National Transport Commission

On-Board Mass Technology Policy Framework Position Paper

Report Prepared by: National Transport Commission

Report outline

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<td>Abstract:</td>
<td>This paper discusses options for an on-board mass policy framework, an emerging technology with potential implications for heavy vehicle mass compliance and pricing policy. It reflects discussion and submissions to previous discussion papers and proposes an evidence-based on-board mass policy.</td>
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Foreword

The National Transport Commission (NTC) is an independent body established under Commonwealth legislation and an Inter-Governmental Agreement and is funded jointly by the Commonwealth, states and territories. The NTC has an on-going responsibility to develop, monitor, maintain and review uniform or nationally consistent regulatory and operational reforms relating to road, rail and intermodal transport.

The Commonwealth Government requested the NTC to develop a policy framework regarding the use of on-board mass monitoring technology in the heavy vehicle transport sector. This work has been guided by the Strategic Research and Technology Working Group’s (ASTART) policy framework for technological innovation in the transport sector¹, as well as the National In-Vehicle Telematics Strategy: The Road Freight Sector, which was approved by the Australian Transport Council (ATC) in May 2011.

In its policy framework paper, ASTART stated that:

"The creation of a national technological innovation framework should encourage a move away from technology-led policy and towards policy-led innovation. The clarification of policy objectives will lead to the development of a wide range of commercial solutions to support the achievement of national policy objectives."

Technology itself should not be a driver of transport policy. Rather, it may present opportunities to further contribute to the achievement of transport policy objectives. This paper seeks to explore those opportunities in the context of mass compliance.

NTC sought public comment on a draft position paper in July 2010. This revised final paper has been prepared for information of road authorities and industry.

I acknowledge the work of NTC staff in developing this report, particularly Jeff Potter, George Konstandakos and Julian Del Beato.

Greg Martin
Chairman

¹ ATC Strategic Research and Technology Working Group, Harnessing the power of technology for Australian transportation reform, September 2009 (unpublished, approved by ATC on 6 November 2009).
Executive summary

The Commonwealth Government requested the NTC to develop a policy proposal for the use of on-board mass monitoring technology. Although the original request was made in response to a more robust means of managing compliance under the Higher Mass Limits (HML) scheme, it is clear that regulatory interest in on-board mass technology extends to the broader regulation of heavy vehicles.

The draft policy for on-board mass technology has been informed by the development of a broader National In-Vehicle Telematics Strategy: The Road Freight Sector, approved by ATC in May 2011, as well as national policy objectives endorsed by ATC in 2009, through ASTART. The Telematics Strategy seeks to encourage wider uptake of technology to support national transport policy objectives (as listed in Appendix A).

The National In-Vehicle Telematics Strategy: The Road Freight Sector sets out the following principles to improve the safety, productivity, efficiency and environmental performance of the transport and logistics industry:

- The role of business is to develop innovative technological solutions – the private sector has the ability to drive the development of new technologies, and the incentive and resources to innovate in-vehicle telematics.
- The role of governments is to provide policy certainty by setting the regulatory framework, creating an environment for business to invest with confidence.
- Technology is a tool to enable policy policy should not be designed to fit a technology.
- Interoperability standards and platforms must be public, transparent and performance based. They should encourage innovation and facilitate multiple uses. Governments should provide standards and policy directions to help facilitate supply chain interoperability and in-vehicle telematics uptake.
- Telematics-based compliance monitoring should be voluntary wherever practical.
- Uptake by industry should be encouraged rather than compelled.
- Mandating in-vehicle telematics applications requires transparent and consistent evaluation considering the needs of all relevant stakeholders in accordance with best practice regulatory principles. It should ensure any new technological requirements delivers demonstrable benefits to individuals and the community.
- National approaches for telematics use – national consistency delivers economies of scale and drives greater uptake within industry.

On-board mass measurement refers to a means of measuring the mass of a given heavy vehicle with equipment affixed to the vehicle. While such equipment has been available for some years, it has matured in its accuracy, reliability, proliferation and acceptance amongst heavy vehicle operators.

In this position paper, the use of on-board mass technology has been reviewed in two main areas:

- as a means of improving mass compliance
- as a potential future technology option to support the Council of Australian Governments (COAG) Road Reform Plan (CRRP) for heavy vehicle pricing.
On-board mass technology can be used as a means of managing the risk of overloading (non-compliance with mass limits). Overloading can increase the cost of road infrastructure maintenance by increasing the rate of wear and damage to pavements and bridges.

The additional costs imposed by overloaded vehicles are subsidised by the majority of compliant heavy vehicle transport sector. Overloading may also reduce road safety levels by making heavy vehicles less stable and reducing their braking effectiveness (causing them to take longer to stop).

Reduced confidence in mass compliance may have limited the extent of road network access for higher productivity vehicles.

Regulators have also identified traditional on-road enforcement as progressively decreasing in its cost-effectiveness. They have cited as a priority the need to identify more cost-effective substitutes for managing compliance, with wider use of electronic compliance such as on-board mass monitoring having being identified as an option.

Looking forward, on-board mass technology has the potential to support heavy vehicle pricing reform options being developed by the COAG Road Reform Plan.

In developing this position paper, the NTC sought the views of industry, policy makers and regulators. Existing regulatory arrangements for managing mass compliance were also reviewed.

Evidence has not yet been identified to suggest that overloading is occurring on a scale to justify any substantial interventionist approach by governments. Rather, the evidence suggests that Chain of Responsibility reform and National Heavy Vehicle Accreditation Scheme mass management have improved mass compliance. On-board mass technology fitted to heavy vehicles voluntarily is playing an important role in supporting those reforms.

To address how on-board mass technology may support the objective of developing more cost-effective management of mass compliance, a number of options were developed. These were broadly categorised as:

**Option 1:** business as usual, which would rely on existing and emerging compliance management measures, other than on-board mass measurement systems

**Option 2:** mandatory use of on-board mass monitoring systems, in which heavy vehicle operators would be required to fit them, either as a broad requirement or as a condition under certain circumstances

**Option 3:** voluntary use, which would obligate operators to devise and/or propose a mass compliance management system, whether utilising on-board mass systems or other means.

In assessing each option, some overarching principles were applied and broad conclusions drawn:

- Each option has been assessed against the objective of supporting cost-effective means of managing mass compliance to deliver both road safety and asset protection outcomes, with on-board mass technology being a tool, alongside others, for supporting it.

- As far as possible, it is preferable to provide industry members with the flexibility to select the most cost-effective means of achieving a given compliance outcome. While encouraging the greater uptake of telematics systems by the road freight sector is an objective of policy makers, this should not be to the detriment of other, more fundamental policy principles.

- The role of policy makers should be to develop a regulatory landscape that encourages efficient behaviour by industry members that supports transport objectives, greater voluntary uptake of on-board mass technology and telematics systems by industry members may perhaps be viewed more as a measure of how successfully that is done.

- In practice, voluntary use of on-board mass measurement systems, as a means of supporting transport industry members’ compliance obligations, is envisaged as the
most likely mechanism to support the Telematics Strategy vision of greater uptake in road freight sector.

Detailed assessments of each option are included in section 4 of this paper. However, in broad terms, it is recommended that the use of on-board mass systems should be on a predominantly voluntary basis by road transport industry members as a means of meeting their mass compliance obligations.

In most circumstances, mandating the use of a specific technology would risk unnecessarily restricting road transport operators in how they may develop a cost-effective mass compliance management system. However, it is acknowledged that in some circumstances, particularly those where an operator has consistently demonstrated an inability or unwillingness to manage their compliance, more prescriptive measures may be necessary.

Regulators have impressed the need for developing more cost-effective means of managing (mass) compliance that may be sustained as the freight task continues to grow at a rapid rate. The NTC is currently developing a national compliance strategy that will assess options to support that objective. However, early consideration of on-board mass systems in this paper has reinforced earlier policy development work that a sustainable compliance strategy must focus on more targeted or risk-based compliance and enforcement measures.

The occasional notion that on-road enforcement of mass compliance may be directly substituted by a broad requirement for heavy vehicles to be fitted with on-board mass monitoring systems raises significant doubts about cost-effectiveness.

Other potential applications for on-board mass systems may exist as part of the COAG Road Reform Plan heavy vehicle pricing feasibility study. This may require an accurate and robust certified mass measurement as well as more flexible mass compliance regulations to improve productivity. The following options to support pricing reform have been identified:

Option 1: low volume technology trials to inform COAG Road Reform Plan policy development.

Option 2: await outcomes of the COAG Road Reform Plan feasibility study before proceeding with any implementation of certified on-board mass monitoring technology.

On the basis that implementation would initially be at low volumes or for trial purposes, option 1 is supported.

Overall, we are of the view that the use of on-board mass systems can provide the basis of a cost-effective compliance tool that can deliver better road safety outcomes as well as greater levels of asset protection.
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1. Background

The Commonwealth Government requested the NTC to develop a policy proposal for the use of on-board mass monitoring technology on heavy vehicles. This request followed from a Bilateral Agreement between New South Wales and Queensland to fund the extension of Higher Mass Limits road networks in these states. To support this, the Commonwealth agreed to “provide funding to the NTC and/or Transport Certification Australia Limited, as appropriate, to accelerate this process with the view to ensuring that both route access and mass compliance can be accurately monitored and regulatory breaches enforced”.

While on-board mass technology has been available for some years, it has matured in its accuracy, reliability, proliferation and acceptance amongst heavy vehicle operators.

In 1998, Australian Transport Council (ATC) approved the Higher Mass Limits policy\(^2\), which provided increased axle mass limits for heavy vehicles. These increases were allowed under the following conditions:

- adherence to route restrictions
- apply only to axle groups fitted with road friendly suspension
- require operators to be accredited to the National Heavy Vehicle Accreditation Scheme Mass Management module.

Some governments have raised concerns in relation to industry compliance with these conditions, in particular the adherence to mass limits on approved routes. From 2009, NSW and Queensland have required that heavy vehicles operating at Higher Mass Limits be fitted with location tracking devices certified under the Intelligence Access Program. Enhanced functionality would be drawn from the ability to also monitor the mass of a heavy vehicle.

In addition to heavy vehicles operating under the Higher Mass Limits scheme, it is likely that such a technology may be considered for the regulation of mass limits applying under other heavy vehicle schemes and operations.

In 2007, the Council of Australian Governments (COAG) agreed to a Road Reform Plan with the objective of promoting a more efficient, productive and sustainable provision of, and use of, heavy freight infrastructure. The project includes a feasibility study into a direct heavy vehicle charging arrangement, including incremental charging and mass distance location (MDL) charging. The development and availability of on-board mass technology has potential implications for how heavy vehicle mass data may be collected, under any arrangement that required this type of data.

As part of a separate project and at the request of ATC, the NTC has prepared advice for the future direction of in-vehicle telematics. Policy for the specific application of on-board mass technology will draw from this strategy for the regulation of broader in-vehicle technology, including telematics.

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2. Purpose and Scope

The NTC has been asked to develop a policy framework for on-board mass technology. In doing so, "problems" for which on-board mass technology may actually serve as a solution, have been identified.

Although the NTC was asked to develop policy for on-board mass technology to support compliance with conditions of the Higher Mass Limits scheme, it is clear that its application in heavy vehicle regulation may extend more broadly. This includes as a mass compliance tool for alternative heavy vehicle access schemes and potentially as an enabler for heavy vehicle pricing reform.

As noted by the NTC in providing advice to ATC on a National Transport Policy Framework⁴:

"Technology will play a critical role in addressing Australia’s national transport challenges. While intelligent transport systems are being used, the divide between technology development and policy development needs to be bridged."

Technology itself is not a driver of transport policy. Rather, supported by the development of appropriate policy, it presents opportunities to further contribute to meeting transport policy objectives.

ATC has approved a *National In-Vehicle Telematics Strategy: The Road Freight Sector*. The strategy articulates a vision for greater uptake of in-vehicle telematics by the road freight sector, in a manner that supports transport policy objectives. Policy for telematics systems has advocated enabling greater rates of uptake through measures for improved interoperability, such as encouraging a common systems architecture platform and integrated on-board telematics units⁵. This has important implications for the range of "plug in" in-vehicle technologies, including on-board mass systems.

From the current circumstance in which in-vehicle technologies are mostly “stand-alone” systems, the capability to communicate a range of data to third parties has potential benefits and implications for both the transport industry, as well as regulators. Accordingly, in this paper, a distinction has been drawn between on-board mass measurement and monitoring:

- **on-board mass measurement** refers to a means of measuring the mass of a given heavy vehicle with equipment affixed to the vehicle
- **on-board mass monitoring** refers to on-board mass measurement in a form that includes a means of telecommunicating measured mass data to a third party.

This is illustrated in Figure 1 and Figure 2.

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⁵ ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).
The on-board mass policy framework is therefore guided by the *National In-Vehicle Telematics Strategy: The Road Freight Sector*, but will address policy matters specifically relevant to the use of on-board mass technology.
3. Problem statement

In developing policy for on-board mass technology, it is necessary to define what underlying problems exist that the technology may help to resolve.

3.1 Impact on road infrastructure

The loading above axle mass limits (or overloading) can cause increased wear and damage to road infrastructure, particularly to pavements and bridges. This results in increased costs to road maintenance and repair.

As higher road freight costs are passed along the supply chain, overloading increases the cost of consumer goods and services to the community transported by heavy vehicles, resulting in higher prices for consumers.

This is inconsistent with the following ATC Transport Policy objectives:

- To promote the efficient movement of people and goods in order to support sustainable economic development and prosperity.
- Transparency in funding and charging.

3.1.1 Overloading under the Higher Mass Limits scheme

The Higher Mass Limits scheme provides increased axle mass limits for heavy vehicles that meet certain conditions. One condition is that when operating at increased axle mass limits, vehicles must adhere to route restrictions, i.e. roads assessed as structurally capable of supporting them. This adds a degree of complexity to the Higher Mass Limits scheme, not applicable to most other heavy vehicle access arrangements.

The Higher Mass Limits scheme imposes a number of conditions on participants. In this report, the following conditions related to mass compliance are relevant:

- adherence to route conditions while operating at Higher Mass Limits (i.e. operating above the default mass limit, but below the Higher Mass Limit on an approved Higher Mass Limits route)
- overloading above Higher Mass Limits (on any route).

Some governments have raised concerns in relation to industry compliance with mass limits on approved Higher Mass Limits routes. Some of the government concerns raised include:

- reduced likelihood of trucks being intercepted by enforcement officers due to factors such as the growing freight task and limited number of enforcement resources
- the difficulty in detecting mass and route non-compliance of Higher Mass Limits operators. For example, non-compliance with Higher Mass Limits route may only occur during the first and last mile of the trip which usually represents a small portion of the overall trip
- the lack of visual cues for detecting non-compliance with Higher Mass Limits conditions. For example a B-double or a heavy mobile crane operating “off route” is easier to identify than a truck operating at Higher Mass Limits with no obvious visual cues that would assist in its detection.

It should be noted that the impact of overloading applies to all heavy vehicles, regardless of which regulatory scheme they may be operating under. The compliance risk of heavy vehicles operating under the Higher Mass Limits scheme and the need for regulatory countermeasures must be assessed in this broader context, i.e. relative to the risk and need for countermeasures applying to other schemes and arrangements.

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3.1.2 Overloading under alternative heavy vehicle access arrangements

Although the motivation for investigating on-board mass technology was to achieve improved compliance for the Higher Mass Limits scheme, it is clear from discussions with regulators that there may also be an interest for this technology to support wider mass compliance under alternative heavy vehicle schemes and arrangements.

There is a wide range of heavy vehicle access schemes and types of heavy vehicle transport operating in Australia. Overloading would have a similar effect to that described above for heavy vehicles operating under the Higher Mass Limits scheme.

The degree of mass compliance may vary according to different factors. To assess how on-board mass technology may be utilised to help minimise wear and damage to road infrastructure, it is necessary to firstly analyse the nature and extent of the problem.

3.1.3 Measuring the impact of overloading

Overloading is a term generically used to describe any load above the legal limit. Heavy vehicle mass limits have been historically set at “reasonable” levels as determined by infrastructure experts. However, as shown in Figure 3, the impact of overloading varies significantly, with severe overloading having a much more significant effect on pavement wear than minor overloads.

Figure 3. Impact of overloading by excess mass and axle group configuration

Degrees of overloading have already been addressed under the Road Transport Reform (Compliance and Enforcement) Bill, which categorises mass breaches as:

- exceeding a mass limit (minor breach)
- a substantial risk breach, where the breach exceeds the greater of five percent of the mass limit or 0.5 tonnes
- a severe risk breach, where the breach exceeds twenty percent of the mass limit.

In addressing the objective of minimising wear and damage to road infrastructure, it is clear that minimising the prevalence of severe and substantial overloading is a high priority.

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7 National Transport Commission, National Transport Commission (Road Transport Legislation - Compliance and Enforcement Regulations) Regulations 2006.
3.1.4 Prevalence of overloading

In regard to overloading, there is evidence that significant cultural change has occurred across much of the transport and logistics industry. Industry and governments have largely put this down to the implementation of Chain of Responsibility legislation, which places the responsibility for compliance on the broader transport and logistics industry.

Table 1: Gross combination mass of 9 axle b-doubles operating in NSW

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<tr>
<th>Description</th>
<th>Breakpoint 1</th>
<th>Breakpoint 2</th>
<th>Breakpoint 3</th>
<th>Total</th>
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<tr>
<td>Limit (t)</td>
<td>62.5</td>
<td>68.5</td>
<td>75.0</td>
<td>-</td>
</tr>
<tr>
<td>Number of vehicles</td>
<td>211,215</td>
<td>33,387</td>
<td>8,751</td>
<td>253,353</td>
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<tr>
<td>% of total vehicles</td>
<td>10.6%</td>
<td>1.7%</td>
<td>0.4%</td>
<td>12.7%</td>
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<tr>
<td>Mean (t)</td>
<td>64.8</td>
<td>68.5</td>
<td>76.7</td>
<td>66.2</td>
</tr>
<tr>
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<tr>
<td>Minimum (t)</td>
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<td>68.6</td>
<td>75.1</td>
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<tr>
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<td>75.0</td>
<td>205.5</td>
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To better understand heavy vehicle mass levels and compliance, the NTC recently commissioned a study of weigh-in-motion (WIM) data⁸, sourced from measurements recorded in New South Wales, Victoria, Queensland and Western Australia between 2005 and 2007. The results indicated that while the majority of heavy vehicles were loaded at compliant mass levels, a smaller proportion were measured with loads above General Mass Limits. However, it is difficult to conclude from WIM data alone what proportion of the latter measurements can be attributed to vehicles operating at concessional mass limits (i.e. above General Mass Limits); to measurement error; or to overloading.

A sample of the results from that study, for 9 axle b-doubles operating in New South Wales, is shown in Table 1 and Figure 4.

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Figure 4. Gross combination mass of 9 axle b-doubles operating in NSW


Table 2: Load data based on weigh-in-motion data

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<td>Degree of overloading</td>
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<td></td>
</tr>
<tr>
<td>Minor breach</td>
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<tr>
<td>Substantial breach</td>
</tr>
<tr>
<td>Severe breach</td>
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<tr>
<td>Under limit</td>
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In consulting with regulators, different views on the general level of compliance have been presented. Most regulators have reported that Chain of Responsibility legislation has driven significant improvements in compliance levels. Nevertheless, there remains scope for further improvement, particularly for transport and logistics industry members not highly integrated within the chain of responsibility.

Industry has reported to the NTC that minor overloading often occurs while attempting to maximise payloads. This may lead to inadvertent overloading, when a heavy vehicle has exceeded prescribed mass limits, but a party liable for its compliance had intended for it to be compliant. An example of inadvertent overloading is when a compliant load shifts during transport, resulting in one axle group being overloaded.
On the other hand, payload maximisation may be undertaken by deliberate overloading, which occurs when a liable party is aware that a heavy vehicle is overloaded. Both inadvertent and deliberate cases of overloading constitute breaches of transport law. However, in any resulting prosecution, the intent of the liable party would be taken into account. Typically, cases of inadvertent overloading are of a lower magnitude (measured by how much the mass limit was exceeded) than deliberate overloads.

In assessing the prevalence or frequency of overloading, these distinctions are important. As suggested by industry members, previous studies have found that severe overloading is far less prevalent than minor overloading.

### 3.1.5 At-risk industry segments

Patterns and the risk of overloading are not uniform. It is therefore useful to consider which segments of the heavy vehicle transport industry are most at risk of overloading. Identifying at-risk areas of the industry may facilitate a more meaningful analysis of how on-board mass technology may be appropriately utilised as an effective means of minimising overloading.

Fundamentally, mass constrained operators, i.e. those for whom payloads are (frequently) limited by legal axle mass limits, represent the highest risk. But within this group, the risk varies significantly. One significant factor is when operators are involved in *uncontrolled loading*, referred to here as loading for which the ability to accurately measure payload mass is compromised.

A common example of uncontrolled loading, where there is limited access to practical weighing equipment, is the loading of bulk commodities such as grain.

**Case study: Grain transport**

In December 2009, representatives from the NTC visited a number of sites and spoke with industry members involved with the harvest, storage, handling and transport of grain. These visits took place during the grain harvest period, in the Wimmera region of Victoria. They were arranged by the Victorian Farmers Federation, whose assistance is acknowledged.

The first phase of grain transport is from the farm to a storage facility. Loading trucks on farms in a compliant manner is a challenging aspect of grain transport. Farms are almost never equipped with weighbridges. The principal means of controlling mass compliance is therefore one of two methods: some form of truck on-board mass measurement and/or experience and knowledge of the truck driver.

In applicable states and territories, in order to qualify for Higher Mass Limits, most operators engaged in grain transport are accredited to the National Heavy Vehicle Accreditation Scheme. Such accreditation is only feasible if an operator’s trucks are equipped with a means of on-board mass measurement, most commonly air pressure gauges from which readings are interpolated to determine axle masses.

Without any means of on-board mass measurement, truck operators must utilise their judgement and experience in loading within mass limits. When transporting grain off a farm during harvest, numerous trips may be necessary. Weighbridge measurements taken at the drop-off point (grain storage facility) provide an operator with feedback, enabling them to gradually increase the load on each subsequent trip (measured visually, i.e. from the top of the trailer) until it approaches legal limits.

Even when utilising on-board mass measurement, a truck operator must still exercise judgement to ensure the grain is loaded within mass limits. For example, when the truck is positioned on uneven

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9 For example a 1998 study by the National Road Transport Commission, *Incidence of Grossly Overloaded Heavy Vehicles (Technical Working Paper No. 32)*, found that under 2 percent of trucks were overloaded by more than 5 and 17 percent of their allowable gross mass in urban and rural environments, respectively. It is likely that these rates have since fallen, since the introduction of reforms such as Chain of Responsibility.
or soft ground, the accuracy of on-board mass measurements may be reduced.

There are a couple of particular challenges with loading and transporting grain. Firstly, the density of grain varies with the variety and moisture content. Whilst this has little impact on a loading method utilising on-board mass measurement, it increases the degree of difficulty for loading methods reliant on the driver's judgement and experience.

Secondly, as a bulk commodity, grain is prone to shifting its position within a trailer under acceleration, in both the fore and aft directions. This may occur under braking and while ascending or descending a hill. Whilst load shift will not cause the gross vehicle mass limit to be exceeded, it may cause an axle group to be overloaded.

The simplest means of complying with mass limits is to load conservatively. However, there is a strong commercial incentive for grain transporters to maximise their payload. In practice, grain transporters aim to load their vehicles as close to legal mass limits as possible.

This case study has considered the practicalities of loading grain, for operators who intend to comply with mass limits. It is apparent that on-board mass measurement technology is useful in reducing the risk of inadvertent, minor overloads. However, as illustrated in Figure 5 on p.13, compliance is not automatically the objective of all operators. It is clear that significantly greater gains, by reducing the frequency of severe overloading, have been achieved through the introduction of Chain of Responsibility legislation.

The above case study on grain transport describes some of the practical difficulties in attempting to maximise payload while not breaching mass limits. Grain operators have reported to the NTC that this practice may result in the occasional minor overloads.

However, such difficulties do not explain overloading of greater severity. An important risk factor for more severe (deliberate) overloading is the perceived risk of detection. Where this is low, the temptation to overload is greater. More discussion on the nature of this risk is discussed below in the section 3.1.6 (Effectiveness of current regulatory measures).

On the other hand, many types of transport involve more controlled loading, such as where there is access to a weighbridge, where the load is of a determinable mass (e.g. cartons of beer) or where on-board mass technology is fitted to the vehicle. The case study on Australia Post discusses a transport operation for which the degree of control of overloading has been maximised by developing a robust mass management system.

Case study: Australia Post

In the 2008/09 financial year, Australia Post handled over five billion mail articles and provided a delivery service to over ten million delivery points. At various points of handling, mail articles are transported by heavy vehicles, the majority of which are owned and operated by Australia Post. Some mail is contracted to hire-and-reward heavy vehicle operators.

In managing its mass compliance, Australia Post implemented policies and procedures that apply to its self-managed resources and to a lesser extent, external customers.

To move mail articles from their acceptance to delivery point in a cost effective and timely manner, Australia Post operates a ‘hub and spoke’ network of mail distribution centres, general and local post offices. Postal articles transported by heavy vehicles are contained in Unit Load Devices.

Unit Load Devices manage the distribution of bulk mail products, and assist with mass compliance. Australia Post requires all Unit Load Devices to be weighed prior to being presented for carriage on a heavy vehicle. The weight must then be clearly printed on the Unit Load Device label.

Each heavy vehicle type is assessed for how Unit Load Devices can be loaded in a configuration

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that complies with all associated mass limits. Australia Post has produced guides that are available on each truck and at all company operated loading points. The truck driver must ensure the loading configuration is adhered to, and it is the responsibility of the ‘consignor’ to ensure each Unit Load Device has been accurately weighed and labelled.

Australia Post drivers must not accept Unit Load Devices that have not been weighed and labelled by the ‘consignor’. The role of ‘consignor’ may be assumed by Australia Post distribution centres, as well as external customers, such as bulk mailing houses. All ‘consignors’ are responsible for declaring the weight of all Unit Load Devices that they present for transport. In practice, this is usually achieved with the assistance of a forklift fitted with scales. Some Australia Post facilities are also equipped with fixed weighbridges that are used to verify the mass of heavy vehicles.

Where the transport of postal items has been contracted to a hire-and-reward operator, Australia Post clearly identifies the weights of each individual Unit Load Device presented to the contractor’s driver. The responsibility for ensuring the contractor’s heavy vehicle is loaded in a compliant manner then lies with the driver.

To support their mass management program Australia Post has a multi-level compliance audit program including auditor visits to postal facilities and checks for policy compliance in all areas.

By implementing a number of measures over and above the minimum requirements of transport law, Australia Post has effectively minimised the risk of overloading. However, not all transport operators are in a position to develop and implement a mass management system on this scale. Therefore, the ability of transport operators to manage their compliance is an important risk factor.

Separate to any deliberate non-compliance, regulators have stated that more proficient operators are able to limit overloading with effective internal management systems. Conversely, less proficient operators may be more prone to engage in overloading.

A track record of non-compliance is a clear indicator that an operator represents an elevated mass compliance risk.

### 3.1.6 Effectiveness of current regulatory measures

Aside from the determination of appropriate mass limits and heavy vehicle access arrangements, regulatory measures to minimise wear and damage to road infrastructure amount to encouraging compliance with mass regulations. Their effectiveness is discussed in this section and is important in identifying the means and extent to which on-board mass technology may be used to supplement existing arrangements.

**On-road enforcement**

In its simplest and most common form, enforcement is conducted by on-road interception. Heavy vehicles may be pulled over by mobile enforcement officers and weighed with portable scales. Additionally, they may be diverted into roadside areas featuring fixed weighing stations.

On-road enforcement is conducted by authorised road agency and police officers. Checks may be conducted in a random manner, which typically involves checking heavy vehicles at fixed (i.e. weighing stations) or mobile (i.e. on-road interceptions by road agency or police vehicles) locations. However, in order to maximise the efficiency of enforcement, there is increasing interest in developing more targeted enforcement strategies.

Operators detected not complying with mass limits may be subjected to sanctions and penalties. Random and targeted on-road enforcement provides a disincentive for operators to overload their vehicles. However, this is only effective when the risk of detection and sanctions are perceived as being greater than the financial benefit derived from overloading.

Regulators have emphasised the need for a compliance strategy capable of sustaining itself under projections of strong growth in the freight task. Enforcement agencies have reported that the deterrent posed by roadside enforcement has progressively diminished, as enforcement agencies struggle to keep pace with the growing freight task and volume of trucks on the road. The high cost of resource-intensive random, on-road enforcement is a major factor.
Two major factors affect the economic viability of on-road enforcement as a principal tool to manage mass compliance: affordability and cost-effectiveness. As heavy vehicle enforcement costs for road agencies (i.e. excluding police enforcement costs) are recovered from operators through heavy vehicle registration fees, the affordability of road agency enforcement operations is assured.

Therefore, the more pertinent factor is its cost-effectiveness. Including by expressing interest in alternative means, such as electronic monitoring, the cost-effectiveness of on-road enforcement has been openly questioned by a number of (if not all) regulators. This is supported by the reported reluctance by regulators to increase road agency enforcement resources to match the rate of growth in the freight task.

Separate to the economic viability of on-road enforcement is its effectiveness as a deterrent against overloading. Additionally and as discussed in the section 3.1.1 Overloading under the Higher Mass Limits scheme, detection of mass breaches via on-road enforcement is often more difficult for heavy vehicles operating under Higher Mass Limits. Therefore the reliance on conventional, roadside enforcement alone may be insufficient.

Improving the cost-effectiveness of enforcement presents a dilemma for policy makers and regulators. A priority in achieving this objective is obtaining better intelligence of compliance behaviour and patterns, which may support more targeted enforcement. However, random on-road enforcement continues to serve as a key source of such intelligence and therefore represents a major deterrent against mass-related (as well as other) offences.

Identifying on-road enforcement as cost-ineffective alone does not justify diverting resources to alternative measures. Such alternatives must be demonstrated as more cost-effective. Reducing the high degree of reliance on this type of enforcement is therefore contingent upon the identification of complementary or substitute measures. The NTC is currently undertaking a project to develop a national transport compliance strategy.

**Electronic monitoring systems**

Electronic monitoring has emerged as a tool to complement and in some circumstances, even substitute for on-road enforcement. This paper has assessed policy implications for a particular form of electronic monitoring, namely on-board mass monitoring. However, other forms of electronic monitoring also exist.

The use of electronic devices is commonplace in today's heavy vehicle transport industry. However, as discussed in section section 2 (Purpose and Scope), electronic monitoring is referred to in this paper as specifically those devices that facilitate the monitoring of compliance with transport regulations by government authorities (as opposed to the range of devices that do not provide authorities with any additional oversight, i.e. where the data generated is unavailable to them).

The In-Vehicle and At-Roadside Technology (IVART) Reference Group, as well as the Cooperative ITS Steering Committee are currently assessing options for electronic compliance systems at a broad level.

One notable form of electronic monitoring is the Intelligent Access Program (IAP), in which a device is fitted to a heavy vehicle that monitors its compliance with any road network access conditions. However, as an alternative to random on-road enforcement, a limitation of this device is that monitoring is only available for heavy vehicles that have been fitted with one.

Transport Certification Australia, the organisation that developed the Intelligent Access Program, is currently developing a technical specification for on-board mass monitoring as an "add-on" to the current road network access monitoring function of the Intelligent Access Program.

Another form of monitoring is the Safe-T-Cam system utilised by the New South Wales Roads and Traffic Authority. Using number plate recognition technology, Safe-T-Cam is able to monitor the movement of heavy vehicles between a number of fixed points on the road network. It has the capability to detect evidence of offences, such as against fatigue management and vehicle registration requirements.
A key distinction between the Intelligent Access Program and Safe-T-Cam is that the former only applies to vehicles that have been fitted with the relevant device, while the latter monitors all heavy vehicles that pass one of the designated (fixed) points on the road network. Clearly, infrastructure-based systems such as Safe-T-Cam that do not rely on being fitted to individual heavy vehicles have broader application to the heavy vehicle fleet than those that do, such as the Intelligent Access Program. However, this broader application is typically traded off against reduced monitoring capability; the detailed data produced by Intelligent Access Program systems is only available by fitting a dedicated system to individual vehicles.

The design and use of electronic monitoring of heavy vehicle compliance by regulators is still in an embryonic stage. The two examples cited here, as well as on-board mass monitoring, by no means exhaust the potential range of possibilities for how electronic monitoring may eventually be developed to support compliance with mass and other transport regulations.

As discussed in section 0 (On-road enforcement), of particular interest to regulators is the potential for electronic monitoring to complement or substitute for conventional methods of on-road enforcement. It would not be feasible to attempt to predict how future developments in electronic compliance monitoring may influence the compliance landscape. However, at this early stage, such systems have made only a relatively modest impact.

With current technology, it is unlikely that electronic monitoring systems could directly substitute conventional on-road enforcement. A more feasible option is arguably to leverage the strengths of electronic monitoring systems to complement other compliance measures.

**Chain of Responsibility**

Consultation with government and industry members has revealed that the Chain of Responsibility legislation has supported significant improvements in mass compliance across the transport industry.

Part of the Road Transport Reform (Compliance and Enforcement) Bill, approved as model legislation in 2007, Chain of Responsibility legislation extends liability for compliance with various types of transport regulations, including mass limits, beyond just the heavy vehicle driver or operator. Under Chain of Responsibility, all parties having influence over how a heavy vehicle is loaded are, to varying degrees, liable for its compliance.

A key objective of the legislation is to reduce the incidences of parties, not previously liable for their actions, placing pressure on heavy vehicle drivers and operators to breach areas of transport legislation (including mass limits). In fact, the legislation requires such parties to take reasonable steps to ensure transport operators are complying with transport regulations.

To date, New South Wales, Victoria, Queensland, the Australian Capital Territory, Tasmania and South Australia have implemented the Bill. The legislation applies to how heavy vehicles are loaded, including compliance with mass limits, as well as a range of other heavy vehicle transport legislation such as fatigue management, the transportation of dangerous goods and speeding.

Previously, much of heavy vehicle transport law was practicably applied only to heavy vehicle drivers and operators. Chain of Responsibility explicitly extends the law to parties including consignors, consignees, packers, loaders and receivers of goods.

Since its introduction, a number of investigations and prosecutions have been made against companies alleged and/or found to have engaged in persistent offending. This has been significant in demonstrating to members of the transport industry that enforcement is no longer restricted to roadside detection, but that members may increasingly be held accountable not only for their compliance at a given point in time, but in the broader sense, over a period of time.

In response, many organisations who are parties in the chain of responsibility have introduced more robust policies and procedures aimed at demonstrating their compliance management. Perhaps more importantly, this has led to improved compliance practices.

This trend has particularly been observed with major transport customers who are engaged with a large number of second and third parties. They tend to have internal company policies and procedures that ensures that they only deal with connected parties who comply with the legal mass
limits. Some operators have claimed that in this type of circumstance, breaching transport law would be impractical regardless of their own company’s policies and attitudes.

Figure 5. Results from targeted overloading audits of grain harvest vehicles in NSW

An example of the effectiveness of the Chain of Responsibility can be shown in Figure 5, which details the results of overloading audits conducted on the NSW grain industry by the Roads and Traffic Authority over a four year period. Following introduction of the legislation and an investigation into mass compliance breaches, it is clear that compliance levels have improved significantly. These improvements are understood to have resulted from industry-wide changes to compliance management procedures and culture.

It should be noted that the flow-on benefits of Chain of Responsibility apply most directly to ‘centralised’ transport supply chains, i.e. where large organisation(s) with significant freight exposure have adopted robust compliance policies that have had a positive flow-on effect for other parties. On the other hand, this flow-on benefit would apply less to ‘decentralised’ transport supply chains.

National Heavy Vehicle Accreditation Scheme

For heavy vehicle access schemes in which there is deemed an elevated mass compliance risk, including Concessional and Higher Mass Limits, it is common for regulators to require operators to be accredited to the National Heavy Vehicle Accreditation Scheme Mass Management module.

The module requires participants to demonstrate adherence to an effective mass management system, tailored to the circumstances of each individual participant’s transport operation. It recognises that the compliance task and risks vary between transport operations. This approach provides greater flexibility and supports more precise compliance risk management than do other regulatory schemes, such as uniform operating conditions attached to Higher Mass Limits.

A requirement of the scheme is that participants maintain an auditable set of records, detailing how their vehicles were loaded. Records must be kept for each vehicle under control of the accredited operator and for each loading event. A demonstrated ability to verify the mass of each load is a cornerstone of the scheme. At the discretion of enforcement officers, accredited operators are potentially subject to the same enforcement as non-accredited operators.

In regulatory terms, the major benefits of accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module are:

- to ensure that operators have developed and are utilising an effective system of managing their compliance with mass limits
- to provide regulators with a degree of confidence that accredited operators are managing mass compliance.
Discussions with regulators suggested that an important factor in the National Heavy Vehicle Accreditation Scheme serving as an incentive for transport operators to effectively manage their mass compliance is how effectively the scheme is administered by regulators themselves. If operators learn that regulators lack the resources to follow up identified non-compliance with mass limits or lapses in meeting audit schedules, the incentive to comply with their accreditation requirements is diminished.

There are also differing views on the extent to which the National Heavy Vehicle Accreditation Scheme serves as a means of compliance assurance. An obvious omission in the scheme is that there is no route compliance assurance element. NSW and Queensland have addressed this through the requirement of Intelligent Access Program (IAP) to ensure route compliance for Higher Mass Limits participants.

The need for a more robust accreditation scheme was considered as part of the Accreditation Policy Review\(^\text{11}\). It included recommendations to support that objective, approved by ATC.

In many respects, the National Heavy Vehicle Accreditation Scheme Mass Management module has similar objectives, albeit using different methods, to on-board mass monitoring technology. This is that they both encourage operators to proactively manage their mass compliance. In some cases, the only practical means of verifying loads, a prerequisite of accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module, may be to fit an on-board mass system to the vehicle.

At present, National Heavy Vehicle Accreditation Scheme Mass Management module is utilised primarily as an operating condition of national schemes, i.e. Concessional and Higher Mass Limits. Consultation has suggested that there is a reluctance amongst some regulators to accept an operator’s accreditation as assurance of their compliance with mass regulations. This is reportedly due to factors such as the reliability of both National Heavy Vehicle Accreditation Scheme mass records and a perception that it provides them with poor ‘visibility’ of operators’ compliance levels. For these reasons, there is a tendency for some regulators to view the scheme more as an operating condition than as a key means of managing mass compliance. Some regulators believe that automatic reporting of non-compliance using an on-board mass enabled Intelligent Access Program system would be more effective.

Restricted access to the road network under Higher Mass Limits

A frequent criticism from industry is that the Higher Mass Limits scheme has inadequate road network access in some states. Predominantly, such criticism has focussed on the lack of ‘last mile’ access, which refers to the difficulty operators have experienced in gaining approval for access to the start and end points of their journey which are located off approved Higher Mass Limits routes.

In many cases, approval for such access is by negotiation with the relevant local government. It is a process that lacks both transparency and accountability. It may be likely that such applications are not viewed as high priority matters by many local governments. Additionally, it is understood that they often lack the technical expertise to properly assess such applications on their merits.

Some states have recognised that enforcement of ‘last mile’ access restrictions is often impractical and difficult to enforce. NSW and Queensland have included participation in the Intelligent Access Program as a condition of the Higher Mass Limits scheme. The addition of on-board mass functionality into Intelligent Access Program is seen by some as the next step in ensuring both Higher Mass Limits route and mass compliance.

However, there is a relationship between the extent of access and the level of compliance required. For example in Victoria, which has been able to provide extensive access to heavy vehicles operating under the Higher Mass Limits scheme, the risk of non-compliance has been judged as insufficient to require participation in the Intelligent Access Program.

It must be acknowledged that various constraints may inhibit governments from providing the full level of road network access desired by the transport and logistics industry. Nevertheless, it is clear that compliance levels are dependent not only on transport operator ethics and the level of enforcement, but also the effectiveness with which regulations have been developed and implemented. In the case of the Higher Mass Limits scheme, broader access and a more streamlined and transparent application process for access extensions would support improved compliance levels, in turn reducing the need for enforcement and regulatory scrutiny.

Summary

There appears to be evidence that a combination of the three major means of regulating mass compliance: 1) On-road enforcement, 2) Chain of Responsibility and 3) National Heavy Vehicle Accreditation Scheme Mass Management module, are effective in encouraging mass compliance for most operators. However, it is also apparent that:

- This hinges on the effectiveness with which they are administered by regulators.
- There is scope to improve the effectiveness of existing regulatory arrangements.
- Their effectiveness varies depending on the circumstances. For some members of the transport industry, existing regulatory measures represent an insufficient compliance incentive.

Aside from general improvements to existing compliance schemes and regulations, an important objective for policy makers is to more precisely target non-compliant segments of the transport industry. In particular, the predominant practice of relying on the management of compliance risk according to the type of scheme an operator has chosen to participate in (e.g. additional compliance requirements for Higher Mass Limits participants) lacks the precision necessary to effectively target non-compliance.

It is notable that there are significant parallels between the objectives of a potential on-board mass monitoring scheme and the existing National Heavy Vehicle Accreditation Scheme Mass Management module. Using different methods, both aim to verify the mass compliance of participants, at the individual load level. Importantly, a feature of the National Heavy Vehicle Accreditation Scheme is the requirement for each participant to develop a compliance management system, tailored to the circumstances and risks of the participant’s specific transport operation. In at least some cases, this includes fitting on-board mass technology to an operator’s trucks.

3.2 Diminished road safety

Overloading of heavy vehicles also has the potential to reduce road safety levels. There are two mechanisms by which this may occur:

- Heavy vehicle stability is an important factor in minimising the risk of rollover. As heavy vehicle mass increases, the stability tends to decrease. Grossly overloaded heavy vehicles are often at a greater increased risk of rollover.

- Heavy vehicle braking performance is reduced as mass increases.

Although there is a popular perception that overloaded heavy vehicles are a road safety risk, the risk is proportional to the degree of overloading. In fact, most modern heavy vehicles are design-rated to operate at masses significantly above legal limits. The major risk associated with overloading is arguably reduced stability (rollover propensity).

In general terms, it can be stated that grossly overloaded heavy vehicles present a significantly higher road safety risk. However, for minor levels of overloading, the increased risk is lower or even negligible. Regulatory countermeasures against overloading are the same as and were discussed in section 3.1.

3.3 Limited access for higher productivity vehicles

Where a reduction in mass compliance risk (or improved compliance assurance) for higher productivity vehicles can be achieved, there may be scope for improved road network access.
Maximising access is a key objective of heavy vehicle productivity schemes (such as Higher Mass Limits). As discussed in section 3.2, lack of confidence in mass compliance translates to lack of confidence in the capacity of vulnerable road infrastructure to support applicable types of heavy vehicles.

Historically, this risk has been controlled by restricting access for higher productivity vehicles to vulnerable road infrastructure. In turn, this reduces the efficient movement of people and goods.

The relationship between regulator confidence in mass compliance for higher productivity vehicles and the extent of road network access is difficult to quantify. There are a range of factors that affect decisions on granting road network access, of which mass compliance is only one.

It is understood, however, that uniform factors of safety for heavy vehicle mass are utilised in assessing bridge capacity ratings for freight vehicles. Such factors of safety are intended to account for mass compliance risk across the broader heavy vehicle fleet, but do not provide for risk assessments at anything less than a fleet level. The NTC, in conjunction with Austroads, is currently undertaking a project to develop an updated bridge assessment tool. It is anticipated that this project will provide a greater understanding and transparency around matters such as whether improved mass compliance assurance may justify broader network access.

3.4 Heavy vehicle pricing arrangements not supporting the efficient use of the road network

On-board mass technology is one option that has the potential to support more efficient pricing arrangements for heavy vehicles. With the road network being a limited resource, it is important that regulatory policy encourages its efficient use so that its benefits are maximised. Accordingly, a National Transport Policy Framework objective is “to promote the efficient movement of people and goods in order to support sustainable economic development and prosperity”.

COAG has outlined a Road Reform Plan\textsuperscript{12} to better achieve this objective:

“\textit{COAG’s objective for road reform is to promote a more efficient, productive and sustainable provision of and use of heavy freight infrastructure.}"

“\textit{COAG’s road pricing reform program has the potential to improve the link between road use and funding. The work agenda is scheduled to be completed in stages over seven years; including incremental charges for heavier (more productive) loads.}"

“The first phase focused on developing the building blocks for mass-distance-location based charges through research and policy development, including incremental pricing.”

On-board mass technology has the potential to support more accurate and precise measurement of heavy vehicle mass. Under the COAG Road Reform Plan, a feasibility study is being undertaken into a more direct heavy vehicle charging arrangement, including incremental charging and mass-distance-location (MDL) charging.

The specific role of on-board mass technology in supporting outcomes of the COAG Road Reform Plan is a matter that will be determined by that project. However, consideration will be given here to the potential implications of its use in that capacity for other potential uses, principally in supporting mass compliance.

The COAG Road Reform Plan is currently considering a range of options including more direct pricing for heavy vehicles, according to the actual mass that a vehicle is carrying on a given trip. If the policy required an accurate and robust means of ascertaining heavy vehicle mass data, this would have significant implications for the regulation of mass compliance; for applicable vehicles, existing means of regulating mass limits may be rendered obsolete.

Importantly, it would also change many of the circumstances considered in the process of developing a policy framework for on-board mass technology. It is important that the policy

proposals, conclusions and recommendations included in this position paper properly account for this contingency.

It is possible that on-board mass technology could be utilised to support such a pricing arrangement. As the performance requirements of on-board mass technology developed specifically for a pricing application would differ in some ways to those for mass compliance, the implications of this must be considered.

### Certified and uncertified on-board mass monitoring and measurement

On-board mass technology has been divided in this paper into two categories: certified and uncertified. Currently, all on-board mass technology falls into the latter category. A range of uncertified on-board mass measurement products of varying accuracy and design are available for sale, commonly used by transport operators as voluntary compliance aids. The measurements are displayed on the truck, or in some cases transmitted wirelessly to a computer owned by the transport operator. The data is not automatically available to regulators.

Under the Intelligent Access Program (IAP) model, detected incidents of non-conformance with route restrictions are electronically reported to the relevant authorities (e.g. road agency). An option is to expand this model to include mass compliance by fitting certified on-board mass monitoring systems connected to an IAP unit. Certification would be offered as a “type approval” to systems demonstrated to have met minimum levels of functionality, accuracy and robustness.

This would provide regulators with the ability to monitor, via automatic electronic reporting of non-compliance events, the mass compliance for applicable vehicles. Under current arrangements, operators of vehicles with IAP units fitted must manually declare the mass of their vehicle.

Certification is a step offering assurance that a given product has met minimum standards (standards are discussed in the section The development of on-board mass standards in section 4.3). It has been proposed that mass data sourced from a certified on-board mass monitoring system may be able to be relied upon as the principal source of evidence in assessing mass compliance for that vehicle/operator, including pursuing any prosecution for a breach of mass limits.

If it was determined that on-board mass technology was to support heavy vehicle pricing reform, it is likely that certified on-board mass technology would be required. Whilst uncertified devices have usefully served transport operators as voluntary mass compliance aids, it is unlikely that they would provide the required level of assured accuracy and robustness to be relied upon for the purpose of determining road use charges.

In developing policy for on-board mass technology, both certified and uncertified on-board mass technology will be considered. Further consideration of policy on the need for and how the certification of in-vehicle telematics systems should be managed is addressed by actions identified in the National In-Vehicle Telematics Strategy: The Road Freight Sector.

To support heavy vehicle pricing, it is possible that only certified on-board mass technology would be deemed suitable. It is also possible that in some circumstances, certified on-board mass technology may be deemed appropriate for supporting mass compliance.

There can be significant costs associated with the development and fitment of on-board mass products to meet regulatory specifications. It is important that any such costs are minimised. Any investments made in on-board mass technology should not be rendered prematurely obsolete by foreseeable regulatory changes.

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13 Type approval refers to approval offered to a product class or model, under which all products manufactured to the approved specification are deemed to be approved.

14 National Transport Commission, National In-Vehicle Telematics Strategy: The Road Freight Sector, 2011.
4. Options

The NTC was asked to develop a policy framework for on-board mass technology. Two areas of heavy vehicle regulation were identified as being impacted: mass compliance and heavy vehicle pricing.

This position paper has analysed how the objectives of these regulatory areas may best be supported by the appropriate utilisation of on-board mass technology. In doing that, shortcomings with existing regulatory arrangements, as well as emerging policy challenges were identified. From these, options have been developed as potential solutions, including but not limited to the utilisation of on-board mass technology.

The preliminary conclusions and recommendations of this position paper are intended to stimulate further feedback and particularly the provision of evidence that may help substantiate policy proposals.

4.1 Options for improved mass compliance assurance

In developing options, several of the identified problems have been grouped together:

- Impact on road infrastructure.
- Diminished road safety.
- Limited access for higher productivity vehicles.

With the root cause for each of these problems being overloading, it is appropriate that options be developed that may increase the level of heavy vehicle mass compliance assurance. The following options should not be considered as absolute choices. Rather, it is possible that different options may suit different circumstances.

The options have been categorised by mandatory and voluntary use of on-board mass systems. In the context of complying with transport law, the distinction between mandatory and voluntary behaviour is partly subjective.

In this paper, “mandated use” of on-board mass systems (Option 2) refers to any regulatory requirement for them to be fitted to a heavy vehicle. Situations where an operator has the option not to fit such a system to their vehicle, but would as a result be precluded from participating in a given regulatory scheme, have been classified here as “mandated use”.

For many operators, participating in a “voluntary” regulatory scheme, such as Higher Mass Limits, is a commercial imperative and for such operators, any requirement of the scheme (such as to fit an on-board mass monitoring system) has been treated in this paper as mandatory.

Option 3 (Voluntary use of on-board mass systems) assesses voluntary use of on-board mass systems. This includes circumstances where (more performance-based) requirements have been imposed on operators, but where they have been afforded a degree of flexibility in how to comply, such as by fitting an on-board mass system or by another equivalent means.

Option 1. Business as usual

This option refers to measures that have been, or may in the future be, taken to manage mass compliance, other than those specifically relying on on-board mass technology.

As yet, the NTC has not identified any substantial evidence to support heavy vehicle mass compliance being rated as a high priority reform issue. It is reasonable to believe that under existing regulatory arrangements, there is, in broad terms, a good level of compliance with mass limits. There is also early evidence that the Chain of Responsibility approach has been effective in driving compliance improvements within some lagging segments of the industry.

Nevertheless, there are a range of options already being considered (or implemented) for how existing compliance arrangements could be improved. These include:
• measures to provide regulators with greater confidence in National Heavy Vehicle Accreditation Scheme Mass Management accreditation as an indicator of compliance assurance (as outlined in the Accreditation Policy Review\(^\text{15}\))

• continued implementation and strengthening of the Chain of Responsibility approach by road agencies and police

• more targeted enforcement

• more robust action against persistent offenders. Where sanctions and penalties have proven ineffective in curbing non-compliance, the Road Transport Reform (Compliance and Enforcement) Bill provides for the imposition of Supervisory Intervention Orders by courts

• improvements to existing heavy vehicle access arrangements that may reduce the incentive for non-compliance (e.g. broader road network access).

The cost effectiveness of compliance options is an important consideration. Regulators have stated that with the growth of the freight task, traditional methods such as on-road enforcement have become economically less viable. Electronic monitoring has been proposed by some as a more cost effective means for regulators to track compliance levels. However, it is questionable whether the broader adoption of on-board mass monitoring would substantially alleviate the need for other mass compliance arrangements, such as on-road enforcement.

For example, as discussed in section 3.1.5 (At-risk industry segments), industry segments are exposed to compliance measures in different ways and to varying degrees. An objective is therefore to develop mass compliance policy so that regulatory measures are matched to the nature and degree of the compliance risk, as it varies with circumstances.

In this context, the major policy question is not whether on-board mass technology can replace existing compliance measures, but more to determine the appropriate circumstances in which each of the available suite of compliance measures should apply.

Regulators are already undertaking improvements to how existing compliance measures are administered. More sharing of compliance ‘intelligence’ between states and territories, as well as the growing use of automated compliance technology (e.g. Safe-T-Cam) may support more targeted enforcement.

There is evidence that the Chain of Responsibility approach has recently driven substantial improvements in compliance levels, including within some historically ‘lagging’ sectors of the transport and logistics industry. However, the benefits of Chain of Responsibility legislation have not yet been fully realised. As regulators are given more time to implement and administer, and industry members learn to adapt, it is likely that compliance levels will continue to improve.

The NTC considers that the National Heavy Vehicle Accreditation Scheme Mass Management module continues to represent an effective means of encouraging operators to manage mass compliance levels. It is expected that implementation of recent outcomes for the Accreditation Policy Review\(^\text{16}\), including to strengthen auditing requirements, will provide a greater degree of assurance to regulators for the scheme’s robustness.

An option for improving the robustness of Mass Management accreditation may be to include some form of record keeping requirements for route compliance.

**Impact**

Reform of heavy vehicle laws, as well as compliance and enforcement practices collectively has contributed to progressive improvements in mass compliance levels. There is evidence to suggest

\(^{15}\) National Transport Commission, loc. cit.

\(^{16}\) National Transport Commission, loc. cit.
that this approach may continue to drive further improvements.

Some regulators have expressed concern for the ability of this option to support an effective program of compliance and enforcement, with strong growth in the national freight task projected into the next few decades. With the current arrangement for cost recovery through heavy vehicle registrations of road agency enforcement activities, funding of compliance and enforcement activities would not appear to be a limiting factor.

More pertinent questions are perhaps: *Are there other effective, or cost-effective options beyond just "business as usual" and in what circumstances would they best apply?* These questions are addressed by assessing the other options in this paper.

**Recommendation**

The NTC supports improvements in current compliance arrangements, the benefits of which may combine with other options assessed below.

**Option 2. Mandated use of certified on-board mass monitoring systems**

The requirement for a heavy vehicle to be fitted with a certified on-board mass monitoring system would subject the operator to a higher degree of regulatory scrutiny than is available via other means.

Where uncertified on-board mass measurement systems may serve as a useful compliance aid for transport operators, a key feature of certified on-board mass monitoring systems is their enhanced ability to assist authorities to detect non-compliance. Some regulators have expressed enthusiasm for this option, as a means of providing a greater degree of mass compliance assurance than other means.

However, it would also impose additional costs. For a semi-trailer, the cost of an on-board mass system was estimated in 2009 at between $5,000 and $12,000. For a B-double, the cost was between $7,500 and $17,000. Equipment suppliers have indicated that these costs are likely to decrease over time. For an on-board mass monitoring system certified by Transport Certification Australia, these costs would be additional to and packaged with those for an Intelligent Access Program system.

**Option 2a. Mandatory on-board mass monitoring systems as a substitute for on-road enforcement**

By electronically monitoring mass compliance, some policy makers have proposed that this may help reduce the current reliance on conventional, random and targeted on-road enforcement, as well as improve mass compliance levels. One option is to make fitting on-board mass monitoring systems mandatory for broad segments, or the entire heavy vehicle fleet.

To assess this option, an indicative comparison of costs for on-board mass monitoring systems with those for existing enforcement activities is shown below in Table 3. Clearly, the costs of fitting on-board mass systems increase with the scope of any requirement to do so.

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18 The current cost of an Intelligent Access Program system to operators is understood to be in the order of $60-100 per month, per unit/vehicle. As on-board mass systems may need to be installed in a more permanent fashion, it is unclear precisely how the cost of an on-board mass-enabled IAP system would be structured (i.e. on a subscription basis or an up-front purchase cost) and therefore what the actual, additional cost may be.
### Table 3: Indicative cost comparison of on-board mass systems with other enforcement activities

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Total number of vehicles</th>
<th>Total estimated cost ($M per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-doubles (62.5 tonnes and above) and B-triples only</td>
<td>9,447</td>
<td>$3</td>
</tr>
<tr>
<td>All heavy articulated vehicles, truck-trailers and road trains</td>
<td>73,313</td>
<td>$24</td>
</tr>
<tr>
<td>All heavy vehicles</td>
<td>376,139</td>
<td>$123</td>
</tr>
</tbody>
</table>

**Enforcement costs** (total per annum) $69

The National In-Vehicle Telematics Strategy outlines a vision for widespread use of telematics reducing the need for conventional, on-road enforcement. A key question is the extent to which increased electronic monitoring may reduce this need. This depends partly on what elements of compliance may be electronically monitored. While the costs in Table 3 include only those for on-board mass monitoring, other potential measures include monitoring of driving hours and vehicle speed.

As shown in Table 3, if a more restrictive requirement for fitting on-board mass monitoring systems was chosen (such as for B-doubles only), the total cost of fitting the equipment is relatively low ($3 million per annum). In this scenario, the majority of the heavy vehicle fleet would not be required to be electronically monitored and would be subject to other compliance and enforcement measures. In other scenarios where a more widespread requirement was imposed, the cost would also be increased, potentially above the total cost of existing enforcement arrangements ($69 million per annum).

It is widely accepted that the effectiveness of enforcement depends significantly on the perceived likelihood of a regulatory breach being detected\(^\text{19}\). For random enforcement, this perception is closely linked to the amount of allocated on-road enforcement resources (i.e. on-road visibility and presence, in terms of the number of enforcement officers and their ability to monitor a sufficient proportion of the freight network).

In other words, for an operator not subject to any additional compliance controls (such as being required to fit an on-board mass monitoring system), there is a risk that reducing enforcement resources may cause them to perceive that the risk of detection has also been reduced. Therefore, there is arguably a minimum threshold of on-road enforcement resources necessary to provide an effective deterrent. This threshold is arguably not reduced by increasing the number of electronically monitored heavy vehicles.

On the other hand, in the case where all heavy vehicles were required to be fitted with on-board mass monitoring systems, this may form a uniformly effective deterrent for mass-related offences,\(^\text{19}\)

\(^\text{19}\) Costs are indicative only. On-board mass systems have been costed based on current retail prices, but discounted by half to reflect likely (or potential) price movements in the case where their widespread mandatory fitment was mandated. Other associated costs, such as for a higher specification (achieving certification), other elements of an on-board mass system (i.e. IAP) and administrative costs to regulators have been excluded. The enforcement costs, which represent annual costs attributed by all state and territory road agencies to enforcing all heavy vehicle regulations (including, but not limited to those for heavy vehicle mass), have been sourced from the PayGo pricing model, used by the NTC to determine heavy vehicle registration prices.

\(^\text{20}\) As discussed in *Bayonets, Tigers and Other Enforcement Dilemmas*, Arie Freiberg, included in proceedings of the conference: *Achieving Compliance through Strategic Enforcement*, March 2002.
independent of any (or no) on-road enforcement. However, as a substitute for on-road enforcement, the effectiveness of this scenario would depend on two criteria:

- the effectiveness of on-board mass monitoring systems alone as a deterrent for mass offences
- a similar requirement to fit other electronic monitoring devices that would serve as effective substitutes for the range of other regulatory requirements currently managed by on-road enforcement.

The effectiveness of on-board mass monitoring systems as a deterrent (for a given heavy vehicle and operator who has fitted such a system) is the subject of ongoing studies, trials and the development of performance specifications by Transport Certification Australia. As a deterrent, the ability to monitor mass compliance in real time has strong potential. However, a conclusive assessment would likely only be possible with greater experience of its use by heavy vehicle operators.

Perhaps a more substantial limitation is the ability of electronic monitoring systems to substitute the range of other functions of on-road enforcement. While work is underway to develop a regulatory framework for using electronic work diaries to help manage driver fatigue, random on-road enforcement fulfils a range of other functions that do not necessarily lend themselves to electronic monitoring. These include checking compliance with vehicle standards and load restraint.

A concern of some regulators is that projected growth in the freight task would place upward pressure on on-road enforcement costs. However, it is unclear whether attempting to directly substitute “manual” on-road enforcement of mass regulations with electronic on-board monitoring would represent a cost-effective solution.

A further dimension is the enforcement costs associated with electronic (on-board mass) monitoring. While such systems may automatically detect potential breaches of transport law, regulators must still allocate resources to investigate such incidents. Some automated compliance devices, such as speed cameras, do not require manual investigation of detected, potential breaches. However, regulators have indicated the likely need to address detected mass offences (by on-board mass monitoring systems) on more of a case-by-case basis, as is understood by the NTC to be the practice for route compliance breaches under the Intelligent Access Program.

Although most road agencies have already implemented administrative arrangements for the Intelligent Access Program, the additional need to manually investigate potential/detected mass breaches would incur additional costs. This paper does not extend to developing policy or assessing the costs for how that would be undertaken, which is viewed as a task most appropriately conducted once the higher level policy principles for on-board mass monitoring technology are determined.

Impact

This option assessed a requirement for fitting on-board mass monitoring systems to broad segments of, or universally across the heavy vehicle fleet as a direct substitute for random on-road enforcement. Regulators have cited the growing freight task as a looming threat to the viability of traditional on-road enforcement as a means of managing compliance. A more cost-effective means must be developed.

However, managing mass compliance is merely one function of on-road enforcement. It is unclear that electronically monitoring the mass compliance of broad segments of the heavy vehicle fleet alone would have a substantial impact on reducing the necessary allocation of resources to on-road enforcement. The cost-effectiveness of such an option is also questionable.

Recommendation

At this time, any requirement for broad segments of the heavy vehicle fleet to be fitted with on-board mass monitoring systems is not recommended. The benefits of mandating on-board mass monitoring and other electronic compliance systems as a direct substitute for on-road enforcement are not immediately clear. It is recommended that further investigation of this option would be needed to better understand how that objective may be achieved, accounting for broader factors such as the range of functions undertaken by on-road enforcement officers, the impact on other
segments of the industry not subjected to electronic compliance and a more detailed assessment of cost implications.

The NTC is currently undertaking a strategic review of these issues through a project to develop a national compliance strategy. That project is better positioned to develop a compliance strategy accounting for the full breadth of compliance matters, beyond just mass compliance.

Any proposal for this type of option must be justified with a regulatory impact statement.

**Option 2b. More targeted requirements for fitting on-board mass monitoring systems**

Another option is for more targeted requirements for heavy vehicle operators to fit on-board mass monitoring systems. As discussed in section 3.1.5 (At-risk industry segments), mass compliance risk varies considerably across the heavy vehicle industry. A risk profile of heavy vehicle operators may be developed, drawing on a number of parameters. These include an operator’s mass compliance record and the nature of the transport task itself.

Once an operator (or even another party in the transport supply chain) has been identified as representing a higher risk of non-compliance with mass regulations, regulators are better positioned to manage that risk. There are a number of options for how this may be done, including greater scrutiny through more targeted on-road enforcement, auditing of business records under Chain of Responsibility legislation, court-imposed orders and imposing conditions on participants operating in concessional schemes. A requirement to fit an on-board mass monitoring system would provide regulators with an additional option.

The robustness of an on-board mass monitoring system, as a tool for providing regulators with a high degree of mass compliance assurance, is a matter of ongoing investigation. However, if demonstrated to provide regulators with a more robust means of monitoring mass compliance than other available measures, it may offer an additional option for managing mass compliance.

Where Option 2a (a requirement for fitting on-board mass monitoring systems across broad segments of the heavy vehicle fleet) was found to be cost-ineffective, this option may provide regulators with a more effective means of managing higher-risk segments of the heavy vehicle transport industry.

Justification of the cost-effectiveness of this option rests not only on the robustness of on-board mass monitoring systems as a compliance measure, but also on their cost-effectiveness compares with other options.

Heavy vehicle operators may also demonstrate that they pose a reduced mass compliance risk by participating in the National Heavy Vehicle Accreditation Scheme Mass Management module. Accreditation is granted to operators who have demonstrated that they have developed and implemented a suitably robust mass management system. The objectives of Accreditation and a certified on-board mass monitoring system are similar: to mitigate the risk of non-compliance with mass limits.

Some regulators have expressed concern for the effectiveness of the National Heavy Vehicle Accreditation Scheme Mass Management module as a means of mitigating the risk of non-compliance. Although some operators have conceded that minor breaches may occur from time to time, the NTC is unaware of evidence suggesting widespread non-compliance with mass limits by National Heavy Vehicle Accreditation Scheme Mass Management accredited operators. Recommendations to improve the robustness of the scheme were included as part of the Accreditation Policy Review, approved by ATC in June 2009.

Therefore, for the majority of operators participating in schemes already requiring accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module, it is unclear that increasing the applicable compliance burden would be justified. It should be noted that on-board mass systems may also be utilised by operators to support their accreditation.

Additionally, other measures, such as targeted on-road enforcement and auditing of business records may be cost-effective in many circumstances. While regulators and police have stated that business audits are typically a drain on their resources and therefore costs, early evidence suggests that these have a deterrence benefit that extends far beyond just the subject of the audit.
Under the provisions of the Compliance and Enforcement legislation, courts also have the authority to impose a Supervisory Intervention Order on persistent offenders, potentially requiring a certified on-board mass monitoring system to be fitted and to impose further sanctions where compliance levels did not subsequently improve.

Some transport tasks may represent an elevated mass compliance risk, by their nature alone (i.e. independent of the operator’s compliance record). An example is the Higher Mass Limits scheme, by virtue of the higher masses at which participants are permitted to load their vehicles and their restricted access to the road network (as discussed in section 0). Under existing arrangements, participation is conditional on also participating in the National Heavy Vehicle Accreditation Scheme Mass Management module.

As two states have already added participating in the Intelligent Access Program as a condition of the scheme, some regulators view requiring on-board mass monitoring as a logical extension. A concern of some regulators is that factors, such as restricted network access and the difficulty of enforcing it, have provided an insufficient deterrent against mass limit and network access offences. Where it could be shown that such offences were widespread and that participating in the National Heavy Vehicle Accreditation Scheme Mass Management module was ineffective in curbing them, stronger measures may be justified. This may include requiring all or some participants to fit an on-board mass monitoring system.

In the case of the Higher Mass Limits scheme, this would require a better understanding of compliance rates and patterns, their causes and how effective existing countermeasures had been in managing them. In fact, better information or intelligence about mass compliance more broadly is a prerequisite of this option, in order to more effectively apply regulatory measures for managing mass compliance in a targeted manner.

### Mandated use of uncertified on-board mass measurement systems

A variation of this option is for mandated use of uncertified on-board mass measurement systems. Utilised as part of a mass compliance management system, such equipment may serve as a useful compliance aid. Indeed, Options 3a and 3b considers the value of this type of use for on-board mass systems.

However, it is unlikely that a simple requirement for fitting an uncertified on-board mass measurement system, without any requirements governing how the system may be properly utilised, would be of any substantial value for encouraging improved levels of compliance. Unlike for an on-board mass monitoring system, an operator may simply disregard readings from an on-board mass measurement system that indicates overloading has occurred. Rather, it is the demonstrated will and capability on the part of a transport operator to manage their mass compliance, such as through the National Heavy Vehicle Accreditation Scheme or even just voluntarily fitting an on-board mass system, that are of greater importance.

### Impact

This option assessed more targeted requirements for operators to fit on-board mass monitoring systems to their heavy vehicles, in circumstances where an elevated risk of non-compliance with mass regulations was demonstrated. Due to its more restricted scope, this option would be at (significantly) less cost to heavy vehicle operators than Option 2a, while still providing regulators with additional oversight of compliance in circumstances of higher-risk (i.e. where it is most needed).

A distinction must be drawn between transport operations properly assessed as posing a higher risk and those for which there is uncertainty about compliance rates and patterns. A common theme in feedback received by the NTC is a lack of detailed data and information available to regulators to accurately assess mass compliance risk. Regulators have reported that a major factor has been inadequate resources for on-road enforcement to meaningfully “survey” the compliance landscape. Some regulators have proposed electronic compliance as a means of better fulfilling
that role (and was assessed as Option 2a).

Therefore, the ability to accurately target heavy vehicles and operators with a higher mass compliance risk depends on a sufficient degree of compliance intelligence being available. Under this option, such intelligence must be procured primarily by means other than from on-board mass monitoring data. Therefore, while it may contribute to improving the mass compliance of operators required to fit an on-board mass monitoring system, it may not necessarily contribute in any substantial manner to reducing the need for deploying other compliance and enforcement measures, such as on-road enforcement.

This option is also contingent upon the effectiveness of on-board mass monitoring systems as a deterrent against overloading. The objective of such systems is to provide a more robust means of monitoring mass compliance than available via alternative means. The extent to which this may be supported is a matter of ongoing investigation.

Furthermore, the option of requiring more robust controls for heavy vehicles and operators with a higher mass compliance risk does not hinge solely on fitting on-board mass monitoring systems. Other means of mitigating that risk may be equally or even more cost-effective.

Recommendation

This option is recommended, where it could be demonstrated that requiring on-board mass monitoring systems to be fitted would mitigate mass compliance risk of a degree and nature that precluded other, potentially more cost-effective alternatives.

Certain circumstances, such as operators proven to have persistently engaged in overloading, would appear to lend themselves to this option. However, at this time, it is unclear that it may be justifiably extended to broader circumstances, such as participants in the Higher Mass Limits scheme.

**Option 2c. Mandatory fitment of on-board mass monitoring systems as a means of supporting productivity improvements**

An option is to require fitting an on-board mass monitoring system as a prerequisite for participating in a higher productivity scheme, or as a condition of a permit for an individual operator to load their vehicle with additional mass than is otherwise permitted.\(^{21}\)

This option is partly an extension of Option 2b, which assessed more targeted requirements for fitting on-board mass monitoring systems. However, it highlights the potential for the technology to support productivity improvements (in the form of increased mass limits), in circumstances where a lack of confidence by regulators in mass compliance assurance has served as a limitation. An example of this is discussed in the case study below, for bridge loading assessments.

**Bridge loading assessments and mass compliance**

Bridge loading assessments serve as a useful case study for how enhanced mass compliance assurance has the potential to unlock productivity gains. Proposed higher productivity vehicles have received in-principle approval under schemes such as Performance Based Standards. However, in a number of cases, their access to the road network has been heavily restricted or denied outright as a result of failing a bridge loading assessment.\(^{22}\)

It is understood that a limiting factor in such assessments can be the practice of assessing a given vehicle at a higher mass than which it is seeking to operate at. This safety factor is understood to account for the risk of overloading, with the assessed load for a vehicle being

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\(^{21}\) Additional mass may include increased axle mass limits, or approval of a higher productivity heavy vehicle to operate at "standard" axle mass limits, but with an additional number of axles or axle groups, resulting in a higher gross vehicle or combination mass than was otherwise approved for a given type of road network access.

calculated based partly on statistical records of overloading, at the fleet level.

It stands to reason that where the risk of overloading for a given heavy vehicle or operator has been demonstrated as having been suitably reduced, there may be opportunities to ‘recover’ some productivity benefits by assessing it with a reduced safety factor. Previous consultation with road agency staff has revealed mixed views on the scope for delivering this option, which for bridge assessments in particular is acknowledged as technically complex.

A limitation on this option is the lack of a defined standard or mechanism through which such a productivity benefit may be delivered. Defining a clearer relationship between mass compliance risk and bridge assessment safety factors is outside the scope of this project. However, it is an objective of the current Austroads project FS1580 (Bridge Assessment Tool).

As for other options canvassed in this paper, a key objective is to improve mass compliance. However, as for all the options to mandate on-board mass monitoring systems (Options 2a, 2b and 2c), any decision to mandate the technology must be justified by demonstrating why the objective was not practicably achievable by alternative means.

**Impact**

This option has the potential to unlock productivity gains, in certain circumstances. However, it is arguably prone to “regulatory creep”, in which potential productivity gains supported by factors such as progressive improvements to road infrastructure are made conditional upon adopting additional compliance measures (such as fitting an on-board mass monitoring system). The type of productivity gain at issue here is restricted to that which has been demonstrated to depend on a reduced degree of mass compliance risk (such as in the case study for bridge loading assessments provided above).

An example of such a productivity gain is where a heavy vehicle was seeking approval under the Performance Based Standards scheme to operate at a higher mass than other “standard” heavy vehicles on a given route. Where it was demonstrated that infrastructure on the route (e.g. a bridge) was particularly sensitive to damage by being loaded above the approved higher mass limit and the applicant was unable to demonstrate a suitably robust mass management system, an option is to make approval conditional upon fitting an on-board mass monitoring system.

**Recommendation**

This option is an extension of Option 2b and the recommendation is similar: that it may be justified where it could be demonstrated that requiring on-board mass monitoring systems to be fitted would be necessary to mitigate mass compliance risk arising specifically from a potential productivity gain for which other, potentially more cost-effective alternatives were unsuited.

**Option 3. Voluntary use of on-board mass systems**

This option analyses circumstances in which operators may choose to voluntarily fit on-board mass systems, in order to comply with transport regulations.

**Option 3a. Uncertified on-board mass measurement systems as a compliance aid under the National Heavy Vehicle Accreditation Scheme**

Under the existing National Heavy Vehicle Accreditation Scheme Mass Management accreditation arrangements, fitting some form of on-board mass technology in certain circumstances is practically a requirement\(^{23}\). Particularly where loading occurs in an uncontrolled environment, such

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\(^{23}\) Officially, accreditation to the National Heavy Vehicle Accreditation Scheme is voluntary. However, it is a prerequisite for operating at Concessional and Higher Mass Limits. For those operators whose viability depends on maximising their payload mass and for whom fitting on-board mass systems is the only practical means of satisfying the National Heavy Vehicle Accreditation Scheme standards, on-board mass systems are indispensable.
as in the farm paddock during harvest, the most (or only) reliable means of verifying loads (other than conservative loading) may be some form of on-board mass measurement.

Typically, this is achieved by fitting analogue suspension air pressure gauges to the truck. The NTC understands that, used and maintained in good faith (as per National Heavy Vehicle Accreditation Scheme Mass Management accreditation requirements), these devices are sufficiently accurate to support compliant loading. However, there are a range of on-board mass measurement products that would serve this purpose.

Under National Heavy Vehicle Accreditation Scheme, no specific technology requirements are imposed on operators. Instead, in demonstrating their ability to manage their mass compliance, it is operators themselves who may choose to fit an on-board mass system. The choice of technology is secondary to the objective of encouraging operators to develop and utilise an effective mass management system.

The National Heavy Vehicle Accreditation Scheme Mass Management module imposes two broad requirements, for an applicant to demonstrate:

- a plan for how they would manage compliance with mass regulations, including particularly a capability to verify the mass of each load
- evidence of effective execution of that plan, by recording evidence of the mass of each load in a written format and periodically submitting the results to an independent auditor.

The use of an uncertified on-board mass measurement system would support the first requirement. Such a system would not necessarily support the second requirement, to produce auditable records of mass measurements. However, the NTC is aware of some transport operators taking increasingly proactive steps to manage their mass compliance, including options such as monitoring and recording electronic on-board mass measurements. In this way, operators may choose of their own volition to undertake a similar role to that of regulators with on-board mass monitoring systems (discussed further in Option 3d).

Impact

This option has strong potential to support operators developing cost-effective mass compliance systems. Accounting for their particular circumstances, operators may choose the optimum means of managing their mass compliance, rather than a given (inflexible) means being imposed on them by regulators.

Empowering operators to take greater responsibility for managing their compliance is likely to build greater trust between them and regulators, which in turn may encourage operators to adopt more positive attitudes towards compliance. This contrasts with enforcement-focussed schemes, for which industry feedback strongly suggests breed resentment and which may encourage some operators to attempt to evade detection.

It is likely that this option will continue to account for a large proportion of on-board mass systems (including analogue air gauges) being fitted to heavy vehicles.

Recommendation

The NTC supports the continued use of non-certified on-board mass technology to be fitted in appropriate circumstances, as a compliance aid. This option recognises the existing practice of operators utilising on-board mass technology, including in supporting National Heavy Vehicle Accreditation Scheme.

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24 The accuracy of on-board mass systems has been reviewed by Transport Certification Australia. Although analogue air gauges were not included in that review, it has been established that the accuracy of all on-board mass systems depends partly on their judicious operation. Consultation suggests that for an operator with a sufficient degree of skill and experience, whose objective is to comply with mass limits, judicious interpretation of analogue air gauge readings, in conjunction with conservative loading, are sufficiently accurate to serve as an effective compliance aid. In other words, the more accurate the means of verifying a load, the more confidently an operator can minimise their margin for error, without affecting the compliance outcome.
Option 3b. Certified on-board mass monitoring systems as an alternative to National Heavy Vehicle Accreditation Scheme Mass Management

Certified on-board mass monitoring systems have the potential to serve as a voluntary alternative and substitute for audit based mass compliance, under the National Heavy Vehicle Accreditation Scheme Mass Management scheme. Instead of manually recording mass measurements under the National Heavy Vehicle Accreditation Scheme, an on-board mass monitoring system would automatically record them. Instead of compliance being assessed by an auditor under the National Heavy Vehicle Accreditation Scheme, an on-board mass monitoring system would automatically notify regulators of non-compliance.

Some operators have indicated that the cost of gaining and maintaining accreditation to the National Heavy Vehicle Accreditation Scheme serves as a barrier to entry to the module. If the cost of purchasing, fitting and maintaining an on-board mass monitoring system were less than the current National Heavy Vehicle Accreditation Scheme, providing it as an alternative may serve to lower the entry barrier.

For others, the administrative burden of gaining accreditation to the National Heavy Vehicle Accreditation Scheme is prohibitive. An option to fit an on-board mass monitoring system instead may help alleviate that burden. Such operators may be willing to pay a price premium (over the cost of the National Heavy Vehicle Accreditation Scheme).

Currently, the National Heavy Vehicle Accreditation Scheme Mass Management module requires operators to develop a sufficiently robust mass management process. A drawback of this option would be the removal of this requirement (i.e. not altogether, but only for those who chose to fit an on-board mass monitoring system). It could be argued that the requirement to develop a mass management system is a core principle of the National Heavy Vehicle Accreditation Scheme. However, by providing regulators with a more ‘complete view’ of an operator’s mass compliance, it could also be argued that the outcome (compliance) renders assessing the process (mass management system) redundant.

It is unlikely that the need for completing paperwork could be avoided altogether. For instance, the National Heavy Vehicle Accreditation Scheme Mass Management module also requires the operator to undertake a program and keep records of suspension condition monitoring and maintenance. The on-board mass monitoring specification being developed by Transport Certification Australia also includes manual record keeping requirements.

**Impact**

The viability of this option rests primarily on the relative cost, i.e. compared with the current requirement for paper based record keeping. The NTC has estimated the cost\(^{25}\) of gaining and maintaining the National Heavy Vehicle Accreditation Scheme Mass Management module over a two year period at about $7,000 for an operator with three trucks and $12,000 for one with five trucks.

In comparison, the cost of certified on-board mass monitoring systems (incorporating the Intelligent Access Program capability) over the same two year period has been estimated, for an operator with three and five trucks respectively (excluding maintenance costs) as:

- $25,000 and $54,000 in capital outlay (including the outright purchase and installation costs of on-board mass measurement hardware); or
- $9,500 and $18,500 for the same initial two year period, but measured by amortising the hardware purchase and installation costs over a ten year period.

At present, it is unclear whether certified on-board mass monitoring systems would support cost savings to an operator, as a voluntary alternative to existing means of gaining accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module. However, telematics industry members have claimed that equipment costs are trending downwards. It is possible that

\(^{25}\) Cost here refers to the cost incurred by the operator and excludes other costs, such as those to government in administering the scheme.
the cost difference, as estimated here, may fall over time. The trend for reducing costs of telematics (including on-board mass) equipment is understood to be substantially contingent upon increasing sales volumes.

**Recommendation**

This option is supported if a cost benefit analysis showed it to be a viable alternative to the current audit based scheme. This has the potential to alleviate some of the costs and administrative burden of the current scheme, particularly for operators whose circumstances may make achieving accreditation to the existing standards difficult.

**Option 3c. Compliance management systems as a means of supporting productivity improvements**

The option for certified on-board mass monitoring systems to support productivity improvements, in the form of increased mass limits, was assessed as part of Option 2c. This Option (3c) is a variation on that, in which on-board mass measurement systems (which include both uncertified measurement and certified monitoring systems) may be used for the same purpose.

However, for this option, the operator would have a greater degree of responsibility for justifying how they had taken adequate steps to manage their mass compliance risk, rather than (as for Option 2c) those steps being prescribed in law. It recognises that the circumstances of heavy vehicle operators vary and accordingly, so does their mass compliance risk and the necessary steps to manage it.

This type of process regulatory approach would broadly align with that taken by the National Heavy Vehicle Accreditation Scheme Mass Management module. Indeed, Options 3a and 3b assess how on-board mass systems may be used to help gain Accreditation (and any associated productivity improvements). However, there are examples of potential productivity improvements, e.g. under the Performance Based Standards scheme, that regulators may assess as representing a particularly high degree of mass compliance risk. In such cases, a more robust means of managing compliance may be required than that provided by Accreditation.

Options 2b and 2c would prescribe fitting an on-board mass monitoring system as the only allowable means of managing very high levels of mass compliance risk. This option would allow operators to propose a mass compliance management system with a level of robustness that is commensurate with the degree of risk. Such a system may or may not utilise on-board mass monitoring.

This option recognises the maturity of at least some segments of the transport industry in managing mass compliance risk; an example is the case study on p.9 for Australia Post. It recognises that some operators have developed sophisticated and robust compliance management systems, for whom additional layers of regulatory scrutiny would be of minimal benefit.

**Impact**

This option assesses a form of process regulation, in which operators may propose to regulators how they intend to manage their mass compliance, whether utilising on-board mass systems in support of their management system, or not. Due to the higher degree of capability in compliance management and effort required to develop such a system that is necessary to support such an approach, it is perhaps not practically applied across the broader heavy vehicle transport industry.

It would also impose an obligation on regulators (or another authorised party) to assess proposed mass management systems, which in turn may require them to procure additional skills. Process regulation is well accepted, understood and utilised in the regulation of other more centralised industries, such as rail safety. However, it has not taken strong hold in heavy vehicle regulation, where the industry is dominated by a large number of owner-operators.

Option 2c discussed the types of circumstances in which productivity improvements may be available; to date, these have been more exceptional than the conditions under which the majority of heavy vehicles operate (which would help alleviate some of the limitations of applying this approach to the heavy vehicle industry). They may also demand a degree of compliance assurance above which is available through the National Heavy Vehicle Accreditation Scheme Mass Management module.
As for other voluntary options, this option would provide operators with greater flexibility in developing a cost-effective mass management system than under Option 2c (to require an on-board mass monitoring systems to be fitted). However, this must be balanced against any imposition of additional cost on regulators to assess proposed management systems.

**Recommendation**

This option is recommended particularly for lower volume productivity schemes where mass compliance assurance is of particular importance. It is preferred above Option 2c, which would apply in similar circumstances, but restrict operators to demonstrating compliance by fitting an on-board mass monitoring system.

Some productivity improvements may demand a higher degree of mass compliance assurance than is offered through participation in the National Heavy Vehicle Accreditation Scheme Mass Management module. Where such productivity improvements are to be made available on a broader scale, it is recommended that options for enhancing the scalability of this option are investigated (such as the recovery of costs incurred by regulators in assessing compliance systems, or outsourcing of that role, as occurs in the National Heavy Vehicle Accreditation Scheme Mass Management module). In this way and similar to Option 3b (fitting an on-board mass monitoring system as an alternative means of achieving Accreditation), operators would be positioned to determine the most cost-effective option to suit their circumstances.

This option should not apply to circumstances in which the National Heavy Vehicle Accreditation Scheme Mass Management module would provide a sufficient degree of assurance for an operator’s mass compliance.

**Option 3d. Other voluntary use of on-board mass systems**

On-board mass systems are often utilised by transport operators as a voluntary compliance aid, including to maximise their payloads and to manage their Chain of Responsibility obligations. Option 3a addresses this type of use specifically for National Heavy Vehicle Accreditation Scheme Mass Management accredited operators. However, voluntary use of on-board mass systems is available to all operators, whether by fitting certified monitoring or uncertified on-board mass measurement systems.

Some industry members have reported that Chain of Responsibility legislation has driven significant changes in the selection criteria for contracted and sub-contracted transport operators. Specifically, to minimise their liability under Chain of Responsibility, confidence in the compliance of contractors has grown in importance.

The NTC understands that it has become more common for transport customers to impose requirements, such as National Heavy Vehicle Accreditation Scheme accreditation under the terms of contract. An additional option is to require on-board mass systems to be fitted.

It should be noted that responsible parties cannot ‘outsource’ their responsibilities under the Chain of Responsibility by simply requiring contractors to fit on-board mass technology to their vehicles. Instead, on-board mass systems would more appropriately form part of a broader compliance management system.

Further guidance on how technology may best support transport operator-managed compliance systems has been developed as part of the National In-Vehicle Telematics Strategy: The Road Freight Sector. Recommendations include to allow the introduction of codes of practice for how telematics systems may be utilised in a form to provide *prima facie* evidence of effectively managing compliance risks, as well as to introduce a positive duty for operators to manage mass compliance (i.e. a requirement for operators to be able to demonstrate having taken proactive steps to manage compliance, rather than merely avoid overloading offences). These recommendations have the potential to encourage stronger uptake of on-board mass systems. The use of on-board mass systems in these capacities is deemed voluntary, as they are not explicitly required by regulations. In developing a policy framework for on-board mass technology, it is useful to compare the need for prescribing the use of on-board mass systems, in contrast to a framework that imposes overarching responsibilities on the transport industry (the outcome, such as through Chain of Responsibility). The latter approach provides industry members with greater flexibility in determining the most practical, cost-effective means of fulfilling those responsibilities (the process).
Impact

The NTC believes that for most of the transport industry, the latter approach has proven the most cost-effective. An important reason is that compliance management systems are not a 'one size fits all' proposition. Rather, the ability of transport companies to develop and manage compliance systems varies significantly, as does their available budget. Whilst such variations do not justify poor compliance management, they highlight the need for policy makers to provide maximum flexibility in how industry members may best comply with their obligations.

As on-board mass technology becomes more affordable, it is more likely that industry members may choose it ahead of other alternatives (such as discussed under Option 3b - Certified on-board mass monitoring systems as an alternative to National Heavy Vehicle Accreditation Scheme mass management).

In developing a policy framework for on-board mass technology, the temptation is for regulators to predetermine precisely how and when its use would be required. There are some specific circumstances where this may be necessary. However, where other existing compliance arrangements have proven effective, on-board mass systems may best be viewed as a supporting technology.

Instead, the NTC believes that growing awareness of the need and maturity amongst transport industry members in managing their compliance obligations (such as under Chain of Responsibility legislation) will be the major driver in greater uptake of on-board mass systems, irrespective of any explicit requirements for their fitment.

Recommendation

Potentially the greatest need and demand for on-board mass technology is to support transport operator compliance management systems. Such systems are developed around the need to demonstrate compliance with transport law, including Chain of Responsibility, rather than the technology itself.

For this type of use, it is unnecessary to develop specific policy for on-board mass technology.

4.2 Options for coordinating with heavy vehicle pricing reform

It is not the role of this project to develop policy for heavy vehicle pricing reform, nor to determine precisely how it may be supported by on-board mass technology. Nevertheless, it is clear that such matters impact upon on-board mass policy.

To date, Transport Certification Australia has undertaken significant research and development into a specification for on-board mass technology, against which commercial on-board mass products may be certified. Similar to that for the Intelligent Access Program, the intention is that certified products would provide regulators with a means of obtaining mass compliance information, with a minimum level of accuracy, robustness and reliability.

It is likely that many features of such an on-board mass specification developed to support mass compliance would be similar to one developed to support heavy vehicle pricing. However, it is also likely that there would be some differences and in some respects, potentially a higher performance standard required to support a pricing application.

It is reasonable to conclude that research and development activities into an on-board mass specification would usefully serve either application (mass compliance or heavy vehicle pricing). However, in considering separate uses, policy makers must endeavour to ensure that any eventual investment in (uptake of) on-board mass products is not rendered prematurely obsolete by future regulatory reform. There are two principal risks:

- the potential for substantial changes to the heavy vehicle compliance landscape, resulting from heavy vehicle pricing reform
- the risk of a heavy vehicle being required to be fitted with an on-board mass system certified for mass compliance purposes, then at a later point in time, a different system certified for heavy vehicle pricing.
The analysis included in this position paper is based on current policy arrangements. Reform to heavy vehicle pricing policy has the potential to substantially alter the compliance landscape, including the circumstances under which the options and recommendations in this position paper were formulated.

Options for managing these risks are discussed below.

Option 1. Proceed with implementation of certified (mass compliance specification) on-board mass systems

One option would be to proceed with deploying or implementing certified on-board mass monitoring technology without waiting for the outcomes of the heavy vehicle pricing policy development process. This would be subject to a sufficient case being made for on-board mass monitoring systems to cost effectively support improved levels of mass compliance.

Implementation here refers to:

- developing a specification for certified on-board mass (compliance) monitoring technology
- developing policy for the circumstances in which this type of equipment would be required to be fitted to heavy vehicles (as addressed in this position paper)
- the fitting and operation of certified on-board mass monitoring technology by heavy vehicle operators
- administering heavy vehicle regulations, including any enforcement actions, utilising certified on-board mass technology generated information.

Impact

Under this option, the risk of technology being rendered obsolete (and the associated costs) could be mitigated by measures to ensure that on-board mass technology and specifications are developed in a manner that would allow for on-board mass firmware and software (and even hardware) to be upgraded (at minimum possible expense).

The risk of obsolescence is also linked to the scale of deployment. Certified on-board mass monitoring policy and technology is very much in its infancy. A conservative program of implementation, based initially on trialling a smaller volume of systems would help mitigate the risk of obsolescence. This would allow for specification and system improvements to be made with a minimum of cost and for outcomes of the COAG Road Reform Plan feasibility study to be incorporated into ongoing development and policy.

Such trials are already underway. The Queensland Department of Transport and Main Roads has overseen the operation of such a system for a period of time. Transport Certification Australia has managed ongoing trials on-board mass systems, as part of an initiative to develop a certification standard under the Intelligent Access Program model.

Recommendation

Subject to the demonstrated need and demand for on-board mass monitoring technology to support mass compliance, this option is supported where implementation is undertaken in a staged manner, such as an initial small volume trial. Outcomes of the COAG Road Reform Plan feasibility study are due at the end of 2011, which will confirm whether there is a need or role for on-board mass technology. In this way, the risk of inadvertent outcomes, such as large volumes of equipment being rendered obsolete by future regulatory changes may be minimised.

Option 2. Await outcomes of COAG Road Reform Plan feasibility study

As part of the COAG Road Reform Plan feasibility study, the Business Systems work stream is investigating the need and/or role of an on-board mass system. Results of the feasibility study are due at the end of 2011. This would provide clarity on whether there is a need for the performance requirements of certified on-board mass systems and reduce the risk of installed systems being rendered prematurely obsolete.
Impact

Transport Certification Australia have stated that in developing an on-board mass specification, they have accounted for the potential need to upgrade the system.

Recommendation

This option may better position policy makers to consider the technical requirements of certified on-board mass systems and reduce the risk of obsolescence. However, it is recommended that the mitigating measures as described under Option 1 would likely be sufficient to mitigate the identified risks.

4.3 The development of on-board mass standards

This position paper has addressed on-board mass systems subject to the availability of various potential standards. These may include:

1. a draft specification being developed by Transport Certification Australia to support the interoperability with Intelligent Access Program
2. a potential standard to support heavy vehicle pricing
3. proprietary systems which are not subject to an official standard.

At present, only the third type of system above exists in practice.

For telematics, standards may be divided into:

- **systems architecture**, which defines the overarching structure of a telematics system and the interrelationship between parties involved in its delivery
- **communication standards**, that may facilitate enhanced interoperability
- **product standards**, that address technical functionality and performance.

In its 2009 report to ATC, *Harnessing the power of technology for Australian transportation reform*, the Strategic Research and Technology Working Group stated that:

“The case for using systems architecture and communications standards as a means to achieve inter-operability is self evident. This policy will need to be applied regularly during implementation of a policy led approach.”

In proposing a way forward, there was caution against overly prescriptive product standards, that risk inhibiting technological innovation and stifling uptake of transport technology by the freight industry:

“The temptation for governments is to react to new and emerging technologies with technical standards. However, this technology-led policy approach tends to lead to market capture by single technologies and can inhibit future transport competition.”

“Systems architecture and communications standards need to be the preferred approach to achieve inter-operability ahead of a product standards approach.”

The need for standards vary based on how on-board systems are used. In assessing the need for standards, the following criteria are proposed:

- industry members and regulators must rely on the accuracy and integrity of on-board mass data
- on-board mass systems must be interoperable

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• on-board mass data must be readily accessible to regulators (including whether in a standard format).

Proprietary on-board mass systems are currently utilised by transport operators in supporting their internal compliance management systems. The need for interoperability and a uniform systems architecture model between on-board mass systems used in this context would be lower than for regulatory purposes. The need for mandatory standards in these circumstance would be assessed as low.

The NTC, through its development of a National In-Vehicle Telematics Strategy: The Road Freight Sector, is assessing the feasibility of developing a code of practice for telematics systems. One option is to provide guidance to the heavy vehicle operators on how in-vehicle telematics products may be most effectively utilised in supporting their management of compliance. Such a code may include elements of a voluntary standard.

Although the policy developed by the Strategic Research and Technology Working Group recommended minimising the imposition of technical product standards, in some circumstances they may be necessary. Where on-board mass systems may be required to support the determination of road pricing, or serve as the primary source of evidence in detecting and prosecuting for incidences of overloading, the need for mandatory standards is higher. A fundamental difference for these types of uses would be the need for regulators to access reliable data. However, it would be difficult to justify such a ‘higher’ technical standard being adopted as a single, uniform standard for the broader industry.

Where the procurement of on-board mass technology may be required as a condition of operating in a voluntary scheme, it is important that sufficient competition exists for its supply. Network architecture and communication standards are useful for ensuring interoperability between different products, supporting consumer choice and minimising switching costs for heavy vehicle operators.

To avoid the risk of market monopoly, it is important that the wider on-board mass technology industry be provided with the opportunity to account for such standards in ongoing and future product development.

These risks also apply to heavy vehicle operators investing in on-board mass technology where their investments may be rendered obsolete by future regulatory changes. As for technology developers, it is also important for heavy vehicle operators that any potential on-board mass standards be developed and maintained in a transparent manner. This may only be achieved through a process of public consultation, including the publication of any regulatory standards.

On-board mass systems may or may not form part of a given telematics system. An on-board mass measurement system that displays data in the vehicle cabin may not be a telematics system. However, an on-board mass monitoring system that includes the wireless communication of readings to a third party may be categorised as a telematics system.

As the adoption of and interoperability between in-vehicle telematics in the heavy vehicle industry increases, it is likely that there will be a continued trend away from ‘stand alone’ products to integrated telematics systems, of which on-board mass technology may form a component. As such, regulatory policy and standards for such systems need to be developed in the same integrated manner. This is being undertaken through actions identified in the National In-Vehicle Telematics Strategy: The Road Freight Sector. The on-board mass policy framework is therefore guided by that strategy, while focussing on issues applying more specifically to on-board mass technology.

Recommendations

• There is a role for government, through actions identified in the National In-Vehicle Telematics Strategy: The Road Freight Sector, in clarifying the policy framework to allow for the development of systems architecture and communication standards that may support improved levels of interoperability for in-vehicle telematics (including on-board mass) products.

• Governments should minimise the imposition of technical product standards that risk stifling innovation, although in some circumstances (such as where more strict monitoring of compliance levels is justified) these may be unavoidable.
• Through actions identified in the National In-Vehicle Telematics Strategy: The Road Freight Sector, the government support industry in the development of a code of practice. This would provide operators with guidance on how to utilise in-vehicle telematics in supporting their management of compliance.

• To provide a level playing field and to support competition amongst technology developers and suppliers, regulatory on-board mass standards should be developed and maintained in a transparent manner (including publication).

5. Consultation

This policy paper was prepared on the basis of extensive consultation with both industry and government sectors, and on feedback received to a discussion paper released in June 2010. That discussion paper was based upon consultation with the following individuals and organisations.

• The Victoria Farmer’s Federation. The NTC wishes to thank Akemi Pham-Vu, Darryl Harrison, Tanya Pittard, Andrew Weidemann, Rob McRae and Marshall Rodda for organising an inspection of Victorian grain facilities.

• David Pickering of Graincorp (Warracknabeal).

• The Australian Trucking Association. The NTC wishes to thank David Coonan for organising a workshop on 3 September 2009, as well as for their input and attendance, Jason Williams of Boral, Anthony Eldridge of Eldridge Corporation, Ashley Morrow of Australia Post, Wayne Walker of Mountain Industries, Troy Cook of Divalls Earth Moving and Bulk Haulage.

• Pat Cox of Australia Post for his assistance with the case study.

• Michael Bleeser of Mott Bleeser Logistics.

• Dick Kyle of Australian Transport Compliance Centres.

• Clayton Shannon of Shannon Bulk Haulers.

• John Welsh of Logistics Safety Solutions.

• Michael Robertson of BlueScope Steel Australia.

• Carmine Cambereri, Don Leoni, Russell Greenland and Richard Bell of VicRoads.

• John Jarrad, Brett Staker and Peter Sakoulas of Transport South Australia.

• Ferdie Kroon and Michael Woods of the Tasmanian Forest Contractors Association.

• Brendan Moritz of the Mildura Transport and Logistics Cluster.

• Roger Sack of Tramanco.

• Dr Charles Karl, David Cai and Shaun Talko of Transport Certification Australia.

• Doug Morgan of Main Roads Western Australia.

• Graham Taylor of the Queensland Department of Transport and Main Roads.

• Steve Lynch of BusNSW.

Written submissions to the discussion paper were received from the Department of Transport and Main Roads Queensland, the Department of Infrastructure, Energy and Resources Tasmania, the Australian Trucking Association and Elphinstone Weighing Systems. Comments were also received from other state and territory road authorities. The contents of submissions received are summarised in Appendix B. All of these comments and submissions have been considered in preparing this paper.
6. Summary

6.1 Mass compliance

The impetus for this project was a proposal to develop on-board mass technology for the purpose of supporting compliance with Higher Mass Limits conditions (in NSW and Queensland). In consulting with regulators, it is clear that there is potential interest for how on-board mass technology may support mass compliance in a broader range of applications. It is this broader context that the policy framework has considered.

The NTC has not yet been able to obtain substantial evidence that there is a major problem with mass compliance levels across the heavy vehicle fleet. However, there is evidence that compliance risk is circumstantial. Risk indicators include:

- being engaged in mass constrained transport operations
- the strength of an operator’s mass compliance management system, including (non) participation in the National Heavy Vehicle Accreditation Scheme Mass Management module
- being engaged in operations that involve ‘uncontrolled’ loading
- level of exposure to on-road enforcement
- degree of ‘integration’ within the Chain of Responsibility
- previous mass compliance record.

Furthermore, regulators have identified traditional on-road enforcement as progressively decreasing in its cost-effectiveness. They have cited as a priority the need to identify more cost-effective substitutes for managing compliance. Electronic compliance, including on-board mass monitoring, holds clear potential to support that objective. However, such benefits are only capable of being realised through developing policy for its strategic deployment.

To address how on-board mass technology may support the objective of developing more cost-effective management of mass compliance, a number of options were developed. These were broadly categorised by:

- business as usual, which would rely on existing and emerging compliance management measures, other than on-board mass measurement systems
- mandatory use of on-board mass monitoring systems, in which heavy vehicle operators would be required to fit them, either as a broad requirement or as a condition under certain circumstances
- voluntary use, which would obligate operators to devise and/or propose a mass compliance management system, whether utilising on-board mass systems or other means.

Under Option 1 (Business as usual) there is evidence that measures such as Chain of Responsibility have recently driven substantial improvements in compliance levels, including within some historically ‘lagging’ sectors of the transport and logistics industry.

The NTC considers that the National Heavy Vehicle Accreditation Scheme Mass Management module continues to play an important role in encouraging operators to manage their mass compliance. It is expected that implementation of recent outcomes for the Accreditation Policy Review, including to strengthen auditing requirements, will provide a greater degree of assurance to regulators for the scheme’s robustness. It is important that policy for on-board mass technology is developed in coordination with that for the National Heavy Vehicle Accreditation Scheme Mass Management module. For most operators who have achieved accreditation to the scheme, it may be difficult to justify the need for imposing additional compliance burden and cost.

Option 2 (collectively) assessed the need for mandating the use of certified on-board mass monitoring systems. It is proposed that this option may be justified in circumstances where there is a higher degree of compliance risk than may practicably be mitigated by the range of other, existing compliance measures.
Option 2a assessed mandating the fitment of on-board mass monitoring systems across broad segments of the heavy vehicle fleet, as a substitute for on-road enforcement. It is unclear that this option would serve that purpose. A broader compliance strategy would account for the full range of compliance matters that need to be managed. Such a strategy, currently being undertaken by the NTC, is needed to properly assess options for reducing the current reliance on and allocation of resources to on-road enforcement.

Option 2b assessed more targeted requirements for heavy vehicle operators to fit on-board mass monitoring systems, in circumstances where an elevated mass compliance risk was identified. In principle, this option is supported, but it relies on an accurate and robust means of assessing compliance risk. Such means arguably do not avail themselves in the current regulatory environment. Furthermore, such a requirement should be justified by demonstrating why such an identified risk could not be mitigated by other, potentially more cost-effective means.

Option 2c assessed requiring on-board mass monitoring systems to be fitted as a means of supporting productivity improvements (i.e. increased mass limits). In essence, this is an extension of Option 2b, but explicitly recognises the potential for on-board mass technology to support the transport reform objective of increased productivity. Also as for Option 2b, this option should be justified by demonstrating a clear and objective link between such a requirement and the productivity improvement (i.e. not imposing it as an arbitrary condition) and that other alternatives were impracticable.

Option 3 (collectively) assessed the need for voluntary use of on-board mass systems. ‘Voluntary’ in this context refers to imposing a requirement on the road freight industry to manage mass compliance, but provide a degree of flexibility in how that may be achieved (i.e. whether utilising on-board mass systems or other means).

Option 3a assessed the existing practice of operators utilising on-board mass technology in supporting the National Heavy Vehicle Accreditation Scheme. It is recommended that this is an effective practice that should continue.

Option 3b would allow for the fitting of certified on-board mass monitoring systems as automatic qualification for the National Heavy Vehicle Accreditation Scheme Mass Management module (i.e. as an alternative to the current requirements). This has the potential to alleviate some of the costs and administrative burden of the current scheme, particularly for operators whose circumstances may make achieving accreditation to the existing standards difficult. It is recommended that the viability of this option be further investigated.

Option 3c assessed means of supporting productivity improvements, in circumstances where a higher degree of mass compliance assurance was necessary. While on-board mass monitoring systems may be one means of supporting that objective, it was recommended that other equivalent means should not be discounted.

Finally, Option 3d recognises the ability of transport industry members to utilise on-board mass technology (and other means) in supporting the development of compliance management systems. This option represents an alternative approach to others, including those discussed in this paper that may seek to prescribe the use of on-board mass technology. With growing awareness amongst industry members of their expanded obligations under the Chain of Responsibility, there is evidence of an increasingly positive response.

It was recognised that in certain circumstances, some industry members have and may continue to respond inadequately to the need for effectively managing their compliance. In such circumstances, this option (3d) alone may be insufficient, and others less flexible, including Option 2b (required use of on-board mass monitoring systems in higher risk circumstances) may be justified.

In assessing each option, some overarching principles were applied and broad conclusions drawn:

- Each option has been assessed against the objective of supporting cost-effective means of managing mass compliance to deliver safety and asset protection outcomes, with on-board mass technology being a tool, alongside others, for supporting it.
- As far as possible, it is preferable to provide industry members with the flexibility to select the most cost-effective means of achieving a given compliance outcome. While encouraging the
greater uptake of telematics systems by the road freight sector is an objective of policy makers, this should not be to the detriment of other, more fundamental policy principles.

- The role of policy makers should be to develop a regulatory landscape that encourages efficient behaviour by industry members that supports transport objectives; greater voluntary uptake of on-board mass technology and telematics systems by industry members may perhaps be viewed more as a measure of how successfully that is done.

- In practice, voluntary use of on-board mass measurement systems, as a means of supporting transport industry members’ compliance obligations, is envisaged as the most likely mechanism to support the Telematics Strategy vision of greater uptake in road freight sector.

Regulators have impressed the need for developing more cost-effective means of managing (mass) compliance that may be sustained as the freight task continues to grow at a rapid rate. The NTC is currently developing a national compliance strategy that will assess options to support that objective. However, early consideration of on-board mass systems in this paper has reinforced earlier policy development work that a sustainable compliance strategy must focus on more targeted or risk-based compliance and enforcement measures.

The occasional notion that on-road enforcement of mass compliance may be directly substituted by a broad requirement for heavy vehicles to be fitted with on-board mass monitoring systems raises significant doubts about cost-effectiveness.

Finally, this paper has assumed a high degree of effectiveness for on-board mass monitoring systems in the objective to provide robust, highly accurate real-time monitoring of heavy vehicle mass. The NTC understands that ongoing investigations by Transport Certification Australia to assess capability of the technology and a performance specification have thus far supported that assumption. However, it is understood that further investigation, such as validating the draft specification through field trials, are planned. The policy recommendations included in this paper are contingent upon outcomes of such further investigations.

6.2 Heavy vehicle pricing

On-board mass technology has been identified as a potential means of supporting heavy vehicle pricing reform. Although it is beyond the scope of this project to determine pricing policy or the role of on-board mass technology, it is appropriate to consider the implications of potential outcomes of the COAG Road Reform Plan. A significant issue is that heavy vehicle pricing reform may result in significant changes to the mass compliance landscape, upon which options and recommendations of this policy paper have been based.

Option 1 is to proceed with any policy and implementation of on-board mass systems certified for a mass compliance application. Implementation may most appropriately be undertaken in a staged manner, such as initially through trials based on smaller volumes. Outcomes of the COAG Road Reform Plan feasibility study are due by the end of 2011, by which time a clearer understanding for the role of on-board mass technology may be known. In this way, the risk of inadvertent outcomes, such as large volumes of equipment being rendered obsolete by future regulatory changes may be minimised. This option is recommended.

Option 2 is to await outcomes of the COAG Road Reform Plan feasibility study. This option may better position policy makers to consider the technical requirements of certified on-board mass systems and reduce the risk of obsolescence. However, it is recommended that the mitigating measures as described under Option 1 would likely be sufficient to mitigate the identified risks.

6.3 The development of on-board mass standards

An important element of policy for on-board mass technology is how the development of standards is managed. Guiding principles were outlined by the ATC Strategic Research and Technology
Working Group in November 2009\textsuperscript{27}, with a recommended focus on facilitating interoperability and minimising the risk of impeding technological innovation.

In summary, it is recommended that:

- There is a role for government, through actions identified in the \textit{National In-Vehicle Telematics Strategy: The Road Freight Sector}, in clarifying the policy framework to allow for the development of systems architecture and communication standards that may support improved levels of interoperability for in-vehicle telematics (including on-board mass) products.

- Governments should minimise the imposition of technical product standards that risk stifling innovation. In some circumstances (such as where more strict monitoring of compliance levels is justified) these may be unavoidable.

- Through actions identified in the \textit{National In-Vehicle Telematics Strategy: The Road Freight Sector}, the government support industry in the development of a code of practice. This may provide operators with guidance on how to most effectively utilise in-vehicle telematics in supporting their management of compliance.

- To provide a level playing field and to support competition amongst technology developers and suppliers, regulatory on-board mass standards should be developed and maintained in a transparent manner (including publication).

\textsuperscript{27} ATC Strategic Research and Technology Working Group, \textit{Harnessing the power of technology for Australian transportation reform}, September 2009 (unpublished, approved by ATC on 6 November 2009).
7. Next steps

The ability to develop evidence-based on-board mass policy, particularly in drawing reliable conclusions on compliance rates and technology costs, depends on the provision of relevant information by both regulators and industry members.

In July 2009, COAG agreed to establish a National Heavy Vehicle Regulator by the end of 2012. An important objective of the Regulator is to support the implementation of more nationally consistent heavy vehicle policy. This policy framework outlines guiding principles for how heavy vehicle policy may be further developed to support more cost-effective means of managing mass compliance. Some specific actions arising from recommendations of this report are to:

- Assess the viability of fitting a certified on-board mass monitoring system as an alternative means of participating in the National Heavy Vehicle Accreditation Scheme Mass Management module.

- Develop a framework and process for how productivity improvements may be better supported by demonstrated reductions in mass compliance risk. This may include working with forums such as the Performance Based Standards Review Panel and the prospective National Heavy Vehicle Regulator.

- Develop a national heavy vehicle compliance strategy, that will work towards assessing how electronic compliance at a broader level, but including on-board mass systems, may contribute towards developing more cost-effective means of managing compliance in a regulatory environment that will be impacted by a rapidly growing freight task.

Other relevant actions consistent with the National In-Vehicle Telematics Strategy: The Road Freight Sector include to:

- Publish national performance-based standards for on-board mass monitoring.

- Update mass regulations to provide a positive duty for managing compliance.

- Allow the introduction of industry codes of practice for in-vehicle telematics.

- Establish enforceable voluntary undertakings for the fitting of in-vehicle telematics systems to monitor compliance.

Transport Certification Australia is also engaged in ongoing work to develop a technical specification for a certified on-board mass monitoring system. The final specification is expected to further clarify more precisely how effectively such a system may support mass compliance monitoring (at the technical level), as well as cost implications and administrative arrangements (data processing and regulatory actions arising from it).
APPENDIX A: ATC OBJECTIVES

In May 2008, underpinning the development of a National Transport Policy Framework, Australia’s Transport Ministers committed to the following policy objectives:

- **Economic** - To promote the efficient movement of people and goods in order to support sustainable economic development and prosperity.

- **Safety** - To provide a safe transport system that meets Australia’s mobility, social and economic objectives with maximum safety for its user.

- **Social** - To promote social inclusion by connecting remote and disadvantaged communities and increasing accessibility to the transport network for all Australians.

- **Environmental** - Protect our environment and improve health by building and investing transport systems that minimise emissions and consumption of resources and energy.

- **Integration** - Promote effective and efficient integration and linkage of Australia’s transport system with urban and regional planning at every level of government and with international transport systems.

- **Transparency** - Transparency in funding and charging to provide equitable access to the transport system, through clearly identified means where full cost recovery is not applied.

In February 2008, ATC directed the Tasmanian Minister for Infrastructure, through establishment of the Strategic Research and Technology Working Group, to develop the strategic research and technology component of the National Transport Policy Framework. The following criteria for future work were endorsed by ATC in November 2009:

- Technological application and innovation to be policy led where possible.

- Technology needs to support the implementation of the ATC’s key policy directions with reference to the work agendas of SCOT’s Standing Sub-Committees.

- Systems architecture and communications standards need to be the preferred approach to achieve inter-operability ahead of a product standards approach.

- The way forward requires input, support and cooperation between government policy makers, technology providers and technology users.

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APPENDIX B: Stakeholder submissions to NTC
On Board Mass Technology Policy Framework
Draft Position Paper

Background
The NTC’s On-Board Mass Technology Policy Framework Draft Position Paper was released in June 2010. The paper provided policy options and recommendations and requested response to a number of questions. Four submissions were received. The themes from these responses are provided below.

Review of submissions
Submissions in response to the draft position paper were received from the following:

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<th>Government departments:</th>
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<td>TMR</td>
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<td>DIER</td>
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<th>Non-government organisations:</th>
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<td>ATA</td>
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<th>Companies:</th>
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<td>Elphinstone</td>
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Significant themes from each of the submissions have been extracted and grouped where possible.

Submissions

1. **Regulatory and commercial systems provide the same evidentiary standard**
   There is no gap in evidence standards between commercial systems data and regulatory systems data (ATA p9)

2. **Regulatory and commercial systems do not provide the same evidentiary standard**
   For both direct enforcement and mass pricing purposes a system needs to be certified. (TMR)

3. **Overloading is an infrastructure concern rather than a safety concern**
   The frequency and risk are low, as most overloading concerns are infrastructure related not safety. (ATA p9)

4. **CoR has reduced overloading**
   …pleasing to see acknowledgement of our view that “evidence suggests that Chain of Responsibility has improved mass compliance. (ATA p9)
   The implementation of CoR has further diminished overloading rates from a pre-implementation low of only two per cent of the fleet exceeding limits by five per cent. (ATA, p11)
As stated in the discussion paper and in this response, the CoR laws are making a positive
difference. However, we disagree that the "flow-on benefit would apply less to decentralised
transport supply chains. The CoR laws make no distinctions between the strength of supply chain
links (ATA, p14)

As I see it there are only two ways to successfully stop over-loading gross and axle weights. The
first is not paying for overloads. This method has worked for 35 years in the Tasmanian woodchip
industry. Operators soon learn to use a good quality weighing system that is properly maintained!
The other way is to have intensified on-road law enforcement. This equates to more inspectors on
the road to catch the 'cowboys'. (ELPHINSTONE)

5. **CoR has not reduced overloading**

Whilst chain of responsibility legislation may be having some impact, particularly where the
chances of being detected are high, this does not appear to be the case where the risks of being
captured are low. (DIER, p2)

6. **OBM should be voluntary**

ATA ITC concurs that voluntary take up is the preferred method to achieve higher usage of on-
board mass measurement devices. (ATA p10)

...ATA does not endorse any additional hurdles for access to higher mass limits (HML) operations
over the original requirement to fit road friendly suspension. (ATA p10)

There is merit in encouraging further voluntary take up of on-board mass measuring devices for
those few parts of the industry where mass is limiting. (ATA, p15)

Operators fit on-board mass measurement technology when it is viable and good business to do
so. CoR correctly applied will assist in encouraging take-up of technology. (ATA, p15)

We concur with the first part of the NTC recommendation: “The NTC support improvements in
current compliance arrangements”. We hold strong reservations about the second part of the NTC
recommendation: “the benefits of which may combine with other options discussed below”. (ATA,
p17)

7. **OBM should be voluntary and mandatory**

The ATA ITC sees only one circumstance where such harsh mandated intervention might be
justified. Where a court establishes a proven history of serious persistent significant and damaging
overloading offences over some years, a sanction option may be the requirement to fit IAP mass
monitoring and mass measuring devices to all truck and trailers. This should be linked to
ownership/control by entity accountable for the offences, and there must also be a way of removing
the impost with demonstrated compliance over a period of time. (ATA, p18)

However, IAP monitoring as a true optional alternative to traditional methods could be provided for
where:
- very high risks of damage arises from the movement of vehicle
- there is a very high consequence from the damage, and
- traditional compliance demonstration methods are costly or inconvenient. (ATA, p18)

TMR supports…that the NTC “supports the voluntary take up of certified and uncertified on-board
mass technology to achieve transport policy objectives” [and]
TMR supports….that “mandated fitment of certified on-board mass technology may be warranted
where there is a significant compliance risk”. (TMR)

8. **NMI can test accuracy – no role for government or any further certification.**
There appears to be no reason to apply further intervention through Transport Certification Australia accreditation of on-board mass devices. (ATA p10)

There is no need for additional intervention from governments or Transport Certification Australia. (ATA p10)

### 9. System need to be certified for regulatory use

For both direct enforcement and mass pricing purposes a system needs to be certified. (TMR)

### 10. No support for mass distance charging

ATA ITC does not support mass-distance-location charging…. (ATA, p10)

### 11. OBM is only for a small portion of industry

Less than 10 per cent are operators who are constrained by mass limits and have spare load space. (ATA, p12)

The risk profile of HML operations are small, especially when compared to the risk of other heavy vehicles. (ATA, p14)

### 12. OBM is part of a larger ITS / Compliance landscape

On-board mass measurement is only one way that vehicles mass can be determined. Even if required for charging purposes, there are other options for determine mass. (ATA p11)

The effect of graduated sanctions and the measuring-adjustment mass-assessment methodology are strong motivators for the industry to achieve compliance. (ATA, p13)

### 13. OBM is a loading aid

On-board mass measuring systems are loading aides that allow operators to ensure they are legal by loading to the limit less the accuracy of their device. (ATA, p12)

On-board weighing will only work as good as the operator wants it to so it is important to have operators who are committed to the process and prepared to put the effort and time into maintaining their on-vehicle weighing systems. There are systems that will work to +/- 0.5% when properly fitted, maintained and calibrated. The poor operator will not even have a system fitted. (ELPHINSTONE)

### 14. OBM would increase road wear

More accurate loading will also result in less underloading, which may marginally increase road wear levels from current levels, all other things being the same.

### 15. NHVAS can only achieve limited safety
The ATA ITC views the NHVAS as being a permit scheme. It is not comprehensive, as it can be chosen to only cover one aspect of business. It is a permit system that allows operators to pay for regulatory benefits, without having to undertake business risk management precautions. This method will only achieve limited safety improvements. (ATA, p14)

National Heavy Vehicle Accreditation Scheme – This will only work with good operators. The poor operators make a mockery of it. In general operators will only buy good on-board weighing systems if they are forced to. Not paying for overloads would enforce this. (ELPHINSTONE)

16. IAP would be improved with OBM

...IAP currently relies on driver nominated “vehicle at HML” or “vehicle not at HML”. This is relying upon exactly the same human element as a driver looking at [a] route map and choosing whether to comply. (ATA, p14)

...the policy paper overlooks the power of OBM to unlock access by delivering timely feedback of compliance to the asset manager. TMR's Lockyer Creek application is case-in-point. (TMR)

Perhaps the most important issue relates to the understanding by several jurisdictions, including Tasmania, that the agreement with industry has always included a provision that IAP based on-board mass technology would be mandated once the systems were available. From our perspective mandated applies in the sense that all permits would be amended to include a condition that required the installation of appropriate technology. Operators could of course choose not to take up an amended permit if they did not wish to have the technology installed. (DIER, p2)

17. HML with road friendly suspension is equivalent to GML with non-road friendly suspension

HML vehicles fitted with road friendly suspension at HML mass limits have the same impact as a non-road friendly suspension vehicle at GML limits. (ATA, p14)

18. OBM has many benefits

Operators have reported great benefits from fitting on-board mass assessment devices. For many operators, the over-load/under-load cycles have become consistently loaded with a net gain in productivity after weighing devices were installed. (ATA, p12)

The data gathered from systems will help target repeat offences and be used as intelligence to identify high risk operations. Certified systems will provide the future option of mass-distance charging (user pays system). (TMR)

Questions

Would the technology most appropriately be utilised as a compliance aid for more precise loading (i.e. minimising minor, often inadvertent overloading) or the detection of more severe (and deliberate overloading)?

On-board mass (OBM) can assist on both fronts. An OBM solution that demonstrated a degree of trustworthiness (that is, a certified solution) would be useful in both scenarios. (TMR)

How may on-board mass technology contribute to minimising wear and damage to road infrastructure, beyond the capability and effectiveness of existing regulatory arrangements?

TMR supports the adoption of systems that display live data in the vehicle as this will encourage improved operator compliance, as well as visibility to authorised officers. (TMR)

The data gathered from the systems will help target repeat offences and be used as intelligence to identify high risk operations. (TMR)
Certified systems will provide the future option of mass-distance charging (user pays system). (TMR)

How can on-board mass measurement technology be used to complement the existing range of regulatory compliance measures?

Overall, the use of IAP type systems can bring efficiency to regulatory business processes. (TMR)

TMR wants widespread use of certified on-board mass measurement systems, with pattern approval under the National Measurements act 1960, as this can provide transport inspectors with the confidence that monitored vehicles are compliant vehicles. (TMR)

…..can be used as part of the bargaining chip with local governments on access issues. (TMR)

Can a technical specification be developed that would serve both purposes, or would it be appropriate for there to be two sets of specifications?

If the charging reform was introduced, requiring on-board mass technology to calculate charges, the technology used would need to be operatable to fulfil an operator’s general mass management requirements. To do otherwise would burden operators, regulators and economic efficiency unnecessarily. (ATA, p16)

TMR supports a performance based specification focused on maintaining compliance. However, it is expected the elements of an OBM compliance solution would translate to a pricing solution. As they are different end uses, a trial may be required. (TMR)

For both direct enforcement and mass pricing purposes a system needs to be certified. (TMR)

Interoperability of systems from all OBM suppliers means the systems provide data in a common format and all units will have a common interface for communication with any service provider. (TMR)

Which types of trucks and how many would be likely candidates for being fitted with on-board mass technology, for either or both applications?

As stated previously only a small percentage of the industry needs to manage mass and only a portion of these may benefit from on-board mass devices. (ATA, p16)

In general, higher risk freight tasks (configurations) should be targeted for OBM compliance monitoring. The process for implementation requires a consideration of vehicle classes. Targeting only large combinations that typically use road friendly tri axle groups may not address vehicles causing the greatest share of road wear. (TMR)

How does the timing of the COAG Road Reform Plan impact upon these matters, including the ability of policy makers to account for outcomes of that project, in developing on-board mass policy?

At this point, in time pre-empting CRRP outcomes would be inappropriate. (ATA, p16)

The COAG Road Reform Plan covers a much wider area than on-board mass. The business requirements need to be determined prior to the outcomes of reform plan. (TMR)

How may the specification of regulatory on-board mass technology minimise the risk of obsolescence?

We doubt that regulatory specification of on-board mass monitoring devices can in fact prevent obsolescence, it may in fact make most operators existing systems obsolete. (ATA, p16)

As much as possible, the specification needs to be performance based. (TMR)
Suppliers will consider the risk of obsolescence and the cost of re-certification when planning upgrades. (TMR)

Can improvements practicably be made to the existing compliance arrangements that would address regulators’ current concerns with their effectiveness?

The ability to make improvements to NHVAS is in the hands of the agencies. They own and operate the scheme. In our view, NHVAS is not as comprehensive or as independent as TruckSafe. One simple enhancement to mass management would be to recognise TruckSafe mass management scheme as being an equal standard and allow TruckSafe members the same regulatory benefits as NHVAS. This should also apply to other schemes that achieve the same standards. This is a zero cost improvement. The nationally agreed model for CoR is not yet fully implemented and operational. We hope the National Heavy Vehicle Regulator initiative will assist CoR becoming even more influential.

Better training and transparency in on-road enforcement practices would be a low cost enhancement. As noted earlier, offence history is a useful indicator of risk. It is also reasonable to consider commodity type, and nature of supply chain in assessing potential targets for enforcement.

The bottom line is the community expects some level of enforcement to be maintained for laws on the statute books that is commensurate with risk and consequences. In the [sic] boarder scheme of law enforcement, these matters already consume lots of resources, particularly in NSW, which brings into question “is the balance right?” (ATA, p17)

TMR wants a proactive compliance strategy not a reactive on.
TMR promotes the three stage accreditation process:
1. Set the standard – accreditation review needs to be completed.
2. Auditing – independent third party and more random audits.
3. On road activities.
An increase in the number of transport inspectors to undertake more roadside inspections and operator consignment records inspections. (TMR)

How would the cost of effectiveness compare with other options, such as the required fitment and use of on-board mass technology?

There is scope to make cost effective gains in areas identified in answer one. On the other-hand, the cost of requiring the fitment and use of on-board technology, especially with third party data transmission capacity, is high. There are also significant on-going operation costs. Further, operationally there is a large potential for inefficiencies as most operations would not actual derive any benefit from such devices, but they would incur costs. (ATA, p17)

The resources required to effectively carry out assessments under existing arrangements on all vehicles operating under the NHVAS Mass management would far out-weigh the resources to introduce OBM technology from a regulatory perspective. From an industry viewpoint, the provision of on-the-spot confirmation and recording of compliance with mass limits provides an opportunity to reduce administration costs associated with the records maintenance and the risk of action from future audits. (TMR)

Is the degree of non-compliance with mass limits of a sufficient magnitude to justify additional costs being incurred (under any option)?

The degree of non-compliance does not justify any further intervention. The trend under CoR is for increasing compliance. However, it is logical to have road agencies do what they are already doing more efficiently as suggested in answers 1 and 2 above. (ATA, p17)

TMR needs more information to justify comment regarding addition costs. (TMR)
In what circumstances would this option be justified, over and above other options for providing mass compliance assurance?

| In general, the mandated use of certified OBM monitoring systems are suited to cases of high risk. (TMR) |
| TMR supports a policy for an integrated system that includes EWD, OBM and Speed monitoring and can provide the regulatory outcomes with benefits to the operator…. (TMR) |

**OPTIONS**

**Option 1**

| This option is not supported. (ATA, p21) |
| TMR supports……that “low volume technology trials” are worthwhile (TMR) |
| There would certainly be sense in having a major trial of on-board mass technology to better determine not only the costs to industry of the above approach, but also in determining the benefits they would achieve in being able to operate closer to the prescribed mass limits and in providing better compliance protection for themselves. (DIER, p2) |

**Option 2**

| TMR supports….that “mandated fitment of certified on-board mass technology may be warranted where there is a significant compliance risk”. (TMR) |

**Option 3a**

| TMR supports…that the NTC “supports the voluntary take up of certified and uncertified on-board mass technology to achieve transport policy objectives” (TMR) |

**Option 3b**

| Like the NTC, we doubt the the cost of NHVAS accreditation is more than the cost [of] adopting an on-board mass monitoring system to regulators standards. (ATA, p20) |
| TMR supports….that the NTC “supports the voluntary take up of certified and uncertified on-board mass technology to achieve transport policy objectives” (TMR) |

**Option 3b recommendation**

| The ATA ITC does not support the need to provide for this option. (ATA, p20) |

**Option 3c**

| This option is therefore not supported. However we do support road agencies delivering a moderated bridge assessment guideline that allows vehicle[s] with higher combination masses much improved access. (ATA, p20) |

**Option 3c recommendation**

| The ATA ITC does not support this recommendation. (ATA, p20) |

**Option 3d recommendation**
We agree with the NTC recommendation, but would add that load optimisation is equal to compliance objectives, as motivation for adoption of on-board mass technologies for most operators where ‘load mass’ is important to their bottom line. (ATA p21)