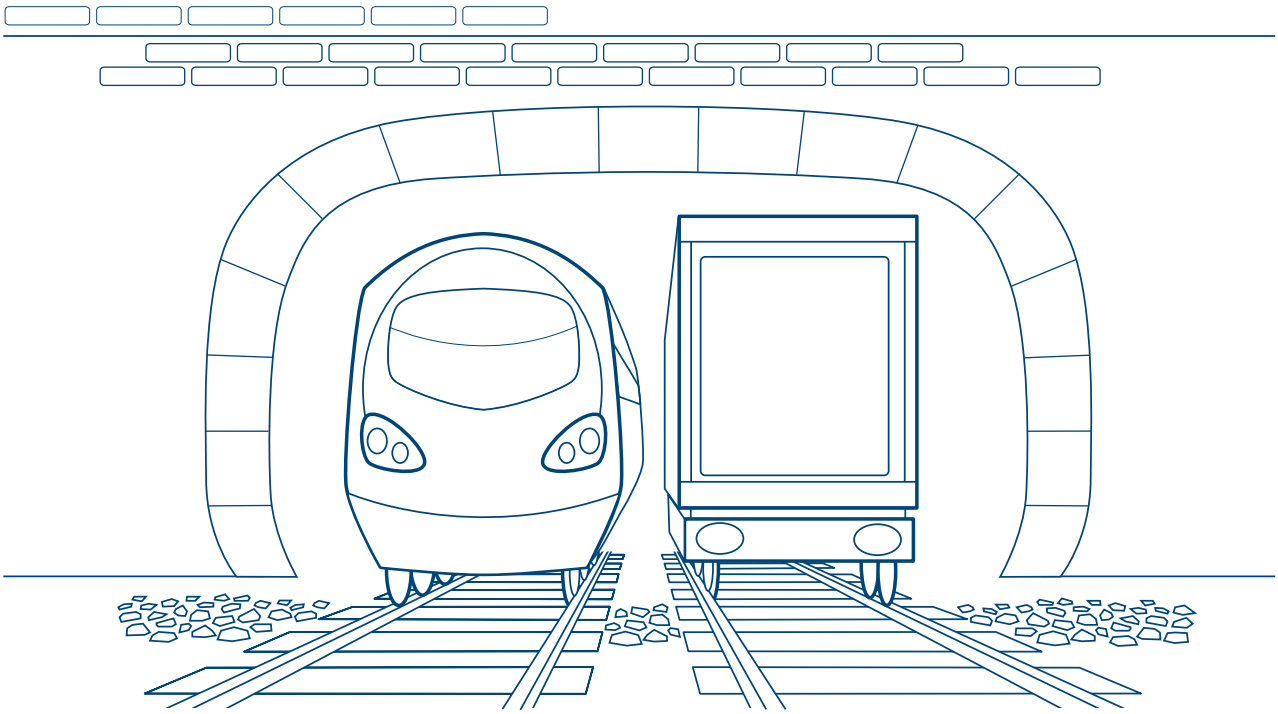
BRITAIN'S RAILWAY, PROPERLY DELIVERED

STRATEGIC RAIL AUTHORITY

Gauging Policy



Executive summary

Why a gauging policy?

Gauging is the process of ensuring that trains safely fit inside the space available within the railway infrastructure (e.g. platforms, tunnels and bridges). This simple concept can become quite complex in practice, depending on:

- The static size and dynamic behaviour of a train, including in various 'failure' modes. The speed of the train, whether or not it tilts and the suspension system are all important;
- The position of the track on which the train runs (determining the train's proximity both to vehicles running on adjacent lines and to the railway infrastructure); and
- The management of this track position over time (since ballasted track moves in service).

There are many gauges on the network. A Gauging Policy is needed to ensure that the industry makes the best use of its existing rolling stock and infrastructure. Gauge enhancement capital projects involve modifying track or structures to increase the available space. Since track, train and structures all have long life cycles, any widespread change is likely to be slow. A long-term target gauge configuration for the network is needed so that passengers, freight customers, the industry and funders all reap maximum benefit from these projects.

Consultation

In November 2004 the Strategic Rail Authority published a consultation on a proposed Gauging Policy. Responses were invited from a wide range of stakeholders as well as the general public. A total of 57 responses were received. The responses came from all sections of the rail industry, the Office of Rail Regulation, Department for Transport, other public bodies and private individuals. It was notable that no respondents indicated any material disagreement with the overall need or aims of the Policy.

There was a strong message from local and regional bodies that they were looking for a more ambitious Policy. They wish to see gauge enhancement used to help stimulate new freight and passenger markets. Responses from within the rail industry generally offered technical comments though here again there was also some feeling that the Policy was not sufficiently ambitious, and that freight gauge improvements and an interoperable passenger gauge should be short term goals. It has been possible to address some of the concerns in this final version of the Policy; however, the priority is to make the best use of today's rail network. Significant investments leading to step changes in capability are beyond its scope.

The publication of the SRA's Gauging Policy follows the completion of the consultation process and fulfils a commitment in its Rolling Stock Strategy (December 2003). The Policy also takes into account the SRA's draft strategy 'Railways for All' published in March 2005.

The industry's role

The Policy is the product of close collaboration between the SRA and the Vehicle/Structure Systems Interface Committee (V/S-SIC) and is the result of over 12 months' work by three cross-industry working groups chaired by the SRA. These groups have had to address many issues but key concerns are lack of clarity about the gauge of the network and the laborious process associated with vehicle approvals. The Policy summarises the main findings of the groups and their proposals. The Railways Act 2005 abolishes the SRA and therefore the implementation of the Policy will pass to the V/S-SIC which is facilitated through a cross-industry protocol by the Railway Safety and Standards Board (RSSB). It is expected that the whole industry will support the V/S-SIC and RSSB in implementing the Policy, which will bring long term benefits to passengers, freight customers, the industry and funders.

Objectives and policy

The objectives of this Policy are to:

- Secure a quicker, cheaper and simpler acceptance process for new and relocated rolling stock;
- Create the opportunity to procure trains offering enhanced passenger space at little additional cost;
- Facilitate freight operations in exploiting the gauge of the network to the maximum;
- Achieve increased flexibility in the deployment of existing rolling stock (leading to higher residual values and a more competitive market); and
- Facilitate a more holistic approach to investment in the industry by looking at the value for money to be obtained from addressing infrastructure at pinch points rather than designing and procuring new fleets of trains.

Key components of the Policy are:

- Detailed maps, supported by descriptive databases defining where both freight and passenger vehicles are cleared to run;
- Much simplified gauging approvals procedures (little formality should be required where a vehicle's gauge is compatible with that stated for the infrastructure);
- A reduced number of standardised passenger vehicle gauges, in most cases larger than those in use today and optimised for defined types of operations and classes of route, each able to operate over an extensive portion of the network;
- A defined 'core network' for gauge-sensitive freight traffic;
- A wider range of standard and more easily comprehensible freight vehicle gauges to best suit the markets' requirements and reap maximum benefit from the available gauge opportunities;
- A target structure gauge configuration defined on a route-by-route basis, taking account of both passenger and freight needs; and
- Optimised track position, to be achieved over time by routine maintenance with new and renewed structures being built to the defined gauge.

Contents

Chairman's foreword

Gauging is about the 'fit' between trains and the structures of the railway, such as platforms, bridges, and tunnels. 'Fit' is not just a matter of the static dimensions of trains and structures: it is governed by the dynamics of the movement of vehicles of a passenger or freight train at different speeds, and by the configuration and movement over time of the track.

Why is gauging an issue? Because of the historical origins of Britain's railway, coupled with the range of new rolling stock coming into service with new physical and performance characteristics, it is a challenging task to optimise the 'fit' for the future. Working out how best and when to modify structures to achieve gauging objectives, and what specifications to adopt for rolling stock presents complex technical and commercial challenges that can only be addressed on an industry-wide basis. The Strategic Rail Authority (SRA) has taken the initiative to bring the industry together to look at gauging policy in a strategic, long-term way.

I am therefore delighted that so much of the rail industry and wider stakeholders have not only participated so enthusiastically in the working groups which led to the draft Policy, but have also responded in the consultation that has now enabled us to publish this policy with confidence. This document summarises our improved understanding of the real possibilities that a more co-ordinated approach to gauging issues can offer. It also discusses less visible yet significant structural and procedural challenges that have been made and which are being addressed as part of the industry's day-to-day activities. As a result, the rail industry's knowledge base has been increased, highlighting the potential for industry to provide better services for both freight customers and the travelling public.

I recognise that many stakeholders would like to see investments in gauge enhancement used to expand the role of rail in both passenger and freight markets. Regrettably that is not within the scope of this document. However, it is heartening to note that much can be done during the course of programmed work, and at no additional cost, to improve the available gauge. Allied to this is the value of a defined target network configuration to provide context and direction for such improvements. This also provides a platform for the industry and its partners to consider what further investment-led enhancements might be supported by business cases and progressed as and when the industry can raise funding. And perhaps just as important is to highlight those areas where no justification has been found for gauge enhancement.

The role of Network Rail in the management of the railway infrastructure, and the knowledge relating to its configuration, is absolutely fundamental to this process. The work referred to within this document, and on which our proposals are based, has built upon the foundation of the database resulting from Network Rail's recent National Gauging Project. Network Rail's continued active engagement with its customers will be crucial in realising the benefits outlined in this Policy. In conveying my appreciation of their work and enthusiasm to date, I would encourage them to continue with determination to build on the significant step forward they have already made towards declaring the gauge capability for each route.

As envisaged in the White Paper ‘The Future of Rail’, and subsequently legislated for in the Railways Act 2005, the SRA will be wound up by the end of 2005. However, many of its functions will continue in some form within a revised industry structure. I am delighted that the Vehicle/Structure Systems Interface Committee will take on the implementation of the Policy and I am confident that they will be supported in this by the rest of the industry. I look particularly to Network Rail, the Office of Rail Regulation and the new Department for Transport Rail team to provide the backing needed to deliver the very real benefits this Policy offers.

Finally I would like to emphasise my belief that this Policy will help to ensure the best use of the rail infrastructure, and the vehicles that use it, to the benefit of the railway’s users and those businesses and communities that rely on it.

David Quarmby
Chairman
Strategic Rail Authority

1 Introduction

1.1 The factors determining whether a train can safely fit along a given piece of railway are broadly dictated by:

- The static size and dynamic behaviour of the train. (The train's speed and whether it tilts are a factor here);
- The available space within the railway infrastructure (e.g. size of tunnel, headroom beneath bridges, etc); and
- The position of the track on which the train runs within that space (determining the train's proximity both to other vehicles running on adjacent lines and to the railway infrastructure).

There are other factors such as the track quality (roughness) and the impact of lateral aerodynamic loads which also need to be taken in to account though these are not a significant aspect of the Policy.

1.2 Effective management of the track position (which can move over time) is crucial in maintaining the optimum clearance for the passage of trains.

1.3 Gauging may be thought of as the process of managing all these factors, with the strategic aim of operating the size of train most appropriate to the railway's customers, be they passengers or freight operators, along a given route.

1.4 Britain's early railways were built before any common standards were developed. Over the decades, a large number of different 'structural gauges', describing the space defined by the infrastructure (as distinct from the 'track gauge', which defines the distance between the rails) have therefore been created. As a result, some rail passenger vehicles are bespoke to the (non-standardised) structural gauge along specific routes for which they have been bought, and to which they are subsequently restricted in operation. Simultaneously, confusion and commercial uncertainty have developed over what freight traffic can move where on the network.

1.5 For passenger and freight operators, the introduction of new vehicles to the network, or even changes to their routing, can involve the laborious risk management of trade-offs (for example, deciding between enhanced track inspections and physically moving the track). To complicate matters further, those gauges that have been defined, have been done so in different ways (e.g. static, kinematic or hybrid methods). While it is not the object of this Policy to comment on this level of detail, the lack of transparency and sometimes poor general understanding of gauge-related matters are a constraint on train and network operation and engender inefficiency within the rail industry.

1.6 'Gauge enhancement' capital projects involve modifying track or structures to increase the available space. Since track, train and structures all have long life cycles, any widespread

change is likely to be slow. A long-term policy is therefore required to make significant improvements to the available gauge across the network.

1.7 This document identifies the major barriers to efficiency inherent in the current management of gauging, as well as the benefits that could be derived (sections 2, 3 and 4). It discusses principles (section 5) for how the gauge of Britain's network should best be exploited in the short term, as well as proposing courses of action to achieve longer-term benefits in line with a strategic future network configuration. Specifically, its proposals concern freight and passenger vehicles (sections 6 and 7, respectively); the processes that support their management (section 8) and the fixed railway infrastructure (section 9) upon which all of these depend. Proposals for implementation are discussed in section 10.

1.8 Key components of this Policy, described in more detail in section 5.2, include:

- Detailed definitions of where vehicles are cleared to run;
- Simplified gauging approvals procedures;
- A 'strategic network' for freight traffic, with clearer gauge definitions; and
- A target gauge configuration for the network and 'Route norms' for structure gauges to apply on a route-by-route basis.

1.9 This Policy does not require substantial additional investment in the rail network; indeed, many of its benefits will be obtained by paying attention to achieving greater certainty over the position of the track relative to the infrastructure. Instead, it defines a framework for decision-making and incremental improvement within the ongoing processes of operation and renewal of infrastructure and rolling stock, offering opportunities to make the most appropriate use of the available space. Perhaps most importantly, this Policy has been developed in close collaboration with representatives of the key affected stakeholders within the industry.

1.10 Gauging is not the only factor to be considered in determining whether or not a train may run along a certain route. Speed, axle weight, cumulative tonnage and electro-magnetic effects are just a few of the other important considerations. Nevertheless, obtaining gauge clearance can often be a major cause of cost and delay in the introduction of rolling stock. Any improvements to current procedures will offer substantial benefits to the rail industry.

1.11 The implementation of this Policy will take due cognisance of emerging findings from Route Utilisation Strategies, Regional Planning Assessments, other ongoing planning work and when available the Department for Transport's 'High Level Output Specification'. The industry must also respond to its obligations under the Disability Discrimination Act.

1.12 Where routes and flows are discussed these are as a result of consideration of current and forecast markets. No attempt has been made to use this policy for the stimulation of new markets.

2 Background to this Policy

Overview

2.1 Following consultation, the Strategic Rail Authority published its Rolling Stock Strategy in December 2003. The document made a commitment to consult on a gauging strategy by the end of 2004. The commitment was realised as a Gauge Policy which was published for public consultation in November 2004; this document represents the finalised Policy.

2.2 Subsequent to the publication of the SRA Rolling Stock Strategy, the National Audit Office report into rolling stock procurement 'Improving Passenger Rail Services through New Trains', published on 4 February 2004, emphasised the need for streamlined vehicle acceptance procedures, of which gauging is an important element.

2.3 Both of these documents, together with preliminary work carried out by the Gauging Stakeholder Board (now the Vehicle-Structures System Interface Committee, or V-S SIC) have highlighted the economic need, and the widespread industry support, for a Gauging Policy.

2.4 This Policy has been developed by three cross-industry working groups chaired by the SRA and facilitated by the V-S SIC. The SRA is grateful for the time and energy given freely by the participants and their sponsoring organisations, without whom this Policy would not have been possible.

2.5 Much more detailed technical work has been carried out than can be published in such a consultation document. Some of this work is already leading to improvements, while other activities support the definition of a longer-term target gauge.

2.6 It is anticipated that more detailed technical documents will be issued as the need arises by appropriate industry bodies as guided by the V-S SIC.

Freight traffic

2.7 To date, the gauge for freight traffic has developed over time on particular routes, with loads in some sectors growing in physical size to make the best use of the space available. This is allied to an international trend towards higher containers and swap bodies driven by customers' requirements.

2.8 Furthermore, little information on existing routing options for freight traffic has historically been published at an operationally-useful level of detail, meaning that operators and their customers have poor visibility of the range of existing routing possibilities.

2.9 Rail freight operates in a competitive market and needs to maintain customer confidence that it can deliver their requirements. Confidence in a sustainable freight market means not only reliable train paths to meet customer requirements but also the structural gauge information to allow maximisation of loads, direct routing and the knowledge to respond quickly and accurately to enquiries regarding new flows.

2.10 A number of freight-specific gauges have been defined over the years. However, there is no strict hierarchy within them (i.e. the gauges do not 'nest' neatly one inside the other as their overall size increases) and different methodologies have been used in their definition, requiring in turn different methodologies to apply them in practice. Moreover, some of these gauges were predictions of likely need and do not adequately correspond to the full range of specific wagon and load combinations now in use.

2.11 Procedures for the approval of freight train consists are based on the widespread use of paper-based RT3973 'exceptional load' out-of-gauge forms, which refer to individual load-wagon combinations rather than declared gauges. Bespoke copies of the form are required for the majority of intermodal freight traffic, leading to a burdensome and potentially error-prone process.

Passenger vehicles

2.12 Other than the historic and now largely redundant C1 and C1 Appendix A gauges, there are few published gauges for passenger vehicles, while the network itself is characterised not in terms of passenger gauges but rather in listings (published by Network Rail in its 'Sectional Appendices') of which vehicles can run where. New vehicles have therefore largely become bespoke, and are now captive to individual routes. This lack of gauging transparency significantly complicates route clearance and increases the associated commercial and financial risks to train operators and their supply chain. The residual value of vehicles notably often reflects their restricted proven route capability.

2.13 The approvals process for new trains is slow and cumbersome though the Office of Rail Regulation, and the rest of the industry have gone a long way to improve this. Insufficient transparency of the network's gauge capability and conservatism within the approvals system, allied to the understandable reluctance of manufacturers and owners to take approvals risk on either initial introduction or future cascade to other routes, have led to the adoption of what is known as 'comparative gauging'. This process proves that any new design of vehicle sits within the shadow of an existing one, thus leading to the design of smaller trains. The potential for modern gauging techniques and the supporting data to permit the design and operation of larger trains, as well as the adoption of more streamlined acceptance procedures, is not being exploited.

2.14 Modern kinematic gauge definitions are the intellectual property of the respective manufacturers and for sound commercial reasons they have been unwilling to release details. This situation can represent a barrier to the acceptance of other vehicles that could be shown to fall within the swept envelope (or 'shadow') of another vehicle already regularly using the route and thus be more readily cleared by a comparative gauging approach. While this approach has some value, the object of this policy is to maximise the use of the network and this requires a move away from comparative gauging. Hence while access to manufacturers data would be useful and is to be encouraged, in the longer term this policy envisages such access would become unnecessary.

Current state of gauging practice

2.15 The requirements for gauging analysis and interpretation are currently set out in the relevant Railway Group Standards, supported by Network Rail's own technical standards and procedures. 'ClearRoute' is a commercially available analytical tool that is widely used across the industry, whose workings reflect the requirements of the relevant standards. This package is approved by Network Rail and the infrastructure profile data within the National Gauging Database can be read directly into it. A vehicle library containing details of all vehicles operating over the network is also held. This Policy recognises that ClearRoute is currently unique in the market; however the industry would welcome the development of alternative future products

2.16 The correct use of analytical tools enables an accurate determination of the physical clearance between trains and line-side structures to be made (dependent nonetheless on the age and precision of the infrastructure measurements recorded in the first place), taking account of all relevant tolerances and other factors. As with any analytical design process, the effective use of such tools is reliant on the correct input of design parameters and data and on the skill and experience of the operator or designer to interpret the results properly in order to target further investigation and testing as necessary.

2.17 Concerns currently remain about the skills and experience of both the operators and those who interpret and build upon their findings. The first aspect is being addressed by improved technical training and certification. The second requires an expansion of the number of individuals who hold a complete knowledge of railway infrastructure engineering; as such this is more difficult to tackle. The need to develop this quality of interpretation has been one of the drivers behind Network Rail's creation of a national Track Geometry and Gauging team. This team has captured a large amount of data though it is recognised that the data does not yet fully meet all user needs.

2.18 A key area is the appropriate application of tolerances to reflect adequately the degree of confidence in and control of track position. Real expertise in these aspects relies upon mastery of related data from a variety of sources, as well as sampling and verification techniques.

2.19 Errors and double-counting may arise in the application of gauging tolerances. Gauge assessment based upon likely risk is needed to validate a project and to support investment decisions. In the past gauging schemes have often appeared unaffordable and projects either shelved or significantly delayed due to poor understanding of these issues and a consequently over-conservative approach.

2.20 The key issue in this analysis is how apparent fouls between the vehicle and the fixed infrastructure are dealt with. 'False negatives' are a common occurrence, whose elimination requires experienced interpretation and effective investigation.

2.21 There has often been evidence of a lack of a 'systems-based' approach. Vehicle specialists can be guilty of assuming an absolutely fixed track, while permanent way engineers have sometimes treated the train as an invariable object. Reality is not so simple, the position and quality of the track and the effect of suspension and lateral aerodynamic loads can affect the results.

2.22 Prior to rail maintenance work being brought in-house by Network Rail, different Infrastructure Maintenance Contractors adopted widely differing approaches to gauging. Some tried to carry out gauging exercises themselves (but without any agreed vehicle references); others used 'through alignments' passed structures. Elsewhere some parts of the network are gauged in absolute terms (i.e. in x and y co-ordinates). Progress will be achieved by defining track position as part of a more holistic approach to managing route geometry. Additionally track must be accurately positioned to enable line speeds, vehicle ride and gauge clearances to be maintained and optimised for speed potential and vehicle ride as well as gauge clearances, especially on major routes.

The opportunity

2.23 The recently completed National Gauging Project has resulted in a step change in the availability of data to support gauging decisions through the development and population of the National Gauging Database, the development of means such as the Structure Gauging Train to keep it refreshed and the fitment of datum plates to platforms and 'reduced clearance' locations. Though incomplete in some respects, a 'virtual' picture of the whole network is now available. There is a need to not only eliminate some 'rogue' data but also to maintain the database with the output from ongoing measurement by increasingly sophisticated techniques. Nevertheless, the gauging database now offers opportunities to improve both operational processes and strategic planning.

2.24 Building on this Database, tools and techniques are now available which, combining high-performance computers and specifically tailored software, can economically identify previously unknown network capabilities and open up opportunities for a radical new approach to gauge management.

2.25 Through a greater understanding of the infrastructure and its physical size, it should now be practicable to determine and define the capability and the limiting profile of each route as well as to identify key constraints and make plans to tackle them. Routes could be characterised by their limited profile. Where vehicles are specified to meet, or can be demonstrated to be compliant with the limiting profile it should be possible to achieve vehicle gauge acceptance in a single step, requiring the very minimum of infrastructure checks or physical work.

2.26 Even after the characterisation of corridors and the other initiatives discussed in this document, there will still be a need for gauging work, primarily to explore and exploit the opportunities to further enhance network capability. There will be a continuing requirement to monitor track position to detect movements in service of track, its supporting formation, platforms and structures. Pragmatic decisions will be required where, for example, it is proposed to raise track during tamping activities to assist in track drainage. Special loads will still need to be assessed on a case-by-case basis.

3 Objectives

3.1 While noting that many stakeholders would aspire to a step change in gauge capability the primary objective of this Policy is to make the best use of the capabilities of the current infrastructure, by exploiting the 'latent gauge potential'. In many cases, vehicles could run on parts of the network to which they are currently not admitted, if only it were known that they could readily be cleared to do so. Greater understanding of the capability of the network will allow operators to take advantage of these opportunities.

3.2 Other objectives of this Policy are to:

- Facilitate where appropriate, and subject to a business case, the introduction of new, larger passenger vehicles by making the best use of available space;
- Facilitate the cascade of passenger rolling stock to alternative routes over their life cycle;
- Increase the residual value of rolling stock through increased transparency of network capability and simpler approvals processes, thus reducing route acceptance risk;
- Protect existing flows and enable growth in the gauge-sensitive rail freight business;
- Improve the options for routing freight vehicles and carrying larger loads in response to market requirements, thus aligning to social pressure and the stated governmental intent to increase rail market share;
- Define future infrastructure and vehicle requirements from a gauging perspective, and thus highlight business opportunities to interested parties;
- Standardise and simplify current operational gauging interfaces, notably reducing the time to answer requests to authorise freight traffic and to approve both new passenger vehicles and new routes for existing passenger vehicles; and
- Ensure that Britain makes the best use of the opportunities offered by the technical harmonisation required by European Interoperability Directives (implemented through Technical Specifications for Interoperability (TSIs)) while at the same time not restricting this country's ability to operate and improve its rail network.

3.3 This Policy also recognises the need, as business cases are established and funds become available, to align network gauge enhancement with identified business priorities and ensure a co-ordinated approach offering the best value-for-money. It should be stressed that such funding should not necessarily be expected to come from the public sector: where private sector beneficiaries are clearly defined then appropriate investment contributions will be sought.

4 Benefits

General

4.1 Many benefits will accrue to different sectors of the rail industry from the pursuit of the major aims of this Policy and the implementation of its proposals.

4.2 Greater clarity regarding the available infrastructure gauge, and those vehicles that can operate within it, will facilitate the diversionary routing of services during planned maintenance work, or peturbed operations. This will thus reduce the negative impact on performance. There should be consequentially greater flexibility when initially planning timetables, and providing different routing options for freight and passenger services thus relieving congested points.

4.3 More efficient assessment tools and the adoption with a long-term target gauge configuration endorsed by the whole of industry will allow investments in gauge enhancement projects to be more efficiently targeted and facilitate of greater co-ordination between passenger and freight gauging.

4.4 Network resilience should improve as more routes are declared accessible, thus aiding service recovery following peturbed operations.

4.5 These activities should also assist Network Rail in fulfilling its obligations under the European high-speed infrastructure Technical Specification for Interoperability (TSI), its Network Licence Condition 24 and the Network Code Part K to provide details of its network.

4.6 The rolling stock supply industry, Train Operating Companies, Freight Operating Companies and Rolling Stock Leasing Companies should benefit from improved confidence in the industry's future requirements and the associated opportunities.

4.7 Acheiving a rail network more consistent with that of our European partners will facilitate the flow of freight and passenger traffic and help deliver the UK mandate for European interoperability. The Policy should also help deliver the SRA's aims set out in its 'Railways for All' consultation (March 2005).

Passenger benefits

4.8 In respect of passenger services, the opportunity for maximum load-carrying capacity and comfort will be obtained within the available space, and rolling stock will be approved to run over the largest possible range of the network.

4.9 The residual value of passenger rolling stock should increase, through the highlighting of alternative routing possibilities (e.g. for vehicle cascade) and the reduction in cost and uncertainty during the route acceptance processes (both for new and cascaded vehicles).

4.10 Transparency over routing possibilities will facilitate the development of standardised vehicles, with cascade designed for, from the outset. Such standardisation will have supply chain advantages, such as being able to procure more of the same vehicles in a given production run.

4.11 Larger passenger trains should be possible where not limited by other constraints, allowing operators and market forces to trade off greater comfort against greater capacity and the need for, and cost of, fewer vehicles.

Freight benefits

4.12 The principal benefit to rail freight will be the ability to maximise loadings by taking advantage of more generous gauge where it actually exists. This will be particularly helpful in the movement of maritime containers and swap bodies although other traffics will also gain. The clear definition of gauge will also reduce the transaction costs currently incurred on establishing route capability on a less structured basis.

4.13 The freight industry should also benefit from the reduction in time and cost of clearance assessments for new or revived traffic.

5 The key components and funding of the Policy

5.1 This Policy statement, together with the greater detail that has been developed as part of its preparation, seeks to address current gauge-related problems as well as setting out a methodology to achieve a target gauge configuration for the network.

5.2 Key components of the Policy are:

- Detailed maps, supported by descriptive databases defining where both freight and passenger vehicles are cleared to run;
- Much-simplified gauging approvals procedures (little formality should be required where a vehicle's gauge is compatible with that stated for the infrastructure);
- A reduced number of standardised passenger vehicle gauges, in most cases larger than those in use today and optimised for defined types of operations and classes of route, each able to operate over an extensive portion of the network;
- A defined 'core network' for gauge-sensitive freight traffic. A wider range of standard and more easily comprehensible freight vehicle gauges to best suit the markets' requirements and reap maximum benefit from the available gauge opportunities;
- A target structure gauge configuration defined on a route-by-route basis, taking account of both passenger and freight needs; and
- Optimised track position, to be achieved over time by routine maintenance with new and renewed structures being built to the defined gauge.

5.3 The Policy takes account of both spending constraints and the need to achieve value for money. However, over time the Policy will bring substantial benefits simply by harmonising the standards to which work that is being carried out on a daily basis and funded from routine maintenance, renewals or project-specific budgets. Through successive maintenance and renewal activities, routes will converge towards their target gauge configuration. As soon as a stretch of line between junctions reaches this gauge, the information would be made available. Eventually, and perhaps over many years, only a small number of locations with 'tight' gauge will remain. A business case, based on the market conditions at the time, should then be established for clearing the remaining bottlenecks, funded by the most appropriate party or parties in the prevailing industry structure.

The individual components and their implementation are described in more detail in the remaining sections of the Policy

6 Freight

Overview

6.1 The rail freight industry is well placed to take advantage of enhanced gauge capability, with intermodal traffic having the most to gain. While within this sector there are other flows which could benefit, including 2.6 m-wide refrigerated units, the two principal markets for gauge-sensitive multi-modal freight traffic are currently:

- Maritime containers up to 2.5 m-wide (i.e. from deep-sea ports); and
- 2.55 m-wide swap bodies (from 'short sea' traffic and through the Channel Tunnel).

6.2 There is a trend toward both taller and wider boxes. Currently, approximately one in three containers passing through UK ports is 9'6" high. By 2010, this is projected to double to one in two containers. Exploiting the market for 9'6" high boxes is a priority for rail freight in the UK.

6.3 It is important to be clear that the ultimate aim is not gauge clearance for its own sake, but rather to be able to carry containers, swap bodies and other relevant traffic to the widest possible range of destinations in a way that utilises current capability as effectively as possible and at the lowest cost in terms of infrastructure and operational expense. To do this, each route, or group of routes, requires a gauge that is fit for purpose and meets the need of the market it serves. It should be noted that the answer to a gauging constraint is not always an infrastructure-based solution. It might, for example, be more viable to continue to use lower wagons for certain freight flows.

6.4 Recent gauge modelling exercises have demonstrated that there may be opportunities to make greater use of the network's gauge potential than was previously identified, with the minimum of further investigation. Work has been undertaken to identify what traffic currently runs where, and what other flows could be accommodated, if the network's capability to support them were identified and the necessary measures taken to translate the specific clearance of a particular flow into a more general clearance.

6.5 This Policy aims to provide long-term confidence to customers and industry at large – a key component is a freight gauge map showing the SRA's analysis, in conjunction with key industry stakeholders, of the priorities and potentials in developing a freight gauge network.

Strategic freight development objectives

6.6 The following map shows a proposed freight network cleared for the transportation of 9'6" high containers, and incremental enhancements to them. It is based on forecasts from currently available data, but intended to be updated on an ongoing basis as new forecasts evolve. In presenting this understanding of the current and forecast freight market, this policy

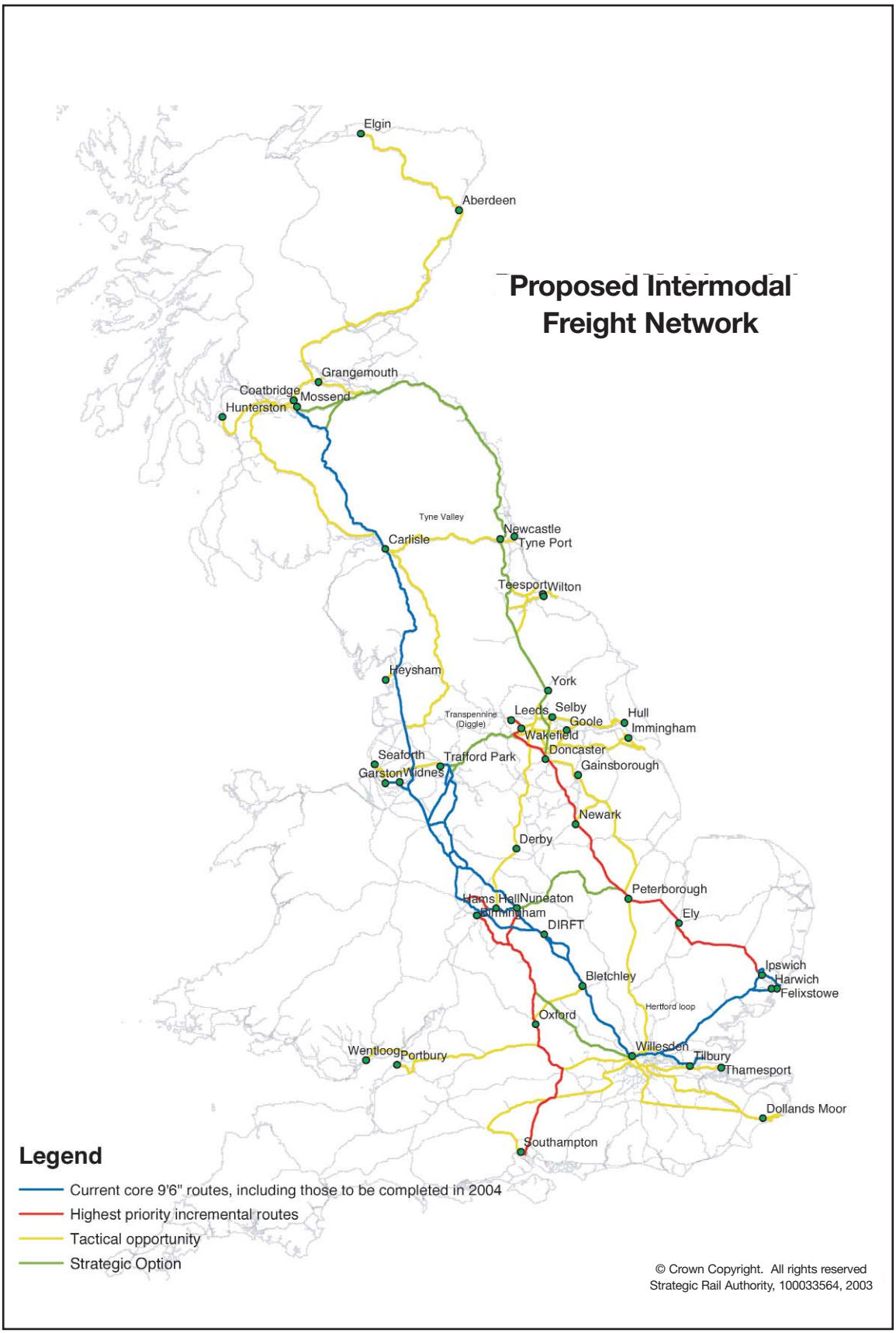


Figure 1 Proposed intermodal freight network

does not reject aspirational enhancements not shown on the map which may be related to other initiatives. Such proposals would however require their own justification and funding.

6.7 Currently only those lines drawn in blue are fully cleared to the gauge required for 9'6" high containers. The red lines have a proven positive business case, but no funding is currently available for their gauge enhancement.

6.8 The other schemes identified (in green and yellow) have not yet been justified in value-for-money terms. A high-level business case would typically consist of an estimate of the cost to clear a route to the desired gauge and a comparison with a calculation of the benefits arising from the freight traffic levels it would permit. Benefits should also be included from Sensitive Lorry Miles calculations. These place a value on the associated reduction in the number of lorry miles removed by increasing rail freight shipments related to the type of roads involved.

6.9 Red, green and yellow lines would not only require a formal business case but would also have to be assessed against other funding priorities.

6.10 Despite these caveats, the benefit of such a map is that all relevant parties can use it to agree where any investment should best be targeted over the years to come. It also highlights those routes that are thought to be less relevant to the transport of traffic that would be affected by gauge enhancement. Improved certainty of the availability of routes would assist freight operators in achieving commitments to long-term flows. Such commitment would in turn allow Network Rail better to concentrate its gauging and maintenance efforts to support this network.

6.11 This Policy proposes that Network Rail should assume ownership of this intermodal freight network map with the intention of publishing and maintaining it on the Internet at a level of detail sufficient for Freight Operating Companies and their clients to plan train movements on the basis of their declared gauge.

Diversionary routes versus maintenance access

6.12 Good performance of the railway requires maintenance works, which mainly take place at night. Since much freight traffic also runs at night, when there are fewer passenger services, freight trains are frequently diverted on to alternative routes. While the delays associated with engineering works can be disruptive for passengers, they may be critical for freight operators if they are unable to meet customer requirements and business is lost as a result.

6.13 The traditional solution to such problems has been to require gauge-cleared freight diversionary routes, since to meet their customers' requirements Freight Operating Companies prefer regular access to the network with a high degree of certainty. The strategic need for diversionary routes, to be used when engineering possessions occupy principal routes and to allow for recovery from unplanned perturbations in operations, is directly linked to the level of disruption that such possessions and other perturbations cause. However, Freight

Operating Companies sometimes also have scope for changing their planning if made aware sufficiently in advance of planned engineering works, obviating the need for diversions. It should also be noted that planned diversionary routes would not necessarily require passage at normal line speed for all traffic. Speeds as low as 5 mph through certain sections could be acceptable if they allowed the traffic to continue, whilst still meeting the customer requirements

6.14 It is clear that a case by case appraisal is required for assessing the diversionary strategy for individual freight routes. It is possible that a stricter and less disruptive engineering maintenance regime may be preferable to spending money on the gauge enhancement of diversionary routes to mitigate the take-up of possessions at short notice. There is a balance to be struck here; it would be valuable to explicitly weigh the benefits of Network Rail's new Efficient Engineering Access approach to possessions, including the option of longer blockades, against the cost of providing freight diversionary routes on a corridor-by-corridor basis and the potential for loss of custom. For example, in some instances it may be cheaper to change maintenance working methods and keep one line (of two or more) open rather than investing to gauge-clear an alternative route. However, there might be further operational and strategic benefits in having alternative routes anyway, especially to mitigate the effects of long blockades needed both for bridge reconstruction and the efficient delivery of renewals.

Defining freight gauges

6.15 Over the years a number of freight gauges, taking into account both the vehicle and its load, have been published. These use a nomenclature Wx where x generally increases with the size of the gauge. The published gauges range from the basic 'W6a' gauge, which is available over the majority of the network, to 'W12', permitting the transport of 2.6 m-wide and 9'6" high containers on most flat deck freight wagons. However, the published gauges do not all have the same rules and they are not nested.

6.16 A problem with the existing suite of gauges is that, due to their stepped nature, it can be prohibitively expensive to enhance a route's gauge to the next largest definition to allow the transport of freight that may not actually require the entire envelope provided by the gauge.

6.17 Even where there is sufficient physical clearance on a route to accommodate the vehicle and its load, this can require a bespoke clearance exercise. One solution to this is to review the load/vehicle combinations that make up the current suite of freight gauges and complement them with new, intermediate, gauges.

6.18 Based on industry's views of requirements over the next 25 years in terms of the markets for International Standards Organisation (ISO) and European containers, swap bodies and wagon fleets, work is now complete on defining a new gauge, 'W11'. This is based on 9'6" high x 2.55 m-wide or 9' high x 2.6 m-wide containers on 980 mm deck height spigot-

fastening FSA-type wagons or 1,000 mm deck height twistlock-fastening KFA-type wagons. This gauge will allow the passage of a significant proportion of anticipated W12 traffic over the next 20 years at a fraction of the enhancement cost. Where W12 is generally considered too aspirational and ambitious for the short to medium term, W11 is a realistic gauge to which a number of routes can readily aspire in the foreseeable future.

6.19 The rail industry has identified that further new or revised gauges need to be considered. These variously increase slightly the definition of an existing gauge, produce new intermediate gauges or are for specific swap body units. In some cases, it may be appropriate for a high-level industry body to sponsor the definition of broadly applicable gauges. In others, those organisations making the request out of their own more specific commercial interests should fund the necessary analysis. In all cases, it is important that all available information on the network's gauge capability be disseminated as widely as possible.

6.20 It is proposed that there be published, at an operationally relevant level, details of what routes can accept which vehicle/load gauge across the whole range of established freight gauges, to be updated as more gauges are defined and the network is enhanced over time. This would not only simplify the current acceptance process, by publishing in advance which vehicles could travel on which lines, but also allow more of the unused potential of the current gauge to be identified and used.

6.21 The need for increasing subdivisions of existing and future gauges leads to the conclusion that in the longer term the current suite of freight gauges should also be renamed to increase its transparency and more closely align it with market requirements. The proposed approach would be to explicitly include both a height and a width parameter. Existing gauges would still be available, and new ones developed to more closely match existing and future freight flows. This new nomenclature of gauges will provide the 'language' in which to express the publication of route gauge capability discussed above.

7 Passenger

Introduction

7.1 Passenger trains are no longer built to nationally defined and applicable gauges, but increasingly, in the absence of declared gauges, cleared for use on individual routes on a case by case basis. Moreover, the vehicle gauge definitions themselves are often deemed to be commercially sensitive and thus not widely disseminated. The desire to reduce acceptance risk while maximising the potential for future cascade (to routes for which there is no defined gauge either) has contributed to increasingly smaller vehicle cross-sections.

7.2 There is a need to reverse this trend, at the same time taking full advantage of the possibilities offered by the National Gauging Database, the broader infrastructure data now being brought together and linked by Network Rail in its Engineering Support Centre and the improved analytical and simulation tools now available. There are, however, particular features of passenger vehicles which must be taken into account, especially the need to balance vehicle clearances to platforms with smaller stepping distances. These two separate requirements can work against each other, especially on sharp radius curves and with respect to passing clearances to freight 'box' vehicles in the vicinity of arched bridges.

7.3 This Policy considers four categories of train and their associated vehicle gauge, relating to the following principal markets:

- 'Interoperable' international high-speed;
- Domestic intercity;
- Suburban commuter; and
- Rural ('go anywhere').

These are considered in turn, following an explanation of the methodology used to define the gauge for each.

A new approach to gauging passenger vehicles

7.4 A new approach to the definition of passenger vehicle gauges has been pioneered in support of this Policy. Rather than starting with a candidate vehicle and modifying its envelope according to each additional route on which it is to run, the gauges have been defined directly from the infrastructure beside and above the routes on which each vehicle will operate. This process produces a profile representing an overview of the physical constraints along all the routes under consideration, and thus the limiting structure gauge to which the vehicle gauge can be designed.

7.5 The designed vehicle will have to comply with the required clearance to this structure gauge line (dependent on the design methodology used) taking into account the preferred trade-off options (e.g. between vehicle size and precise shape; ride comfort and stiffness of suspension; stepping distance and passing clearances) that any manufacturer has to consider.

7.6 The aim of this work has not been to define a prescriptive gauge for vehicle builders. Rather, it is to provide a summary of the constraints represented by the infrastructure along relevant routes, and an indication of the size of vehicle that could be accommodated.

An 'interoperable' high-speed vehicle gauge for Britain

7.7 The High Speed Directive 96/48/EC of the European Council of 23 July 1996 is applicable to the United Kingdom and carries the full force of law. It has led to the production of Technical Specifications for Interoperability (TSIs): technical standards that define parameters at the interfaces between the major elements comprising the railway system, with the ultimate intention that vehicles from any European Union country may operate in any other. Included within the TSIs are the definitions of vehicle and structure gauges.

7.8 Parts of the UK's rail infrastructure are more than 150 years old, built at a time when trains were smaller and travelled more slowly. Much of the continental European network, in particular its high-speed routes, has been built more recently and to a much more generous gauge, using UIC (Union Internationale des Chemins de Fer) principles. UIC gauging rules are relatively crude and make no explicit assessment of the actual clearance between a given vehicle and a line-side structure, but do offer the benefit of not requiring any knowledge of a specific vehicle's dynamic behaviour.

7.9 Attempting to apply such conservative UIC gauging rules to the UK network would result in only unfeasibly small trains being allowed to operate. For the purposes of the TSI Great Britain has therefore obtained a derogation, termed a 'Specific Case', from standard European gauging principles. This derogation is permanent. Any initiative to apply general European principles would require significant investment which is not anticipated under this Policy.

7.10 Britain's high-speed gauge is currently being revised as 'UK1 issue 2'. It applies only to routes defined as forming part of the European high-speed Trans-European Network (TENs) i.e. including all or part of the Channel Tunnel Rail Link, East and West Coast Main Lines and the Great Western Main Line.

7.11 UK1 issue 2 has been established according to the principles outlined in 7.4 to 7.6 above, on the basis of the current space availability on TSI-defined UK high-speed routes only, so does not require any substantial infrastructure investment. The accompanying rules allow the passage of a Eurostar-sized vehicle over the defined routes.

7.12 Although the UK TENS routes are not yet declared as being interoperable, and so are not yet available for trans-European passenger trains, UK1 issue 2 provides an accurate indication of the space within which a train could realistically operate on these routes once all other aspects of them are fully interoperable. It allows the intentions of the TSI to be complied with, but at the same time provides the opportunity to work beyond the 'state of the art' contained in TSIs to allow train growth and avoid the size of trains in the UK being artificially constricted in size by UIC gauging rules.

7.13 It is anticipated that a similar approach will be adopted for future passenger gauges for the non-high speed (or 'Conventional') UK network.

A gauge for a replacement for the intercity High Speed Train (HST)

7.14 A gauge for intercity rolling stock is being developed along very similar lines to those followed for UK1 Issue 2. The intercity gauge is physically defined by the infrastructure along a series of routes which represent current and likely future intercity train operation. These routes will be agreed by Network Rail and Train Operating Companies, however, it is important to note that the use of the routes is technical and should not be seen as a determination of the long term intercity network.

In defining the routes used for defining the intercity gauge the following categorisation has been used.

Category 1:

Routes which would provide the primary definition of the gauge. These routes are:

- High speed TENS routes. These are mandatory for compliance with the high speed TSI; and
- Principal Intercity routes.

Category 2:

Routes which would only be excluded from defining the gauge if they introduced disproportionate constraints or expense.

Category 3:

Routes which would be desirable to define the gauge, but only if the cost of removing the constraints was inexpensive or paid for by a third party. A map of these routes is shown.

Planned diversionary routes

Diversionary routes to the above routes, which could be operated at reduced speed or with other operational constraints. Slow or relief lines will be assumed to be diversionary routes on all multiple track sections.

Depots

Depots access routes for train maintenance/servicing/stabling.

7.15 The Intercity gauge could be used both to clear cascaded or new vehicles from existing builds or, when entirely new designs of vehicle are chosen, could offer the possibility of 26 m-long vehicles of a cross-section slightly larger than that of the current intercity Mark 3 coaches.

7.16 Intercity gauge is based on the current space availability on the routes defined in the categories above. It is worthy of note that no one route amongst this list has disproportionately affected the size of this gauge.

'Suburban' and 'go anywhere' vehicle gauges

7.18 It is proposed to define a 'go anywhere' vehicle gauge that could apply virtually anywhere on Britain's rail network.

7.19 Preliminary analysis has indicated that a Class 150-sized vehicle is the only one that can currently 'go anywhere' on the mainland railway network. However, other work undertaken in developing this Policy has indicated that:

- Many parts of the network could support wider and taller vehicles;
- 26 m-long vehicles may be able to operate on significant parts of the network; and
- There may be scope to significantly increase the extent of routes over which Class 165-sized vehicles could operate.

7.20 Further work to develop a 'go-anywhere' gauge will focus on identifying those structures that unduly restrict the resultant vehicle gauge. The incremental removal of such structures from the population used to define the vehicle gauge, considering the location and nature of infringement imposed, should lead to a gauge definition representative of the substantive railway network.

7.21 Such an incremental approach will identify clusters of restrictions which, if addressed, may enable a larger 'suburban' gauge, being an operationally-useful compromise between the HST-replacement unit and the smaller 'go anywhere' vehicles, to be defined covering major metropolitan areas.

7.22 It is intended to determine the value of these 'suburban' and 'go anywhere' gauges and if appropriate, to formally define them and to publish maps of those routes on which vehicles built to them can operate.

Double-deck trains

7.23 Double-deck trains have frequently been proposed as a solution for increasing capacity on busy routes on which it is difficult to gain additional train paths. If gauge clearance were available, existing continental European train designs could be used in the UK, also theoretically opening up the possibility of running double-deck trains from around the country and through the Channel Tunnel.

7.24 Preliminary gauging analysis has been carried out for a typical continental gauge double-deck train along the main line between Paddington and Bristol. This has made it clear that significant infrastructure work would be needed to accommodate such a train along the route. Perhaps even more crucially, continental vehicles are clearly incompatible with the standard UK platform position.

7.25 Furthermore, an examination of a double-deck train that has been used in Britain (the Bulleid class 4DD) suggested that the limited loading gauge prevented the access and egress required to achieve standard station dwell times. This slow de-training could be mitigated by using double-deck trains predominantly for long-distance travel.

7.26 Further generic problems identified with double-deck trains, which would require specific solutions, include:

- Concerns over security, with passengers being more isolated than in standard open vehicles;
- The hazard presented by multiple steps, allied to an increasing Health and Safety constrained environment;
- Access for disabled passengers; and
- The management of emergency egress.

7.27 The conclusion from this work is that, in the short- to medium-term at least, standard European double-deck stock could not run on the UK network. It is possible that a radical approach to train design/layout could result in a feasible double-deck vehicle, but one has yet to be developed and proven. This Policy does not therefore reject attempts to develop a UK specific double deck train but highlights the obstacles to its successful introduction.

8 Process and methodology

Overview

8.1 Gauging should be considered and fully integrated with all other aspects of vehicle acceptance, with appropriate information flows, rules and controls. Clear roles and responsibilities should be derived from this. Gauging analysis, utilising state-of-the-art analysis software applied to the available data and applying the rules set down in technical standards, is a precise and clear technical discipline. However, the appropriate application of tolerances and allowances, and interpretation of findings (and further investigations and verification) carry with them key safety responsibilities and require the consideration of wider aspects of infrastructure and vehicle upkeep, particularly the sustainability of track configuration. It is a given that safety levels should not be eroded by any of the changes proposed.

8.2 The declaration of gauges, for both vehicles and infrastructure, is a key step in achieving greater transparency. A new method of route classification by gauge (with a given route perhaps having several classifications) will be another useful development.

Exceptional loads

8.3 Freight operators are currently required to obtain paper-based 'exceptional load' forms (designated RT3973) from Network Rail for vehicle/load combinations that exceed the stated capability of a route. In practice, such forms are required and used on a daily basis for many loads that are far from exceptional, resulting in an apparently needless bureaucracy. However, this position has arisen due to the nature of the commercial relationships and the focus on short-term and specific flows rather than longer-term strategic traffic patterns. There has been no definition of overall needs or the full and permanent gauge clearance of these routes.

8.4 The publication of a wider range of standard gauges and their application to the network will reduce the use of these RT3973 forms to those loads that truly are exceptional or need to benefit from very tight clearances under controlled conditions of speed and timescale. While a computer-based control process, vehicle acceptance database and better analytical tools could simplify and speed up the current process, it will be important to retain an effective control mechanism. This objective will be supported by the definition and promotion of the permanent clearance of core freight routes, discussed in section 6.

Estimating gauge enhancement costs

8.5 In the past, it has been difficult to obtain a reliable first-order cost for a gauge enhancement project as a precursor to sizing the associated business opportunities. Rapid methods are required to determine the initial feasibility of gauge enhancement projects and an estimate of their cost. There is a current tendency, due largely to a lack of alternative methods and poor sharing of cost information, to work up full scheme designs before realising that the routes chosen are not optimal or that the project is unaffordable.

8.6 A matrix tool is being developed that aims to provide approximate 'first-order' cost estimates directly from clearance assessments for outline feasibility purposes. It applies aggregated generic costs derived from recent projects and attempts to relate the degree of foul to the type of structure in order to derive a likely solution (e.g. track or structural alterations), together with an approximate cost. Such 'order of magnitude' estimates would be of great use in planning and prioritising competing strategic options.

8.7 Once fully developed and validated, it is anticipated that this high-level tool will be maintained and be made available to industry decision-makers to inform strategic planning and better direct gauge-enhancement resources.

9 Infrastructure

Structure gauge

9.1 When erecting new or replacement structures across or adjacent to a railway line it may sound obvious to aspire to provide the largest possible aperture. However, the local topology, road alignments and, in the case of replacement structure, service routes can make such provision very expensive, thus it is necessary to optimise the gauge to which new structures are built. Therefore, in addition to developing new freight and passenger gauges, suitable structure gauges will be defined. A possible classification for passenger lines would be:

- Totally new lines;
- High-speed interoperable lines;
- Intercity capable lines; and
- All other lines.

These definitions would be combined with a route's intended freight gauge to derive a gauge for new and upgraded structures along a given corridor.

9.2 A route's gauge should be aligned with the long-term objectives for that section of infrastructure, taking account of both passenger and freight traffic needs, as well as the requirements for overhead electrification.

9.3 However, the major challenge is not in defining suitable structure gauges but rather the implementation of mechanisms to ensure that these are suitably funded and actually built during planned renewals or when new structures are erected, to support the gauge objectives for the route in question.

Maintaining gauge

9.4 It is important not to lose existing gauge potential around the network. However, this should be maintained as part of a broader approach to route capability (also considering speed and axle weight) and to a defined track geometry and position. Pursuing gauge clearance alone should not be allowed to lead to perverse results. For example the degradation of an existing smooth and 'natural' alignment to the point where it cannot be maintained effectively and/or deliver the required speed and performance capability should be avoided.

9.5 Decisions need to be made on resolving alignment problems. The management of alignment or geometry and that of gauge clearance should be considered together, both being determined by the key managed attribute of track position. Network Rail is bringing both these aspects together, along with vehicle ride, as a key component of its in-house maintenance regime. Track position is currently defined (by means of datum plates) at platforms and at locations of reduced clearances, while techniques of 'absolute track geometry', using on-track machine guidance systems, are being applied on the West Coast Main Line.

9.6 Network Rail publishes 'Sectional Appendices' by geographical region, which describe the operating arrangements on all routes across the network together with speed limits, station locations, track layout and other relevant features. These documents also record lists of passenger vehicles cleared to operate, together with any particular requirements. Network Rail is currently revising and standardising the format and content of these documents and the vehicle acceptance information that they contain. It should also be encouraged to provide a Vehicle Acceptance Database which holds, and is the control point for, the gauging information. In time, this database and documents published from it should also include the target gauges for a route.

Gauge enhancement

9.7 There are four broad levels of possible infrastructure activity to enhance the available gauge:

- 'Do nothing': allowing rail to naturally drift from its current position, frequently without a design position to which to restore it during maintenance activity. This failure to act would, over time, erode the existing available gauge;
- 'Free' upgrade: making the rail position conform with a target configuration as part of planned maintenance – this notably implies the existence of a defined position to which the track should migrate over time;
- Incremental activities during other planned works in the area; and
- A capital project specifically aimed at gauge enhancement and typically costing several million pounds. While such projects are rare in the current economic climate, the early identification of those schemes with a good business case can facilitate their future implementation.

9.8 New structures on high-speed TENS routes should clearly be built to a structural gauge to permit at the very least the passage of UK1 issue 2 gauge vehicles (although almost certainly defined in reality by the larger gauge requirements of freight vehicles). Any wholly new railway lines should be built to the European GC gauge, as was the through path of the Channel Tunnel Rail Link. New or replacement structures on existing lines would be built in accordance with the route's target structure gauge.

9.9 Once target structure gauges have been defined for each route, investment can be targeted more efficiently by building new structures to the precise size determined for the route.

9.10 It will be fundamental to the implementation of the proposals in this Policy, most notably the new vehicle gauge definitions, that all parties concerned are able to place confidence in the maintained position of the track, which should form part of the maintenance specification. Track position should in turn be accurately reflected in the Gauging Database, upon whose contents clearance analyses are based. Network Rail is making considerable efforts in improving their knowledge of gauge and track position. This Policy encourages their efforts in this respect.

10 Implementing the Policy

10.1 Developing this Policy has highlighted a number of key gauge-related activities that the industry should embrace.

Future configuration

10.2 A credible future gauge map should be established on a route-by-route basis across Britain, linked to clear definitions at the level of network 'links' and 'nodes' and integrating the requirements of both passenger and freight vehicles. A migration strategy should then be drawn up to describe how the transition from today's gauge to this target configuration may be achieved. Consideration should be given to including this target configuration within the relevant Route Utilisation Strategies being developed by Network Rail.

Transparency of network capability

10.3 There is, however, an immediate need to describe with a high level of confidence the gauging capability of the existing network. Network Rail should therefore be supported by the industry to undertake the necessary analysis and investigations to publish and maintain a database, capable of visualisation by detailed maps, of route gauging capabilities for both freight and passenger vehicles across the whole of Britain's network.

10.4 These gauging capabilities should be expressed in terms of currently-defined gauges, complemented where appropriate by additional freight and passenger gauges where these may usefully 'fill in' between them. Such additional gauges will require development.

10.5 To facilitate the definition of the target gauge configuration, routes should be classified according to the gauge of their traffic, again using standard definitions. This should in turn lead to much-simplified gauge acceptance processes.

Process assurance

10.6 The analysis implicit in the above activities is only as good as the data on which it is based. The integrity of the National Gauging Database must be further improved and linked to associated infrastructure data such as alignment. This is already beginning to happen as Network Rail takes in-house the track recording vehicle and database resources to create its Engineering Support Centre. There is scope for significant improvement in the processes for the periodic collection of gauging data by the Structure Gauging Train and other means, and in its downloading, editing and interpretation into the National Gauging Database. Key areas

include removing elements of rogue data; infilling where information is sparse and the effective capture and integration of 'as-built' data following changes during maintenance and renewals activities, which must be systematically submitted for incorporation.

10.7 Track should be systematically maintained to conform to its defined design, with reference to fixed trackside datum plates.

10.8 The general level of gauging knowledge within the industry needs to be improved, not only through better dissemination of current best practice but also in strengthening the small group of individuals in whom the fundamental interpretive gauging skills and responsibilities are currently vested.

Accessibility considerations

10.9 The possibility of operating longer and wider vehicles offers benefits to all passengers. There is nevertheless a trade-off between train-to-platform clearances and stepping distances (for all passengers), especially given the sharp curvature of some suburban platforms. It will therefore be important to ensure that, in taking advantage of the opportunities highlighted in this Policy, accessibility, and notably stepping distances, are acceptable.

Further developments

10.10 The key 'pinch point' constraints across the network should be identified, to inform enhancement strategies.

10.11 The ongoing RSSB study into reviewing and reassessing various aspects of current UK gauging practice and the appropriate application of tolerances should be built upon.

10.12 Diversionary routes for intermodal freight and UK1 issue 2 and intercity passenger gauges should be identified.

10.13 Standard methodologies for assessing the value of larger passenger vehicles (to justify passenger-driven gauge enhancement projects) should be developed.

Future Ownership

10.14 The passing of the Railways Act 2005 will result in the abolition of the Strategic Rail Authority. Therefore the future management of this policy will rest with the Vehicle – Structure System Interface Committee which is facilitated through the Railway Safety and Standards Board.

Appendix A: List of respondents

The SRA wishes to thank all those individuals and organisations who spent the time and effort to review the consultation for the policy and provide their responses. Their input has been invaluable in checking the assumptions and conclusions underlying the Policy.

- AEA Technology
- Alsthom
- Angel Trains
- Atkins
- Associated British Ports
- ATOC
- Bombardier (Notified Body)
- BSI Gauging Panel
- Capita Symonds
- City of Bradford
- CLRL
- Corus
- David Dews
- East Midlands Regional Assembly
- East of England RDA
- Eurotunnel
- EWS
- First Group
- Freightliner
- Dr Bruce Gillies
- Go-Ahead
- Government Office for the East Midlands
- Heritage Railway Association
- HSBC Rail
- Humber Forum
- IMechE Railway Division
- Henry Law
- Lloyds Register Rail
- Malcroft Engineering
- MDS Transmodal
- Merseytravel
- Mott Macdonald
- Network Rail
- North East Regional Assembly
- North West Rail
- Northamptonshire County Council
- Northwest RDA
- Office of Rail Regulation
- PTEG
- Railfuture Freight Committee
- Railfuture Passengers' Council and Committees
- Railway Industry Association
- Regional Development Agencies (England)
- Rail Safety and Standards Board
- Scottish Executive
- Servant Consultants (Dorian Baker)
- Siemens Transportation Systems
- Richard Spencer
- Tees Valley Joint Strategy Unit
- Transport for London
- Virgin Trains
- Welsh Assembly Government
- West Midlands Regional Rail Forum
- West Yorkshire PTE
- Yorkshire and Humber Assembly

Appendix B: Acknowledgements

The ideas, analysis and proposals presented within this document would not have been possible without the enthusiasm and sustained commitment of the members of the Vehicle-Structures System Interface Committee and its working groups formed to look specifically at passenger, freight and process and methodology issues, as well as the input from BSI Working Group 32 and the support of the Railway Safety and Standards Board. The SRA wishes to thank all those who have contributed freely of their time to this exercise, and in particular:

Neil Charles	Network Rail [3]
Gordon Edgar	Direct Rail Services (DRS) [3]
Robert Goundry	Freightliner [1] [3]
David Hatt	Bombardier Transportation [5]
Stephen Ingleton	Laser Rail [5]
David Johnson	Laser Rail [1] [2] [3] [4]
Peter Lander	Network Rail [4]
Philip McGrath	GB Railfreight [3]
Andrew McNaughton	Network Rail [1 - Chair]
Ian Morrice	Her Majesty's Railway Inspectorate (HMRI) [1]
Andrew Relf	English Welsh & Scottish Railway (EWS) [1] [3] [4]
John Roberts	The Office of Rail Regulation (ORR) [1]
Keith Rose	Porterbrook Leasing Company [1] [2]
Jon Seddon	Bombardier Transportation [1] [2]
Rebeka Sellick	Association of Train Operating Companies (ATOC) [1] [2] [4]
Jon Taylor	Railway Safety and Standards Board (RSSB) [1]
David Ventry	Network Rail [1]
Keith J Watson	Network Rail [4]
Brian Wright	Railway Safety and Standards Board (RSSB) [1] [2] [3] [4]

The network-wide analysis performed to support the proposals within this document, and notably develop the new vehicle gauges discussed, has only been made feasible within the timeframe of this exercise by 'HyperRoute'. This is a proprietary software and hardware package developed by Laser Rail and made available without charge to the groups developing this gauging initiative.

[1] Vehicle-Structures System Interface Committee (V-S SIC)
[2] V-S SIC Passenger Vehicle Working Group
[3] V-S SIC Freight Vehicle Working Group
[4] V-S SIC Process & Methodology Working Group
[5] British Standards Institution Working Group 32

55 VICTORIA STREET LONDON SW1H 0EU SWITCHBOARD 020 7654 6000 FAX 020 7654 6010 www.sra.gov.uk