



**Draft impact
assessment on the
value-based capacity
package**

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1. Summary

1. The purpose of this impact assessment is to assess the potential benefits and costs of implementing a modified structure of charges which reflects the relative value of capacity on different parts of the rail network - i.e. the “value-based capacity package”. The option is described in detail in [section five](#) of this impact assessment. Box 1 below explains what we mean by the value of capacity, and this is the definition we will use throughout this document. This work has been undertaken as part of our [first consultation on the review of Network Rail’s PR18 structure of charges](#) (‘our consultation’), in preparation for the 2018 Periodic Review (PR18).

Box 1: What do we mean by the value of capacity?

Throughout this document we often refer to the idea of the ‘value of capacity’. When doing so we are using the meaning assigned in economics to the concept of *value*. Namely, value describes the benefits provided by a good or service. Often, economic value is thought of as the maximum amount of money individuals are willing to pay for the good or service. However the value of a good or service can also include benefits that they do not pay for in practice, as described below.

In the case of rail capacity, value is often used to refer to the revenue an operator can secure (mostly through fares) as a result of running a particular service that uses a specific unit of capacity (however this may be defined). This is the **commercial value** of a service. However, when referring to the value of services and capacity in this document, this includes the benefits to users and society that are generated but which are not included in the price of the ticket paid by passengers or the prices paid by freight customers. We call this the **social value** of a service. Such benefits include the reduction in CO2 emissions as a result of passengers or goods not travelling on the roads (modal shift), reduction in crowding on other rail services, as well as benefits to the economy resulting from better connections between different cities/parts of the country (this list is not exhaustive). The value of capacity is the highest value that can be achieved from services using that capacity. Therefore, when referring to the value of capacity in this document, we are talking about **both the commercial and the social value of rail capacity**.

2. This assessment considers the way in which provision and use of rail capacity could be improved through charges based on the relative value of that capacity. We acknowledge however that the concept of capacity in a railway context is complex in itself, with a series of physical, operational and technical features impacting the amount of capacity available. In developing any detailed options under this package, we would need to carefully consider the unit of capacity that such charges would apply to.

3. Throughout this document, we distinguish between capacity provision and capacity allocation (or utilisation) when discussing the potential benefits of value based capacity charging. Efficient capacity provision refers to whether the maximum number of train paths has been made available using the existing infrastructure. Efficient capacity allocation or utilisation refers to whether this capacity has been given/ is being used by the services that are able to make best use of it, either because they generate the most revenue (i.e. commercial value) or because they generate significant social benefits (i.e. social value). When referring to the value of capacity, we mean the value that could be achieved as a result of best use and provision. The value of current use on the other hand reflects the current services running on the network.

Main conclusions of this impact assessment

4. We make a distinction in this assessment between impacts relating to improved information about the value of capacity, and additional impacts relating to reflecting this information in charges. The former has potential to affect those taking decisions about capacity provision and use (funders, Network Rail and ORR), whilst the latter could also affect train operators. We set out below, separately, the key benefits under each of these 'sub-options'.

5. The main impacts from providing better information about the relative value of capacity on different parts of the network are:

- Better information could be used by Network Rail and ORR to improve allocation of paths to the highest value users. It could also be used by funders at the time of re-franchising. These responses to better information could lead to improvements in terms of network utilisation and the overall value of services using the network, compared with the status quo.
- Better information about the value of network capacity could also highlight areas where this value is particularly high. This might allow Network Rail to make trade-offs and allocate its resources between different parts of the network. More practically, information about value could better inform business cases, which might support better timetabling or improved management of key assets, supporting increased traffic and realising more value from the rail network.
- In addition, better information about value could improve decision-making by funders, Network Rail and ORR on options for enhancing the network.

6. This information might also provide a basis for improved regulation of Network Rail's management of network capacity. For example, by providing an additional 'metric' to measure performance and against which to hold Network Rail to account.

7. In addition to the benefits outlined above, passing this improved information into charges could have the following additional impacts:

- Improve use of the network by providing an incentive for capacity to be used by those with the greatest commercial and social value. Value-based charges would in theory incentivise train operators to withdraw, re-route or re-time low value train services as a result of having to pay higher charges to access capacity-constrained parts of the network. This relies on the charges accurately reflecting overall value and for there to be an ability on train operators to respond – as discussed below.
- Value-based capacity charges could send price signals to Network Rail in terms of the most efficient way to allocate capacity to operators, as well as encouraging it to accommodate additional requests in general, on the back of updated regulatory incentives. It might also support efforts to improve the use of capacity on congested parts of the network, for example through better timetabling. Overall, there is potential under the value-based capacity package to increase overall use of the network, which would mean higher levels of passengers and goods being carried overall.

8. Potential costs/challenges of implementing this package:

- Implementing value-based capacity charging in the absence of a better understanding of network costs and their drivers could result in future volatility in charges and unintended incentive effects.
- For options within this package to be effective other changes must take place. In particular, a degree of flexibility in franchising is needed to realise benefits from value-based charging, so that train operators and Network Rail are able to respond. In addition, many of the benefits would only be realised if access rights were reallocated on a more frequent basis than happens today; something that would, in itself, have implications for the franchise process, freight users and passengers.
- Implementing most of the options in practice would also be complicated and costly. This is because of issues such as the potential redesign of the billing system to be able to accommodate different charge rates at different times of day (which it cannot currently do). This would likely result in a significant cost for Network Rail.
- In addition, if a new charge was underpinned by complex economic models, the industry would likely need to incur some costs to understand and be able to respond to these new charges. This might reduce or delay the benefits from such a charge.

9. As outlined in our consultation, we are not proposing to continue developing this package of charging options for PR18. We are however proposing to continue developing charging options for the infrastructure costs package, as it represents the biggest opportunity to improve outcomes.
10. It is likely to be both complicated and costly to establish a methodology that directly links charges to the value of capacity. If such a model were established it is also not clear that it would have sufficient stability over time or buy-in among stakeholders to encourage participants to respond.
11. We do think that information about the value of capacity can play an important role in a range of important decisions taken by funders, Network Rail and ORR. It is also important not to send signals in the charging framework that discourage use of under-used capacity or unduly encourage use of scarce capacity.
12. In light of this, we propose to review the cost-based options to ensure that they are consistent with sending sensible signals about the value of capacity.
13. ORR's work on system operation could provide an alternative way to improve incentives in respect of use and provision of capacity. We have recently concluded an initial consultation looking at the scope of system operation, what activities are involved and what good system operation looks like ([A 2015 ORR consultation, System operation – a consultation on making better use of the railway network](#)). We will use the evidence we have gathered as part of this consultation to further develop our understanding of the main issues with the way system operation is currently undertaken, in order to feed into PR18 policy development.

2. Counterfactual

14. The counterfactual scenario is the scenario which we are comparing the value-based capacity package against. For the purposes of this assessment, we define the counterfactual as a *'do nothing'* scenario. This means no substantial changes to the structure of charges for access to Network Rail's network, as well as no substantial changes to contractual, funding and regulatory arrangements in the wider rail industry (i.e. the current 'state of the world').

Current structure of charges

15. Under this scenario, operators continue to pay to access the network under the existing structure of charges, which you can read more about in [Annex A](#) to our consultation. The existing structure does not include any charges which reflect the relative value of capacity on different parts of the network. Specifically, it does not reflect the different values that operators place on capacity, particularly on parts of the network where demand for capacity is above the level of capacity available.

16. However, there are elements of the current charging structure which have some overlapping objectives with options that could be implemented as part of the value-based capacity package. We provide more details on these elements below.

a) Variable usage charge (VUC)

17. The VUC is intended to allow Network Rail to recover the additional short-run wear and tear costs imposed by running an additional train on the network. These are the maintenance and renewals costs imposed by each additional train in the short-run. There is anecdotal evidence suggesting that on heavily utilised parts of the network, the VUC under-recovers short-run wear and tear costs. This potential under-recovery occurs because of the nature of the calculation of the VUC and also because as the network becomes busier, NR might face additional operating costs to deliver a certain level of performance. This is because there is currently a performance regime (Schedule 8) in place between Network Rail and operators. These costs are not currently captured in the charging framework.

18. Short-run wear and tear costs are a subset of short-run marginal costs (SRMC). SRMC are all the costs imposed in the short-run by an additional train running on the network. In the absence of scarcity, i.e. when demand is below available capacity, the VUC should ensure that only operators who are able to generate enough value by running a train to cover these short-run wear and tear costs are accessing the network.

19. However, on heavily utilised parts of the network, this charge alone is not able to provide strong incentives for Network Rail to accommodate more traffic on the network, even when the value of this additional traffic may be higher than the costs it imposes.

b) Capacity charge

20. Schedule 8 is designed to compensate operators for lost revenue over time due to unplanned service disruption. It is designed to be financially neutral at forecast performance and (implicitly) traffic levels. The capacity charge is a variable charge that allows Network Rail to recover additional Schedule 8 costs it incurs as additional traffic comes onto the network. These costs arise because it becomes more difficult for Network Rail to recover from incidents as the network becomes more crowded.

21. Without a capacity charge in place, Network Rail would have a disincentive to allow additional trains onto the network above the traffic level forecast at the periodic review, because it would not be able to recover additional Schedule 8 costs incurred through charges received from operators.

c) Volume incentive

22. The volume incentive enables Network Rail to receive additional income if actual traffic growth is above the forecast level. It is intended to provide a financial incentive for Network Rail to accommodate unexpected requests for capacity. The incentive payment rates are uniform across the network, and only differentiated between freight and passenger services. This incentive also has a downside, which means that Network Rail has to make payments to governments if actual traffic growth is below forecast levels.

States of the world

23. Under the current state of the world, the majority of train services running on the network are passenger services that are provided by franchised train operators. The franchise agreements may define what operators must deliver quite tightly, including in terms of services to be operated. In addition, franchise agreements typically protect train operators from changes to the level of track access charges over the duration of the franchise, except in the case of in-franchise changes to services (which are subject to the current structure of charges).

24. Evidence we have gathered suggests that this level of franchise protection from changes in the level of access charges, which applies to a high proportion of services, limits the incentive properties of existing charges – i.e. operators do not actively consider the charging implications of their decisions about how to run services.

25. Currently, less than 1% of passenger miles are being provided by open access passenger operators, making them a very small proportion of the market. These operators do not have franchise agreements and therefore are exposed commercially and to changes in the regulatory framework. Open access operators, as well as freight train operators are fully exposed to any changes in the charges they pay and therefore have to adjust their businesses accordingly.

26. An additional constraint on the flexibility of capacity use is the existence of track access agreements, which contractualise the access rights that Network Rail grants to operators (subject to ORR approval) for a number of years. These specify the features of access rights for operators, such as service frequency or calling patterns. The parameters of the track access rights are specified to varying degrees in different track access agreements.

27. The rights allocated through these agreements restrict flexibility in timetabling services to some extent, and make it harder to make substantial changes to the allocation of capacity on the network. However, this approach is evolving, with ORR and Network Rail both having a policy of promoting the use of 'quantum only' rights as part of passenger track access agreements, except in specific circumstances. Quantum only access rights are more flexible and in turn can help promote a more dynamic allocation of capacity. Freight operators have also agreed to a more flexible approach to access rights specification in their access contracts.

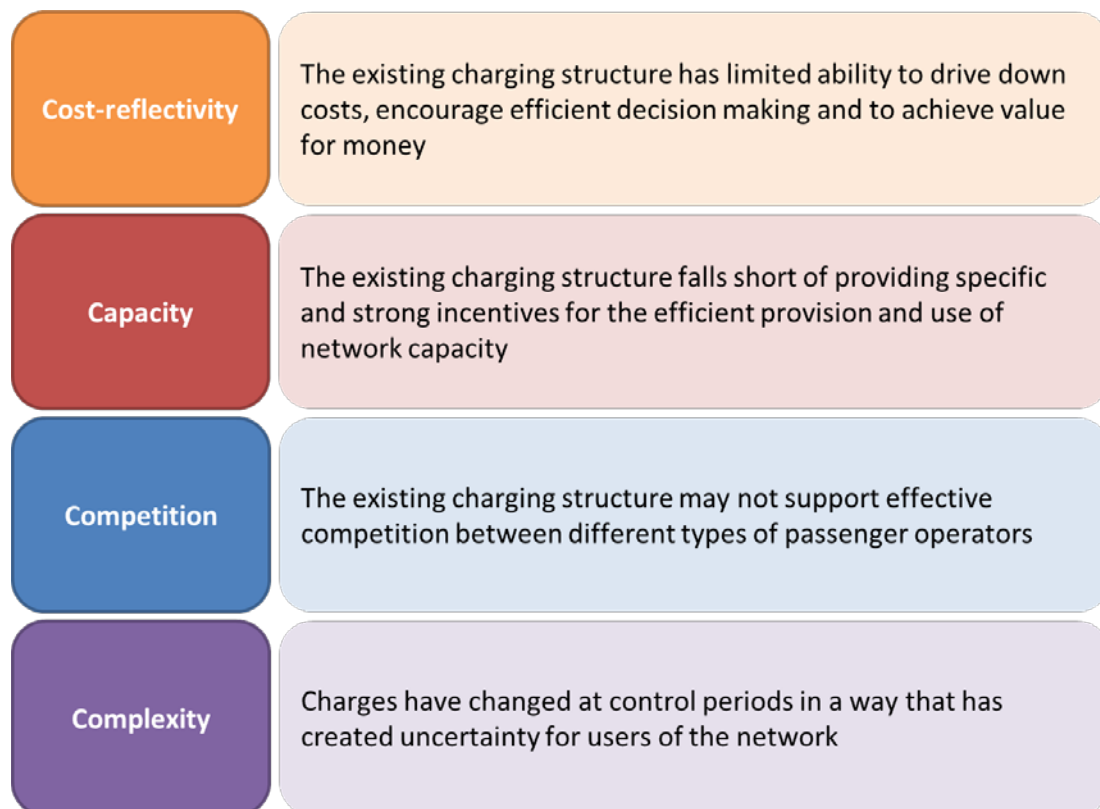
28. Network Rail's timetabling of train services (and any associated processes) also influences the way in which capacity on the network is used, and who gets to use that capacity. Operators request paths in the timetable on a bi-annual basis, while Network Rail is responsible for timetabling all of those services. This process can result in requests which cannot be accommodated, which can trigger a declaration of congestion.

3. Rationale for intervention

29. As part of the structure of charges review we have carried out a gap analysis, an overview of which you can find in [Annex B](#) to our consultation. This involved comparing the outcomes achieved through the existing charging structure with our charging aims and objectives. It helped us to understand how far our current charges are from meeting these aims and objectives.

30. The gap analysis identified the following four thematic areas which summarise the apparent main shortcomings of the existing charging structure. These provide a helpful framework for thinking about options for how we might best improve on the existing charging structure.

Figure 1: Gaps identified in relation to the existing structure of charges



31. One of the gaps identified through this exercise is the ‘capacity gap’. This refers to the fact that the existing structure of charges does not provide specific and strong incentives for efficient provision and use of network capacity. The lack of such incentives could lead to a situation where:

- Capacity may not be **used as efficiently as possible** – i.e. by the highest value services; and

- Capacity may not be **provided in the most efficient way** – i.e. by making the most of the existing network, and only building new capacity (i.e. enhancements) where value to users is high enough.

32. There are mechanisms within the current structure of charges that aim to provide some of the incentives necessary in terms of provision and use of capacity. Our gap analysis highlighted however that these may not be achieving the optimal outcomes for the network.

33. The **VUC** is intended to allow Network Rail to recover the additional short-run wear and tear costs imposed by running an additional train on the network. However, this provides limited incentives for Network Rail to accommodate more traffic particularly on heavily utilised parts of the network. This is because Network Rail cannot receive any additional income on top of the VUC, for additional trains it allows onto the network, particularly on congested parts of the network, even where operators might be willing to pay more.

34. In addition, Network Rail currently has strong incentives on performance, through Schedule 8 and through its regulated performance targets. These mechanisms impose financial and reputational penalties on Network Rail for failing to deliver a baseline level of performance. Schedule 8 benchmarks in particular are calibrated based on a forecast traffic levels. If Network Rail allows more traffic onto the network above this level, it faces potentially higher Schedule 8 payments due to the impact of reactionary delay.

35. The **capacity charge** currently in place is intended to remove this disincentive. However, the capacity charge rates are averaged across the day for passenger services, and for freight services there is a single national rate. This means that the price signals the charge is able to send are not very accurate, and therefore it does not provide particularly strong incentives for Network Rail or operators.

36. The **volume incentive** is intended to provide a financial incentive for Network Rail to accommodate additional requests for capacity. The incentive payment rates are however uniform across the network, and only differentiated between freight and passenger services. Therefore, they are not able to drive a better allocation of capacity which takes account of the relative value different operators place on capacity.

37. While the VUC, capacity charge and volume incentive are elements of the current structure of charges which in theory should encourage Network Rail to allow more traffic onto the network, there are a number of issues with the design and actual incentive properties of these mechanisms, which are outlined in the gap analysis.

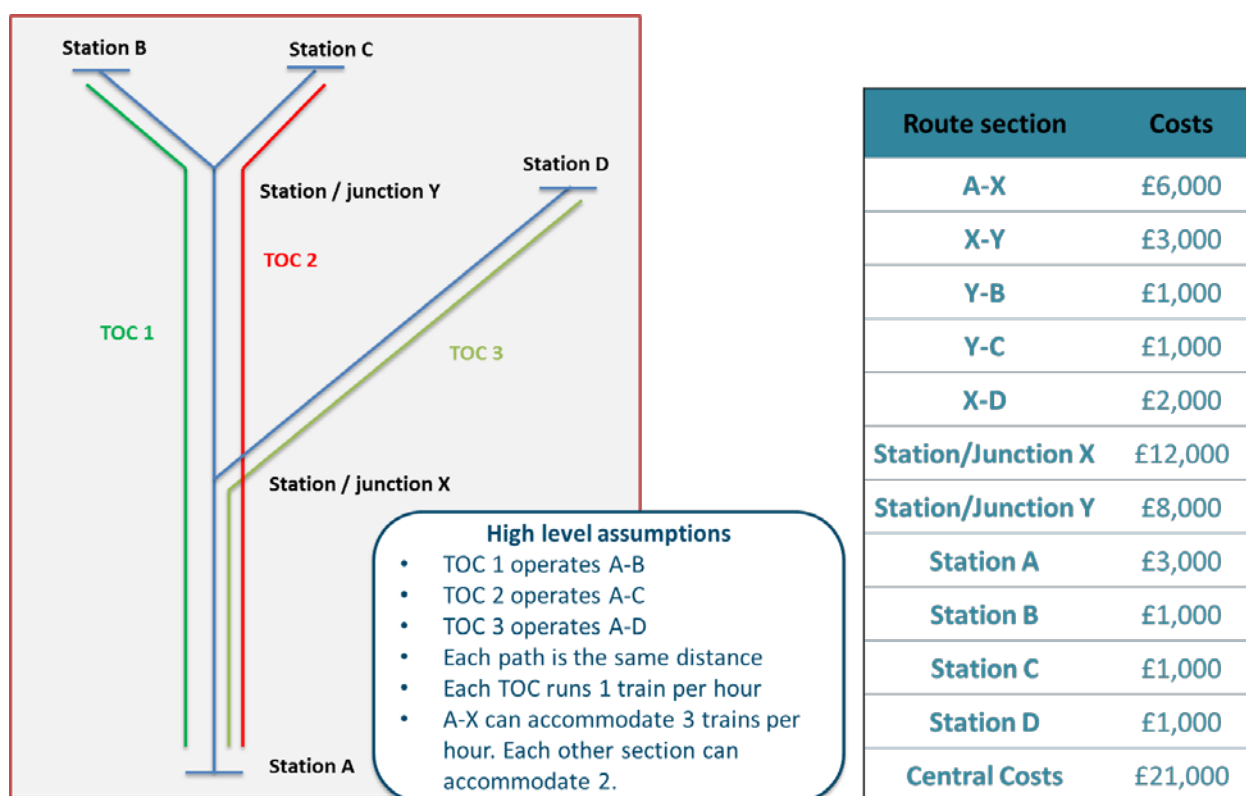
38. These mechanisms are also not specifically designed to reflect the value which operators place on network capacity, particularly on parts of the network that are capacity constrained, and are therefore not able to send accurate price signals to operators for the more efficient use of the network or to Network Rail for the more efficient provision of the network.

Illustrative example

39. A way to understand the benefits that may result from charges reflecting the relative value of capacity to users is to consider a stylised example. We have developed the following example to illustrate the concepts behind the value-based capacity package. The impacts of implementing such an approach are discussed more widely in [section six](#). All the numbers in this example are illustrative only, and have been chosen for simplicity of explanation (i.e. they bear no relationship to actual network costs).

40. For this illustration we have used a highly simplified representation of the network, developed to show some of the key effects of this charging approach. The illustration considers a simple section of the network, with three different operators. Costs have been attributed to sections of this route and to stations/junctions (other assets have been ignored at this stage). The key features of the illustration are set out in the diagram below. The table in this figure shows a breakdown of the annual infrastructure costs and spare capacity for each track section.

Figure 2: Illustrative options under a value-based capacity package



41. Table 1 shows that, under the current structure of charges, if we assume all operators run the same number of trains, each operator pays the same charge, £20,000. This is because traffic related fixed costs (total of 39,000) are estimated at a route level, and then allocated to operators based on simple metrics (primarily train miles). Central costs (total of 21,000), which are those that do not vary with traffic such as an IT system, are allocated in the same way.

Table 1: Illustrative charges under the current regime (counterfactual)

	TOC 1	TOC 2	TOC 3
Traffic related fixed costs	£13,000	£13,000	£13,000
Central costs	£7,000	£7,000	£7,000
Total charges	£20,000	£20,000	£20,000

42. In our stylised example, the congested parts of the route are track sections A-X and X-Y. Table 2 shows illustrative value-based charges for the two sections of this route which are at capacity. The fact that value-based charges are not levied on the track sections which are not congested does not mean that the services running on those sections do not generate both commercial and social value. However, because spare capacity exists, this value does not need to be reflected in the price operators pay to access the network, because any additional services which can meet the SRMC of using the network should be accommodated.

Table 2: Illustrative value-based charges

Track section	Spare paths	Charge based on value of capacity to users (per train, per hour)
A-X	0	£5,000
X-Y	0	£2,500
Y-B	1	N/A
Y-C	1	N/A
X-D	1	N/A

43. There may be a service, such as a heavily utilised commuter train, that would generate a much higher value out of using these sections of the route compared with the services that are currently operating. This service could have a different origin/destination compared to the existing services, but would require access to the track sections in our example in order to run. However, there are no spare paths on this part of the network, so it cannot operate. If we could estimate the value of this path, we could pass this on as a charge and the operators willing to pay this charge would secure the paths. This would result in the highest value use of the network.

44. In our example, under a value-based capacity charging framework, TOC1 and TOC2 would be faced with a charge of £5,000 each per path, per hour, to continue using track section A-X, and a charge of £2,500 each per path, per hour, to continue using track section X-Y. TOC3 would be faced with a charge of £5,000 per path, per hour to continue using section A-X.

45. In practice, depending on the level of costs that would be recovered through value-based capacity charges, any remaining infrastructure costs would need to be allocated to operators in some way. This is reflected in Table 3 which compares total charges paid by the three operators under the counterfactual scenario, where all fixed costs are recovered through a simple allocation in proportion to mileage run, and charges paid after the introduction of the value-based capacity charges.

Table 3: Illustration of potential cost allocation under the infrastructure cost package

	TOC 1	TOC 2	TOC 3
Charges in counterfactual scenario	£20,000	£20,000	£20,000
Value-based capacity charge (A)	£7,500	£7,500	£5,000
Remaining fixed costs allocated as in the counterfactual scenario (B)	£13,333	£13,333	£13,333
Total charge under value-based capacity option (A+B)	£20,833	£20,833	£18,333
<i>Change in total charges</i>	<i>+£833</i>	<i>+£833</i>	<i>-£1,666</i>

46. Levying value-based capacity charges would ensure that operators continue to use these parts of the network only if their services are generating at least as much value as the level that the charge is set at – i.e. it is ensuring that the highest value services are priced onto the network. Having to pay higher charges to use route sections which are congested could provide incentives for existing operators to change the way they use the network, for example by retiming, rerouting or withdrawing some services. Such changes could include TOC3 for example changing its service to stop at station X rather than continuing onto track section A-X.

47. As noted above, since value-based income could potentially exceed Network Rail's total costs, an adjustment would be required to avoid over-recovery. One approach to ensure there is no over-recovery would be to net off value-based charging income from central costs, and then divide the remaining central costs between all operators using the route, in the same way as in scenario 1 (i.e. in proportion to their use of the route). This is what we have done in this analysis.

4. Appraisal criteria

48. We have developed a set of appraisal criteria to provide a framework for assessing the impacts of different future charging options we could consider as part of the upcoming periodic review. Specifically, the criteria will help us measure:

- how successful each option is at meeting our charging aims and objectives; and
- how well it helps to address the identified gaps.

49. Assessment criteria will also help us to ensure consistency of approach as we assess different charging options, and that we do not miss any relevant costs and benefits.

50. The following criteria were reached after considering a range of sources based on the legal and policy aspects:

- Impact on key charging aims and objectives;
- Wider policy impacts;
- Potential for the option to address identified gaps;
- Wider external impacts;
- Legal impacts; and
- Alternative states of the world.

51. Further detail on these criteria, including we developed them, can be found in [Annex D](#) to our consultation.

5. Option generation

52. The issue of improving the way in which existing network capacity is provided and used has become of significant importance to the industry, given the growth in traffic over the last decade, and the high costs of network expansion. Given the very high level of demand currently seen on some parts of the network, it is likely that not reflecting the value of capacity in the charges paid by operators is leading to a situation where capacity is substantially under-priced on these parts of the network. It is less clear whether – in the current state of the world – this pricing is having significant adverse consequences.

53. More generally, the limitations on the information available about the value of capacity when it is allocated through administrative processes might be resulting in the value of services currently running being lower than it could be.

54. Our gap analysis has also highlighted that the way in which fixed costs are currently recovered from users, i.e. without a good understanding of cost drivers, is dulling Network Rail and operators' incentives to drive down network costs and encourage efficient decision making. These two issues, i.e. the limited understanding of the drivers of network costs and of the value of capacity on different parts of the network, are arguably resulting in value for money from the rail network not being maximised.

55. There are two main ways in which scarcity of capacity could be reflected in the charges operators pay to use the networks:

- Charges reflecting the cost of infrastructure needed to accommodate demand in the long-run. This approach is discussed briefly at the end of this section. Cost-based charging approaches are however the topic of the infrastructure costs package and associated impact assessment and therefore not discussed in detail here; or
- Charges based on estimates of the value of existing capacity in terms of the value that could have been generated by those unable to use the network. This approach is the focus of this package.

Principles of value-based capacity charging

56. The current approach to charging for and allocating capacity is potentially resulting in train operators not making best use of the network, in the absence of information or price signals to do so. Better use could be achieved, for example, in some instances by running more trains, longer trains, varying the speed of trains or a different mix of services. This better use could be achieved in a number of ways. For example, operators could invest in order to improve their rolling stock to allow better use of capacity (e.g. reduce dwell times or raise rolling stock performance). However, they currently have no explicit information or incentives to encourage them to do this.

57. SRMC charges could in theory ensure infrastructure is efficiently utilised, if there was no shortage of capacity. This is because they ensure that only those operators who are willing to pay the additional short-run costs they impose can access the network. If a shortage of capacity exists, efficient prices would typically reflect the 'opportunity cost' of that capacity, in terms of the value of services that would like to use this capacity but are not able to currently. We explain the rationale for this in more detail below.

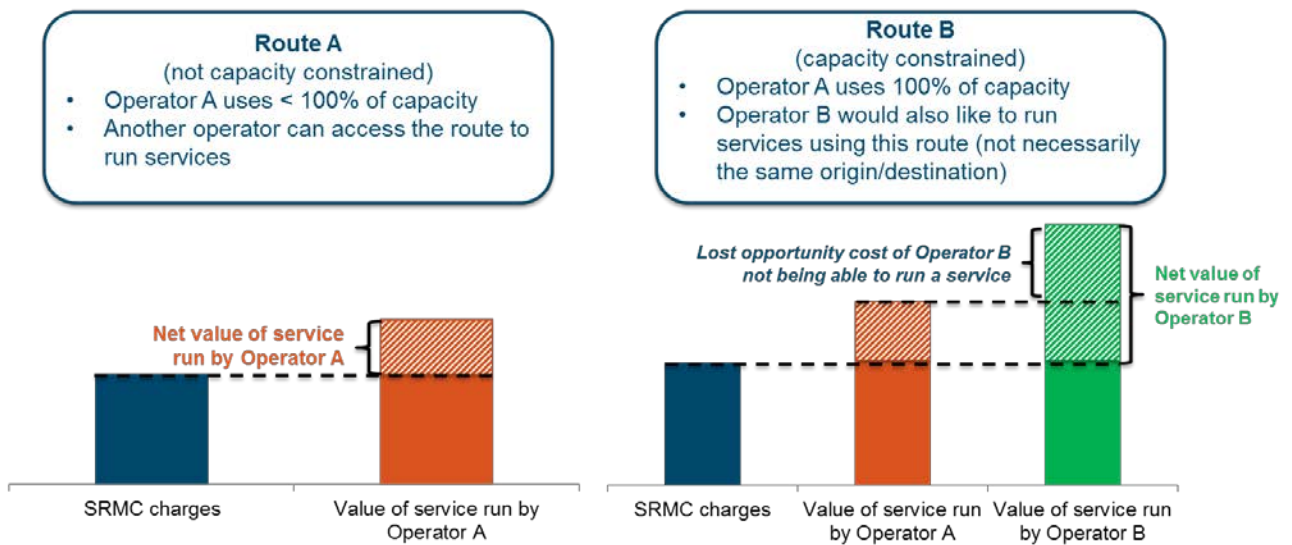
58. In practice, evidence suggests demand is close to, or above capacity, on a number of parts of the GB rail network. When price is set at SRMC, the existence of shortages in supply (e.g. scarcity of rail capacity in the short-run) can result in operators who want to access the network not being able to do so.

59. In a competitive market, a shortage in supply will ultimately result in higher prices, which would ration demand to those willing to pay a premium. This would remove the excess demand, bring it into line with available supply and ensure that the available supply is used by those who value it the most. Currently in rail however, there are weak incentives to move from the status quo and improve use of capacity on parts of the network which are heavily utilised. The franchising process, which influences the broad allocation of capacity for a number of years, includes a range of service specifications and can limit the ability of franchised operators to vary services and make better use of capacity (with changes either requiring flexibility within the franchise specification or a willingness on the part of the franchise authority to vary the franchise agreement).

60. The existing charging structure means Network Rail is not able to adjust its charges in order to reflect this shortage of capacity, thus providing information and incentives to operators and/or funders. Therefore, users who place a higher value on capacity may be unable to access the network. Value might be lost as a result of forcing these (potentially higher value) trains to travel by a less favoured route, at a less favoured time, or not to use rail at all.

61. This lost value is the additional value that the operator who cannot access the capacity could have generated, were it able to run its service. This value could either be commercial (e.g. revenue from sale of tickets) or social (e.g. lower pollution as a result of fewer people travelling by road). The lost value is what we call the opportunity cost of allocating that capacity to the users who value it less. In practice, this means that on capacity-constrained parts of the network, the current mix of services might not reflect those services which would have the highest value, either for operators or for society as a whole. This is illustrated in the diagram below, in a stylised way.

Figure 3: Stylised illustration of opportunity cost of train slots



SRMC charges – cover short run wear and tear and traction electricity costs, as well as lost performance regime income to Network Rail and some operating costs (coal spillage)

Value of service – could include **commercial value to operator** and **social value** of service. The social value of services is to some extent by franchising authorities in specifying the services that a franchised train operator needs to run

62. At a high level, the value-based capacity package is a broad approach that would result in a charging framework which reflects the value train operators place on scarce capacity through the charges they pay to access the network. In other words, charges would reflect the opportunity cost of capacity, on parts of the network and at times when capacity is constrained.

63. Since most of the services which run on the network are currently specified through franchises and access rights are allocated through track access agreements, there is a question around the effectiveness of the transmission mechanism for such an approach. However, the improved information that would result from the exercise of approximating the value of capacity on different parts of the network could help improve the franchising process and more broadly capacity allocation, even without implementing these types of charges in the charging framework.

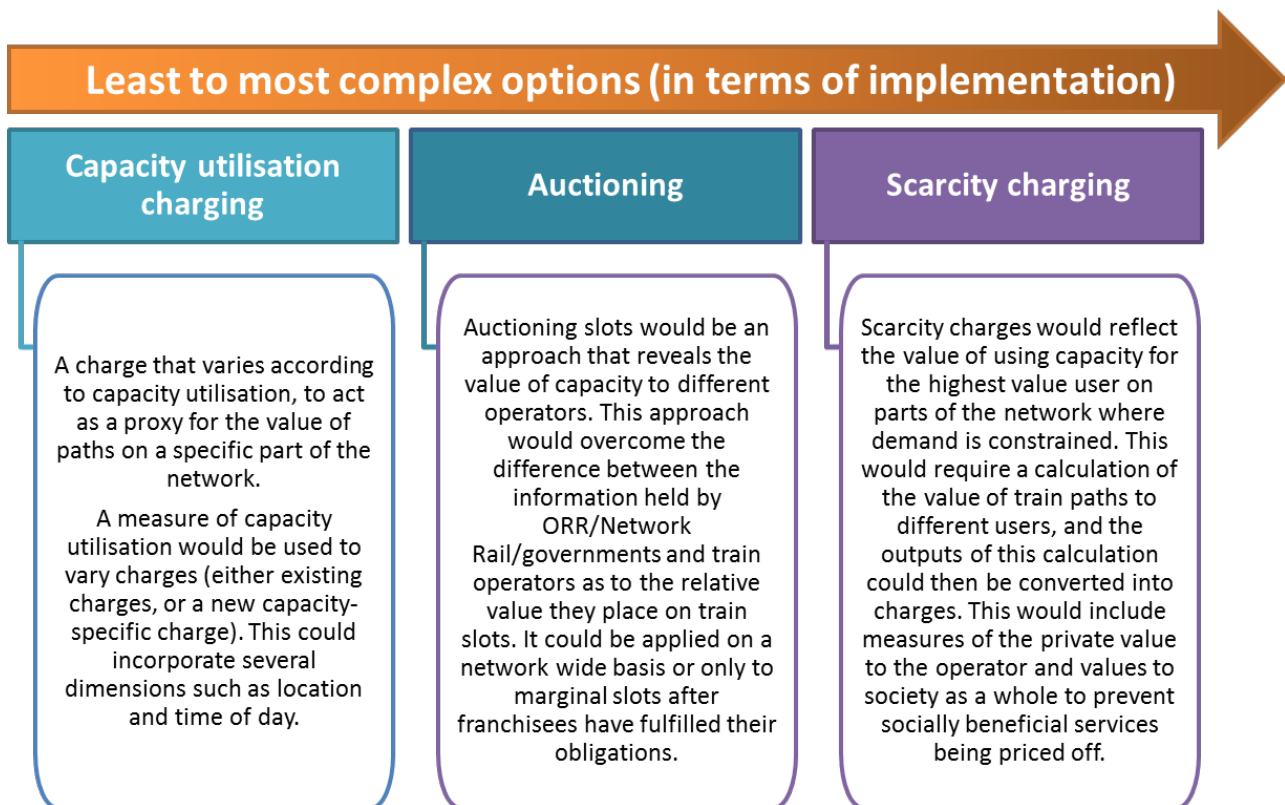
Potential approaches to value-based capacity charging

64. There are a number of types of charges or mechanisms that could be used to incorporate a measure of the opportunity cost or value of capacity into the charges that operators pay Network Rail to access the network. The main effort in developing this package would be around trying to estimate the value, or opportunity cost, of train services, at a sufficient level of disaggregation, and then translating that into a charge (applied to the relevant unit of capacity). There are also approaches which would involve operators themselves revealing the value they place on capacity (auctioning). Figure 4 provides a high level summary of illustrative approaches for value-based capacity charging options. It is these options which are the focus of this impact assessment.

65. In the figure below, we have outlined the illustrative options in order of complexity of development and implementation, by which we mean the effort involved in developing the specific charging approach and then of implementing it in practice. We have not however incorporated considerations of impacts in this ordering. For example, the effort involved in calculating scarcity charges might be more than that involved in setting up auctions. Auctions would however represent a radical departure from the franchising model, and it is currently illegal to trade slots. This might make the option impractical and limit the benefits that could be secured through such an approach. We highlight that this ordering is illustrative itself.

66. If scarcity costs were reflected in the charges that operators paid to use the network, decision-making around the provision and use of network capacity could be improved in theory, and in the absence of other constraints.

Figure 4: Illustrative options under a value-based capacity package



Alternatives to value-based capacity charging

67. Value-based capacity charge, if based on an estimate of opportunity cost, cannot be easily linked in practice with the actual costs incurred by the infrastructure manager in providing network capacity. That is because opportunity cost reflects the lost value as a result of services not being able to operate. If enhancements were undertaken to increase capacity on parts of the network where scarcity exists, the costs of these would be clearly linked to reducing scarcity. Therefore, implementing charges that, for example, reflect long-run marginal costs (LRMC) could be a way to incorporate into the charging framework the costs of expanding the network as a result of use. This would be an alternative option for calculating charges which aim to achieve some of the objectives pursued through the value-based capacity package, and is discussed below.

68. Currently, Network Rail is able only to recover its forecast revenue requirement which is based on actual costs incurred in a five year period. Introduction of charges under the value-based capacity package could mean that a higher proportion of Network Rail's income would come through variable rather than fixed charges. This means that the introduction of any mechanism to charge operators for the value or opportunity cost of capacity would potentially require netting off against existing charges. This would ensure Network Rail would not recover more than its revenue requirement overall, but would have the effect of a higher proportion of Network Rail's income coming through variable rather than fixed charges.

69. The types of charges proposed under the value-based capacity package are not necessarily the only ones which could promote efficient use of scarce capacity on the network, or efficient production of capacity. Some of the charging approaches explored through the infrastructure costs package could also try to achieve these objectives.

70. An attribution of fixed infrastructure costs that better reflects the drivers of costs (in terms of who causes them and how) could highlight parts of the network and assets which are more expensive or are driving higher expenditure for Network Rail. Charges reflecting these higher costs could incentivise operators currently using those parts of the network and only facing short-run marginal cost charges to reroute, retime or withdraw some service which do not generate high enough value.

71. For example, an approach that could promote more efficient use of the network involves basing charges on a calculation of LRMC. LRMC are defined as the costs attributable to an extra permanent unit of traffic in bringing forward the future capital programme. One important difference between opportunity cost based capacity pricing options and LRMC pricing is that where current demand is lower than available capacity, scarcity costs tend to be low (i.e. zero). However, as extra demand might contribute to the need for future network expansion to be brought forward, LRMC can be positive even if there is no current shortage of capacity. Additionally, at times and in areas where supply is lower than demand, the scarcity costs which reflect the costs of foregone demand could potentially be much higher than estimated LRMC.

72. Estimating LRMC might in practice be more difficult than estimating opportunity cost, as it requires the ability to estimate – with sufficient accuracy – the additional costs of projects to enhance the network. It also requires the ability to attribute these costs to a small increment in demand. This is particularly challenging in rail, as increasing capacity might require investment in a range of different projects. It would be costly and complex to identify such projects across the network, including because of the need to establish cost estimates of projects in abstract.

6. Option assessment

73. In this section we assess the potential impacts of introducing the value-based capacity package. We are not at this stage assessing individual options within this package separately. This assessment has been carried out under the current state of the world. The potential impacts are assessed against the counterfactual scenario outlined in [section two](#) of this impact assessment. The approach to assessing potential costs and benefits is based on the assessment criteria also outlined above and detailed in [Annex D](#) to our consultation.

74. We have also undertaken a sensitivity analysis which looks at how benefits and costs of this package would change if certain aspects of the current state of the world changed (part F of this section).

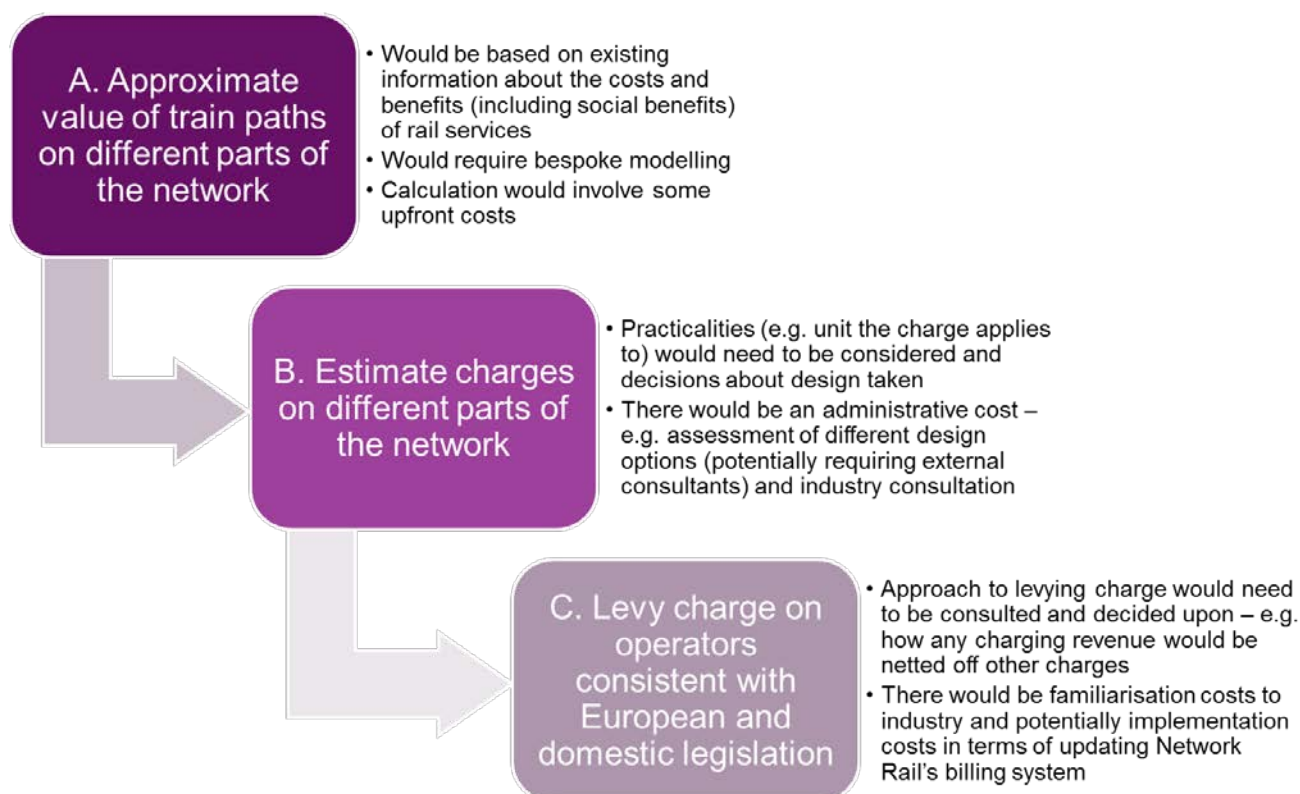
75. We outline impacts under the relevant criteria we have identified for this package. However, in developing this assessment, we have looked at all the criteria on the list. Given current evidence and understanding, this impact assessment only provides a qualitative assessment of potential costs and benefits.

76. A high proportion of network capacity is currently allocated through administrative processes (i.e. the combination of track access agreements and the timetabling process). Where decisions are taken administratively, better information can improve the quality of these decisions. Better information about the value of capacity on different parts of the network may have benefits with or without this information being passed through to charges to provide financial incentives. Reflecting this, we assess the benefits that could be secured from this package in two stages, which also provide the broad structure for this impact assessment:

- The **benefits and costs of better information about the value of capacity** being available to decision makers to inform existing administrative processes; and
- The **benefits and costs of implementing a value-based charging** approach to provide explicit incentives for better use of network capacity.

77. The diagram below shows the main steps that would be involved in delivering this option. It illustrates that the benefits and costs associated with this option would be different depending on the development stage we are looking at. The benefits and costs shown are not exhaustive. One option would be to stop at the point where the information about the relative value of capacity has been obtained, without then developing charges based on that information. This would secure some of the benefits and would limit the scale of some costs.

Figure 5: High level steps involved in developing the value-based capacity package



A. Impact on key charging objectives

78. A key benefit of this package is the potential to significantly improve provision and use of network capacity, through the impacts it can have on various industry parties. This is especially the case on parts of the network where capacity is constrained. As outlined below, improvements in provision and use of network capacity could be secured either through the availability of **better information**, or through the provision of **explicit incentives via charges**. The potential benefits of each approach would vary under the current state of the world, primarily in terms of their scale.

Impact on train operators

79. As outlined above, opportunity cost exists where the demand for capacity is above the level of capacity available. Under the counterfactual scenario, there are parts of the network where capacity is scarce and possibly not allocated to those that are able to deliver the most value to society. This is because capacity is currently allocated via administrative processes, and information about the relative value of capacity on different parts of the network does not exist to inform these processes in a systematic way.

80. Existing charges do not reflect the opportunity cost of capacity in a way that would cause less valuable train services to travel via a different route, at different time, or not to use the network at all. This means that the current system relies largely on administrative processes to deliver the “right” mix of services, which might suggest the potential for improvements through the use of charges and incentives.
81. A key benefit of implementing charges under this package is the potential to increase the overall value secured from the existing network by providing incentives for the highest value services to use scarce network capacity.
82. The first step in developing this option would involve a calculation or approximation of the value of capacity on parts of the network where scarcity exists (see Figure 5). The information that would become available as a result of the calculation could on its own allow operators to improve the way they use existing network capacity.
83. This better information could be used by funders, Network Rail and ORR when taking decisions about franchise specification, access rights and timetabling. It may also inform train operators of commercial opportunities and consequently improve decisions when operators want to run alternative services. This could improve capacity utilisation, and increase the overall value of services using the network.
84. Passing information about the value of capacity into charges could further improve use of the network by ensuring operators who can extract the most value out that capacity get to use it. Therefore, measures under this package would improve cost-reflectivity and incentives on parts of the network that are capacity constrained, by reflecting this opportunity cost in the charges paid by operators.
85. This would create incentives for train operators to plan their services more effectively. For example, value-based charges would in theory incentivise train operators to withdraw, re-route or re-time low value train services as a result of having to pay higher charges to access capacity constrained parts of the network. They could then be replaced with services that generate higher commercial and/or social value, either through the franchising process, or through access applications from open access and freight operators.
86. The scale of this effect would however be limited under the current state of the world because a high proportion of services running on the network are specified through franchises and therefore franchised operators are obliged to run them (within certain parameters). Furthermore, franchised passenger operators are currently protected from changes in charges through their franchise agreements. This protection would also limit the incentive properties of any value-based capacity charges. However, freight and open access operators would be fully exposed and value-based capacity charging would likely affect their behaviour.

87. A 2014 report by Steer Davies Gleave, [“The practicalities of scarcity charging”](#) (2014 SDG report) on the practicalities of scarcity charging suggests that, under the current state of the world, freight and open access operators would respond most to the introduction of this type of charges. However, this type of charging approach, if implemented under an alternative state of the world with more franchise flexibility, would potentially impact a much wider group of operators.

88. The value-based capacity package could deliver some benefits in terms of how capacity is used even in the current state of the world where most services are specified through franchises and there is a limited contestable market for capacity. This is because the introduction of value-based capacity charges would lead to higher variable charges per service for those services running on congested parts of the network. Depending on the nature of their franchise agreements, some TOCs might be exposed to these higher variable charges, particularly in terms of services they run in addition to their core franchise commitments. Therefore, introduction of value-based capacity charging might result in a response from franchised operators, albeit limited.

89. We do not currently have a lot of evidence to allow us to accurately approximate the effects of introducing value-based capacity charges in practice. However, as part of conversations we have had with European rail regulators and infrastructure managers, we have obtained evidence about the effects in practice of scarcity charges or charges based on capacity utilisation which are in place in these countries. Currently, there are charges in place in other European countries that bear some resemblance to value-based charging, for example: (i) OBB’s ‘supplement for congested infrastructure’ (Austria); (ii) Infrabel’s combination of ‘H’ and ‘T’ parameters in track access charges (Belgium); and (iii) Trafikverket’s ‘passage charge’ (Sweden).

90. Evidence we have gathered suggests that all these charges have some properties to influence operators’ behaviour, but the extent of this influence varies based on a number of factors. One of these factors is whether the charge is material enough to influence behaviour, and in some of the cases we have looked at, evidence suggests the charges are too small to have an impact on operators’ behaviour in practice.

Impact on funders/taxpayers

91. The availability of better information about the relative value of network capacity could also be used by governments in specifying any future franchises, as well as by ORR in making decisions about granting access to open access, franchised or freight operators. This would in effect allow incremental improvements to the current allocation of capacity, and therefore over the long-term should result in higher value secured from the services using the network.

92. Furthermore, this information could also be valuable in identifying those parts of the network which are of the highest value and where, due to scarcity, additional capacity is required. This information could help identify enhancement projects which would yield the highest value for users and the economy as a whole.

93. There may be parts of the network which are currently close to or at capacity where in fact the value of excluded services might not be very high. Building new infrastructure would not generate high value for money on these parts of the network. Information about the relative value of capacity on different parts of the network would highlight areas where the value is high enough (i.e. the demand from customers or the external benefits of services which cannot currently run are sufficiently high) to justify enhancing the network.

94. These benefits rely mainly on improvements to the information available to decision-makers. Moreover, reflecting this information in charges would – through the response of train operators – improve the quality and credibility of the available information on value.

Impact on Network Rail

95. Value-based capacity charging has the potential to promote improved provision of network capacity. This would be achieved through improved price signals to Network Rail, which could improve decision making around the provision of network capacity, in the short and long-term. As in the case of improved use, some of these benefits could be achieved just by calculating the value of existing network capacity and providing more information than is currently available to decision makers.

96. Availability of information about the value of network capacity could highlight areas where this value is high, which would allow Network Rail to focus on those areas in terms of its efforts to optimise use of existing assets. Network Rail could do this for example through better timetabling or by managing those assets more effectively, to maximise traffic but also value secured from the rail network.

97. In theory, the existing volume incentive (see [section two](#)) should incentivise Network Rail's to use this information to grow traffic on the network, where the value of additional traffic exceeds the short-run costs it imposes. Evidence from a 2014 report by Credo, "[Evidence gathering on the effectiveness of PR08's incentives regime](#)" (2014 Credo report), but also from other sources, suggests Network Rail faces significant reputational and financial incentives in relation to performance, which sometimes limits its incentives to provide more capacity, even when its value might be high enough. Therefore, it seems that in practice Network Rail's incentives to use this information even if it was available are limited to some extent.

98. If implemented as part of the charging framework, value-based capacity charges could send clearer price signals to Network Rail in terms of the most efficient way to allocate capacity to operators, which would include encouraging it to accommodate additional requests for capacity, where it is efficient to do so ([2014 SDG report](#)). In particular, as access requests would be made against a requirement on operators to pay charges reflecting value, this would provide useful information about actual (minimum) value of these services.

99. If value-based capacity charges existed, Network Rail would have an incentive to identify and sell more capacity on congested parts of the network, by providing capacity more efficiently, for example through better timetabling. This is because Network Rail would expect to receive a higher amount of variable charging income in respect of those parts of the network (assuming that its price control allowed Network Rail to retain revenue from additional volume). This means that Network Rail would be more efficient in the way it determines available capacity from the existing physical network, through timetabling but also by working with operators to find cost-effective solutions that improve capacity utilisation, including rolling stock performance (e.g. speed, dwell times etc.).

100. We have seen a number of examples of operators identifying additional capacity on parts of the network that were previously considered full, or where operators have suggested timetable or rolling-stock modifications that have released capacity. If value-based capacity charges existed, and Network Rail received additional income from services wishing to operate on busy parts of the network on top of short-run marginal wear and tear charges, it would have stronger incentives proactively to try unlocking some of this additional capacity itself.

101. A case study from a 2015 report by Credo, [“Incentivising better capacity management in GB rail”](#) (2015 Credo report) highlights one such instance where an operator was able to identify spare capacity and pursued a solution with Network Rail to unlock this capacity. London Midland has been the operator of the West Midlands franchise since 2007. Until 2012, WCML operators (other than Virgin Trains) were restricted in their ability to add new services due to legal measures imposed through Moderation of Competition (MoC). MoC ended in March, 2012, at which point a number of options were submitted to ORR by open access and franchised TOCs for the introduction of new services or variations on existing ones.

102. London Midland submitted a proposal for an amendment to their existing track access contract as part of this. A project team at London Midland was tasked with reviewing timetable options for the period after MoC came to an end. It was suggested that if running speed could be enhanced from 100mph to 110mph, there was potential to operate two services within the current path. This could be delivered by upgrading the operating speed of the existing rolling stock, which London Midland decided to do. As a result, an additional two morning peak services and five evening peak services were added, including non-stop journeys between London and Northampton.

103. Measures under the value-based capacity package could increase overall use of the network, which would mean higher levels of passengers and goods being carried overall. The availability of better information about the value of network capacity could also improve decision making concerning network enhancement projects. This would likely be the case, even if this information was not implemented in charges.

104. If this information was then translated into charges, either through an opportunity cost based approach or a LRMC approach, the improved price signals it would create could encourage Network Rail and other parties to think about network expansion more effectively, i.e. improve investment-related decision making, in a way where network expansion is targeted where it is most needed in order to release capacity constraints and accommodate demand.

105. The benefits that could be secured in terms of avoiding unnecessary and costly network expansion, either through better information or through charging, have been estimated in a 2015 report by Steer Davies Gleave, [“Identifying the benefits of an improved understanding of Network Rail's costs and cost drivers”](#) (2015 SDG report). However, the earlier SDG study on the practicalities of scarcity charging emphasised that evidence suggests that scarcity charging cannot be as effective as cost-benefit analysis in supporting efficient investment decisions ([2014 SDG report](#)). This makes it difficult to conclude if there would be any real benefits in terms of designing better value for money enhancement schemes, or avoiding unnecessary network expansion.

B. Wider policy impacts

Policy impacts

106. If operators were able to respond to charges, implementing a value-based capacity charging option could lead to some redistribution between passenger and freight train services as well as the coverage of passenger services between geographical markets, i.e. low value passenger services being reduced or reallocated to different timings. Freight services would likely be impacted to a lesser extent by these charges, as they typically run fewer services at times or locations where value-based capacity charges could apply.

107. In terms of passenger services, some locations and communities could gain, but others could lose as passenger service operators would be incentivised to remove low value services and potentially introduce higher value ones. However, this charging approach should not lead to a loss of services with a high social value if these social values are effectively incorporated or signalled through charges. Overall therefore, the value delivered to users and society would be expected to increase.

108. If the opportunity cost calculation took account of all user and non-user benefits (including wider social impacts), some services would be faced with charges that are greater than the commercial value to the train operating company of the slot. If the government did not continue to compensate operators for this difference, socially desirable services could potentially be priced off the network, where the social value of a service is high.

109. This is particularly an issue for open access, freight and charter services as under the current state of the world, franchise agreements typically tightly define service requirements. Without a mechanism to reflect the non-user benefits of all services, there is a risk that value-based charging (in its purest form) would have the unintended effect of pricing off commercially viable services that also deliver non-user benefits.

110. As set out in the section outlining impacts on key charging objectives, measures under the value-based capacity package could increase overall use of the network, which would mean higher levels of passengers and goods being carried overall. In practice, this could lead to more revenue coming from users through fares, thus reducing the need for state funding, which would have a positive impact for governments and taxpayers. It could also reduce the amount of state funding required by the railway by incentivising more efficient capacity production by Network Rail and therefore increasing value for money.

Transitional impacts

111. We would need to consider how charges that could be introduced under this package would work in the current periodic review framework which requires ex-ante calculation of charge rates which are then published on price lists. Value-based capacity charges might need to be introduced during a control period, when a section of the network became full (i.e. when scarcity occurred). This would introduce a level of risk and uncertainty into the revenue forecasts over the five-year period, which might affect Network Rail's cash flow and/or debt requirements.

112. Implementing most of the options in practice would also likely be complicated and costly. This is because of issues such as the potential redesign of the billing system to be able to accommodate different charge rates at different times of day (which it cannot currently do). This would likely result in a significant cost for Network Rail.

113. In addition, with a new charge underpinned by economic theory and calculated using complex models, the industry would need to incur some costs to understand and be able to respond to these new charges. These familiarisation costs are likely to be significant at an industry wide level. However, some of the familiarisation and implementation costs could be reduced by implementing the calculated charges as shadow prices in the first instance. This would give the industry a longer period of time in which to familiarise themselves with and adjust to these new charges.

114. The complexity of calculation and understanding required with this package are likely to result in a less transparent charging structure overall. As explained below, under the current scenario, it might be difficult to introduce these types of charges and provide effective incentives in practice. However, some of the benefits could be achieved by undertaking only the first phase of the analysis, to reveal the opportunity cost of network capacity, which would have some costs associated. These would however be smaller than the costs of converting the opportunity cost calculation into a charge and levying it on operators.

Practicality issues

115. Generally, the effort involved in calculating value-based capacity charges would depend on the design of the charge and we would expect it in general to increase as we go from left to right through the options shown in Figure 4.

116. Bespoke analysis would need to be undertaken to calculate the value or opportunity cost of capacity. There is a range of different possible approaches, but all of these would need to draw on a number of industry models (e.g. MOIRA, LENNON) and on significant data resources. The financial resources and industry input required therefore to calculate scarcity charges which are accepted and well understood would likely be substantial. Furthermore, this type of analysis would be novel and involve significant assumptions which could impact the final result and therefore the incentive properties of any charging approaches developed based on the analysis. This would need to be done at a relatively disaggregated level and to a high level of accuracy to support charges based on value.

117. The assumptions used would be key because, for example, in practice, capacity can be used in a number of ways to produce a variety of types of services and the value of a particular timetable slot can depend on how other slots are being used. This could lead to unexpected results in terms of the opportunity costs calculated, and ultimately a lack of transparency in terms of how opportunity cost was translated into a charge. This would likely only become obvious after the calculation has been undertaken. The degree of certainty over the calculation underpinning any new charging approach would have an impact on the risk borne by train operators, which in the case of franchised operators could increase franchise premiums.

118. Converting a calculation of opportunity cost or value into a charge which can be levied on train operators would require further analysis and extensive consultation with industry. Features such as the unit of capacity to levy the charge on, or the frequency of recalculation would need to be considered. All of these design features would have an impact on the incentive properties of the charge.

119. In their report on the practicalities of scarcity charging, consultants SDG identified a number of issues relating to the implementation of opportunity cost based charging ([2014 SDG report](#)). For example, they highlight that in order to send accurate signals, value-based charges, if designed to reflect the scarcity of capacity on the network would also need to be updated regularly to reflect any changes in capacity and its use. This could result in having less stable charging structure and potentially increase risk for operators by affecting their ability to plan the future of their businesses with a reasonable degree of assurance. This would represent a significant cost to industry and could also dull the incentive properties of the charge.

120. The information that could be obtained through this calculation could however be very useful in informing decisions (but not driving them), as highlighted above. The accuracy of the calculation and the degree of certainty over the assumptions used would be considerations in deciding whether to use the information obtained to set any access charges. This would however not need to be as analytically challenging where the purpose was only to inform decision making.

121. A key disadvantage of this package alongside potentially significant development and implementation costs is the risk of it resulting in second order problems such as unintended incentive effects ([2014 SDG report](#)). Firstly, any approximation of value would be influenced by current use, which is determined by existing charges and contractual and regulatory arrangements. Because the current charges and the way capacity is currently allocated do not reflect the value of capacity on different parts of the network, the results of a calculation based on the existing services could be inaccurate. If a LRMC approach was used to approximate value, this would also be based on the existing network and how it is used, which are again influenced by a poor understanding of costs. Consequently, designing this package without having a good understanding of infrastructure costs first is likely to increase this risk of perverse incentives and behaviours.

C.Potential for the option to address a gap

122. As discussed in previous sections, this package is specifically designed to provide strong incentives and to send price signals for the efficient provision and use of capacity on the network. However, under the current state of the world, this option would only partially address the capacity gap. This would come at the expense of significant costs involved i.e. in estimating these charges and of obtaining stakeholder acceptance of these new charges.

D. Wider external impacts

123. In terms of the funds available to the Secretary of State, the value-based capacity package is likely to be neutral, at least in the short run where franchised train operators are not exposed to any changes in charges. On the other hand, it would help to ensure that the government gets better value for money linked to spare capacity (i.e. capacity not allocated to existing operators) from the funds invested in the network.

124. As outlined previously, in the long-run we would expect a more positive impact as capacity-related decisions would be made more efficiently, including potentially more effectively specifying franchises, and leading to lower Network Rail's costs and as a result to a lower burden on the Secretary's funds.

125. Despite the redistribution of some services discussed in the previous section, we do not expect customers to experience higher costs in terms of fares paid, at least not regulated fares. This package is only intended to influence charges which are paid by train operators for the use of its infrastructure and therefore there should not be a significant impact on average fare, as prices are determined by passenger willingness to pay and the overall level of services provided. However, there could be some negative impact on freight customers.

E. Legal impacts

126. Any charging framework we put in place as part of PR18 has to be compliant with the relevant legislation. The European Railway Directive 2012/34/EU ('the Directive') sets out the principles for access charging. This Directive should be transposed into British law soon and will replace the Railways Infrastructure (Access and Management) Regulations 2005 ('the Regulations'), currently in place. We expect this Directive to be transposed into British law before PR18 commences. Until this is transposed we cannot be certain of the exact provisions. However we expect many of the provisions to be similar to the Regulations, so we will use those and the Directive as a guideline for what the transposition may contain.

127. The provisions in the Directive set the principles for the design of charges. The starting point is that Network Rail must set fees for the use of the infrastructure at the cost that is directly incurred as a result of operating the train service. In addition, Network Rail may also include a charge which reflects the scarcity of capacity and charges may be modified to take account of the cost of environmental effects caused by the operation of the train. If we were to develop this package further and pass the improved information on value into charges, the most relevant provision would probably be the scarcity charging provision.

128. If we were to develop options under this package, the detailed options proposed would need to be checked thoroughly against the conditions required to use the scarcity charging provision.

129. If we had more defined options to assess, we would also need to ensure we considered all factors that may affect our statutory duties which are laid out in full in Section 4 of the Railways Act 1993. Consideration of many of the duties has been included above in the relevant sections of the analysis but this is limited due to the broad definition of the package at this stage.

130. Similarly, we would also ensure full compliance with the Regulatory Enforcement and Sanctions Act 2008 and the Equality Act 2010. These are explained in [Annex D](#).

F. Sensitivity analysis

131. The previous assessment considers the value-based capacity package under the current state of the world. This section focuses on this package under other states of the world, as outlined in [Annex C](#) to our consultation. We explain how for each state of the world the key impacts we have previously identified would change relative to the current state of the world.

132. Under all states of the world, we assume that the majority of the implementation costs of the package could remain constant, as similar investment would be required to develop this package and to develop mechanisms to understand and estimate values attached to different services. However, there are familiarisation and transaction costs that would likely increase in proportion to the market exposed to the value-based capacity charging. Similarly, the scaling effect would apply to the distributional costs as well as the efficiency benefits in terms of additional value generated.

133. The difficulty is to understand how some of the risks of unintended consequences would vary under each state of the world, as some of these are more inherent in the nature of industry and its arrangements than the design of the value-based capacity charging. In addition, it is difficult to know how the magnitude of the change in impacts compares to the costs under different states of the world, and therefore where the “tipping point” at which it is sensible to bear those costs is.

State of the world 1: More on-rail competition, low franchise protection

134. More on-rail competition means having more scope for open access services through less specified and protected franchises. Under this scenario, the introduction of a market based mechanism to allocate capacity to those that value that capacity most (i.e. a path or a slot being allocated according to a value-based charge), could result in a higher impact in terms of the overall value generated through the services that run on the network. This is because under this scenario, franchise operators would gain the degree of flexibility and exposure required to respond to price signals and therefore would adjust their services accordingly. This would be in addition to the other market players who would already be able to respond to these price signals, like freight and open access operators.

135. This state of the world could provide the required conditions to develop a more dynamic market and therefore to increase the net benefits of the value-based capacity package in relation to the current state of the world.

136. Because of the higher degree of flexibility, under this scenario the number of services impacted by value-based capacity package would be higher. Therefore, the importance of reflecting the social value of services, through for example an appropriate subsidy regime, would grow. This is because without such a regime, potentially socially beneficial services could be priced off the network.

State of the world 2: On-rail competition via flexible franchising

137. Under 'on-rail competition through more flexible franchising' scenario, we could see some additional net benefits of this value-based package being realised through franchises having more flexibility to adjust their services in response to value-based capacity charges. However, the scale of benefits as well as costs would potentially be lower as compared to state of the world 1, but potentially higher relative to the current state of the world. This is because we assume that franchise operators would still be protected from changes to charges and therefore some incentive properties of this package would remain limited.

State of the world 3: More highly specified franchises

138. Under this state of the world, the benefits that could be achieved through this package are likely to be lower than in the counterfactual scenario. Franchises are already highly specified, with little scope to adjust their services, and under this state of the world there would be less or no scope to make any changes to franchises.

139. Any benefits that could be achieved would come from better use of capacity by operators who do not have franchise agreements, i.e. open access and freight operators.

State of the world 4: Freight protection/subsidy

140. It could be argued that if freight is subsidised more directly to reflect its full benefits including social benefits, freight and passenger services would face charges that better reflect their overall value. Such charges would encourage a better allocation of capacity between these competing uses.

141. Under this scenario, valuable freight services could replace low value passenger services, resulting in a higher overall value secured from the network. At the same time, hypothetically high-value passenger services might replace low-value freight. The overall impact would be uncertain but would tend to improve the overall value of network use.

State of the world 5: Access beneficiary pays for capability

142. This state of the world could improve the overall ability of the industry to respond to market signals. This could create the environment where all train operators very carefully plan their services in relation to the charges they have to pay as they would be directly paying a greater proportion of funds directly allocated to them instead of Network rail.

143. Overall, better aligned incentives across the rail sector could lead to greater benefits compared to the current state of the world. However, it is not obvious that the gains from value-based capacity charging under this state of the world would be higher or lower.

State of the world 6: Change in approach to capacity allocation

144. The current administrative process used to allocate capacity means that Network Rail may be limited to respond to incentives delivered through value-based capacity charging.

145. A change in approach to capacity allocation could address some of these issues and allocate capacity based on price signals that charges would contain. This could lead to the realisation of greater benefits relative to the current state of the world.

State of the world 7: More regional decision making

146. Generally, it is not clear that this scenario would have a significant impact on the outcomes of this package. Arguably, each region would have better information and stronger incentives to improve the allocation of their infrastructure capacity relative to the current state of the world, but the scale of this effect is not clear.

147. Some coordination might be required across regions to avoid any unintended consequences such as pricing off some of the cross-regional services.