These are summarised in Table 4.1.

Table 4.1
Estimated Capital Costs: Systemised Approach

Process	Cost (£)	Tolerance
Pre-feasibility and initial feasibility work including the capture, documentation and endorsement of the business requirements	135,000	30%
Production of the high level design documents to allow the the development of the Functional Specification and Outline Solution Design	90,000	20%
Detailed Design Work	67,500	15%
Development of a prototype	45,000	10%
User Testing	67,500	15%
Implementation	45,000	10%
Total	**450,000**	**40%**

Source: Network Rail

An alternative suggestion, proposed by Freightliner, involves basing the reservation charge on a comparison between total rights miles and total train miles run.[47] Network Rail agrees that the scheme would be simpler to implement and so have significantly lower initial set-up costs, in the order of £13,500.[48] A breakdown of these costs is provided in Table 4.2.

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45 Network Rail, *Response to Consultation on 'A Reservation Charge: Issues and Option'*, 31 January 2007.

46 Network Rail, *Letter to ORR, Reservation Charge: Progress Update*, 18 May 2007.

47 Freightliner, *Freightliner Group Limited Response to ORR Consultation Document on Reservation Charging,* 25 January 2007.

48 Network Rail acknowledged in its May 2007 update that such an approach would be significantly simpler to implement. However, it raised concerns that the approach could generate perverse incentives for operators to spot bid more for services to minimise their total right miles and, therefore, reservation charge liability. Network Rail is also concerned that this scheme would be more prone to dispute.

Table 4.2
Estimated Capital Costs: Simplified Approach

Process	Cost (£)
Calculation of total 'right miles'	10,000
Design of spreadsheet / database to capture rights	1,000
Linking of the spreadsheet / database to BIFS & PABS	2,000
Development of a process for updating 'rights mileage'	500
Total	**13,500**

Source: Network Rail

Included in these initial set-up costs, for both schemes, are the costs associated with documenting all the rights and loading data or total right miles. Network Rail expects this process to take several weeks, and incur costs in the order of £10,000 generated by the need to employ temporary staff.

We have assumed the capital costs associated with the set-up of the billing system will be spread over a period of 5 years.[49] This results in annualised implementation costs of £102,506 and £3,075 for the systemised and simplified solutions respectively.[50]

On the basis that the simplified approach will result in significantly lower set-up costs, in the order of 3 per cent of those that would be incurred in developing a systemised approach, we have used the capital costs associated with the simplified solution for our base case scenario. However, we also consider the impact of using the full systemised approach costs in the sensitivity testing (see section 7).

4.3. Ongoing costs

Although the main set-up costs are likely to be incurred by Network Rail, it seems likely that Network Rail, ORR and the train operators will all incur costs on an on-going basis. Network Rail has provided us with a breakdown of its estimate of ongoing costs, presented in Table 4.3. These costs would be of similar magnitude for both the systemised and simplified solutions, although Network Rail has argued that the simplified solution is likely to be more prone to disputes amounting to an additional £5,000 per annum.

[49] ORR has acknowledged that the scheme is unlikely to be introduced at the beginning of CP4, so an alternative assumption would be to spread the fixed charges over a three year period. This would increase the annualised implementation costs to £163,698 and £4,911. In line with our general approach, we have adopted a five year period for the base case analysis.

[50] We have assumed a weighted average cost of capital of 4.5 per cent (real) for the purpose of annualising the set-up costs. This is within the range used by ORR in assessing Network Rail's allowed return. See ORR, *Periodic Review 2008 Advice to Ministers and framework for setting access charges*, February 2008, p.104, para. 7.31.

Table 4.3
Ongoing Administrative Costs: Simplified Solution

Process	Cost (£ per annum)
Updating total right miles (or maintenance and modification of system for updating rights in the case of a systemised solution)	75,000
Ongoing rights reviews	(included above)
Dispute resolution	20,000
Total	**95,000**

Source: Network Rail

The costs associated with updating total rights miles (or maintaining and modifying the system for updating rights in the case of a systemised solution) are driven by the need to employ three full time employees. Network Rail estimates that these costs will increase by 3 to 4 per cent annually thereafter.

It is likely that the freight operators and ORR will incur additional costs associated with reviewing and monitoring the charges and rebates. We have assumed that these tasks will create the need for one additional full time equivalent employee across the industry, amounting to additional costs of £25,000. This could be an underestimate of the costs that would be incurred in practice.

In total, even the simpler approach, as proposed by Freightliner, would give rise to ongoing administration costs of £120,000 per year. Should the systemised approach be adopted, ongoing administration costs are expected to total £115,000 per year.

5. Base Case Results

5.1. Introduction

This section outlines the main output from our analysis of a network-wide reservation charging regime using the approach detailed in section 3, and then brings together the results with the costs detailed in section 4 to generate estimates of the overall net benefits of the scheme. As we have explained in section 1.2, our methodology focuses on the main costs and benefits of a reservation charging scheme to the rail industry. However, we also discuss the potential but unquantifiable impacts on both the rail industry and the wider economy.

As discussed in section 2 and section 3.3, our results focus on the benefits associated with paths that are freed up as a result of changes in traffic flows and then subsequently taken up. As part of our sensitivity analysis we also consider the net benefits that might arise if additional paths that are voluntarily surrendered include some that are useful to other operators.

In the remainder of this section we present our estimates of:

§ the total number of train rights held, train rights held and used, and train rights held but not used for each commodity;

§ the number of train rights initially held by each operator, by commodity;

§ the number of train rights held by operators that are not used by each operator, by commodity;

§ the number of train rights freed up by each operator, by commodity;

§ the reservation charge liability for each operator;

§ a summary table presenting our estimate of the total benefits of the reservation charge; and

§ a second summary table presenting our estimate of the net benefits of the reservation charge.

We also discuss how these results might change if the scheme were to be introduced in 2009 or 2014, and provide a qualitative discussion on what wider impacts a reservation charge might have.

The results reflect our base case assumptions, as summarised in Table 5.1. To test the robustness of the findings to these assumptions, we present the results of a number of sensitivity tests on them in the Section 7.

Table 5.1
Base Case

Description	Assumption
Reservation charge per path	£20
Headroom allowance	10 percentage points less than the proportion of paths that are unutilised (subject to maximum of 50%)
% of freed up paths that are re-used by new traffic	2.5%
Benefit per path freed up and re-used by new traffic	£723
% of freed up paths that are re-used by existing traffic	2.5%
Benefit per path freed up and re-used by existing traffic	£500
Annualised set-up costs	£3,075 per annum
Ongoing administration costs	£120,000 per annum

5.2. Distribution of Train Rights

In Table 5.2 we provide a summary of our estimates of the number of initial train rights held, the number of train rights held and used, and the number of train rights held but not used for each commodity grouping. Note that train rights held and used, and train rights held but not used will not necessarily add to give the total initial train rights held because of the headroom allowance. For example, other minerals have a headroom allowance of 50 per cent. This implies that half of the initial train rights held (ie 49,866 rights) are discounted for the purpose of applying the reservation charge.

Table 5.2
Summary of Train Rights

Commodity	Initial train rights held (per annum)	Train rights held and used (per annum)	Train rights held but not used (net of headroom adjustments – per annum)
Containers: deep sea	28,613	27,182	1,431
Containers: short sea	1,908	1,812	95
Coal: power station	166,931	75,119	16,693
Coal: other	16,905	7,607	1,691
Metals	42,656	21,755	4,266
Ore	14,181	7,232	1,418
Other minerals	99,733	36,901	12,965
Auto	2,534	1,293	253
Petroleum & chemicals	18,702	10,473	1,870
Waste	7,596	3,874	760
Domestic Intermodal	7,115	6,760	356
Nuclear	453	431	23
Own haul (NR)	36,015	13,325	4,682
Channel Tunnel	18,451	3,875	5,351
Total	**461,793**	**217,639**	**51,853**

Note that the columns may not add due to rounding

Power station coal and other minerals together make up the majority of the train rights, at 36 per cent and 22 per cent of total rights respectively. These high shares reflect the fact that coal and other minerals make up a substantial part of rail freight traffic, demonstrated by the similarly high shares of train rights used for these commodities.[51] However, the high share of train rights held also reflects the fact that these commodities have relatively low utilisation rates and require a significant amount of headroom. The effect of the low utilisation rate can be seen from their similarly high shares of train rights that are held but not used.[52]

In total, unused train rights represent approximately 11 per cent of the total number of train rights held. A total of 192,301 paths are removed from the impact of the reservation charge because of the headroom allowance.[53] This represents 42 per cent of total paths. By dividing train rights used by train rights held we get an overall utilisation rate of 47 per cent.

In Table 5.3 we present our estimates of the number of train rights held by each operator prior to the introduction of a reservation charging scheme. These rights holdings are estimated by NERA using the methodology explained in Appendix A.

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[51] 35 per cent and 17 per cent of train rights held and used for power station coal and other minerals respectively.

[52] 32 per cent and 25 per cent of train rights held but not used for power station coal and other minerals respectively.

[53] Calculated by subtracting train rights used and train rights no used from initial train rights held.

Although we have split train right holdings by operator, it is important to note that, to some extent, it is the total number of paths held that is important to this analysis and not the allocation between operators. Although market shares are important for understanding how each operator will be affected by the charge (and therefore the impact on their incentives), it is the total number of paths that drive the benefit outcome, not their allocation to individual operators.

When drawing conclusions from the following results it is important to note that the estimates of train right holdings are dependent upon the industry average utilisation rates by commodity from the Freight RUS (amongst other assumptions). In so much as there may be variations between the operators (which may or may not reflect relative efficiency), the actual distribution of unused paths may vary from this estimated distribution.

Table 5.3
Initial Train Rights Held Per Annum, by Operator & Commodity

Commodity	EWS	Freightliner	DRS	First GBRF	Total
Containers: deep sea	1,699	24,573	0	2,341	28,613
Containers: short sea	113	1.638	0	156	1,908
Coal: power station	122,587	44,300	0	44	166,931
Coal: other	5,103	11,802	0	0	16,905
Metals	42,656	0	0	0	42,656
Ore	14,181	0	0	0	14,181
Other minerals	86,138	6,021	0	7,573	99,733
Auto	2,504	30	0	0	2,534
Petroleum & chemicals	16,645	1,938	25	95	18,702
Waste	4,875	2,721	0	0	7,596
Domestic intermodal	1,088	2,120	3,908	0	7,115
Nuclear	0	0	453	0	453
Own haul (NR)	24,479	8,101	0	3,435	36,015
Channel Tunnel	18,451	0	0	0	18,451
Total	**340,521**	**103,244**	**4,386**	**13,642**	**461,793**

Note that the columns and rows may not add due to rounding

Our estimates suggest that EWS holds the highest proportion of train rights with around 74 per cent of the total. For the same year, EWS had a market share of around 69 per cent of turnover.[54] The slightly higher share of train rights relative to turnover is attributable to the majority of EWS' freight business being primarily in commodities that have low utilisation rates for held paths, such as coal, metals, other minerals and the Channel Tunnel.

Table 5.4 presents our estimates of the number of train rights held but not used, by operator, prior to the introduction of a reservation charging scheme. Again, note that these estimates

[54] TAS UK Passenger Transport report, *Rail Industry Monitor 2006 Volume 5, The Freight Railway*, p.18.

take into account the adjustments made for headroom (see Table 3.2). Therefore, the estimates of unused train paths will be lower than if the path utilisation rates reported in Table 3.1 were simply applied to the train rights holdings.

Table 5.4
Train Rights Held But Not Used Per Annum, by Operator & Commodity

Commodity	EWS	Freightliner	DRS	First GBRF	Total
Containers: deep sea	85	1,229	0	117	1431
Containers: short sea	6	82	0	8	95
Coal: power station	12,259	4,430	0	4	16,693
Coal: other	510	1,180	0	0	1,691
Metals	4,266	0	0	0	4,266
Ore	1,418	0	0	0	1,418
Other minerals	11,198	783	0	984	12,965
Auto	250	3	0	0	253
Petroleum & chemicals	1,664	194	3	9	1,870
Waste	488	272	0	0	760
Domestic intermodal	54	106	195	0	356
Nuclear	0	0	23	0	23
Own haul (NR)	3,182	1,053	0	447	4,682
Channel Tunnel	5,351	0	0	0	5,351
Total	**40,731**	**9,331**	**221**	**1,570**	**51,853**

Note that the columns and rows may not add due to rounding

Our estimates suggest that EWS holds the highest proportion of train rights that are not used (79 per cent). This reflects both EWS' higher market share and the higher proportion of commodities that exhibit low utilisation rates in EWS' business mix. In contrast, despite the fact that Freightliner holds 22 per cent of train rights, it only holds 18 per cent of the path rights that are not used. This can be attributed to its higher proportion of freight services in the intermodal market, where utilisation rates are around 95 per cent.

5.3. Train Rights Freed Up by Reservation Charging

In Table 5.5 we present our estimates of the number of train rights freed up as a result of the introduction of a reservation charging scheme. These results are particularly important, as they feed directly into the calculation of the total benefits from reservation charging.

Table 5.5
Train Rights Freed Up Per Annum, by Operator & Commodity

Commodity	EWS	Freightliner	DRS	First GBRF	Total
Containers: deep sea	1	17	0	2	20
Containers: short sea	0	1	0	0	1
Coal: power station	29	11	0	0	40
Coal: other	4	9	0	0	13
Metals	52	0	0	0	52
Ore	0	0	0	0	0
Other minerals	1,023	72	0	90	1,185
Auto	5	0	0	0	5
Petroleum & chemicals	24	3	0	0	27
Waste	0	0	0	0	0
Domestic intermodal	1	1	2	0	3
Nuclear	0	0	0	0	0
Own haul (NR)	0	0	0	0	0
Channel Tunnel	105	0	0	0	105
Total	**1,245**	**113**	**2**	**92**	**1,452**

Note that the columns and rows may not add due to rounding

The majority of train rights freed up arise from other minerals traffic (82 per cent of the total). The next biggest contributor is the Channel Tunnel, with 7 per cent of all paths free up. Deep sea containers, power station coal, metals and petroleum & chemicals each contribute between 1 and 4 per cent of paths freed up, while the remainder contribute negligible amounts.

The drivers of these results are the variations in elasticities and path utilisation between each of the commodity groups. As discussed in section 3, other minerals have a significantly higher elasticity than other commodity groups at -4.1. Also contributing to the large number of other minerals train rights given up is a very low path utilisation factor of 37 per cent, suggesting the reservation charge would have a significant impact on this sector. The only commodity group with a lower path utilisation rate is the Channel Tunnel. This group is the second biggest contributor to freed up train rights.

In comparison to other minerals, power station coal has a very low elasticity of -0.1, suggesting few paths would be given up, despite the relatively low utilisation rate of 45 per cent. This is consistent with our results, which suggest that less than 3 per cent of paths freed up will originate from power station coal paths.

Reflecting the nature of its business and the size of its train rights portfolio, EWS is expected to contribute the highest percentage of freed up train rights, representing almost 86 per cent of the total freed up. Although Freightliner holds 18 per cent of total unused train rights, it is expected to release only 8 per cent of the total number of train rights freed up. In contrast, First GBRF holds 3 per cent of train rights that are not used and yet contributes over 6 per cent of paths freed up. This again reflects the business mix of the two operators. Around 27 per cent of Freightliner's business is intermodal traffic, which exhibits high path utilisation rates and so is less exposed to the reservation charge. Another 55 per cent is in the lowly utilised but highly inelastic coal market. In contrast, around 55 per cent of First GBRF's business is in the other minerals group which, as discussed above, is highly elastic ***and*** exhibits low utilisation rates.

5.4. Reservation Charge Liabilities

In Table 5.6 we present estimates of the total reservation charges paid by each operator and the total charge net of the rebate. The net charges paid sum to zero as the reservation charge is intended to be revenue neutral for rail freight as a whole.

Table 5.6
Reservation Charge Paid, by Operator

Operator	Total charges paid (£ per annum)	Net charges paid (£ per annum)
EWS	814,627	113,731
Freightliner	186,630	-98,671
DRS	4,412	-15,397
First GBRF	31,393	337
Total	**1,037,061**	**0**

Note that the columns may not add due to rounding.

As expected from the previous tables (Table 5.4 in particular), EWS would pay by far the highest gross reservation charge at £814,627. This represents 79 per cent of the total £1 million paid by the industry in charges before rebates.

The net charge reflects the impact of the rebates on the amount paid by each operator. In the cases of Freightliner and DRS the net charge is negative, indicating that these operators would receive a higher rebate than they paid. This is discussed further in section 6.

5.5. Benefits from Reservation Charging

In Table 5.7 we present our estimate of the total main benefits from reservation charging, based on our base case assumptions presented in Table 5.1. The total benefits are divided into the benefits from freed-up and re-used train rights and the value lost for incumbent operators from giving up rights. Benefits from freed up paths are further divided into the benefits arising from new traffic picking up freed up train rights and existing traffic re-using train rights.

The benefits are also divided into commodity groups to show where the benefits of the reservation charge are derived from. Note that they do ***not*** represent the industries to which the benefits will accrue. As discussed in section 3.4, our assumptions about the value generated when freed up paths are re-used are based on an estimate of the profits associated with additional intermodal traffic.

Table 5.7
Summary of Total Benefits

Commodity	Gross benefits from freed up and re-used train rights (£ pa): New traffic	Gross benefits from freed up and re-used train rights (£ pa): Existing traffic	Total value lost from giving up train rights (£ pa)	Total benefits (£ pa)
Containers: deep sea	364	251	-201	414
Containers: short sea	24	16	-13	27
Coal: power station	721	499	-399	821
Coal: other	230	159	-127	262
Metals	940	650	-520	1,070
Ore	0	0	0	0
Other minerals	21,417	14,811	-11,849	24,379
Auto	94	65	-52	107
Petroleum & chemicals	490	339	-271	557
Waste	0	0	0	0
Domestic intermodal	61	42	-34	69
Nuclear	0	0	0	0
Own haul (NR)	0	0	0	0
Channel Tunnel	1,897	1,312	-1,049	2,159
Total	**26,237**	**18,144**	**-14,516**	**29,866**

Note that the columns may not add due to rounding.

The total benefits are expected to be close to £30,000 per annum. This relatively low figure can primarily be attributed to the assumption of a low expected take-up rate of unused paths. The reasons for this assumption are discussed in Section 3.4.

To the extent that the take-up rate of unused paths is likely to be significantly higher, the net benefits will increase. Similarly, to the extent that the benefits associated with a take up of freed up paths increases, the net benefits will increase proportionally. The sensitivity tests undertaken in the following section examine the impact of altering these assumptions.

Approximately 82 per cent of the total benefits are derived from paths freed up by other minerals flows, followed by 7 per cent from Channel Tunnel traffic. This follows from the fact that the majority of paths are given up from these traffic types.

In Table 5.8 we present a summary of our estimate of the net benefits to arise from the implementation of a reservation charge. Again, note that these estimates are derived from our base case scenario, summarised in Table 5.1.

Table 5.8
Summary of Net Benefits

Benefits from freed up and used train rights (£ per annum)	44,381
Value lost from given up train rights (£ per annum)	-14,516
Total benefits (£ per annum)	29,866
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	**-93,210**

Our estimates suggest that the expected level of economic benefits resulting from a reservation charge will be relatively low. In comparison to these estimates, the total cost of implementing the charge is expected to be fairly high, resulting in a negative overall net benefit.

5.6. Looking Forward to CP4 and Beyond

It is important to note that our calculations were based predominantly on data from 2004/05. However, it is possible that the value of the benefits and the associated costs of a reservation charge will change over time with changes in market conditions. For example, as demand for freight services grow, latent demand for paths is likely to become more widespread. Consequently the take-up rate of freed up paths would increase over time, with a commensurate increase in the size of the benefits associated with implementing a reservation charge. However, the number of paths that are freed up in the first case could decrease, as demand growth leads to higher utilisation rates and encourages operators to hold onto the paths that they possess.

MDS Transmodal have forecast the number of tonnes of freight lifted to increase from 117.9 million tonnes in 2005 to 128.5 million tonnes in 2009 and 141.8 million tonnes by 2014.[55] The projections in Network Rail's Freight RUS are broadly consistent with these estimates.[56] Much of this increase is expected to be driven by minerals traffic other than coal, metals and ore, which is expected to rise from 21.6 million tonnes in 2005 to 31.5 million tonnes in 2014. This forecast increase is attributed to an increase in road costs and a subsequent substitution of freight from road to rail. In contrast, coal is forecast to fall from 47 million tonnes in 2005 to 43.1 million tonnes in 2014, driven by a fall in coal supplied to power stations.

55 MDS Transmodal (2006), *Impact of track access charge increases on rail freight traffic*, Final Report, November 2006, Table 1, p.6.

56 Network Rail, *Freight Route Utilisation Study*, March 2007.

Using the forecasts for rail freight traffic, we have estimated the number of train rights held in 2009 and 2014,[57] again split into operators and commodity groups. In calculating these estimates we have made the following simplifying assumptions:

§ the net weight per train for each commodity is held constant. It is likely that the net weight would, in fact, increase over time, which would serve to decrease the number of train rights held according to our estimates;

§ the path utilisation rates remain the same. As with net weights per train, the utilisation rate is likely to increase over time as operators run more trains (as well as longer or heavier trains). This would also decrease the number of paths held compared to our estimate; and

§ the market shares for the four operators do not change. Although market shares will change over time, market shares only impact the allocation of the rebate between operators and do not change the magnitude of the net benefits. Since our focus here is on the net benefits from the reservation charge, this assumption should have no impact.

We have then used the revised number of train paths to re-estimate the net benefits associated with a reservation charge, following our previous methodology detailed in section 3, to provide an indication of how those benefits might change over time. Note that we have also assumed the same base case scenario.[58] Table 5.9 provides a summary of our results.

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[57] See Appendix A for an explanation of how we calculate the number of train rights.

[58] See Table 5.1 for a summary of the base case scenario.

Table 5.9
Results Summary for Rail Freight Traffic Forecasts

	2005 Totals	2009 Totals	2014 Totals
Initial train rights held (per annum)	461,793	514,423	580,093
Train rights held but not used (per annum)	51,853	61,133	72,651
Train rights freed up (per annum)	1,452	1,827	2,296
Gross reservation charge paid (£ per annum)	1,037,061	1,222,655	1,453,028
Benefits from freed up and re-used train rights (£ per annum)	44,381	55,856	70,198
Value lost from giving up train rights (£ per annum)	-14,516	-18,268	-22,959
Total benefits (£ per annum)	29,866	37,587	47,239
Annualised set-up costs (£ per annum)	-3,075	-3,075	-3,075
Ongoing administration cost			
Network Rail (£ per annum)	-95,000	-95,000	-95,000
Freight operators (£ per annum)	-25,000	-25,000	-25,000
Total Costs (£ per annum)	-123,075	-123,075	-123,075
Net Benefits (£ per annum)	**-93,210**	**-85,488**	**-75,837**

The increase in tonnage has resulted in an increase in the train rights held between 2005 and 2009, and then between 2009 and 2014 (although we note that the uncertainty surrounding our assumptions is greater for 2014 than 2009). This, in turn, has led to increases in the train rights freed up and the gross reservation charges paid by the operators. The number of train rights freed up increases by 26 per cent between 2005 and 2009, and by 58 per cent between 2005 and 2014. This leads to proportional increases in the benefits from freed up and re-used train rights, the value lost from giving up train rights and the net benefits.

There are two important points to note regarding these results. First, the size of the estimated net benefits in 2014 is still substantially lower than the estimate of the implementation costs associated with the reservation charge, even using the lower cost estimate provided by Network Rail. The net benefits of the reservation charge are therefore unlikely to outweigh the costs over CP4. Second, these results are likely to overestimate the benefits for two reasons:

§ our simplifying assumptions of unchanging net tonnages per train and utilisation rates are likely to overestimate the number of paths held in 2009 and 2014, and so overestimate the benefits from a reservation charge; and

§ the impact of strategic behaviour will likely lessen these benefits.

However, we have also held the proportion of freed up paths that are re-used constant at 2.5 per cent for both existing and new traffic. To the extent that this rate could be expected to increase over time, the benefits could also increase. We examine the sensitivity of the model results to changes in the take up rates in section 7. However, we note that the increase in the take up rate would need to be substantial to increase the benefits enough to outweigh the implementation costs, particularly if the full systemised implementation cost estimates are used.

5.7. Indirect Impacts

In addition to the main benefits and costs to the rail industry associated with a reservation charge, there a several indirect impacts that are difficult to quantify and so have been excluded from our calculations.

There are two important but unquantifiable benefits that would impact the freight industry following implementation of a reservation charge:

- increased competition in the future as a result of freeing up paths, and therefore reduced barriers to entry; and
- delaying the need for network enhancement/expansion.

Both of these impacts are likely to increase the magnitude of the benefits associated with a reservation charge. However, we note that, as the number of paths likely to be freed up by the charge will be small, the order of magnitude of these benefits is likely to be small as well. In the case of delaying network enhancement/expansion, the main driver for investment will be the needs of passenger services. As the reservation charge is unlikely to produce many, if any, additional paths that are usable for passenger services, the impact of the reservation charge on delaying investment is likely to be very small.

In addition to these indirect benefits there are also a number of indirect costs that may arise from the reservation charge. These include:

- costs to the rail industry related to reduced timetabling flexibility; and
- costs to the wider economy from the congestion and environmental costs associated with the traffic priced off rail and on to road.

We explore both of these types of cost in the following subsections.

5.7.1. Costs to the rail industry

Other than those costs that are directly imposed on the freight industry, including set-up and going administrative costs, the reservation charge may also impose a number of indirect costs on the wider rail industry. These costs are most likely to be related to the impacts on the working timetable following the take-up of paths that were previously held but not used on a frequent basis. To the extent that those infrequently used paths are freed up and subsequently used by other operators, two factors may serve to increase costs to the industry:

- a reduction in the flexibility of Network Rail to provide timetable resilience. The relatively low levels of path utilisation for freight trains compared to passenger operations means that even in areas where all capacity on a route is timetabled, there is in reality some spare capacity. This has two principal advantages. First, it increases the resilience of the timetable. The free space that arises from freight operators not running services provides greater ability for the network to recover from external shocks (eg signalling failures or broken down trains). Effectively the unused paths act as buffers in the timetable; and

- a reduced ability to accommodate ad hoc re-routings or services may be reduced. The space in the timetable associated with paths that are held but not used provides Network Rail with the freedom in otherwise congested parts of the network to provide (primarily freight) operators with re-routed paths or additional ad hoc services.

If the impact of the reservation charge is to increase the number of freight rights used (primarily through increased utilisation), therefore, there would be costs associated with reducing the operational flexibility that the lower rights utilisation produces (all other things being equal).

5.7.2. Costs to the wider economy

While the focus of our analysis in this report relates to the impact on the rail industry rather than the economy more generally, it is possible that the reservation charge will impose costs on the economy as a whole. The most notable of these costs will be those associated with traffic that is priced off the rail network and on to road. Such costs will include:

- **congestion costs** – additional freight transported by road instead of rail will increase road congestion. This may be particularly an issue in London where there is significant rail freight activity in aggregates and there is already significant road congestion; and
- **environmental impacts** – shifting freight from rail to road is likely to result in increased emissions.

To provide an indication of the potential scale of impact based on a number of assumptions we estimate that, for aggregates, the impact of the total freed rights on avoided lorry journeys could be around 14,000 journeys.[59]

[59] This estimates is based on assuming that the utilisation of rights freed up is the same as the average for all aggregate rights, the average load per aggregate train lost is the same as the average for all aggregate trains run, the average haul length is consistent with that published by MDS Transmodal in Table 6 of their ***Impact of track access charge increases on rail freight traffic*** (Nov 2006) report, and that the ratio between total net tonne kilometres moved to avoided lorry journeys published in section 3.3 of the ***National Rail Trends Yearbook 2005-06*** for 2004/05 applies to aggregates.

6. Rebate of the Reservation Charge

6.1. Introduction

ORR intends the reservation charge to be cost neutral across the rail freight industry as a whole.[60] Consequently any revenue earned through the reservation charge will be rebated to operators. In this section we examine the approach to rebating the revenue that ORR considered in its consultation on the charge. We consider both the impact of such an approach on operators' net reservation charge payments (that is the gross charges minus any rebate), but also importantly the implications of the rebates for the effective incentives faced by each operator as a result of the reservation charge.

6.2. Approach to Calculating the Rebate

In its December 2006 consultation on the reservation charge ORR outlined how it envisaged the rebate system to work. Under this approach each operator will receive a proportion of the total revenue derived from the reservation charge. That proportion is equal to the total number of paths used by a given operator as a percentage of the total number of paths used by all freight train operators as a whole.

In Table 6.1 we provide a slightly amended version of the illustrative example of how the mechanism would work which appeared in the ORR's consultation document.[61]

Table 6.1
Distributing the Rebate

	Operator A	Operator B
Total train rights	12	12
Train rights after headroom adjustment	10	10
Train rights used	8	6
Net train rights unused	2	4
Charge per train right unused	£1	£1
Reservation charge	2 x £1 = £2	4 x £1 = £4
Revenue to be rebated	£2 + £4 = £6	
Proportion of rebate	8/(8+6) = 57%	6/(8+6) = 43%
Amount rebated	57% x £6 = £3.43	43% x £6 = £2.57
Net charge	£1.43 (gain)	-£1.43 (loss)

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60 In its December 2006 consultation on the reservation charge ORR notes that the rebate is intended to help with affordability concerns as the net impact on operators as a whole would be zero (footnote 22).

61 ORR's description of the reservation charge is based on a charge per each train path reserved, less a rebate for the number of trains run by each operator, less a further rebate to ensure that the charge is revenue neutral. We have adopted the simpler description of a charge for each unused train path.

For the purposes of our modelling, and considering the impact of the scheme on incentives, we have replicated this approach to allocating the rebate in our model.

6.3. Rebate Estimates and the Net Reservation Charges

This section presents our estimates of how the ORR's proposed rebate mechanism may impact on each of the main operators. Table 6.2 presents the total charge paid, the rebate, and the net reservation charge paid by each operator.

Table 6.2
Estimates of the Rebate (£ per year)

Operator	Total charge	Rebate	Net charge
EWS	814,627	700,896	113,731
Freightliner	186,630	285,301	-98,671
DRS	4,412	19,809	-15,397
First GBRf	31,393	31,055	337
Total	**1,037,061**	**1,037,061**	**0**

Note that, in line with policy, the total net charge for the freight industry as a whole is zero, since the reservation charge is rebated in full to operators. However, there is a redistribution between operators as a result of the distribution of charges and rebates varying across the operators. As a consequence EWS pays a positive net charge (ie its rebate is less than the amount it pays into the pot), while Freightliner and DRS each pay a negative net charge (ie they receive more than they pay). First GBRF also pays a positive net charge, though this is very small.

EWS is the only operator to pay a significant positive net charge. It holds the biggest share of unused paths and, in particular, the majority of coal paths. Since coal is fairly price inelastic, these train rights are more likely to be held despite many rights not being used, and so incur the reservation charge. EWS' large share of the other minerals market also contributes to its positive net charge. Although some of these train rights are likely to be dropped in response to the reservation charge, thus reducing the cost of the charge to EWS, many rights will still be retained.

In fact, it is quite likely that the effective net charge that EWS is required to pay would be higher than that shown in Table 6.2. This is because we have assumed that the average utilisation rate for each commodity applies equally to all train operators that carry that commodity. In practice, we might expect EWS to have lower utilisation rates than the average for particular commodities, if only for historical reasons. For many years, EWS was the main service provider for many of the commodity groups with low utilisation rates and, as we note in section 9, until recently there has been little or no pressure on it to release paths that it may longer require (for example, because traffic patterns have changed over time).

In contrast, we would expect the access rights held by other operators carrying commodities such as coal and minerals to be more closely aligned with the trains that they run. This is because they will have acquired these access rights more recently. Whether they were obtained through the Part J procedures described in section 2.3 or requested directly from

Network Rail (and approved by ORR), it is more likely that their rights were reviewed closely and restricted to the minimum necessary to run the proposed service.

While differences in utilisation rates between operators will be an important driver of the relative distribution of net charges between the operators, the allowance for headroom within the design of the reservation charge is also important in determining the absolute scale of the net charges.

As is shown in section 7.5 the level of net benefits generated by the reservation charge is highly dependent on the level of allowed headroom. This is a result of headroom determining the extent to which operators are exposed to paying the charge for unused train rights. It is therefore not surprising that as the level of allowed headroom is reduced, the scale of net charges faced by the operators also varies. Table 6.3 shows our estimates of the net charge liabilities for each of the main operators under each of the three headroom sensitivities identified in section 7.5.

Table 6.3
Net Charges for the Headroom Sensitivities

Net charges (£ per annum)	EWS	Freightliner	DRS	First GBRF
Headroom set at 10% below non-utilisation	113,731	-98,671	-15,397	337
Headroom set at 20% below non-utilisation	192,967	-157,887	-29,272	-5,807
No headroom	568,374	-475,963	-88,688	-3,723

It is clear that the provision of headroom has implications on the financial impact of the scheme to each of the operators. Using our base case, EWS would pay a net charge of around £114,000. However, under a scenario where there is no headroom allowance, we estimate that this net charge liability will rise to around £568,000. Conversely, for Freightliner (ie the operator set to gain the most in the base case) the removal of headroom allowances increases the amount that they receive from the net charge from around £99,000 to around £476,000.

The strong impact of different headroom allowances on the net amounts paid by each operator mean that the design of any reservation charge scheme, and the setting of headroom allowances in particular, is likely to be provoke strong (and conflicting) representations from individual train operators.

6.4. The Implications of the Rebate for Effective Incentives

As with any charging scheme, the reservation charge is intended to alter behaviour by providing financial incentives to operators. However, while the introduction of the charge itself creates one set of incentives for the operators, the requirement to make the scheme revenue neutral introduces a risk that these incentives will be diluted or even reversed.

To take an extreme case, if there was only one freight train operator, the entire reservation charge would be refunded to that operator and the effective incentive would be zero. There is a danger that similar effects will occur with the rebate scheme proposed by ORR. The extent to which this arises in practice will depend on how train operators adjust their access rights.

The simplest case to consider is the situation where an operator simply sheds an unwanted train path, with no impact at all on the number of trains it runs. Since the number of trains run by each operator is unchanged, then the change in the rebate for each operator will simply be the change in total reservation charge receipts multiplied by its share of the total number of trains run.

The overall impact of the rebate in this situation is that an operator with a large market share will get back a high proportion of any additional reservation charge it pays, or have to forfeit a high proportion of any initial reduction in reservation charge payments because of the rebate scheme. Conversely, an operator with a very small market share will receive very little rebate and therefore, at the margin, will face almost the full reservation charge.

This is confirmed by the middle column of Table 6.4, which shows the overall reduction in each operator's net reservation charge payments if it surrenders an additional train path but there is no change in the number of trains run. Because of its large share of the rebate, the net benefit to EWS from giving back a train path is only £3.58, despite the "headline" reservation charge of £20 per train path. Conversely, DRS faces almost the full charge. It would enjoy a net saving of £19.58 by returning an unwanted train path.

The situation is more complicated if there is a change in the number of trains run, as well as the number of unused paths. This would occur, for example, if an operator ceased running a service because the increase in costs as a result of the reservation charge made it uneconomic. In this case, the operator's share of the rebate changes, as well as its initial payments. The net impact on its incentives will also depend on the utilisation rate of the service that ceases, and therefore the relative impact on used and unused access rights.

The right hand column of Table 6.4 shows the net impact on each operator's reservation charge payments (per train path surrendered) if there is a change in both the total number of train rights and the number of trains run. For these illustrative calculations, we have assumed that each operator's utilisation rate remains unchanged. The outcome is that both Freightliner and DRS would face an *increase* in net reservation charge payments if they shed some traffic and a corresponding number of train rights. Since they run fewer trains, they receive a lower share of the overall rebate. Because of their higher than average utilisation rates (plus the impact of their respective market shares), this effect outweighs the reduction in their initial reservation charge payments.

Table 6.4
Effective Reservation Charges (£ per path)

Operator	Unwanted paths surrendered	Utilisation rates held constant
EWS	3.58	0.58
Freightliner	9.72	-2.06
DRS	19.58	-3.83
First GBRF	11.50	0.11

Our base case estimates assume that train operators respond to the "headline" charge of £20 per unused path, rather than the effective net incentive that results from any particular rebate scheme. This might occur either because train operators do not take account of the rebate when making their decisions, or else because an alternative rebate scheme has been adopted that reduces the impact on incentives. We carry out a sensitivity test in section 7.3 to illustrate the impact on our overall results if operators recognise, and respond to, the lower incentives as shown above.

It is clear that the provision of headroom has implications not only for the scale of the net benefits, but also for the financial impact of the scheme to each of the operators. Using our base case, EWS would pay a net charge of around £114,000. However, under a scenario where there is no allowance for headroom, we estimate that this net charge liability will rise to around £568,000. Conversely, for Freightliner (ie the operator set to gain the most in the base case) the removal of headroom allowances increases the amount that it receives from the net charge from around £99,000 to around £476,000.

However, as the estimates show, the level of headroom is of particular importance to First GBRF. Under the base case they have a positive net charge. However, with reduced headroom (or no headroom) First GBRF pays a negative net charge. This switch reflects the fact that, as headroom reduces, operators are required to pay higher charges. Since First GBRF is fairly small in terms of market share, the increase in its charge is proportionally less than the total increase in reservation charge. First GBRF's rebate from this enlarged pot of revenue will rise, offsetting the increase in charges that they have to pay.

7. Sensitivity Tests

7.1. Introduction

This section presents the results of the sensitivity analysis undertaken to examine the effects of varying some of the key variables and assumptions critical to this analysis from the base case scenario summarised in Table 5.1.

Sensitivity analysis is important in modelling of this type since it increases the robustness of the conclusions by showing the magnitude of changes in the modelled outcomes given changes to individual assumptions or key variables. We therefore obtain an understanding of the reliability of the results with regard to these assumptions. The range of outcomes for the total and net benefits derived from the sensitivity analysis also allows us to form judgements on the upper and lower boundaries of total and net benefits around the base case.

We have tested the following sensitivities around the base case:

- voluntary surrendering of useful paths;
- use of “effective” reservation charges;
- the reservation charge is increased from £20 to £40;
- all headroom allowance is removed;
- headroom is calculated as (1-utilisation rate)-20%, rather than (1-utilisation rate)-10% under the base case;
- 10 per cent and 20 per cent overall of paths freed up are re-used, rather than 5 per cent under the base case;
- rail costs per train of plus and minus 10 per cent compared to the base case;
- the benefit per path re-used by new traffic is reduced from £723 to £341 and the benefit per path re-used by existing traffic is reduced from £500 to £100;
- the train cost elasticities are increased and decreased by 25 per cent of the base case (with the exception of ‘other minerals’ where the base case is used instead of increasing it by 25 per cent, however we do test the decrease);
- the train cost elasticity for ‘other minerals’ is reduced to 50 per cent of the base case level and the combined rate of paths freed up that are re-used is increased to 20 per cent (rather than 5 per cent in the base case); and
- use of Network Rail’s proposed systemised approach to matching rights to trains run, rather than implementation of the simpler methodology proposed by Freightliner.

Figure 7.1 shows the total benefits under each of these sensitivities and Figure 7.2 shows the net benefits under each of the sensitivities. The results are discussed in the following sections.

Figure 7.1
Total Benefits for Sensitivities (£ pa)

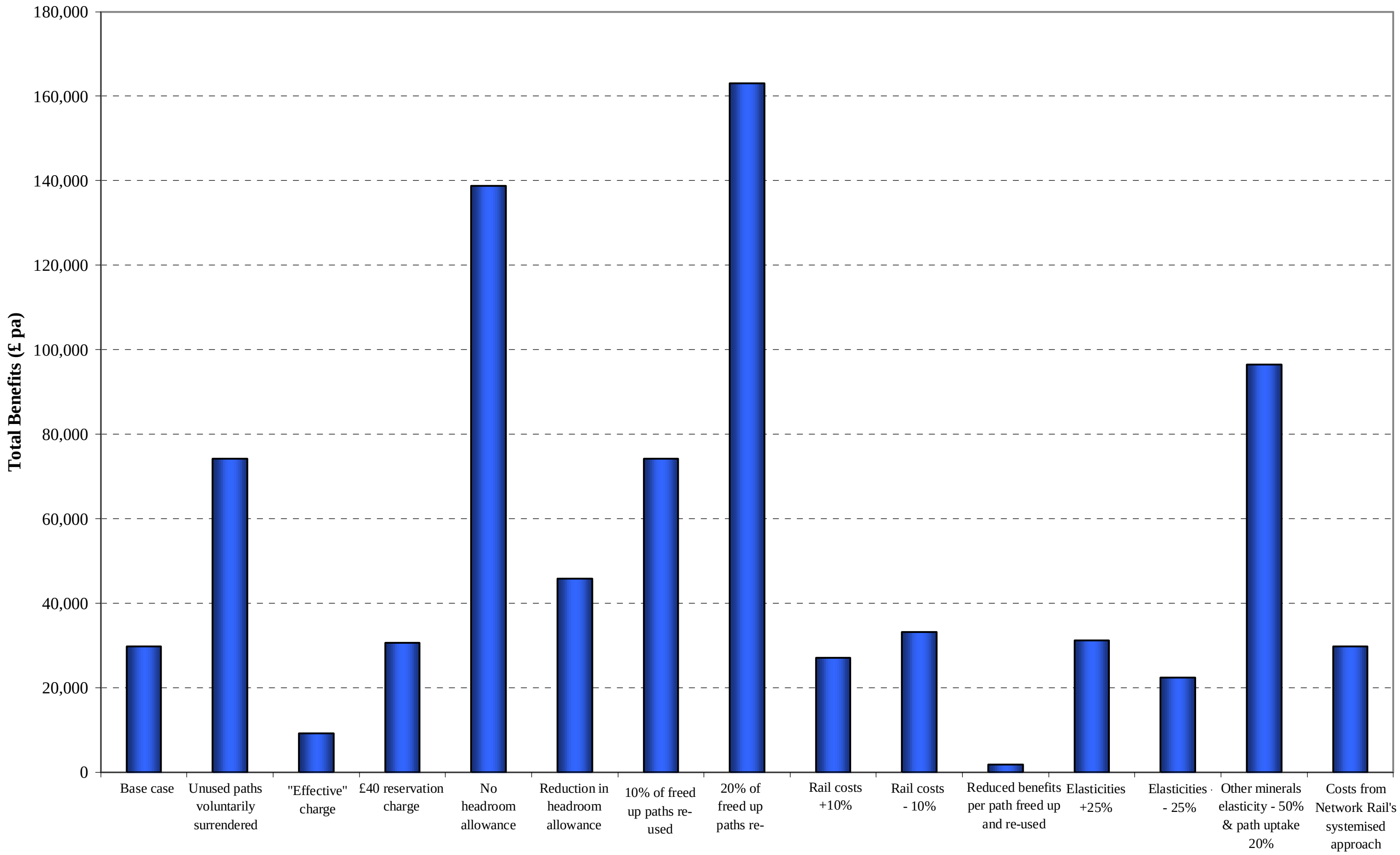
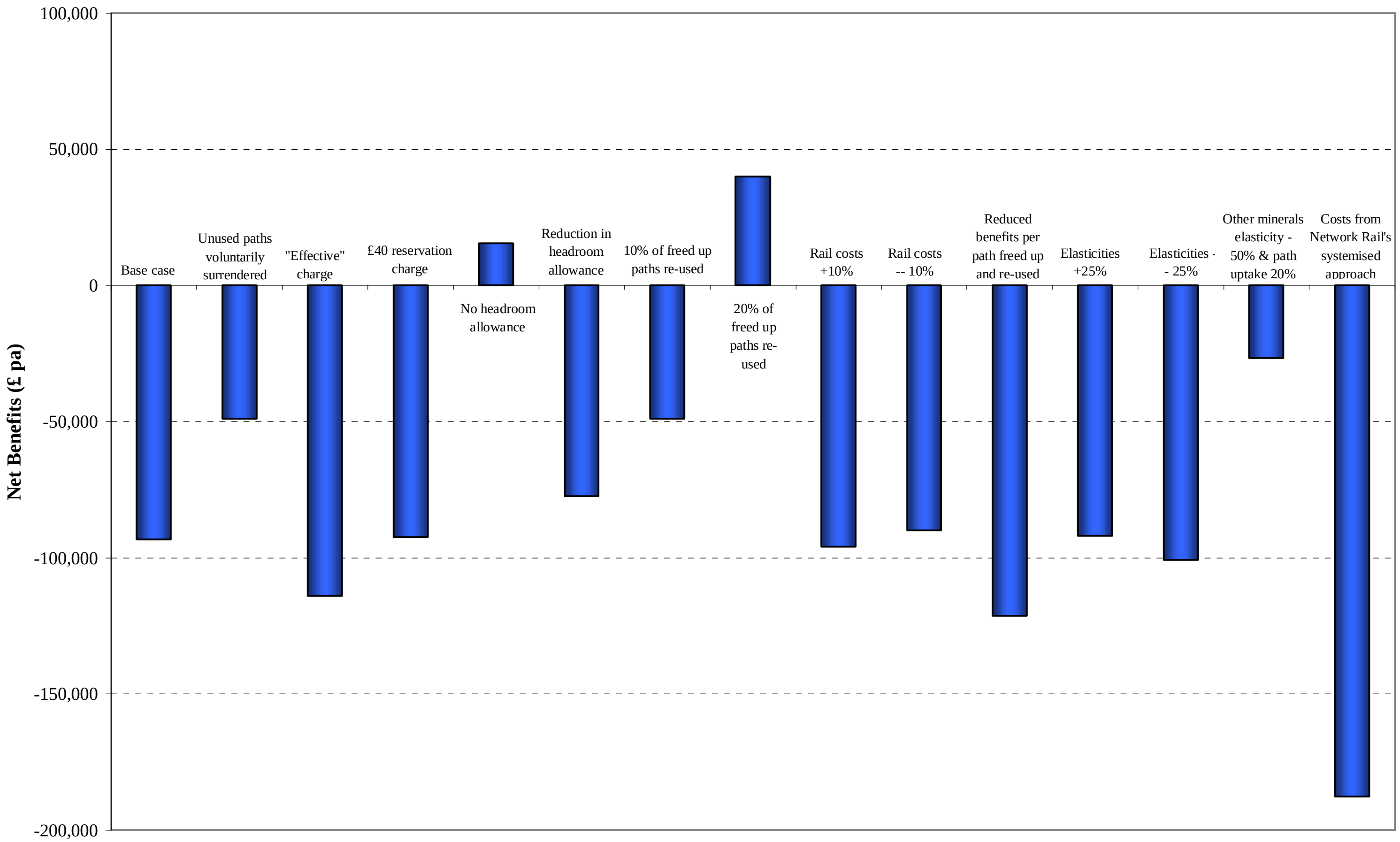


Figure 7.2
Net Benefits for Sensitivities (£ pa)



7.2. Voluntary Surrender of Useful Paths

In the base case we assume that, while train operators may surrender some paths voluntarily as a result of the reservation charge, these are not paths that are likely to be useful to other train operators. To illustrate the impact of relaxing this assumption, in this sensitivity test we assume that twice as many useful train paths are freed up, without any increase in the amount of traffic priced off the network by the reservation charge. The results of this test are shown in Table 7.1.

Table 7.1
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	2,903
Benefits from freed up and used train rights (£ per annum)	88,762
Value lost from given up train rights (£ per annum)	-14,516
Total benefits (£ per annum)	74,247
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	-48,828

The doubling of the train rights freed up to 2,903 causes the gross benefits from freed up and re-used train rights to double to £88,762. The value lost is the same as in the base case, as the additional freed up paths in this test are assumed to be surrendered voluntarily, resulting in the total benefits increasing from £29,866 in the base case to £74,247. The annualised set-up cost and the ongoing costs give a total cost of £123,075, which offset the total benefits to give a net loss of £48,828.

In practice it is unlikely that there are many existing paths that are held but not used at all. Network Rail is currently undergoing a 'timetable cleansing' process with EWS and Freightliner to try to free up paths that are not being used.[62] Furthermore, to the extent that there are paths that are held but unused and those paths are sought after by other operators, Network Rail is able to request those paths be surrendered under the Part J process. Any remaining paths that are voluntarily surrendered following the implementation of a reservation charge are therefore less likely to be useful to other operators.

[62] We note that the effectiveness of this approach is to some extent limited by the information asymmetry that exists between the operators and Network Rail (ie Network Rail does not know which rights the operator does and does not need).

7.3. Use of "Effective" Charges

Our base scenario assumes that operators respond to the "headline" level of the reservation charge (ie £20), not the effective charge implied by the rebate. As discussed in section 6, the effective charge will be less than the headline charge, since much of the headline charge will be rebated. In this section we explore what the outcomes will be if operators respond to the incentives from the effective charges.

Table 7.2 provides a summary of the outcomes of our modelling assuming operators respond to the first set of effective charges shown in Table 6.4, whereby operators surrender unwanted paths.

Table 7.2
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	
EWS	223
Freightliner	55
DRS	3
First GBRF	53
Benefits from freed up and used train rights (£ per annum)	10,167
Value lost from given up train rights (£ per annum)	-992
Total benefits (£ per annum)	9,175
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	-113,900

The number of train rights initially held and the number of train rights held but not used remain the same, since these variables do not depend on the size of the reservation charge. However, the number of train rights that are freed up drops significantly, from 1,452 in our base case to 333. This reflects the large reduction in the incentives for operators to give up paths, mirroring a significantly lower effective charge.

As a consequence of the substantial fall in the number of train rights that are freed up, total benefits per annum also fall from £29,866 to £9,175. Consequently, if operators respond to the effective incentives implied by the rebate they receive, the benefits from a reservation charging scheme are likely to be minimal. Taking the estimated annual costs of the reservation charging scheme into consideration, the net loses under this scenario are estimated to £113,900.

7.4. Reservation Charge Level

The base case assumes that the reservation charge is set at £20 per unused path. This is at the lower end of the £20-£40 range that ORR has initially indicated may be appropriate for the charge. In this sensitivity we therefore examine the impact of raising the charge to £40. The results of this test are summarised in Table 7.3.

Table 7.3
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	2,903
Benefits from freed up and used train rights (£ per annum)	88,762
Value lost from given up train rights (£ per annum)	-58,062
Total benefits (£ per annum)	30,700
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	-92,375

The increase in the reservation charge from £20 to £40 per path leads to an increase in the total benefits from £29,866 under the base case to £30,700. At first glance one would expect a doubling in the reservation charge to double the benefits. Although this is true for *gross* benefits, *total* benefits increase by a smaller amount. This result stems from the value of the loss associated with giving up paths. As the charge level is increased, more and more valuable traffic is priced off the network, generating the levels of lost value.

The increase in the reservation charge leads to increases in train operators' costs and therefore the number of paths freed up by operators. The number of freed paths drives the magnitude of the benefits associate with new and existing traffic taking up paths, but only by a factor of 2.5 per cent for each type of traffic. In contrast, *all* of the paths given up affect the value lost. The net result is a small increase in total benefits, which are still offset by the annualised set-up cost and the ongoing costs, resulting in a net loss of £92,375.

7.5. The Level of Headroom

As discussed in section 2.2, headroom is an essential component of the design of the charging scheme to ensure operators are not penalised for freighting commodities that, due to the nature of the business, operational flexibility. However, determining the relevant level of headroom afforded to different commodities is complex, due in part to disentangling what is required for genuine customers needs and what reflects inefficiency.

The approach adopted in dealing with headroom in the base case is subjective. Therefore, understanding how the results might change with variations in the level of headroom is particularly important. We consider two tests, both of which imply a reduction in the level of headroom:

- no headroom allowance; and
- changing the calculation from *(1-utilisation rate)-10%*, to *(1-utilisation rate)-20%.*

Note that the assumption of no headroom allowance is purely illustrative. It is designed to show the upper bound on the benefits, and is not a realistic option in practice due to the requirement for some commodities to have an element of headroom for legitimate business reasons (see section 2.2).

The results of these tests are summarised in Table 7.4.

Table 7.4
Sensitivity Results Summary

	No Headroom	Changed Calculation
Train rights held but not used (per annum)	244,155	88,306
Train rights freed up (per annum)	6,742	2,227
Benefits from freed up and used train rights (£ per annum)	206,131	68,075
Value lost from given up train rights (£ per annum)	-67,418	-22,265
Total benefits (£ per annum)	138,713	45,810
Annualised set-up costs (£ per annum)	-3,075	-3,075
Ongoing administration cost		
Network Rail (£ per annum)	-95,000	-95,000
Freight operators (£ per annum)	-25,000	-25,000
Total Costs (£ per annum)	-123,075	-123,075
Net Benefits (£ per annum)	15,638	-77,265

Removing the headroom allowance for operators causes the total benefits to increase significantly from £29,866 to £138,713. As the level of headroom allowed decreases, operators' exposure to the charge increases since there is less protection for paths that are not used for reasonable business purposes. A greater exposure to costs will cause more paths to be given which, in turn, causes benefits to increase. The net result is a large increase in total benefits, although the benefits are partially offset by additional value lost through given up train rights. The annualised set-up cost and the ongoing costs give a total cost of £123,075, which offset the total benefits to give a net benefit of £15,638. However, as we have already discussed, any reservation charge scheme would need to provide some allowance for headroom. Furthermore, if the full systemised implementation approach was adopted by Network Rail, the increase in annualised costs would result in an overall net loss for this sensitivity as well.

We also test the sensitivity of total benefits to a less extreme change in our approach to calculating the headroom allowance, causing headroom to decrease slightly from our base case for each operator. As illustrated in the previous test, a reduction in headroom has a significant impact on total benefits. The increase in benefits in this test is less extreme, since the change in magnitude of the headroom was smaller. The result is an increase from £29,866 in the base case to £45,810. Again, the annualised set-up cost and the ongoing costs offset the total benefits to give a net loss of £77,265.

7.6. The Proportion of Re-used Freed Up Train Rights

In the base case, we have assumed that 2.5 per cent of paths freed up are re-used by new traffic and 2.5 per cent of paths freed up are re-used by existing traffic. The basis for this assumption is anecdotal evidence provided to us by the industry on the existence of latent demand for paths. This evidence led us to conclude that relatively few paths would be re-used in the event of a reservation charge. The choice of 2.5 per cent for both take-up rates is largely a judgement call, though we feel it could be an overestimate.

Nevertheless, in these tests we consider the impact of increasing these take-up rates to 5 and 10 per cent, again applied to each of new traffic and existing traffic. The results of these tests are summarised in Table 7.5.

Table 7.5
Sensitivity Results Summary

	10% Overall Take-up	20% Overall Take-up
Train rights held but not used (per annum)	51,853	51,853
Train rights freed up (per annum)	1,452	1,452
Benefits from freed up and used train rights (£ per annum)	88,762	177,525
Value lost from given up train rights (£ per annum)	-14,516	-14,516
Total benefits (£ per annum)	74,247	163,009
Annualised set-up costs (£ per annum)	-3,075	-3,075
Ongoing administration cost		
Network Rail (£ per annum)	-95,000	-95,000
Freight operators (£ per annum)	-25,000	-25,000
Total Costs (£ per annum)	-123,075	-123,075
Net Benefits (£ per annum)	-48,828	39,934

Increasing the path take-up rates has a positive impact on the total benefits of the charge. In the case where the take-up rates both increase to 5 per cent (ie 10 per cent of paths overall are taken-up), the total benefits increase from £29,866 in the base case to £74,247. While, in the case where the take-up rates both increase to 10 per cent (ie 20 per cent of paths overall are taken-up), the total benefits increase from £29,866 to £163,009.

The increases in total benefits are large because there is a linear relationship between the proportions of freed up paths and the benefits from freed up and used train rights. The number of train rights freed up does not vary in these sensitivities and therefore neither does the value lost from given up train rights. The net results are large increases in the total benefits.

As per our base case, the annualised set-up cost and the ongoing costs give a total cost of £123,075. Therefore for the 10 per cent overall take-up rate case, the total costs offset the total benefits to give a net loss of £48,828. For the 20 per cent overall take-up rate case the total benefits offset the total costs to give a net benefit of £39,934. However, we note that, even with this substantial variation from the base case assumption, if we use the full systemised implementation costs for Network Rail (rather than the lower cost solution), the net benefits would be offset by a considerable margin (ie the net benefits would become net losses of around £60,000).

7.7. Rail Costs

The level of train costs is a key element of understanding the potential impact of a reservation charging scheme on operators. It is therefore important in understanding the potential scale of train paths that may be shed by operators. In the absence of any more detailed data, the assumptions regarding train costs are estimated by NERA, based on data from MDS Transmodal's report. As these parameters are estimated, there is potential for them to deviate from the actual underlying costs. In these tests we therefore explore how the total benefits estimates vary by adjusting the train costs per train in the base case by 10 per cent above and 10 per cent below the level in the base case for all commodities. The results of these tests are summarised in Table 7.6.

Table 7.6
Sensitivity Results Summary

	Costs+10%	Costs-10%
Train rights held but not used (per annum)	51,853	51,853
Train rights freed up (per annum)	1,320	1,613
Benefits from freed up and used train rights (£ per annum)	40,347	49,312
Value lost from given up train rights (£ per annum)	-13,196	-16,128
Total benefits (£ per annum)	27,151	33,184
Annualised set-up costs (£ per annum)	-3,075	-3,075
Ongoing administration cost		
Network Rail (£ per annum)	-95,000	-95,000
Freight operators (£ per annum)	-25,000	-25,000
Total Costs (£ per annum)	-123,075	-123,075
Net Benefits (£ per annum)	-95,925	-89,891

As the results demonstrate, the change in total benefits is indirectly proportional to the change in operating costs. Therefore an increase in the costs of 10 per cent leads to a fall in total benefits from £29,866 in the base case to £27,151. Whereas a decrease in the costs of 10 per cent leads to a rise in total benefits to £33,184. This suggests that, although the results are to some degree sensitive to the cost estimates, the order of magnitude of this sensitivity is considerably less than for other assumptions (eg headroom).

In the case of increased rail costs the set-up and administration costs offset the total benefits to give a net loss of £95,925. In the case of lower rail costs the set-up and administration costs offset the total benefits to give a net loss of £89,891.

7.8. Benefits per Train Right Re-Used

In the base case, our assumption for the benefits from train rights being taken up for new services is based on an estimate of the profitability of intermodal services. This is based on an estimate of the average profitability per train. However, as we might expect new services to be somewhat less profitable than existing, core services, in this sensitivity test we assume that the benefit per path taken up by new services is only £350 rather than £723.

Similarly, for the purpose of this sensitivity test we have reduced the benefits associated with the take up of paths by existing traffic from £500 to £100. This might represent the case where the impact of improved timings is small, yielding some saving in staff costs but not allowing any material improvement in the utilisation of locomotives and wagons.

Therefore, to test the sensitivity of the results to these alternative assumptions, we have undertaken a test which assumes that the benefits for paths taken up for new traffic are £350 per train right and the benefits for paths taken up for existing traffic are £100 per train right. The results of this test are summarised in Table 7.7.

Table 7.7
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	1,452
Benefits from freed up and used train rights (£ per annum)	16,330
Value lost from given up train rights (£ per annum)	-14,516
Total benefits (£ per annum)	1,814
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	-121,261

Since the gross benefits (ie excluding value lost) from re-used train rights are directly proportional to the benefits per train right, the effect of reducing the benefit per train right is to also reduce the total benefits from freed up train rights being re-used. In this test the benefits before value lost fall from £44,381 in the base case to £16,330. However, as the level of value lost does not vary with the benefits per train right, the impact on total benefits is that they fall from £29,866 under the base case to £1,814. After subtracting the annualised set-up cost and the ongoing costs, the net loss amounts to £121,261.

7.9. Elasticity Estimates

In the base case we have used cost elasticities estimated by MDS Transmodal. As with any estimates, these parameters could differ from the underlying, actual elasticities. Therefore, to test the sensitivity of total and net benefits to these elasticities we have run two sensitivities tests:

- 125 per cent of the base case elasticities; and
- 75 per cent of the base case elasticities.

However, we note that as the cost elasticity for 'other minerals', which is 4.1 in the base case, already implies a very elastic response to cost changes, we do not increase this particular estimate in the 125 per cent case. The results of these tests are summarised in Table 7.8.

Table 7.8
Sensitivity Results Summary

	Elasticity+25%	Elasticity-25%
Train rights held but not used (per annum)	51,853	51,853
Train rights freed up (per annum)	1,518	1,089
Benefits from freed up and used train rights (£ per annum)	46,420	33,286
Value lost from given up train rights (£ per annum)	-15,182	-10,887
Total benefits (£ per annum)	31,237	22,399
Annualised set-up costs (£ per annum)	-3,075	-3,075
Ongoing administration cost		
Network Rail (£ per annum)	-95,000	-95,000
Freight operators (£ per annum)	-25,000	-25,000
Total Costs (£ per annum)	-123,075	-123,075
Net Benefits (£ per annum)	-91,838	-100,676

Under the 125 per cent sensitivity the total benefits increase from £29,866 in the base case to £31,237. The higher cost elasticities cause operators to free up more paths, increasing both the benefits from freed up and used train rights and the value lost from freed up train rights. The net result is a small increase in total benefits. Using the base case cost assumptions, the annualised set-up cost and the ongoing costs are £123,075, which offset the total benefits to give a net loss of £91,838.

Under the 75 per cent sensitivity the total benefits decrease to £22,399. The lower cost elasticities cause both the total benefits from freed up and used train rights and the value lost from freed up train rights to decrease by 25 per cent.[63] The net result is a decrease in the total benefits, which leads to a net loss of £100,676.

7.10. Alternative 'Other Minerals' Scenario

MDS Transmodal's estimate of the elasticity of aggregates suggests that this type of traffic is highly sensitive to cost. Our discussions with the operators suggest that while aggregates traffic is indeed the most elastic traffic on the network, it includes a number of different types of traffic. While some flows may be point-to-point flows, others form a hub-and-spoke

[63] The initial sensitivity did not increase benefits and value lost by 25 per cent due to the base case elasticity being used for 'other minerals'.

network, particularly in and around London. There two types of aggregate flows operating within these networks:

- the main trunk flows connecting the quarries (eg the Mendips) to the distribution yards (eg Acton); and
- the spoke flows which carry the smaller loads from the distribution yards to the end delivery points (eg other parts of London and the South East).

Hub activities are likely to be less responsive to cost increases due to heavier loads and higher utilisation compared to spoke activities, and the longer distances served (which generally enhances rail's competitiveness relative to road). Our discussions with operators (particularly EWS) suggest that the traffic as a whole may not be as elastic as is implied by the MDS Transmodal estimates, and that traffic losses could fall mainly on certain spokes.

In this sensitivity we therefore test how the results vary with a lower elasticity for aggregates. Specifically, we assume that the elasticity is half of that estimated by MDS Transmodal (ie -2.05). Given the elasticities estimated for the other commodities (see Table 3.3), this is likely to represent a lower bound estimate.

If traffic losses are indeed focused on certain locations in and around London, then it is quite possible that the proportion of freed up paths that are reused might be higher than the 5 per cent we assume in the base case. In this sensitivity we therefore also increase the take-up rates to 20 per cent (ie 10 per cent for new services and 10 per cent for retiming existing services). This represents what we consider to be the upper bound take-up rate.

The results of the test are summarised in Table 7.8.

Table 7.9
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	859
Benefits from freed up and used train rights (£ per annum)	105,069
Value lost from given up train rights (£ per annum)	-8,591
Total benefits (£ per annum)	96,478
Annualised set-up costs (£ per annum)	-3,075
Ongoing administration cost	
Network Rail (£ per annum)	-95,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-123,075
Net Benefits (£ per annum)	-26,597

Although the reduction in the elasticity of the 'other minerals' traffic leads to a reduction in the number of paths that are freed up by the charge, as the results in Table 7.8 show, the quadrupling of the freed up proportion of paths that are reused results in total benefits that are higher than in the base case (ie £96,478 compared to £29,866). However, as in the base case, these total benefits are not sufficient to outweigh the implementation costs (ie net benefits are -£26,597).

7.11. Implementation Costs

In the base case we have used the estimate of the costs associated with implementing Freightliner's simplified solution (£123,075) to estimate the total net benefits, which includes an annualised set-up cost and ongoing administration costs for Network Rail, freight operators and ORR. In this sensitivity we assume Network Rail's systemised approach is implemented, which leads to a considerably higher total annualised implementation cost of £217,506.[64]

Table 7.10
Sensitivity Results Summary

Train rights held but not used (per annum)	51,853
Train rights freed up (per annum)	1,452
Benefits from freed up and used train rights (£ per annum)	44,381
Value lost from given up train rights (£ per annum)	-14,516
Total benefits (£ per annum)	29,866
Annualised set-up costs (£ per annum)	-102,506
Ongoing administration cost	
Network Rail (£ per annum)	-90,000
Freight operators (£ per annum)	-25,000
Total Costs (£ per annum)	-217,506
Net Benefits (£ per annum)	-187,641

The increase in the implementation costs does not impact the total benefits calculation but it does serve to reduce the overall net benefits, from a loss of £93,210 to a net loss of £187,641.

7.12. Summary

All but two of the sensitivity tests we have undertaken produce net losses from the reservation charging scheme of around £50,000 or more, even using the lowest estimates of the implementation costs for Network Rail. Both of those sensitivities that do generate net benefits (ie no headroom and 20 per cent up take in freed up train rights) use what we would consider to be extreme assumptions which, in the case of headroom, would be very unlikely to occur. However, even in these two extreme cases, if we use the higher implementation cost estimate provided by Network Rail for the systemised approach (ie Network Rail's preferred solution), then even these sensitivities would generate substantial net costs.

64 Note both sets of annualised costs are estimated on the basis of spreading the set-up costs over five years. If the charge was introduced later into CP4 (and therefore the charge was spread over fewer years), the implementation costs would rise further (see section 4.2.2).

8. Reservation Charging in Specific Locations Only

8.1. Introduction

In its December 2006 consultation document[65] ORR presented two alternative models of a reservation charge for consideration:

- a network-wide regime in which all unused reserved capacity would be liable for charging;[66] and
- a charging regime which is restricted to certain locations, specifically those that are capacity constrained.

Our analysis in the previous sections has examined the potential impacts of the network-wide model. In this section we consider the potential impacts of the second, location specific model.

The rationale for restricting the reservation charge to only those areas that are capacity constrained is to more closely align the reservation charge to the underlying opportunity costs of reserved capacity, and therefore achieve a more efficient allocation of capacity than would result from a network-wide charge. In essence, the measure is targeted towards the areas where the benefits are potentially the greatest due to scarcity of capacity on the network. Although the existence of capacity constraints does not in itself imply the existence of an opportunity cost (there must also be latent demand for the constrained capacity), the two are likely to be closely correlated. Therefore the opportunity cost of a path right on a congested part of the network is likely to be high.

A reservation charge that focuses on congested areas will incur similar types of costs and benefits as those generated by a national scheme. Network Rail and the freight operators will both need to incur the costs of setting up the billing systems as well as monitoring the scheme's operation, while the main benefits will be generated from freeing up little or unused paths for new activity. However, restriction of the scheme to congested areas may result in different outcomes from the network-wide scheme, particularly for the relative and absolute size of the benefits. It is these differences that we focus on in the remainder of this section.

8.2. Our Approach

As discussed in section 2.5, the Gospel Oak to Barking, Glasgow and South Western and Reading to Gatwick Airport routes have been declared congested by Network Rail. In line with our approach to considering a network-wide scheme, we focus our analysis on the impact on freight operators only.[67] Therefore, as the Reading to Gatwick Airport route is largely a passenger route, we exclude it from consideration. To examine the effects of a

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[65] ORR, *Periodic Review 2008, A Reservation Charge: Consultation on Issues and Options*, December 2006.

[66] Note that this refers to all unused reserved capacity in excess of that allowed for under any 'headroom' adjustments.

[67] This reflects the tendency for passenger operators to use all the paths that they hold (and therefore would be largely unaffected by the imposition of a reservation charge).

geography-based charge we focus our analysis on the Gospel Oak to Barking and Glasgow and South Western areas in turn, before summarising the combined results.

Our methodology for assessing the total benefits of reservation charging is the same as that used for the network-wide model. It therefore uses an elasticities-based approach to model those train rights that are freed as a result of pricing marginal traffic off the network. As with the network-wide model, we do not model the impacts of the surrendering of train rights that is not accompanied by a loss in traffic (since we assume that operators would be unlikely to give up rights that have a strategic value).

Similarly, we use the same base case parameters and assumptions as for the network-wide model. Importantly this includes the same path utilisation rates and cost elasticities used for the network-wide charge.

The only difference in our approach for the geography-based charge is the method adopted to estimate the number of train rights. In the case of the network-wide charge we used data on freight lifted and average load weights to estimate the number of freight trains run. We then combined this estimate with path utilisation rates to estimate the total number of train rights held. However, for the congested infrastructure we based our train rights estimates on two sources of data:

§ confidential data[68] supplied by EWS on the timetabled services it operates through the relevant areas; and

§ analysis of data from *Freightmaster*[69] on timetabled freight services.

The approach involved analysing a large dataset provided by EWS to estimate the number of timetabled paths it holds for a range of broad commodity groups in the congested areas. As the two routes are dominated by either coal traffic (ie Glasgow and South Western) or aggregates/wagonload traffic (ie Gospel Oak to Barking), EWS is expected to have the highest market shares on these routes.

In the absence of data on the services timetabled by the other major operators, we supplemented the EWS data with information on the services run by other operators from the *Freightmaster* publication. This provides details of rail freight timetables for a large number of stations across the country. The information derived from Freightmaster provided us with data on approximate the number of paths held by other major operators on the congested routes.

The information we received from Network Rail detailing the cost to set up a billing system to implement the reservation charge was focussed on the network-wide scheme. As such, we do not have specific information on the likely cost expected to be incurred by Network Rail or the freight operators for a location specific charge. However, to the extent that a systemised approach to matching rights with trains run is still required, then it seems reasonable to assume that the expected necessary capital costs will be the same.

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[68] Please note that, reflecting the confidential nature of these data, a number of redactions have been to this public version of the report.

[69] Freightmaster Publishing, *Freightmaster: The National Railfreight Timetable,* No 45, Spring 2007.

Although the capital costs are likely to be of a similar magnitude, we would expect the ongoing operational costs to be smaller given the reduced focus of the geography-based charge. To this extent, we assume that the industry will require one full time equivalent employee to administer the charge, incurring costs of £25,000 per annum.

8.3. Gospel Oak to Barking

In this section we present the results from our analysis of the Gospel Oak to Barking route. Using the same analytical framework as for the network-wide model, we first assess the impact of the reservation charge on operators that utilise the Gospel Oak to Barking route, determine how operators will respond and finally assess the likely total benefits of the charge.

8.3.1. Impact on operators

In Table 8.1 we present our estimates of the total number of train rights initially held by all operators on the Gospel Oak to Barking route, split by commodity. This clearly shows the importance of construction and general wagonload traffic on the route (as explained in section 2.5.2), each of which accounts for over ["] per cent of total train rights. In addition there is some automotive traffic (["]) and some Ministry of Defence traffic (["]).[70]

Table 8.1
Summary of Train Rights, Gospel Oak and Barking

Commodity	Train rights initially held (per annum)	Train rights held and used (per annum)	Train rights held but not used (per annum)
Containers: deep sea	["]	["]	["]
Containers: short sea	["]	["]	["]
Coal: power station	["]	["]	["]
Coal: other	["]	["]	["]
Metals	["]	["]	["]
Ore	["]	["]	["]
Other minerals	["]	["]	["]
Auto	["]	["]	["]
Petroleum & chemicals	["]	["]	["]
Waste	["]	["]	["]
Domestic intermodal/wagonload	["]	["]	["]
Defence	["]	["]	["]
Own haul (NR)	["]	["]	["]
Channel Tunnel	["]	["]	["]
Total	**13,572**	**8,867**	**1,217**

Note that the columns may not add due to rounding. Also, train rights held but not used include adjustments for headroom. Therefore, train rights used and train rights not used do not sum to total train rights held.

70 Note for the purposes of this analysis we assume MOD traffic to have the same characteristics as nuclear traffic. Importantly this means that the traffic has an elasticity of zero so will not be affected by the reservation charge.

Table 8.1 also provides our estimates of the number of train rights held and used as well as the number of train rights held but not used on the Gospel Oak to Barking route. These estimates are derived using the path utilisation rates and headroom assumptions detailed in Table 3.2.

The majority of paths that are unused on the route, after adjusting for headroom, relate to construction (or ‘other minerals’) traffic due to the low utilisation of paths for this commodity group. Therefore, assuming that the utilisation rates on the route are not significantly higher than for the network as a whole (and we do not have evidence to suggest the contrary), the introduction of a reservation charge would mean that operators hauling construction traffic, in particular, would be required to pay for a substantial proportion of their paths that had previously not incurred costs. However, as the proportion of total train rights that are not used is lower on this route than for the network as a whole (["]),[71] we would expect that the impact on operator costs may be proportionately lower than for the network as a whole.

8.3.2. How will operators respond?

The overall response of operators on the route to the charge will be largely driven by their response to the charge on the two main commodities trafficked on the route, ie other minerals and general wagonload traffic. In Table 8.2 we present the estimated number of train rights freed up on the route.

Table 8.2
Train Rights Freed Up in the Base Case, Gospel Oak to Barking

Total train rights held (per annum)	13,572
Train rights held but not used (per annum)	1,217
Train rights freed up (per annum)	74
Other minerals train rights freed up	["]
Autos train rights freed up	["]
General wagonload train rights freed up	["]

The market for aggregates and construction traffic is highly competitive, both in terms of mode (ie road and rail competition) but also between operators. Therefore, as demonstrated by the estimates of cost elasticities presented in Table 3.3, traffic levels are highly sensitive to changes in cost, more so than for any other major traffic category. As we have discussed in our analysis of a network-wide charge, the increase in operating costs associated with a reservation charge is therefore likely to result in a proportionately greater reduction in the number of rights held than for any other commodity. The impact of this high elasticity would be compounded by the larger than average impact on costs that arises from the low levels of path utilisation. As a consequence, of the 74 train rights we estimate would be freed up by the charge on this route, ["] (or ["] per cent) are related to other minerals traffic.

[71] Note that this is a result of the mix of commodities on the route differing from the average for the network, not higher utilisation per se.

Although the general wagonload and autos traffic on the route are not as cost sensitive as the other minerals traffic (ie have a lower elasticity), they are still cost elastic and therefore are still sensitive to changes in cost. Despite this cost sensitivity, the reservation charge is likely to have a relatively small impact on operators as a consequence of the higher levels of path utilisation for these types of traffic. We estimate that only ["] train rights in total will be freed up from these types of traffic.

While we might expect a reduction in the number of train rights of the estimated order of magnitude for the network as a whole, the extent to which the same scale of reduction may materialise in the areas of Congested Infrastructure will depend upon the extent to which operators' strategic behaviour in these areas may differ from the network as a whole.

In areas of Congested Infrastructure there is, by definition, no or very little spare capacity available. This is not the case for the network more generally. This could influence the propensity of operators to act in a strategic manner and defend their path rights. For example, if an operator anticipates traffic growth on a congested route, then it may be more willing to pay reservation charges to retain paths than would otherwise be the case, anticipating that if they give up paths they would find it difficult to regain them in the future to accommodate the new traffic. As such, we would anticipate that the number of train rights freed up in the Congested Infrastructure routes could be lower than for the network as a whole. Our estimate of 74 train rights freed up therefore represents an upper estimate of the number of paths that would actually be freed up as a result of the reservation charge.

8.3.3. Assessing the benefits

The order of magnitude of the net benefits of the freed up paths on the route will depend upon two key determinants:

§ the take up rates of the paths for both new traffic and retiming/rerouting existing traffic; and

§ the value of the traffic picking up the paths.

We have adopted the same base case assumptions as those used for the network-wide analysis, set out in Table 5.1. This includes a take up rate of 2.5 per cent of freed up paths for both new and existing traffic, and benefits of £723 and £500 per re-used path, respectively. Table 8.3 we present a summary of our results of the impact of a reservation charge applied to the Gospel Oak to Barking route.

Table 8.3
Base Case Results Summary, Gospel Oak to Barking

Total train rights held (per annum)	13,572
Train rights held but not used (per annum)	1,217
Train rights freed up (per annum)	74
Benefits from freed up and used train rights (£ per annum)	2,262
Value lost from given up train rights (£ per annum)	-740
Total benefits (£ per annum)	1,522

The magnitude of the benefits of a reservation charge targeted at the congested Gospel Oak to Barking route is likely to generate low levels of benefits, at around £1,500 per annum. However, although this route represents 3 per cent of the total network-wide number of train rights held, it makes up 5 per cent of the benefits. This results stems from the fact that a large proportion of the traffic on the Gospel Oak to Barking route is 'other minerals', which contribute the largest proportion to the net benefits estimated for the network-wide model.

It is important to note that for this modelling we have assumed the same parameters as for the network-wide model. However, because of the nature of the Congested Infrastructure, we might expect the parameters to differ, in particular for the take up rates and the value of the traffic that utilises the freed up paths. We therefore explore these assumptions in more detail, and undertake some sensitivity tests around the base case to determine how the results might change with changes in these assumptions.

8.3.3.1. Take up rates

The likely levels of the path take up rates are difficult to assess as there are a number of conflicting influences at work, however they could be higher than for those that would be experienced by the network as a whole. Theses factors include:

- the Gospel Oak to Barking route, as previously explained, does not have gauge clearance for operators to haul container traffic on it. Similarly, it is not located in an area where many other commodities are hauled. Therefore, the number of other commodities that could take up freed paths is limited. The most likely commodity to take up the paths would therefore be aggregates itself, with new operators either competing with the incumbent operator or existing operators looking to optimise their rights portfolios. This restriction in the potential size of the market for freed up paths suggests that the take up rate could be low compared to other congested areas.
- the fact that the route is highly congested suggests that, all other things being equal, any free capacity will be taken up by either by competing freight operators or passenger services. In the case of the Gospel Oak to Barking route, it is the lack of availability of passenger paths that has resulted in the route being declared congested. Therefore, it seems reasonable to assume that, in addition to any latent demand by freight operators, there is also latent demand from passenger services, which could point to a higher take up rate of paths. However, in considering this it is important to note that passenger operators require services that are well distributed over the hour and are regular. Given that so few paths are likely to be freed up by freight operators, it is unlikely that passenger services

will be able to effectively use them to introduce new services. The most likely impact on passenger services will be that they may be able to use some paths to improve the timings of existing services, although the potential for even this seems very limited.

To test the sensitivity of the results to changes in the take up rate, we changed our assumption from a total of 5 per cent of paths freed up that are subsequently used, to a total of 20 per cent. This figure represents a take up rate that is significantly higher than we have assumed in the network-wide modelling reflecting the congestion on the route, but is still relatively low to reflect the lack of alternatives for unused paths.

In Table 8.4 we present the results from this test. As would be expected, the total benefits increase proportionately from £1,522 per annum to £8,309 per annum. However, this figure is still relatively low compared to the size of the costs involved in implementing the reservation charge.

Table 8.4
Results Summary for 20% Rights Take Up Rates, Gospel Oak to Barking

Total train rights held (per annum)	13,572
Train rights held but not used (per annum)	1,217
Train rights freed up (per annum)	74
Benefits from freed up and used train rights (£ per annum)	9,049
Value lost from given up train rights (£ per annum)	-740
Total benefits (£ per annum)	8,309

8.3.3.2. Value of paths taken up

The value of the re-use of paths freed up is another important determinant of the overall benefits expected to result from the reservation charge. The value of the paths taken up will depend on what those paths are then used for. We assumed for the purpose of estimating network-wide benefits that the benefit per path was the marginal profitability associated with running an intermodal service, using average profit as a proxy (see section 3.4 for an explanation). There are several reasons why the value associated with a path re-used on the Gospel Oak to Barking route may differ from this assumption:

§ for paths used by existing freight traffic to optimise their rights portfolio (ie achieve cost saving from better routes and timings) it appears that there may be some benefits, but given the length and nature of the route, it seems unlikely that there are many opportunities for rerouting or retiming traffic;

§ for paths used by existing passenger services for retiming services it seems likely that the benefits, depending on what time of day they occur, could be substantial in terms of time savings and stimulated demand. However, the nature of passenger services suggests there will be limited opportunities to improve the timing of passenger trains, restricting the level of these benefits; and

- for paths used for new freight traffic the benefits are likely to be relatively small due to the competitive nature of the aggregates industry resulting in relatively low margins on this activity.

Taken together, these issues suggest that the value of any traffic that take up freed paths on the Gospel Oak to Barking route is likely to be low. To test the impact of a reduced value for such traffic, we have re-estimated our model with benefits of £350 and £100 per path re-used for new and rerouted/retimed traffic respectively. The results are presented in Table 8.5 below.

Table 8.5
Results Summary for Reduced Benefits per Path, Gospel Oak to Barking

Total train rights held (per annum)	13,572
Train rights held but not used (per annum)	1,217
Train rights freed up (per annum)	74
Benefits from freed up and used train rights (£ per annum)	832
Value lost from given up train rights (£ per annum)	-740
Total benefits (£ per annum)	92

The assumption of a lower level of benefits per re-used path causes the overall level of benefits to drop from £1,522 to £92. The revised assumption for the value of a re-used path suggests that there is very little benefit to be gained from targeting the Gospel Oak to Barking route even before the costs associated with the scheme are taken into account.

8.3.3.3. Overall benefits expected

Table 8.6 below provides a summary of the total benefits expected from applying both a higher take-up rate and a lower benefit per path re-used than presented in our base case. The combination of these two revised assumptions represents a more likely outcome for the Gospel Oak to Barking route.

Table 8.6
Results Summary for Combination of Increased Take Up Rate and Reduced Benefits per Path, Gospel Oak to Barking

Total train rights held (per annum)	13,572
Train rights held but not used (per annum)	1,217
Train rights freed up (per annum)	74
Benefits from freed up and used train rights (£ per annum)	3,330
Value lost from given up train rights (£ per annum)	-740
Total benefits (£ per annum)	2,590

The combined effect of an increased take up rate and reduced benefits per path imply total benefits per annum which are slightly higher than those under our base case scenario, but are still very low.

Taken as a whole, it seems likely that the total net benefits from applying a reservation charge on this route will be relatively low, certainly lower than for the network-wide scheme. The route has a small number of total paths and, although the traffic is very sensitive to cost, very few paths in absolute terms would be freed up by a reservation charge. Of those that would be freed up, while it is likely that a higher proportion will be re-used than for the network as a whole, the vast majority will be picked up by other freight operators for aggregates traffic which is likely to generate low profit margins, and therefore, low benefits per path. It seems highly unlikely that many, if any, opportunities will arise for passenger operators to either expand or reschedule services.

8.4. Glasgow and South Western

The Glasgow and South Western route carries a very different combination of traffic than the Gospel Oak to Barking route, ie it is dominated by coal traffic, and therefore we would expect the results to differ significantly. In this section we present the results from our analysis of the route. Again, we replicate the methodology used to analyse the benefits resulting from a network-wide reservation charge.

8.4.1. How will operators be affected?

In Table 8.7 we present our estimates of the total number of train rights initially held by all operators on the Glasgow and South Western route. The table shows that the route is dominated by the hauling of coal, which makes up ["] per cent of the total number of train rights held. Petroleum & chemicals and domestic intermodal make up the remainder, with ["] per cent of paths held each.

Table 8.7
Summary of Train Rights, Glasgow and South Western

Commodity	Train rights initially held (per annum)	Train rights held and used (per annum)	Train rights held but not used (per annum)
Containers: deep sea	["]	["]	["]
Containers: short sea	["]	["]	["]
Coal: power station	["]	["]	["]
Coal: other	["]	["]	["]
Metals	["]	["]	["]
Ore	["]	["]	["]
Other minerals	["]	["]	["]
Auto	["]	["]	["]
Petroleum & chemicals	["]	["]	["]
Waste	["]	["]	["]
Domestic Intermodal	["]	["]	["]
Nuclear	["]	["]	["]
Own haul (NR)	["]	["]	["]
Channel Tunnel	["]	["]	["]
Total	**20,280**	**9,348**	**2,010**

Note that the columns may not add due to rounding. Also, train rights held but not used include adjustments for headroom. Therefore, train rights used and train rights not used do not sum to total train rights held.

Table 8.7 also provides our estimates of the number of train rights held and used as well as the number of train rights held but not used. These estimates are derived using the path utilisation rates and headroom assumptions detailed in Table 3.2.

Since coal traffic makes up the significant majority of paths held on the Glasgow and South Western route, it follows that it also accounts for the majority of unused paths. Furthermore, coal has a lower path utilisation rate than both petroleum & chemicals and domestic intermodal. Consequently, the effects of the reservation charge on this route are predominantly driven by the impact on coal traffic.

As we demonstrated in Table 3.1, the utilisation of paths for coal traffic is relatively low (45 per cent). Therefore, unless coal utilisation rates on this route are significantly higher than the industry average, the introduction of a reservation charge would mean that operators would be required to pay the charge for a substantial proportion of their paths, even after adjusting for headroom, resulting in higher total operating costs.

8.4.2. How will operators respond?

Unlike the traffic on the Gospel Oak to Barking route, coal traffic is relatively unresponsive to cost increases. While there are some competitive constraints (both between train operators and between coal and gas), there is more scope for train operators to pass on cost increases than there is for aggregates, for example. As such, ignoring any strategic considerations, we would expect a relatively low proportion of coal train rights to be freed up. Our modelling for a network-wide charge suggests that around only ["] per cent of coal train paths would be freed up by a reservation charge. This is consistent with our estimate of train rights freed up for the geography-specific charge, as presented in Table 8.8 below. ["]

Table 8.8
Train Rights Freed Up in the Base Case, Glasgow and South Western

Total train rights held (per annum)	20,280
Train rights held but not used (per annum)	2,010
Train rights freed up (per annum)	5
Coal power station train rights freed up	["]
Petroleum & chemicals train rights freed up	["]
Domestic intermodal train rights freed up	["]

As with the Gospel Oak to Barking route, there is a risk that operators on the Glasgow and South Western route will act strategically so as to retain access to paths on sought after routes. We might therefore expect the actual number of rights freed up to be even lower than our estimate suggests. While coal shipping customers require flexibility from freight operators, the traffic generated is considerably more profitable for the train operators than many other commodities. Given the level of congestion on the route and the existence of significant latent demand from new entrants for paths on the route, it seems likely that the propensity for operators to pay the reservation charge to retain the paths will be higher than for the network as a whole. This is for two reasons:

- to maintain the operational flexibility which may give them a competitive advantage over new entrants; and
- to prevent new entrants from getting the minimum number of rights needed to compete for the traffic.

8.4.3. Assessing the benefits

Since so few paths on this route are likely to be freed up by a reservation charge, the net benefits of such a scheme will be very small. This assertion is borne out by our results for the base case scenario, presented in Table 8.9.

However, it is important to note that, given the existence of latent demand and the profitability of the traffic, where paths are freed up they are highly likely to be taken up, and the benefits per path from doing so are likely to be relatively high. Therefore, in addition to our base case results presented in, we test the sensitivity of the benefits to an increase in both the take up rate and the benefits per path re-used.

Table 8.9
Base Case Results Summary, Glasgow & South Western

Total train rights held (per annum)	20,280
Train rights held but not used (per annum)	2,010
Train rights freed up (per annum)	5
Benefits from freed up and used train rights (£ per annum)	164
Value lost from given up train rights (£ per annum)	-54
Total benefits (£ per annum)	111

8.4.3.1. Take up rates

The likely levels of the path take up rates are again difficult to assess, however we would expect the value to be reasonably high because of the existence of latent demand and the valuable nature of the traffic. Since the number of paths freed up is small, we have assumed that all of these paths will be taken up by other operators (ie a 100 per cent take up rate). The results from this sensitivity test are presented in Table 8.10, and show a marked increase in total benefits from our base case, from £111 to £3,233.

However, even with the highest possible take up rate, the value of the total benefits is severely restricted by the number of train rights that are freed up.

Table 8.10
Results Summary for 100% Rights Take Up Rates, Glasgow & South Western

Total train rights held (per annum)	20,280
Train rights held but not used (per annum)	2,010
Train rights freed up (per annum)	5
Benefits from freed up and used train rights (£ per annum)	3,286
Value lost from given up train rights (£ per annum)	-54
Total benefits (£ per annum)	3,233

8.4.3.2. Value of paths taken up

For the purpose of calculating benefits per path re-used for the network-wide model and the Gospel Oak to Barking route, we assumed that the benefit was commensurate with the average profit of an intermodal train. However, the margin on coal traffic is likely to be higher than that for intermodal. Our second sensitivity test therefore doubles the benefits associated with new traffic to £1500 from our base case. However, we keep the benefits per path for existing traffic at £500. Our results for this test are presented in Table 8.11.

Table 8.11
Results Summary for Increased Benefits per Path for New Services, Glasgow & South Western

Total train rights held (per annum)	20,280
Train rights held but not used (per annum)	2,010
Train rights freed up (per annum)	5
Benefits from freed up and used train rights (£ per annum)	269
Value lost from given up train rights (£ per annum)	-54
Total benefits (£ per annum)	215

Increasing the benefits per path re-used has a positive effect on the estimated total benefits per annum. However, the absolute value of the total benefits per annum is still small, at £215, again because of the very small number of paths that are freed up.

8.4.3.3. Overall benefits expected

Table 8.12 below provides a summary of the total benefits expected from applying the combined revised assumptions described above to give a more likely estimate of overall benefits, ie a 100 per cent take up rate and increased benefits per re-used path. It shows that total benefits are estimated to be £5,321 per annum.

Table 8.12
Results Summary for Combination of 100% Take Up Rate and Increased Benefits per Path for New Services, Glasgow and South Western

Total train rights held (per annum)	20,280
Train rights held but not used (per annum)	2,010
Train rights freed up (per annum)	5
Benefits from freed up and used train rights (£ per annum)	5,374
Value lost from given up train rights (£ per annum)	-54
Total benefits (£ per annum)	5,321

The implications of the sensitivity tests described above suggest that the total benefits from applying a reservation charge on this route will be relatively low and, as with the Gospel Oak to Barking route, certainly lower than for the network-wide scheme. The low benefits result from the very low number of train rights that are freed up which, in turn, is driven by the very low elasticity for the predominant type of traffic on the route. Although the traffic is likely to be of higher value than the average over the network, and so the take up rate is likely to be greater, the low number of paths freed up presents a key restriction on total benefits even before strategic behaviour is taken into account.

8.5. Summary

In Table 8.13 we combine our base case results for the Gospel Oak to Barking and Glasgow and South Western routes to provide an indication of the overall results of a geography-specific charge applied to all relevant Congested Infrastructure areas.

Table 8.13
Base Case Results Summary, Gospel Oak to Barking and Glasgow & South Western

Total train rights held (per annum)	33,852
Train rights held but not used (per annum)	3,227
Train rights freed up (per annum)	79
Benefits from freed up and used train rights (£ per annum)	2,427
Value lost from given up train rights (£ per annum)	-794
Total benefits (£ per annum)	1,633

Overall, 9.5 per cent of paths held are unused. The £20 reservation charge applied only to Congested Infrastructure implies 79 paths will be given up, representing 0.2 per cent of paths held. Total benefits per annum remain low at £1,633.

Finally, Table 8.14 presents what we believe is a more likely outcome of the geography-specific reservation charge, combining an increased take up rate and reduced benefits from our base case for the Gospel Oak to Barking route, and a 100 per cent take up rate with increased benefits for the Glasgow and South Western route.

Table 8.14
Results Summary for Most Likely Scenario, Gospel Oak to Barking and Glasgow & South Western

Total train rights held (per annum)	33,852
Train rights held but not used (per annum)	3,227
Train rights freed up (per annum)	79
Benefits from freed up and used train rights (£ per annum)	8,704
Value lost from given up train rights (£ per annum)	-794
Total benefits (£ per annum)	7,911

This scenario significantly increases benefits from our base case scenario, (ie from £1,633 to £7,911) but the absolute value of the benefits is still low, particularly compared to the likely costs of implementing the reservation charge. Even without taking the capital costs of implementing the charge into account, it is clear that the benefits are far outweighed by the costs. The ongoing operational costs of the charge are likely to be in the order of at least £25,000, ie the cost associated with employing one full time equivalent person. This far exceeds the estimated net benefits of the charge of £7,911.

Overall, when accounting for strategic behaviour, the benefits from introducing a geography-specific model are likely to be small. Any existing unused paths on Congested Infrastructure are likely to be very valuable, since by definition it is difficult or impossible to obtain new paths. Operators are therefore unlikely to drop these paths, instead choosing to incur the reservation charge but maintain control of an important path.

Excluding the possibility of strategic behaviour, some paths are likely to be given up. These will mostly be on the price sensitive Gospel Oak to Barking route, since the predominantly coal freight Glasgow and South Western route is relatively insensitive to price. However, the number of paths on the Gospel Oak to Barking route is low compared to total train rights, significantly constraining the magnitude of the benefits.

9. Administrative Mechanisms

9.1. Introduction

As ORR notes in its December 2006 consultation document, a more efficient allocation of reserved capacity could be achieved through the enhancement of the existing administrative mechanisms for the allocation of capacity.[72] As such, in addition to considering the two potential reservation charge models already discussed, ORR also asked us to explore the impact of a tightening of the current administrative approach. While such a policy could be a substitute for introducing a reservation charge, it could also be a complementary policy that would further enhance any financial incentives provided by the charges. It is therefore an important area to explore.

The main administrative mechanisms, as set out in Part J of the Network Code, are described in section 2.3. In this section, we consider the possible impact of tightening up one of these mechanisms. A such, we outline the current administrative approaches used by the industry, consider anecdotal evidence received by NERA on their success, explore how such schemes could be frustrated and finally, give our assessment of the potential impact of tightening the provisions.

9.2. A 30 Day UIOLI Provision

As described in section 2.3, the use it or lose it ("UIOLI") provisions in Part J of the Network Code allow Network Rail to reclaim access rights which are not used for 90 days and where the train operator cannot demonstrate a reasonable ongoing commercial need for the rights. ORR has published criteria with reference to which a claim of reasonable ongoing commercial need should be assessed. These state that the train operator must be able to show *all* of:[73]

- commitment – the train operator must have a commitment to a third party which cannot be satisfied without the rights in question, or a reasonable prospect of entering into such a commitment;
- acceptable reasons for the failure to use the rights – these might include seasonality, non-economic factors (eg a fire) or industrial action;
- committed resources – suitable locomotives, wagons and traincrew (with relevant route and traction knowledge) should be available or obtainable; and
- reasonable ongoing prospect of use.

ORR asked us to consider the impact of tightening up the current UIOLI provisions, in particular such that the period after which UIOLI can be invoked is reduced from 90 to 30 days.

[72] ORR, *Periodic Review 2008, A Reservation Charge: Consultation on Issues and Options*, December 2006, page 2.

[73] For a full description, see Office of Rail Regulation, "Notice of Approval of Criteria for Interpreting the Expression "Reasonable On-going Commercial Need", June 2005.

We would not expect such a tightening up to have much, if indeed any, impact on the availability to other train operators of poorly used paths. One important reason for this is that no use for 30 days is still quite a high threshold. For most paths that correspond to a genuine customer requirement, we would expect trains to run more frequently than this. And where there are exceptions (such as some Ministry of Defence services), the operator should be able to demonstrate a reasonable ongoing commercial need.

The tighter UIOLI provision is more likely to have an impact, therefore, on rights which train operators could surrender but which they choose to keep for strategic reasons – either to meet possible future demand growth or to frustrate other train operators' aspirations. But train operators are only required to surrender paths if they have not been used at all, and they can therefore prevent this happening by ensuring that train paths are used at least once every 30 days. There are two main ways in which this could be achieved:

§ by running "ghost trains". In fact, the UIOLI provisions are intended to apply even where trains are run with the sole purpose of trying to ensure that the UIOLI provisions do not apply. Thus the running of ghost trains may not guarantee that an operator will be able to retain a path. However, it may be difficult in practice to identify trains that are run for this purpose; or

§ by retiming or rerouting certain services to ensure that all paths are used reasonably regularly. This may involve some loss of operating efficiency or service quality for the train operator. But it is probably less expensive than running ghost trains, and will certainly be more difficult to detect.

Along with the "reasonable commercial need" provisions, we think that train operators are likely to have sufficient ways to retain paths that they see as strategically important. The retiming of services, in particular, can be planned in advance by train operators to minimise any impact on operating costs.

The main impact of a tightening up the UIOLI provisions, therefore, might be to bring forward the time at which Network Rail can reclaim rights that the train operator is content to surrender. But the benefits from this are likely to be very small, as:

§ such paths are less likely to be on parts of the network where there is unmet demand for access rights – otherwise operators might recognise the possible strategic benefits from retaining these paths; and

§ there are other mechanisms (including formal rights review meetings, or unilateral action by the relevant train operator) that could lead to the surrender of these train paths.

10. Conclusions

Our analysis raises important questions about the net benefits that would result from a reservation charge, and whether there is any likelihood that they will be large enough to offset the costs associated with the charge. In principle, a reservation charge is an attractive idea to deal with situations where train operators, for whatever reason, appear to be using access rights infrequently, or could operate their services with a smaller portfolio of rights. But we have not found convincing evidence of significant and widespread costs being imposed on other parties as a result of such cases. And there is a serious risk that the reservation charge might be less effective in the very situations that it is meant to address.

There is no doubt that the introduction of a reservation charge would impose additional costs on a number of parties. These include:

- the continuing costs to ORR, train operators and Network Rail in developing, commenting on and refining proposals for a reservation charge. This could well be a difficult process, and there are a number of policy decisions that are likely to lead to a redistribution of income between competing train operators. Some decisions are likely to be vigorously contested by the operators that would be most disadvantaged by them;
- the initial and ongoing costs of administering the charging system. Even with a "simple" approach, based on a comparison between train miles and calculated "rights miles", the costs to Network Rail of administering this system and to train operators of checking Network Rail's calculations (and challenging any apparent errors) could very well outweigh the net benefits generated by the reservation charge; and
- the potential loss of traffic due to the increased cost to train operators. Within particular commodity groups, this is most likely to affect flows with below average path utilisation, since they will benefit least from any commodity-specific headroom allowance. This reflects the fact that the reservation charge is a "blunt instrument", which could increase costs even for flows that have a genuine reason for poor utilisation and might use only uncongested parts of the network.

The loss of traffic might be relatively low if train operators respond to the effective incentives (after taking account of the refund mechanism discussed in section 6), rather than the headline figure. In this case, however, any net benefits generated by the charge are also likely to be very small, and almost certainly lower than the administration costs.

Even if the problem of the refund mechanism can be resolved, so that train operators do face appropriate incentives, there still appears to be a significant risk that the net benefits will be less than the costs incurred as a result of the reservation charge. We have not been able to identify widespread cases where latent demand for rail freight services is frustrated by the inability to reclaim poorly used paths. Network Rail and train operators are very often able to find some way of resolving the problem, whether by rejigging the timetable or using alternative routes, and so the benefits that might be created by the reservation charge are often simply the provision of "better" train paths (rather than allowing new traffic onto the network).

Importantly, the reservation charge may be even less effective in situations where, despite possible low levels of path utilisation, train operators perceive strategic advantages from retaining certain paths. These advantages include either a greater flexibility to accommodate potential future traffic flows, or the likelihood of frustrating potential competitors. In each case, however, the strategic advantages are likely to be greatest where the network is most congested. This will reduce the likelihood of train operators releasing train paths in the very problem areas that the reservation charge is intended to tackle.

The underlying problem behind this overall conclusion is the inability of the reservation charge to distinguish between cases where poor utilisation is justified and/or relatively harmless, and situations where an operator may be hoarding paths and frustrating potential competitors. Worse than this, the reservation charge may be less effective in the latter cases.

If the reservation charge fails to resolve the problems that it was designed to tackle, then it might be tempting in future to increase the level of the charge. But this will increase the risk of traffic being priced off uncongested parts of the network, and it may still not free up capacity where it is needed most. Indeed, the sensitivity test described in section 7.4 suggests that raising the charge might have very little impact on the level of benefits.

It is important, moreover, that both the level of the reservation charge and the headroom allowance for each commodity group are chosen carefully. These are the main parameters that will determine the impact of the charge on each train operators' revenues and costs, and therefore the redistribution of revenues between operators. If the charge is increased, for example because it appears not to be working in certain areas, this will lead to even higher transfers between train operators.

Neither is a tightening up of formal mechanisms (such as the current "use it or lose it" provisions) likely to provide a solution. Because these measures can lead to the compulsory removal of rights, there is (rightly) a relatively high hurdle to be overcome – in this case the right must not be used at all for a specific period of time, and there must be no evidence that the train operator can produce of a reasonable ongoing commercial need for the path.

The most promising measures are those that include a subjective element. This would allow the relevant parties to identify specific instances where rights appeared to be being used inefficiently, and especially where this was giving rise to a genuine cost (eg because other train operators wanted to use the same path). A system of regular rights reviews by Network Rail might help to identify problem areas but, if the train operator does not co-operate, Network Rail's ability to resolve any problems may be limited. And it may be difficult to resolve some situations without the need for a subjective judgement on the number of paths that an operator really needs to serve a particular customer or group of customers.

Such measures should be reinforced by ORR's ability to review proposed access contracts and to carry out a more detailed analysis of issues such as:

- whether the access rights being sought are all essential, or whether the proposed services could be delivered with a more tightly defined set of access rights;
- whether the way in which the access rights are specified is appropriate, or whether an alternative approach might be adopted in order to give Network Rail more flexibility to accommodate additional traffic in future; and

- whether there is any need for mechanisms to review the allocation of rights during the life of the contract.

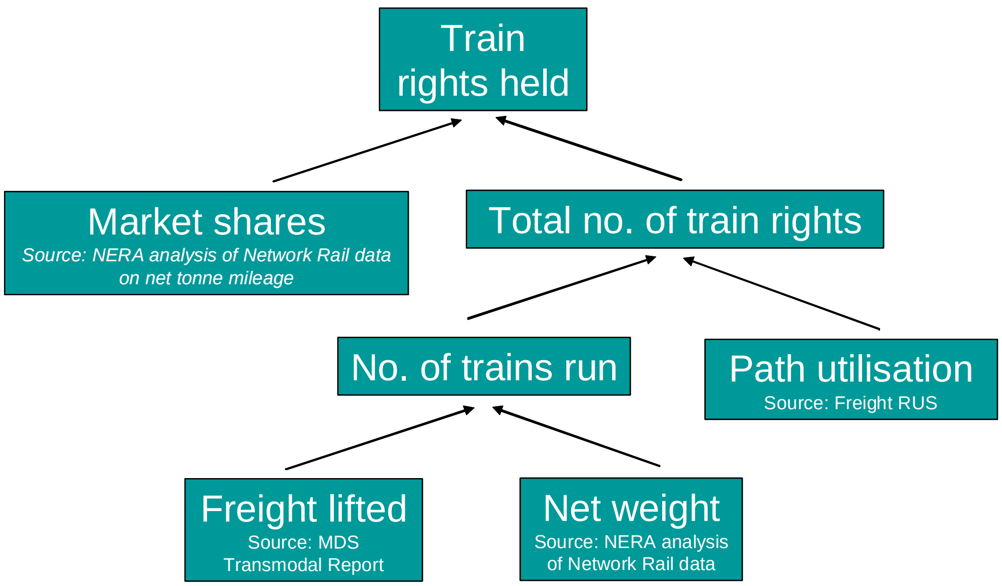
A more rigorous approach to reviewing freight operators' rights could be complemented by a more proactive approach from Network Rail, for example in challenging rights that may be superfluous. If such initiatives can be made to work, they have the important advantage of being able to focus intervention on situations where there are potential benefits to be delivered, rather than the much blunter approach of industry-wide incentive schemes (which may be least effective where they are needed most).

Appendix A. Estimating Train Rights

A.1. Introduction

Clearly understanding the number and distribution of train rights is an important component of our analysis. However, we were unable to access detailed data on rights and timetabled paths. In the absence of these data we have generated our own estimate of train rights (see section 3.2 for our definition of 'train rights'). Figure A.1 illustrates the approach we have adopted to do this. The resulting estimates are reported in Table 5.3.

Figure A.1
Approach to Estimating Train Rights Held



In broad terms the approach relies on using estimates of total freight lifted for each commodity and average train loads to generate estimates of the number of trains run. By applying path utilisation rates to these train number estimates, we can generate an estimate of the total number of train rights held for each commodity. Then, by using data on market shares for each operator in each commodity, we estimated the number of train rights for each commodity held by each operator.

The resulting estimates of train rights held are likely to differ from the actual holdings of either access rights or timetabled paths for a number of reasons, including:

- our estimated train rights are based on the assumption that one train journey (ie from origin to end destination) uses one train right, however, one train journey may actually be comprised of several paths or rights;
- our approach implicitly incorporates spot bid paths in so much as they are used to haul freight and are incorporated in the estimates of path utilisation;
- the path utilisation rates are industry averages so may disguise large variations between operators.

Therefore, while we believe the estimates provide a good approximation of the underlying levels of reserved network capacity, they may not provide an exact match to either timetabled paths or access rights.

A.2. Data and assumptions

Data on freight lifted are an important starting component of the estimation. These data, for 2005, are sourced from a MDS Transmodal report prepared for ORR in 2006[74] with the data split between 14 commodity groups.

Data on the average load weight for a train, split by commodity, is the second key component for this analysis. These average weight estimates are based on data supplied to NERA by Network Rail on net tonne miles and chargeable train miles.[75] These base data relate to 2007 (the only year available), but using other data supplied by Network Rail on gross tonne kilometres in 2006/07 and 2004/05, we were able to estimate and apply factors to the 2007 estimated average load weights, to estimate the relevant values for 2004/05.

By dividing the total freight lifted by the average weight per train for each individual commodity, we estimated the number of trains journeys operated for each commodity.

We then used the estimates of path utilisation rates published in the Freight Route Utilisation Strategy (see Table 3.1) to estimate the train rights utilisation rates for each of our commodities. By dividing the estimated number of trains by the assumed train right utilisation rates, we estimated the number of train rights by commodity.

The net tonne mileage data provided by Network Rail, which we used for estimating average load weights, are disaggregated by both commodity and operator. We were therefore able to use the same dataset to estimate the market shares for the four main operators (EWS, Freightliner, DRS and First GBRF) for each of the commodities. The data were only available for 2006/07, and in the absence of any consistent data upon which to make adjustments, we have used the 2006/07 estimates for our analysis. However, the Network Rail data did not allow us to distinguish between the short sea container traffic, deep sea container traffic and the domestic intermodal traffic. We therefore used data from Freightmaster[76] on intermodal traffic flows to generate approximate operator market shares for the three commodity categories.

The final stage in the estimation process was multiplying the estimated number of train rights for each commodity by the estimated market shares for each operator for those commodities to produce an estimate of the train rights held for each operator and for each commodity.

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74 MDS Transmodal Ltd (2006), *Impact of track access charge increases on rail freight traffic*, Final Report, November 2006, page 2.

75 These data used slightly different commodity definitions to those used by MDS Transmodal.

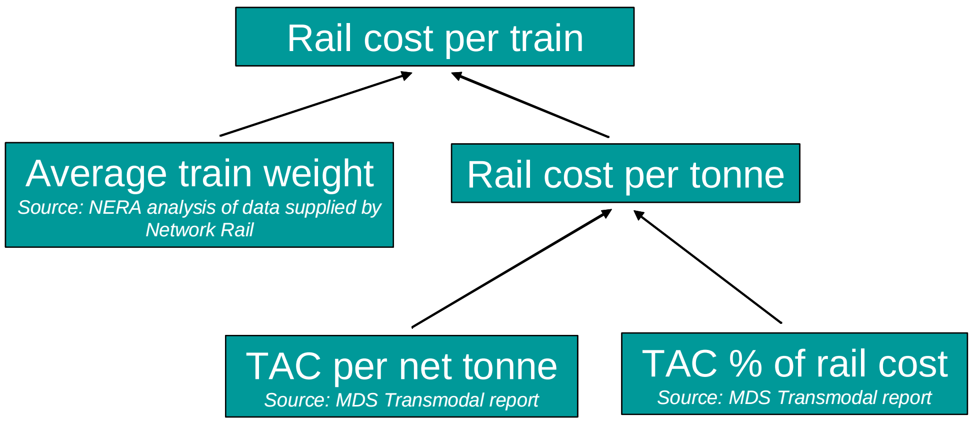
76 Freightmaster Publishing, *Freightmaster: The National Railfreight Timetable,* No 45, Spring 2007.

Appendix B. Estimating Rail Costs per Train

B.1. Introduction

In addition to the number of train rights, the other key modelling inputs we needed to estimate, due to an absence of published data, were the rail costs per train for each of the commodity groups. Figure B.1 illustrates the approach we adopted to generating the estimates.

Figure B.1
Approach to Estimating Rail Costs



We note that, while individual cost estimates are generated for the 14 commodity groupings, we estimate industry average costs so they are not disaggregated by operator. However, we have undertaken some validation exercises comparing implied total cost estimates for operators with published accounting data and are satisfied that the estimates are of the appropriate order of magnitude.

B.2. Data and assumptions

The core base data for the cost estimates come from the MDS Transmodal report commissioned by ORR in 2006.[77] This provided us with data on track access charges (TAC) per tonne and TAC as a proportion of overall rail costs (which include handling and terminal costs). Both of these sets of information were split by the 14 commodity groupings used throughout our analysis. By dividing the TAC per tonne by the TAC as a proportion of rail costs, we estimated the total rail cost per tonne for each commodity grouping.

To estimate the total rail costs per train, we multiplied the rail cost per tonne by the estimated net weight per train (see Appendix A for details on how the net weight estimates are derived from data supplied by Network Rail).

[77] MDS Transmodal Ltd (2006), *Impact of track access charge increases on rail freight traffic*, Final Report, November 2006, page 20, table 6.

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