



Rail Access Arbitration Guideline No. 1

Incremental Capacity Consumption Charge

November 2002

RAIL ACCESS ARBITRATION GUIDELINES: INCREMENTAL CAPACITY CONSUMPTION CHARGE

The purpose of publishing this Arbitration Guideline is to inform QR, access seekers, industry, government and other interested parties about the principles that are likely to guide the Authority when considering an access dispute, or assessing new reference tariffs, in relation to the determination of an incremental capacity consumption charge.

An indication of the approach the Authority will take in arbitrating an access dispute on this matter is important as it may assist the negotiations between QR and access seekers by narrowing the boundaries for those negotiations.

Nevertheless, the appropriateness of these principles will be assessed on a case by case basis. The Authority will give all parties involved in a dispute the opportunity to provide submissions and to raise specific issues in relation to whether these principles are appropriate in the specific situation being addressed. The Authority will give due consideration to all submissions made by the parties in making its decision on incremental capacity charges to be imposed.

Arbitration Principles

Principle One:

An estimate of the system capacity, in terms of maximum number of train paths for a reference and non-reference train service should be carried out using a readily available simulation package.

Principle Two:

The estimate of the incremental capacity consumption of a non-reference train service should be determined according to:

$$r = \frac{\text{maximum number of referencetrains at full utilisatio n}}{\text{maximum number of non referencetrains at full utilisatio n}}$$

Principle Three:

The incremental capacity consumption charge for a non-reference train service should be determined as the product of ratio r and the incremental capacity component of the reference tariff.

The attached paper elaborates on this matter.

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1. INTRODUCTION

QR's access undertaking establishes the processes to be followed by third party access seekers and QR when negotiating the terms and conditions on which QR will allow third parties to operate their own train services on QR's intrastate railway infrastructure. In the circumstances where QR and the access seekers are unable to agree on a matter, the undertaking includes a dispute resolution framework that, *inter alia*, provides for the Authority to resolve the matter. Under the *Queensland Competition Authority Act 1997* (the QCA Act), the Authority could seek to mediate or arbitrate any such dispute.

QR's access undertaking also includes principles to guide the negotiation of the terms and conditions of access. In certain cases, QR's access undertaking specifies in detail the terms and conditions of access. However, the amount of any such detail included in QR's access undertaking is necessarily limited given the diversity in possible train configurations and operating scenarios. For example, QR's access undertaking only specifies reference tariffs for defined coal carrying train services in central Queensland.

In the course of the Authority's assessment of QR's 1999 draft access undertaking, a series of related issues arose concerning the measurement of the capacity of a rail network (in terms of train paths), the consumption of that capacity by a particular train service and how a train service's consumption of capacity should be priced. These matters were resolved in QR's approved access undertaking to the limited extent that the undertaking includes reference tariffs for coal carrying train services in central Queensland, one component of which sets a charge for the reference train service's consumption of network capacity.

To address the remaining uncertainty surrounding the quantification of a capacity consumption charge for non-reference train services, the Authority attached a technical paper to its decision on QR's 2001 draft access undertaking. In that paper, the Authority proposed a simple transparent methodology to determine, and therefore price, the capacity consumption of a particular train service. The Authority also requested interested parties to comment on its proposed approach and indicated that it would finalise its position after considering those comments.

In seeking to finalise its position on the quantification of capacity consumption, the Authority recognises that it is unable to require QR to amend its already approved access undertaking. As the existing uncertainty on this matter is most likely to be revealed in the context of a dispute on the access charge for a non-reference train service, the Authority has decided to publish its findings on the quantification of capacity consumption in the form of an arbitration guideline. For purposes of consistency, the Authority would also seek to adopt the same approach to assessing any applications for new reference tariffs that include a capacity consumption charge.

The remainder of this document outlines the relevant legislative requirements and pricing principles that would guide any determination the Authority might make on this matter (section 2), the Authority's proposed approach to quantifying a capacity consumption charge as set out in the December 2001 technical paper (section 3), interested parties' comments on the Authority's proposed approach (section 4), the Authority's considerations regarding the comments (section 5) and the Authority's findings on this matter in the form of arbitration guidelines (section 6).

2. LEGISLATIVE AND ACCESS REQUIREMENTS

The QCA Act and QR's access undertaking provide for the Authority to resolve disputes that may arise in the context where QR and an access seeker are unable to agree on a matter. In resolving an access dispute by way of a determination, the Authority is guided by the relevant criteria in the QCA Act, QR's access undertaking and the rules of natural justice. The factors that would guide the Authority in arbitrating a dispute regarding capacity consumption are summarised below.

2.1 Legislative requirements

In providing for the Authority to resolve a dispute, the QCA Act places a number of restrictions on the type of determination the Authority may make and sets out the matters the Authority needs to consider when making a determination.

Section 119 of the QCA Act provides that, in resolving a dispute, the Authority's determination:

- cannot be inconsistent with an approved undertaking for the service;
- must not have the effect of reducing the amount of the service able to be obtained by an access provider, unless
 - the access provider is a party to the arbitration; and
 - the reduction does not prevent the access provider from obtaining a sufficient amount of the service to be able to meet the provider's reasonably anticipated requirements, as assessed by the Authority, as at the time the dispute notice was given; and
 - if the Authority considers the access provider is entitled to be compensated for the reduction - the amount of compensation is taken into account in fixing the amount to be paid by the access seeker for access to the service.
- must not have the effect of resulting in the access seeker or someone else, becoming the owner or one of the owners of the facility, without the existing owner's agreement;
- must not have the effect of requiring an access provider to pay some or all of the costs of extending the facility. However, the Authority can still make a determination requiring the access provider to extend, or permit the extension of a facility if:
 - the access provider is the owner of the facility; and
 - the Authority is satisfied
 - the extension will be technically and economically feasible and consistent with the safe and reliable operation of the facility; and
 - the legitimate business interests of the owner of the facility are protected; and
 - for a determination requiring an access provider to extend a facility – the Authority imposes a requirement under the determination on a person other than the access provider to pay the costs of extending the facility.

If the Authority makes a determination requiring or permitting the extension of the facility it must, in fixing the terms of access for the access seeker, take into account:

- the costs to be paid by the parties for the extension; and
- the benefits to the parties resulting from the extension.

Moreover, in making a determination, the Authority must have regard to:

- the access provider's legitimate business interests and investment in the facility;
- the legitimate business interests of persons who have, or may acquire, rights to use the service;
- the public interest, including the benefit to the public in having competitive markets;
- the value of the service to:
 - the access seeker; or
 - a class of access seekers or users;
- the direct costs to the access provider of providing access to the service; including any costs of extending the facility, but not costs associated with losses arising from increased competition;
- the economic value to the access provider of any extensions to, or other additional investment in, the facility that the access provider or access seeker has undertaken or agreed to undertake;
- the quality of the service;
- the operational and technical requirements necessary for the safe and reliable operation of the facility;
- the economically efficient operation of the facility.

In addition, the Authority may take into account any other matter, relating to the above matters, that it considers appropriate.

Section 118 of the QCA Act lists examples of the types of determinations the Authority can make, including: to state the terms on which the access seeker has access to the service; or to require the access provider to extend, or permit the extension of, the facility.

2.2 QR's access undertaking

Pricing principles

QR's access undertaking establishes pricing principles governing the development of access charges for all train services operating on QR's network. These pricing principles, as set out in chapter 6 of QR's access undertaking, deal with a range of matters including:

- revenue adequacy for QR;
- limitations on price differentiation, for example differences in access charges for train services, for a specified commodity in a specified geographic area, must be based on differences in risks or costs to QR; and

- access charges for individual, or combinations of, train services must sit between incremental and stand-alone costs.

QR's access undertaking also provides for QR to develop reference tariffs for defined train services. The Authority can approve any such reference tariffs in accordance with the QCA Act. Where reference tariffs exist, the structure of the access charges must be consistent with the structure of the approved reference tariffs. Where no reference tariff exists, access charges may consist of fixed or variable charges or any other agreed structure. Access seekers may also be required to make upfront contributions to mitigate any financial risks imposed on QR where, in order to facilitate access, QR is required to make project specific capacity enhancements.

Reference tariffs for coal carrying train services

Currently, reference tariffs have only been developed and approved for defined coal carrying train services in the central Queensland coal region. Schedule F of QR's access undertaking sets out the structure of the reference tariffs for defined reference train services. The reference tariffs, as set out in Part B of Schedule F, are comprised of a number of components, namely:

- AT₁ – Incremental Maintenance Charge (\$'000 GTK)
- AT₂ – Incremental Capacity Charge (\$/Train path)
- AT₃ – Allocated Component 1 (\$'000 NTK)
- AT₄ – Allocated Component 2 (\$/NT)
- AT₅ – Electric Access Charge (\$'000 EGTK)
- AT₆ – Electric Energy Charge (\$'000 EGTK)

Part B of Schedule F of QR's access undertaking also specifies the unit rates of each of these components for the nine clusters of coal mines in central Queensland.

Combined, these components enable QR to earn sufficient revenues to meet its efficient and reasonable costs of providing access to its central Queensland coal network. The incremental maintenance and capacity charges (AT₁ and AT₂) are based on a causative relationship. These two charges seek to signal to train operators: the relationship between maintenance costs and infrastructure usage; and the relationship between capacity utilisation and capacity expansion costs. As these two charges do not generate sufficient revenues to meet QR's coal network costs, the two allocative components (AT₃ and AT₄) have been determined in order for QR to recover this revenue shortfall. The remaining two components (AT₅ and AT₆) relate solely to the use of QR's overhead electric traction infrastructure.

The reference tariffs only apply to the defined reference train service. A defining characteristic of a reference train service, as outlined in Part B of Schedule F of the undertaking, is a designated below rail transit time. The nominated transit time of a reference service is defined as the sum of the nominated section running times (as included in the relevant information pack) plus an additional factor to incorporate the other transit time components. This factor varies by system to reflect the particular characteristics of the infrastructure. For example, the factor applied in the Blackwater system is 27% whereas in Goonyella it is 23%. Other capacity related reference train service characteristics include loading and unloading times, which are specific to each loading and unloading facility, and stowage times that are system specific, and operate independently of the mainline incremental capacity charges, the subject of this Guideline. The characteristics of a reference train service also includes a specified maximum length and axle load.

Incremental capacity charge

The subject of this Guideline is the incremental capacity charge component of the access charge. This charge is intended to reflect the causal relationship that exists between infrastructure usage and the cost of capacity expansion (ie the incremental cost to QR of providing additional network capacity). In other words, it represents the current cost associated with QR providing an additional train path, whether additional capacity is required or not. Consequently, a train operator is forced to confront the fact that the consumption of existing capacity could ultimately result in the need for future infrastructure augmentation. It is also a signal which alerts operators that they need to use the existing capacity efficiently.

As the size of this charge does not affect the total revenue required by QR over the regulatory period, the incremental cost of capacity concept is distinct from other capacity-related costs which are associated with providing the capacity currently in place. These latter costs have already been factored into the determination of the reference tariffs.

The total incremental capacity cost incurred by an operator is equal to the product of:

- the number of paths consumed by that operator's train; and
- the incremental capacity charge per path.

The incremental capacity charges (AT_2) for the reference train services are set out in Table 1. This component of the reference tariff is likely to represent around 10% of the access charge for a return trip for most clusters, however it may be as low as 3% and as high as 17%. While the incremental capacity charges for coal carrying services have been approved by the Authority, the method used to assess the paths consumed by an operator's train has not been spelt out in the undertaking.

Table 1: Incremental capacity charge for reference train service, by cluster, at 1 July 2001

Cluster/System	\$s per Train Path
Central Blackwater	1,072
Stanwell	1,072
North Blackwater	1,072
North Goonyella	687
West Goonyella	687
South Goonyella	781
Gregory via Goonyella	781
Moura	385
Newlands	172

Capacity consumption is a function of a train's transit time over a given origin/destination combination. A train's transit time comprises the sum of the sectional running times it can achieve over the track sections involved and an allowance for stopping, starting and waiting times.

In the process of negotiating access to the QR network, an access seeker would need to provide QR with sufficient information to enable it to assess the sectional running times of the train being proposed to operate the service. Where an operator's train varies in anyway from the sectional running times and resultant transit times as defined in Part B of Schedule F, QR and

the access seeker must agree on the section running times for the proposed train service. QR and the access seeker would then need to agree the actual number of train paths to apply in the calculation of the incremental capacity charge. It is on the nature of these agreements that potential disputes may arise and this issue is the subject of this Arbitration Guideline.

2.3 Natural justice

The Authority's dispute resolution processes and access determinations are subject to the principles of natural justice. The principles of natural justice are not concerned with whether the Authority's decision was correct, but with whether the decision was arrived at after a fair hearing. Natural justice is a flexible concept and what is required in order to afford persons a fair hearing will vary from case to case.

In order to act fairly and in good faith, the Authority must observe at least three elements of natural justice, namely:

- Rule against bias – members of the Authority must be, and must appear to be, independent and unbiased;
- Hearing rule – parties must be given an opportunity to be heard, to properly present their case and to know the case against them;
- Decisions are to be based upon evidence which has some probative value.

If the Authority fails to observe the rules of natural justice, a determination is open to challenge on a number of bases whereby it could be set aside.

3. SUMMARY OF AUTHORITY’S PROPOSED APPROACH

In the technical paper attached to its decision on QR’s 2001 draft access undertaking, the Authority proposed a simple and transparent methodology for determining the capacity consumption of a particular train service.

In that paper, the Authority acknowledged a weakness of its earlier approaches that defined network capacity in terms of theoretical capacity. The Authority accepted that the capacity of the system should be measured from a practical, rather than theoretical perspective.¹ Accordingly, the Authority proposed that the total theoretical system capacity should be discounted to account for below-rail disruptions caused by factors such as weather conditions, temporary speed restrictions, minor signalling faults and other infrastructure-related factors. However, no allowance was proposed for scheduling-related factors such as transit-time constraints. The Authority proposed that, as the rail industry generally accepts that around 15% of theoretical capacity is lost due to these factors, then a reduction factor of 15% be applied to the theoretical capacity to determine the practical capacity of a network. The Authority indicated that this reduction factor would be applied to both numerator and denominator in the weighting formula to determine the capacity consumption of the non-benchmark train relative to the reference train. A definition of practical capacity of a system was also used in calculating the incremental path costs as reflected in the reference tariffs.

In that technical paper, the Authority also expressed a number of concerns regarding the approach proposed by QR to determine the capacity consumption of a particular train. The Authority was concerned that QR’s proposed approach:

- would determine a range of capacity consumption levels, rather than a single outcome, and that the capacity consumption charge would have to be revisited each time an operator altered its market share;
- would establish a potential entry barrier as new entrants would generally incur a greater number of path charges per service than the incumbent operator; and
- was not adequately transparent as an access seeker would be heavily reliant on QR to carry out the path consumption calculations using specialised computer-based simulation and optimisation software, such as QR’s custom-modified Planimate simulation tool.

The Authority acknowledged that an operator should bear financial responsibility for choosing a train-type with poor operational characteristics, eg if its train services consumed more capacity than others and therefore brought forward capacity augmentation. However, the Authority expressed the view that conflict-related capacity costs should not be borne solely by new entrants, particularly in the early stages of a developing competitive above-rail market. The Authority argued that, as the benefits of competition will accrue to all existing and future rail users, the conflict related capacity costs are best borne by all users and not by any particular group of users.

To address this concern, the Authority proposed that an operator’s capacity consumption (ie the number of paths that a particular train service is deemed to consume per train) should be determined by the following formula :

$$\text{No. of paths/train} = \frac{\text{maximum number of benchmark trains at full utilisatio n}}{\text{maximum number of proposed trains at full utilisatio n}}$$

¹ For a further discussion of these issues see: QCA 2000, Draft Decision on QR’s Draft Undertaking, Vol. 4, Working Paper 3 – Incremental Cost of Capacity.

The numerator of this expression is a constant for each system, based on the operation of the benchmark service. The benchmark train would correspond to the train most commonly operated by QR in each system. The denominator would vary depending upon the operational capabilities of the proposed train. These operational capabilities would be used to determine the train's potential sectional running times and therefore to assess the maximum number of services that can be performed each day.

The expression yields a single definitive measure of capacity consumption and would apply regardless of whether the operator runs 7 such services per week, or 7 services per day. It is also independent of whether the services are operated as a fleet of services or at regular intervals throughout the day. Also, this capacity measure is based only on the relative capabilities of both trains and ignores any scheduling or operational considerations.

To address concerns regarding the transparency of the assessment methodology, the Authority suggested that commercially-available computer packages be used to determine the maximum number of services for both the benchmark train and the proposed train. The Authority used MTrain as an example of one such package.

The Authority's preferred approach has a number of clear advantages, including:

- simplicity – complex simulation is not required;
- transparency – there is no reliance on QR to perform the necessary calculations. Results may be independently verified;
- the result is definitive, applicable for each service and across all potential levels of operations; and
- the lessening of QR's inherent advantage of incumbency in having the most number of trains on the network.

The Authority's technical paper also reported that the second element of the incremental capacity charge, namely the incremental path cost, had been determined for each of the central Queensland coal systems and included in the approved reference tariffs (see Table 1). The Authority accepted that these incremental path costs should be determined on the basis of potential actual train paths.

4. SUMMARY OF INTERESTED PARTIES' COMMENTS

The Authority received submissions from Pacific National (PN), the Queensland Mining Council (QMC) and Queensland Rail Network Access (QRNA) in response to the technical paper released in December 2001.

PN and the QMC supported the Authority's proposed approach to quantifying the capacity consumption charge for a non-reference train services. In particular, both PN and the QMC supported the Authority's proposed "ratio approach" to calculating capacity consumption on the basis of simplicity and transparency. In this context, QR also agreed that it is desirable to have a simple and transparent approach that is fair to new entrants and the existing operator.

PN stated that the Authority's proposed approach combined a number of virtues, including that it: can be used by any access seeker with a high degree of confidence; can be replicated by any party using the same inputs; would lead to prices that signal the market to minimise capacity consumption; and does not bias an outcome in favour of the incumbent but requires new entrants to take into account capacity consumption when designing a service.

In a similar vein, the QMC supported the Authority's proposed approach whereby no particular group of users would bear the conflict costs associated with the entry of train services that have characteristics which are different to the predominant train. The QMC argued QR's long standing monopoly position in the above rail market would be further entrenched if new entrants were to bear the costs of conflict. The QMC indicated that it expected that actual competition would deliver economic benefits in excess of any such costs of competition. For instance, the QMC questioned whether QR's predominant service represented the most efficient service and that new entrants may introduce new technologies and technological innovation.

While PN and the QMC supported the Authority's proposed approach, they did question a number of elements of that approach. First, the QMC accepted that a reduction factor should be applied to the theoretical maximum train paths in order to reflect the impact of weather, scheduled maintenance and other factors on network capacity. However, the QMC argued that such a reduction factor should be based on external or system wide features and not on rules of thumb, the nuances of QR's above rail operating configuration nor QR's management systems that would not apply to a third party. The QMC argued that further work needed to be carried out to reconcile the analysis of system capacity to actual system performance. For instance, in an additional letter to the Authority, the QMC argued that the methods for quantifying conflict costs should be independently developed or verified and that the relevant data (eg section running times) should be transparent. The QMC argued that the Authority should oversee the development of an agreed methodology and reporting procedure in order to reduce future disputes and arbitrations.

Second, PN questioned whether a proposed service's overall transit time would be used to determine the maximum number of services capable of being operated within the specified time frame. PN argued that total transit time incorporated speed as well as other operational considerations (eg level of priority). For instance, PN argued that, while a passenger train can traverse the network in the fastest time, it does so because lower priority trains must give way to passenger trains. As a result, the lower priority trains lose time and may result in a reduction in the network's capacity by reducing the number of available train paths.

PN argued that the additional capacity consumed by higher priority trains should be taken into account when determining a capacity charge. That is, sectional running times *plus* maximum allowable transit times should be taken into account when determining the maximum number of services that a particular train can achieve. Moreover, PN argued that a range of other relevant factors should be incorporated into the calculation of the number of potential train paths (eg where an over-length train exceeds the length of a crossing loop).

In contrast to the views expressed by PN and the QMC, QRNA argued that the Authority's proposed approach may be ineffective in promoting efficiency through competition, and may actually result in greater inefficiency. QRNA argued that the Authority's approach seeks to charge operators the incremental capacity costs associated solely with the operator's choice of train type. However, that approach ignores the congestion costs resulting from the interaction of two or more train types on the network. QRNA were concerned that, by ignoring this second, and, based on its analysis, more significant cost, the Authority's proposed pricing approach would encourage a diversity of train types without attracting the efficiency benefits associated with increased competition.

QRNA were also concerned that, by imposing these congestion costs onto the system, QR would be required to bear those costs until the next review of reference tariffs. QRNA argued that such costs could be substantial. For example, in the event that 25% of the existing services on the Blackwater system were performed by a non-standard train, QR would have to undertake additional capital expenditure to sustain the transit times of the remaining trains. QRNA argued that it is reluctant to accept an arrangement that would require it to undertake such additional expenditure without any corresponding increase in revenue. Indeed, QRNA questioned whether such an arrangement is consistent with the access undertaking which provides for an access charge to differ from a reference tariff on the basis of cost or risk to QR. QRNA indicated that such additional cost or risk could include either a current expansion in capacity or the bringing forward of a future expansion in capacity.

Furthermore, even in the event that such costs were passed onto users at the next review of reference tariffs, QRNA questioned why an existing operator, and customers, should face a price rise as a result of additional congestion caused by the entry of a new operator.

Given their concerns, QRNA proposed an alternative approach that they considered balanced simplicity and transparency with a price that reflected the capacity costs due to both an operator's choice of train type as well as a reasonable allowance for the interactions between train types. QRNA's proposed approach involved:

1. using its Planimate model to assess the operational capacity² of a system, for a 24 hour period, across the scenarios of:
 - (i) 100% reference train services, to be defined in terms of the Standard Train Paths (STP);
 - (ii) changing proportions of reference and non-reference train services (from 1 to 50%), including different train spacings;
2. estimating the capacity consumption of the non-reference train service in terms of STPs from each of the Planimate simulations using the following formula:

$$\text{Weighting} = \frac{(\text{Planimate Capacity} - \text{Reduced Capacity}) + \text{No. of Non Predominant Train}}{\text{No. of Non Predominant Train}}$$

3. averaging the STP weightings for the non-predominant train across all of the scenarios (from 1 to 50%);

² Operational capacity reflects the maximum or theoretical capacity discounted by a reduction factor reflecting a range of factors including planned maintenance times, the need to comply with particular transit times and unplanned factors such as weather conditions, temporary speed restrictions and other infrastructure related problems.

4. determining the incremental capacity charge for the non-predominant train as the product of the average STP weighting and the reference tariff.

QRNA argued that this revised approach is simple, as the weighting is set upfront and will not vary with minor variations in an operator's market share, and would include in the access charge the congestion costs resulting from the operation of non-standard trains. Nevertheless, QRNA indicated that this revised approach did not address the Authority's concerns regarding the transparency of its customised version of the Planimate model. QRNA suggested that, rather than not use its model, QR would be willing to improve the transparency of its approach by, amongst other things, sharing the relevant information and work through its analysis with an operator.

5. AUTHORITY'S ANALYSIS

In December 2001, the Authority proposed an approach to determining the capacity consumption of a particular train based on three broad principles, namely: network capacity should be defined on a practical and not theoretical basis; the capacity consumption of a particular train should be determined by the ratio of the network's capacity for the predominant train relative to the proposed train; and modelling should be carried out using a commercially available simulation package such as MTrain. The Authority argued that this approach was simple, transparent, definitive and did not provide the incumbent with a competitive advantage.

The Authority's consideration of interested parties' comments on its proposed approach falls into three broad categories, namely: simplicity, accuracy and a number of sundry matters associated with implementing a preferred approach.

In responding to the Authority's technical paper, QRNA proposed an alternative approach which it argued was both simple and transparent yet captured the interaction between train types. QRNA's revised approach seeks to determine capacity consumption of a particular train on the basis of an average of possible capacity consumption levels across a range of scenarios.

The Authority accepts that QRNA's revised approach is more definitive than its earlier proposal as the capacity charge for a non-predominant train service would not alter as its market share altered between 1 and 50% of train services on a network. That capacity consumption charge would only alter once the non-predominant train became the predominant train on a network at which point the reference tariff would be recalculated to reflect the characteristics of that train. The Authority also accepts that QRNA's revised approach would reduce the entry barrier for train operators with a relatively small market share (eg below 25% of train services). However, this reduction is only achieved because QRNA is proposing to average the capacity consumption estimates over the 1 to 50% range. In comparison with QRNA's earlier proposal, this revised approach would redistribute charges from those operators with a small market share to those with a higher, but below 50%, market share. Consequently, any reduction in the entry barrier for an operator with a relatively small market share comes at the expense of an operator with a significant, but not predominant, presence on the network.

Despite these improvements, the incumbent train operator would continue to enjoy a competitive advantage over operators of non-predominant train services. Moreover, the Authority is not convinced QRNA's revised approach is either simple or transparent. QRNA's revised approach will still require modelling the impact of a large number of scenarios using its custom modified Planimate model. Even if QRNA improved the transparency of its data and modelling, its proposed approach would still make it very difficult for an access seeker, or the Authority in the context of arbitrating an access dispute, to replicate QRNA's calculations. Consequently, the Authority remains concerned about the complexity of QRNA's proposed approach.

The second issue focussed on the likely accuracy of the capacity consumption charge. Conceptually, capacity consumption can be dissected into: a direct impact, that is, capacity consumed solely by an operator's choice of train type; and indirect impact, that is the capacity consumed as a result of conflicts arising from the interaction of two or more train types on the network.

The first of these elements, the direct impact, is included within both of the Authority's and QRNA's proposed approaches to measuring capacity consumption of a particular train. Interested parties did not dispute the proposition that a train's direct impact on capacity consumption should be included in the calculation of an incremental capacity charge. However, the second of the two elements, the indirect impact associated with conflict costs, was more

contentious. The debate centred on who should pay the conflict costs and how much they should pay.

QRNA's revised approach seeks to include, in the determination of a non-predominant train services' capacity consumption, an estimate of the conflict costs resulting from the interaction of two or more train types on the network. QRNA argued that, by ignoring such conflict costs, the Authority's proposed approach would lead to inefficiencies by encouraging a diversity of train types. Under QRNA's proposed approach, the operator of the non-predominant train would pay the conflict costs as part of its incremental capacity charge.

The Authority recognises that competition on QR's rail infrastructure is likely to be accompanied by the introduction of a range of train types and that this may result in a decline in the maximum number of train paths available in comparison to the situation where a single train type operated on the network. However, for a number of reasons, the Authority does not believe that the conflict costs, that act to reduce potential train paths, can be attributed entirely to the non-predominant trains.

First, such conflict costs arise as a result of the interaction between the differing train types. Therefore, as the predominant train and the non-predominant train are jointly responsible for giving rise to the conflict costs, they should also be jointly responsible for paying the conflict costs. To seek to attribute such conflict costs solely to the non-predominant train (new entrant) is tantamount to accepting that the predominant train (incumbent) has a right to gain access on more favourable terms than a non-predominant train (new entrant).

Second, new entry and the resulting competition are likely to generate dynamic efficiencies in the above-rail market. As those efficiencies will ultimately accrue to both current and future rail users then the conflict costs should not be borne by any particular group of users such as the initial new entrants.

Third, as demonstrated in QRNA's own published modelling work on the Blackwater system, the network manager can also play a part in managing the size of conflict costs. For instance, while the Authority has made no judgement on the appropriateness of fleeting, QRNA's work shows that conflict costs decline as fleeting increases.

Consequently, the Authority believes that, as conflict costs arise as a result of the interaction between the differing train types, they need to be allocated to, and paid for by, all train operators on a system. There would also seem to be some scope to consider developing a mechanism whereby all parties, train operators as well as the network manager, have an incentive to schedule train services in a way that minimises conflict costs.

There is then the separate issue of how the level of the conflict cost charge should be determined. This is likely to be a complex and imprecise exercise. In an economic sense, the conflict costs are only relevant when the network is operating at full capacity or when capacity is expanded. Any accurate measure of the conflict costs would be based on the predicted mix and scheduling pattern of train services in operation at the time when either of these events occurs. As it is presently uncertain what this future mix of train services will be, measurement of the conflict costs cannot be performed with a high degree of precision. While it might be argued that QRNA's proposed approach would seek to address this concern by averaging the capacity consumption over a range of mix of train services, the Authority is not convinced that such an approach would be sufficiently accurate on which to base a reliable signal regarding use of the network.

Under the Authority's proposed approach, the conflict costs would not be recovered through the incremental capacity charge. Rather, the conflict costs would be implicitly shared amongst all users of the network and recouped through the existing components of the reference tariffs.

QRNA was critical of this approach in the circumstance where it was required to undertake unanticipated capital expenditure to provide sufficient additional capacity to allow a mine to replace an existing reference train service with a slower non-reference train service. QRNA argued that it would not be in a position to adjust reference tariffs to reflect that additional expenditure until the next review of the reference tariffs.

The Authority believes that QRNA's concerns are somewhat over stated. In the course of assessing QR's access undertaking, the Authority identified significant spare capacity on a number of systems, including the Blackwater system. Consumption of that spare capacity, by replacing an existing reference train service with a slower non-reference train service, would generate additional revenues for QR even using the Authority's proposed approach. Any such additional revenue could support expansion of the rail network at no net cost to QR. However, the likelihood of QR being in this position in the very near future is remote given the remaining duration of the existing coal haulage agreements.

Nevertheless, the Authority acknowledges that the set of circumstances outlined by QRNA could arise. To avoid the uncertainty this would create, the Authority is willing to work with QR to establish a mechanism to ensure there is no net cost to QR from the entry of non-reference train services on the network. This work could take place either in the context of the 2003 review of the existing undertaking or in the lead up to the approval of a new undertaking that will take effect from 1 July 2005.

In conclusion, the Authority has maintained its view that the capacity consumption of a particular train should be determined by the simple ratio of the network's capacity for the predominant train relative to the proposed train. The Authority's primary consideration in reaching this conclusion is that the conflict costs associated with the interaction of different train types should be attributed to all train operators on a system. The Authority believes that it would be discriminatory to seek to allocate all such costs to the operators of the non-predominant train. Moreover, in the early stages of the operation of the access regime, such an approach is likely to establish a significant entry barrier and provide the incumbent, QR trains, with a competitive advantage over potential new entrants.

In addition, the Authority believes that its proposed approach provides a better balance between simplicity and accuracy in comparison to QRNA's proposed approach. The Authority has not been convinced that the added complexity of QRNA's proposed approach can be sufficiently justified on the basis of providing a more accurate assessment of the capacity consumption of a particular train. Indeed, the Authority believes that it would be very difficult to provide an accurate and reliable estimate of train conflict costs and that an inaccurate estimate may do more harm than good.

While the Authority's proposed approach shares the impact of conflict costs across all users, it does require an operator to meet the cost of capacity consumed solely by an operator's choice of train type. The Authority believes the resulting incremental capacity charge will provide a sufficient signal to new entrants to seek to limit the consumption of network capacity. Equally importantly, this charge will not seek to discourage new entry simply on the basis that conflict costs are inappropriately, or imprecisely, allocated to the operators of non-predominant trains. Added to this, the Authority's proposed approach requires only two estimates of network capacity. The Authority believes that this simplicity will limit the grounds for access disputes and is therefore consistent with the underlying objective of the reference tariff approach.

The Authority believes that this simplicity will be further enhanced, and the likelihood of disputes will be further reduced, if the modelling work used to generate the train path estimates is carried out using a readily available simulation package such as MTrain. By relying on a commercially available simulation package, the resulting estimates of a particular train's

capacity consumption should be more easily replicated either by the parties engaged in access negotiations or by the Authority in the context of arbitrating an access dispute.

While the Authority has maintained the principles set out in the December 2001 technical paper, the Authority recognises that these principles need to be couched in terms of QR’s access undertaking. QR’s access undertaking defines the characteristics of a reference train service and sets out the associated reference tariffs and does not specifically refer to predominant and non-predominant trains. As a result, the principles for calculating capacity consumption should also be defined in terms of the reference train service, in particular where a sectional running time is the only difference between the characteristics of the proposed train and the reference train. A separate reference tariff may need to be developed where the characteristics of the proposed train differ from those of the reference train in a more fundamental way (eg the proposed train exceeds the maximum axle loads or train lengths or the nature of the traffic requires different level of priority).

The Authority has concluded that the access charge for a non-reference train service should be determined in accordance with the following principles:

- estimates of the system capacity, in terms of maximum number of train paths for a reference and non-reference train service should be carried out using a readily available simulation package;
- the estimate of the incremental capacity consumption of a non-reference train service should be determined according to:

$$r = \frac{\text{maximum number of referencetrains at full utilisatio n}}{\text{maximum number of non referencetrains at full utilisatio n}}$$

- the incremental capacity consumption charge of a non-reference train service should be determined as the product of the ratio “r” and the reference tariff.

While the QMC and PN supported the Authority’s approach to calculating the capacity consumption charge, they did question certain detailed aspects of how the above principles might be implemented in practice.

The QMC argued that the reduction factors used to generate the system practical capacity from theoretical capacity need to be specifically estimated and that further work needed to be conducted to reconcile system capacity with performance, including verifying the methodology for quantifying conflict costs and providing transparency for the relevant input data (eg system running times).

In considering this matter, the Authority notes that the application of a reduction factor to both the numerator and the denominator of the weighting factor will not alter the r ratio nor have a material impact on the calculation of the capacity consumption of a non-reference train relative to a reference train. Consequently, the Authority has not included the reduction factor as one of the principles in this Guideline. However, this is not to suggest that the Authority does not accept that practical capacity is a relevant consideration in determining a capacity consumption charge. Rather, it is simply a recognition that the question of practical capacity enters the equation through the determination of the reference tariff. That is, the capacity consumption component of the reference tariff is based on the number of additional (practical) train paths generated by a capacity expansion project.

In addition, the Authority acknowledges that further work could be undertaken to provide a greater understanding and transparency on a range of key performance characteristics of QR’s network. However, the Authority does not believe that it is necessary for this work to be undertaken as part of this Arbitration Guideline as many of the issues raised by the QMC are more relevant for the determination of future reference tariffs. In this regard, the Authority notes QRNA’s offer to provide a greater understanding of its approach to modelling capacity consumption and sharing relevant information. The Authority will raise these matters with QRNA with a view to establishing a public consultation process.

PN sought clarification on whether the calculation of capacity consumption would specifically be based on transit times which reflected a range of factors such as train characteristics (eg speed) as well as train priority. PN also questioned how other features of a non-reference train service, such as over-length trains, would be included in the determination of a train’s capacity consumption.

The Authority accepts that the actual performance of trains and the network will be dependent on a range of operational considerations consistent with the network management principles (eg scheduling and train control). However, the Authority does not believe that train priority should be a relevant consideration in determining the capacity consumption for a non-reference coal carrying train service.

First, QR’s access undertaking provides that all coal carrying train services will receive the same level of priority. Consequently, train priority should not have a systematic impact on the determination of the relative capacity consumption of reference and non-reference coal trains.

Second, the Authority believes it is necessary to abstract from the real time operation of trains and the network when determining the capacity consumption charge. By doing so, the Authority believes that capacity consumption will be determined in a transparent manner and it will ensure that reference and non-reference trains are treated consistently. Consequently, the Authority’s approach will be to focus on the relative technical characteristics (eg sectional running times) of reference and non-reference trains when determining a capacity consumption charge.

Nevertheless, the Authority recognises that a particular train service (eg passenger) may be determined as consuming a greater amount of capacity in a range of circumstances including where it is afforded a higher level of priority over the coal carrying train services or where it is over-length. However, the Authority believes that such train services are significantly different from the currently approved reference train services and should therefore be subject to their own separate reference tariff. Consequently, the matters raised by PN are beyond the scope of this arbitration guideline as they would need to be addressed in the context of the approval of a reference tariff for those services.

While the Authority believes that many of the issues raised by the QMC and PN are beyond the scope of an Arbitration Guideline, it recognises that the arbitration principles do not document in detail the procedural steps that will be adopted in determining the capacity consumption of a non-reference train relative to a reference train. Consequently, the Authority has developed the following procedural notes that set out in more detail how the Authority intends to apply these arbitration principles. It is the Authority’s intention to apply these procedural notes in a flexible manner to reflect the circumstances of a specific case.

Procedural notes

Step 1. Validate technical specifications of the access seeker’s proposed train. This step includes establishing the locomotive, wagon and train rolling stock characteristics for

input into a simulation model. For example, the locomotive tractive effort curve, train braking and train wind and rolling resistance characteristics are established.

- Step 2. Validate the technical specifications of the relevant infrastructure’s current reference train. Parameters enabling simulation of the reference train are established in the same manner as Step 1.
- Step 3. Input the relevant infrastructure configuration data into a commercially available computer package (eg MTrain) and validate the operation of the model to ensure accuracy and reliability. This step involves converting the configuration data to a format that is compatible with the computer program and validating the data with that provided by way of visual printout and trial operation.
- Step 4. Simulate the operation of the reference train over the relevant infrastructure. This step involves simulating the reference train in such a way as to establish its run times from section to section (passing loop to passing loop) in both the forward and return journeys without stopping except at the origin and destination. The train paths implied from these simulation results are then plotted to establish the maximum number of trains (forward and reverse) that could be operated in any 24 hour period over the network in question. If in order to provide for a maximum number of trains over the 24 hour period, a train needs to stop to permit a passing operation (on single track) then the train is stopped and then started after the other train has passed. The criteria for the simulation are:
 - An equal number of forward and reverse trains must operate during the 24 hour period.
 - Trains must be able to operate in the simulation such that they operate in accordance with the infrastructure configuration in terms of permanent speed restrictions, curve speeds, signal configuration and grades, and that they operate in perfect running conditions for the rolling stock configuration provided.
 - Where a train stops for the passing of another train, an allowance of extra time for the section is added to the ‘free running’ (pass to pass) time. This extra time allowance is to be determined by simulating a start and a stop at each passing loop and using the appropriate time allowance at each stop.
 - This operation could also be performed by utilising features of the computer model (eg MTrain) that permit the insertion of an increasing number of trains onto the network until saturation occurs. In any event, a hypothetical maximum ‘saturated’ capacity of the network is established where trains are assumed to operate under ideal conditions where no delays occur (other than crossing delays) and no breakdowns or temporary speed restrictions are imposed.
- Step 5. Step 4 is repeated except that the access seekers’ proposed train is the subject of the simulation. Similarly, a maximum number of access seekers’ trains are hypothetically deduced. The simulation carried out for the proposed train is undertaken on an identical basis to that used for the reference train.
- Step 6. Calculate the ratio (r) of the maximum number of reference trains (as calculated in Step 4) to the maximum number of proposed trains (as calculated in Step 5). In this calculation, any difference in transit time between the two operations is ignored. A simple ratio of maximum theoretical number of trains is established regardless of the effect on transit time. Clearly, if there is a difference in the maximum number of trains

that can operate, a difference is likely to be evident in the transit times displayed by the reference and proposed trains. However, the method is purposefully insensitive to transit time as this parameter is a matter for the train operator and will be subject to many other considerations.

- Step 7. The component of access price relating to the consumption of network capacity for the access seeker is then calculated as the reference train path tariff component multiplied by the ratio (r) calculated in step 6. For example, if, for the reference train the maximum theoretical number of trains that could operate is 100 and for the access seekers' train, the maximum number is 50, then the access seekers' price for network capacity consumption is twice that of the reference train.