



Australian Government

Department of Infrastructure,
Transport, Regional Development,
Communications and the Arts



Remote operation of vehicles with an ADS

This paper **explores** new policy

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Overview

Remote operation can be used to support the safe and efficient operation of an Automated Driving System (ADS). However, remote operation can introduce additional risks that must be managed.

Previous policy work on automated vehicle reforms proposed a head of power to make prescriptive rules to regulate remote driving.

This paper presents further analysis and proposes more targeted measures to manage the risks of remote operation of a vehicle with an ADS. We are seeking feedback on the proposed scope of regulation and proposed measures.

Key points

Remote operation encompasses a range of activities, including remote driving, remote ADS assistance and remote monitoring. For the purposes of regulation under the Automated Vehicle Safety Law (AVSL), forms of remote operation that support the safe and efficient operation of an ADS are most relevant – remote driving and remote ADS assistance.

Remote operation can introduce additional safety risks in relation to connectivity, cybersecurity, physical security, disruptions to remote operation centres, and the capabilities of remote operators.

Proposed measures in the AVSL to manage risks associated with remote driving include:

- placing a duty on an Automated Driving System Entity (ADSE) to ensure the safety of remote operation as far as is reasonably practicable (or alternatively providing for a separate party to be responsible for remote operation)
- placing a supporting safety duty on remote operators to perform remote operations safely and comply with reasonable directions of the ADSE

- requiring that remote operation is performed from within Australia
- accounting for remote operation in other elements of the AVSL.

Consultation questions

We welcome feedback on all elements of the regulatory framework. In relation to the measures proposed to manage the remote operation of an ADS, we are especially interested in the following.

11. What are your views on the proposed additional AVSL measures to manage the safety risks of remote operation of a vehicle with an ADS? In your response, please consider:
 - a. How are companies using or planning to use remote operation as part of ADS deployment, and what business models are likely to be used? Which parties will have an influence on the safety of remote operation?
 - b. Do you agree with the proposed scope of remote operation to be managed under the AVSL, and if not, which forms of remote operation do you consider should be managed under the AVSL?
 - c. Should an ADSE have responsibility for the safety remote operation performed to support its ADS? Should we consider other models for allocation of safety responsibility for remote operation?
 - d. What duties should be placed on an ADSE or other entities for remote operations?
 - e. Should remote operators be subject to a safety duty, or any other requirements, under the AVSL?
 - f. What specific skills or proficiencies should be required of remote operators?
 - g. Should the AVSL require that remote operations centres be located in Australia? What are the advantages or disadvantages of this?

Why are we doing further consultation?

The approach suggested as part of the 2022 *Regulatory framework for automated vehicles in Australia*¹ was a head of power to make prescriptive rules to regulate remote driving, but the scope of this power was not specified. A broadly scoped power in the AVSL could inadvertently capture forms of remote driving that are not sensible to regulate under the AVSL. For example, remote driving performed for a vehicle that does not have an ADS would not be connected to the things the AVSL regulates. Therefore, it may not be suitable for the AVSL to regulate all instances of remote driving.

The focus on remote *driving* in the proposed head of power also meant that other forms of remote operation were not in scope. We are consulting on a more targeted set of measures to regulate remote driving and other forms of remote operation of an ADS.

Remote operation policy gap

The proposed AVSL places duties on an ADSE to ensure the safe operation of an ADS, but in some forms of remote operation, such as remote driving, the ADS is not engaged. Responsibility for the safety of remote operation needs to be clarified in the automated vehicle regulatory framework.

Managing the safety of remote operation may require additional measures beyond those anticipated for the management of ADS safety; for example, consideration of:

- what forms of remote operation are in scope of the AVSL
- requirements for companies performing remote operations
- requirements for individual remote operators
- requirements for the location from which remote operations are performed
- how remote operation interacts with the existing AVSL regulatory framework.

What is remote operation?

Remote operation is a broad term covering different types of functions. These may be related to ADS support and could also be used for vehicle monitoring or passenger support. This section identifies the main types of remote operation, which forms of remote operation could be managed with new AVSL measures, and the safety risks of remote operation.

Remote driving

Remote driving is the practice in which a person who is not sitting in the driver's seat does part or all of the dynamic driving task; for example, monitoring the driving environment and braking, accelerating, steering or signalling. That person could be located remotely, in another position in the vehicle, or located directly outside the vehicle. They do not control the vehicle using the normal steering and braking controls, but instead use a different method to control the vehicle, such as a console.

When a vehicle is being remotely driven, the remote driver has control of the vehicle and performs part or all of the driving task. Remote driving can occur in conventional vehicles (those without an ADS) as well as vehicles with an ADS – it does not rely on a vehicle having an ADS.

¹ National Transport Commission (NTC), [The regulatory framework for automated vehicles in Australia](#), NTC, Melbourne, 2022, accessed March 2024.

Remote ADS assistance

Remote ADS assistance is the practice in which a person who is located remotely helps an ADS to enable trip continuation when the ADS encounters a situation it cannot manage. When using remote ADS assistance the ADS performs all of the dynamic driving task. The role of the remote ADS assistant may include plotting alternative routes for the ADS around an obstacle or assessing routes suggested by the ADS and confirming if they are appropriate.

Remote monitoring

Remote monitoring can include the oversight of the vehicle's condition, occupants and cargo. Remote monitoring can include remote user assistance which is the practice in which a remote operator (when requested) provides information or advice to vehicle passengers or other road users nearby.

Consultation questions

11a. How are companies using or planning to use remote operations as part of ADS deployment, and what business models are likely to be used? Which parties will have an influence on the safety of remote operation?

Forms of remote operation managed with new AVSL measures

Not all forms of remote operation need to be managed with new regulatory measures under the AVSL. When considering which forms of remote operation would need additional measures to be included in the AVSL to manage safety risks, key factors include:

- whether the remote operation occurs in a vehicle with an ADS
- the way the use of remote operation relates to the operation of the ADS and performance of the dynamic driving task
- whether there are other regulatory frameworks, or existing elements of the AVSL, that would be more suitable to manage the risks.

Based on these considerations, we propose that:

- additional measures in the AVSL to regulate remote operation would focus on remote driving and remote ADS assistance that is done to facilitate trip continuation when an ADS encounters a situation it cannot manage, or to otherwise ensure the safe operation of a vehicle with an ADS, such as moving a vehicle off the road after a crash
- forms of remote driving that are not done in connection with the safe and efficient operation of an ADS would not be regulated by the AVSL; for example, remote driving of a vehicle that does not have an ADS, or remote driving of a vehicle with an ADS over an extended distance (e.g. to move a vehicle between the ADS's geographical operational design domains)
- forms of remote operation that provide information, support or monitoring functions do not need additional measures in the AVSL, but may be relevant to other AVSL requirements, such as the safety duties and law enforcement and emergency services interaction protocol (LEESIP), and existing regulatory frameworks, such as state and territory passenger transport regulations or the Heavy Vehicle National Law.

The measures proposed in this paper are intended to apply to the extent that the ADSE uses remote driving and remote ADS assistance to ensure the safe operation of its ADS. They would not make it compulsory for an ADSE to use remote driving or remote ADS assistance as part of its operations.

Consultation questions

11b. Do you agree with the proposed scope of remote operations to be managed under the AVSL, and if not, which forms of remote management do you consider should be managed under the AVSL?

Safety risks to be managed

Remote operation brings challenges and risks that can impact the safe operation of vehicles with an ADS. Given the forms of operation proposed to be managed under the AVSL, the safety risks that may need to be managed for the ongoing safety of remote operation while the vehicle is in service include:

- ensuring there is a secure and stable communications connection between the vehicle and the remote operator, with appropriate bandwidth, latency and reliability
- managing cybersecurity, including secure transmission and receipt of data, and ensuring remote operation consoles, devices and all other system components are protected from cyber attacks
- managing the impacts of other threats or events such as breaches of physical security, unscheduled electricity disruption and physical impacts to supporting infrastructure from fires, storms and other natural disasters
- ensuring that remote operators have the necessary physical and mental capabilities when on duty, are suitably skilled, have appropriate training and qualifications, have access to appropriate and well-maintained workstations, and are not impaired by alcohol, drugs or fatigue
- ensuring that remote operation is performed in accordance with the applicable road traffic laws.

Proposed measures

This section sets out measures that could be included in the AVSL to manage the safety of remote operations.

Duty to ensure the safety of remote operation

The proposed scope of remote operation to be managed under the AVSL is focused on remote operation used to support an ADS.

ADSE responsibility for safety of remote operation

In a vehicle with an ADS, ADS operation and remote operation are tightly linked, which means the ADSE is likely to be well placed to manage the safety of remote operation. Including a duty in the AVSL would help to clarify that an ADSE should ensure the safety of remote operation, even if it has contracted some parts of remote operation to another company.

The AVSL could include a prescriptive duty that an ADSE must ensure, so far as is reasonably practicable, the safety of remote operation of a vehicle where remote operation is performed in connection with its ADSs.

It is proposed that meeting this duty would include:

- the ADSE having sufficient oversight of remote operations performed in relation to its ADSs
- that remote operation is provided in a safe way, including by appropriately skilled and trained operators

- that remote operation occurs in accordance with road traffic laws unless strict compliance is not possible due to a road-environment related hazard or emergency related to the dynamic driving task.

Alternative approach – separate entity responsibility for safety of remote operation

The approach described above is focused on clarifying an ADSE's responsibility for ensuring the safety of remote operation. An alternative approach could be to provide the option for a separate entity to take responsibility for the safety of remote operation and be subject to duties and obligations under the AVSL.

In this approach a new entity responsible for remote operations would be regulated by the new regulator and would undergo a certification process. The process would require the remote operations entity to demonstrate:

- a corporate presence in Australia
- suitable financial capacity
- data recording and sharing capabilities.

As part of certification, the entity would also need to:

- identify the ADSs that it is providing remote operations for
- demonstrate it has ongoing arrangements with the ADSE to assist it in meeting its duties and obligations under the AVSL
- provide a safety management system for remote operations and demonstrate how this interacts with the ADSE's safety management system
- develop a LEESIP in conjunction with the ADSE.

Under the alternative approach, an ADSE could still choose to be the entity that manages remote operation.

Providing for a separate entity to have responsibility for remote operation may allow greater flexibility in business models for ADS deployment. For example, multiple remote operations entities could manage the remote operation of the same kind of ADS in different geographic regions as part of a commercial passenger transport service. Providing for a separate remote operations entity would introduce additional complexity to the regulatory framework for automated vehicles, and could result in a lack of clarity where there are overlapping safety responsibilities for an ADSE and a remote operations entity. Providing for a separate remote operations entity may not be necessary in the early years of ADS deployment while the market is still developing.

The approaches proposed in this section – for an ADSE or a new entity to have primary safety responsibility – are focused on a clear allocation of responsibilities, and provide for a certification process to determine the suitability of an organisation to take responsibility for the safety of remote operations before it commences this function. There may be other regulatory options to allocate responsibility for remote driving, and we welcome feedback identifying such options.

Consultation questions

- 11c. Should an ADSE have responsibility for the safety remote operation performed to support its ADS? Should we consider other models for allocation of safety responsibility for remote operation?
- 11d. What duties should be placed on an ADSE or on other entities for remote operations?

Safety duties for remote operators

Remote operators are integral to safe remote operations. Even though they are a part of a larger organisation, their conduct as individuals when performing their role as remote drivers or remote assistants has direct links to road safety.

While the ADSE and/or other regulated entity would have the primary responsibility for ensuring the safe provision of remote operation, the AVSL could also include measures to support the fulfilment of this duty. This recognises that while an ADSE could do everything that is reasonably practicable to ensure the safe provision of remote operation, a remote operator could perform their role poorly or without sufficient care, resulting in poor safety outcomes.

The AVSL could include a supporting safety duty that requires remote operators to:

- perform remote operation with care for their own safety and the safety of others affected by their acts or omissions
- comply with the reasonable directions of the ADSE.

In practice, this could include:

- being appropriately qualified (for example, having completed required training)
- holding required licences
- conducting remote operations in accordance with applicable road traffic laws, unless strict compliance is not possible due to a road-environment related hazard or an emergency related to the dynamic driving task
- being physically and mentally fit for safe provision of remote operations
- understanding Australian driving rules, norms and etiquette to support remote operation occurring in a way that is safe and consistent with the behaviour of other road users
- following policies and processes specified by the ADSE for the safe provision of remote operations.

Consultation questions

11e. Should remote operators be subject to a safety duty, or any other requirements, under the AVSL?

11f. What are the specific skills or proficiencies required of remote operators?

Requirement for the location of remote operation

Theoretically, remote operations could be performed from anywhere in the world, but the location could introduce risks to the safe provision of remote operation. A key consideration is whether the AVSL should require remote operation to be performed from within Australia.

An entity's ability to effectively manage remote operation is reliant on having a secure and stable connection. Moving operations outside of Australia may affect the security and reliability of these remote connections and they may be more susceptible to variance in performance due to offshore infrastructure. As remote operation is performed further from the location of the ADS, the latency of communications between the remote operator and ADS will increase due to the distance data must travel and the number of network devices the data must pass through. If remote operation is performed from outside Australia, the increased latency could negatively impact safety.

In addition to direct safety risks, the location of remote operation will impact the ability to monitor, undertake investigations and, where necessary, take enforcement action in relation to an ADSE's remote operations and remote operators. Law enforcement agencies and the proposed new regulator may need to exercise powers provided under relevant legislation. The geographical reach of these powers varies, but in many cases does not extend beyond Australia's borders. If remote operation

from outside Australia is permitted, regulators may need to rely on international agreements to enable effective monitoring, investigation and enforcement offshore. Requiring remote operation to be undertaken in Australia would improve the enforceability of any safety obligations placed on remote operators or remote operation providers.

The AVSL could include requirements about the location of remote operation to manage the safety and enforceability challenges identified above. These requirements could include:

- as a part of ADSE certification, where remote operation is used, the corporation seeking ADSE certification would be required to demonstrate it has the appropriate structures, contracts, facilities and other measures in place to conduct these operations from Australia – and that these measures are in place before the ADSE provides a vehicle with an ADS to the Australian market
- that remote operation continues to be performed from a location in Australia for as long as the ADSE is responsible for the safe operation of the ADS.

Consultation questions

11g. Should the AVSL require that remote operations centres be located in Australia? What are the advantages or disadvantages of this?

Accounting for remote operation in other elements of the AVSL

To support the proposed new duties and requirements outlined above, existing elements of the proposed AVSL may need to be updated to ensure that remote operations safety is incorporated into complementary areas of the proposed legislation.

Prescriptive safety duties

The way an ADSE meets other prescriptive safety duties proposed in the AVSL needs to account for remote operations used to support an ADS. This includes duties that an ADSE must:

- ensure that it continues to implement, review and update its safety management system
- prevent the operation of an ADS when the ADSE is aware the ADS is unsafe, so far as is reasonably practicable
- ensure, so far as is reasonably practicable, that all system updates and/or upgrades to the ADS are installed safely and do not result in the operation of an unsafe ADS, and that an ADS does not operate if updates to safety critical systems have not been successfully installed
- provide education and training to all relevant parties, including all users of its ADSs, that will minimise the safety risks of operating the ADS, so far as is reasonably practicable
- make efforts to ensure the ADS cannot be interfered with by third parties, so far as is reasonably practicable.

Safety management system

Where the ADSE identifies that remote operations are required for the safe operation of its ADS, the safety management system should provide information about the processes, policies and systems for the safe provision of remote operation services. This may include:

- connectivity requirements for remote operation
- the operational limits for remote operation
- cybersecurity, operational security and infrastructure disruption management systems
- fail-safes to ensure safety in the event of a critical remote operations system fault or connectivity failure

- management of remote operators to ensure they are appropriately licensed and trained, and that their provision of safe remote operation is not affected by temporary or permanent impairments.

Law enforcement and emergency services interaction protocol

LEESIP requirements should include requirements for the ADSE to provide information about how enforcement officers or emergency services personnel can interact with a remote operator at the roadside.

Data recording

Data recording requirements could be expanded to include an additional requirement for the ADSE to record data related to the provision of remote operation services. This data will help the in-service regulator determine if remote operation services are being provided in a safe manner, as well as determine responsibility in the event of a safety incident.

Reporting

Existing reporting requirements for ADSEs in relation to an ADS should be expanded to include remote operations where applicable, including reporting on:

- systemic safety issues related to remote operations
- breaches of road traffic laws, infringement notices and safety incidents that occur related to remote operations
- third-party interference attempts related to remote operation systems or unauthorised remote operation.