

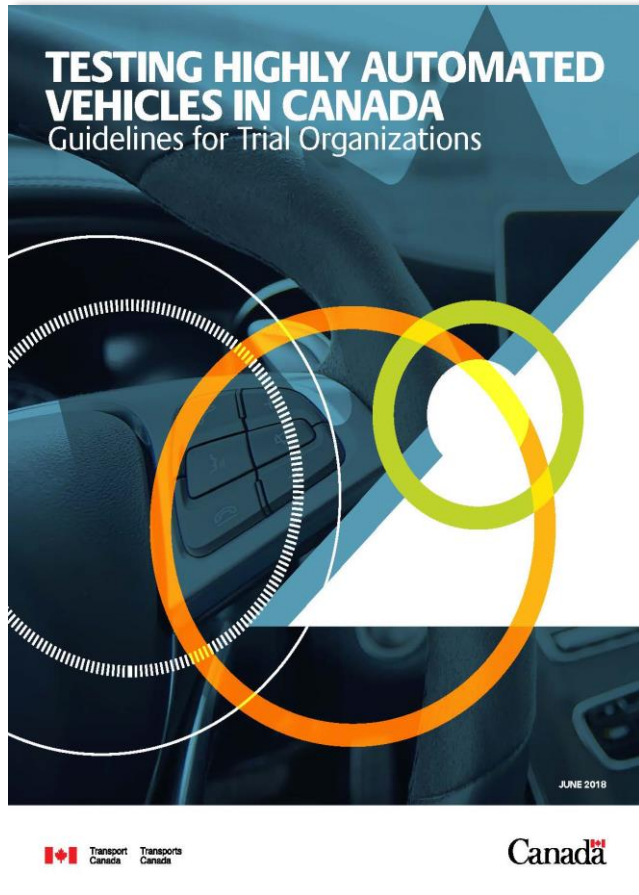
Transport Canada's Testing Guidelines for Automated Driving Systems



Purpose

- Provide an overview of Transport Canada's updated guidelines for testing automated driving systems, based on lessons learned from testing in Canada to date.

First version of TC's testing guidelines, published in June 2018



Key objectives of the document:

- Promote Canada as a destination for ADS testing.
- Outline roles and responsibilities of various levels of governments in approving and facilitating trials of ADS-equipped vehicles.
- Establish safety best practices that trial organizations should consider when operating in Canada.

Rationale for updating Transport Canada's Trial Guidelines

- Lessons learned and best practices observed from ADS testing around the world continues to grow, including testing conducted in Canada.
- Provide additional guidance on emerging topics such as driverless testing, remote support and low-speed automated shuttles.
- Provide stakeholders with additional information on the administrative steps to follow when seeking authorization for testing in Canada.
- Opportunity to align guidelines with other TC tools that have been issued since 2018 (e.g., TC's Safety Assessment).
- Please visit www.canada.ca/automatedvehicles to view TC's tools and resources devoted to connected and automated vehicles.



Overview of the updated guidelines

Engagement with Government Agencies

- Responsibilities of each level of government
- Pathway to Approval Checklist

Pre-Trail Considerations

- Assessing vehicle safety
- Route selection and route types
- Development of safety management plans
- Trials with safety drivers
- Public Communication and Awareness
- Engagement with first responders and law enforcement

Test Considerations

- Graduated approach to testing
- Adapting safety management strategies
- Incident response and safety driver responsibilities
- Remote driver safety considerations
- Conducting trials without a safety driver
- Interaction with other road users
- Trials with passengers and accessibility
- Reporting and information sharing

Post-Test Considerations

- Final reporting
- Export, disposal, donation of test vehicles
- Summary of best practices

Appendices

- Shuttle annex
- Provincial/territorial contacts page
- International Standards Resources
- Updated definitions

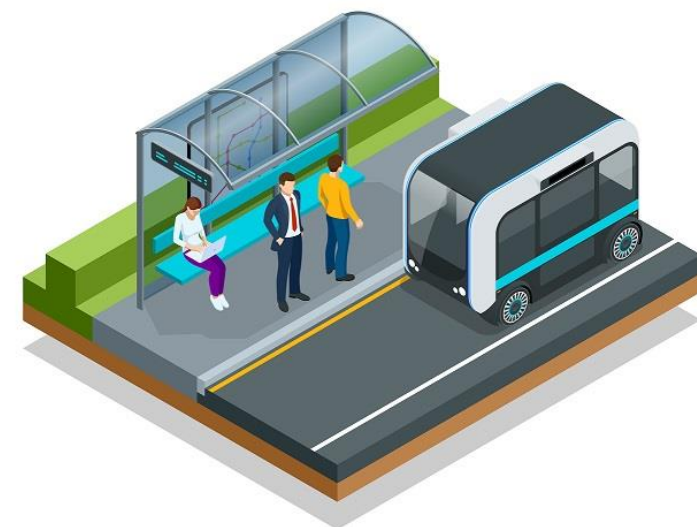
Key updates:

- Authorization procedures (e.g. authorization checklist)
- Assessing test vehicle safety (safety assessments)
- Developing safety management plans for trial operations
- Safety drivers and safety driver training
- Passenger safety
- Engagement with first responders and law enforcement
- Low speed shuttle safety
- Safety of remote support applications



Shuttle annex overview

- The shuttle annex was developed based on informal consultations in summer/fall 2020.
- The best practices identified in the shuttle annex take into account three unique safety considerations:
 1. Vehicle design
 2. Types of organizations conducting testing
 3. Inclusion of members of the public in testing activities
- Discussion of key topics and best practices included in the annex.
 - Operational Design Domain and Object Event Detection Response
 - Route selection
 - Safety drivers and on-board attendants
 - Testing without an on-board safety driver
 - Passenger safety and crashworthiness
 - Engagement with municipalities and transit agencies



Overview of human and ADS roles in various types of remote support applications (illustrative examples)

Remote dispatcher	Remote monitor	Remote assistant	Remote Driver Direct line of-of-sight	Remote Driver Beyond line-of-sight
<p>Roles may include:</p> <ul style="list-style-type: none"> ▪ Directing a vehicle to a destination ▪ Making strategic driving decisions such as planning and selecting routes 	<p>Roles may include:</p> <ul style="list-style-type: none"> ▪ Continuous monitoring of passenger safety and security ▪ Communicating with passengers to address any questions or concerns ▪ Requesting emergency responders in response to safety or security event 	<p>Roles may include:</p> <ul style="list-style-type: none"> ▪ Periodic assistance with manoeuvre planning ▪ Providing information and advice to the vehicle (e.g. to assist with navigating through an intersection or deviating around a roadway obstruction etc.) 	<p>Roles may include:</p> <ul style="list-style-type: none"> ▪ Performing some or all aspects of the DDT from on-board or nearby location overlooking the vehicle 	<p>Roles may include</p> <ul style="list-style-type: none"> ▪ Performing some or all aspects of the DDT without a direct view of the vehicle and its environment ▪ <u>Recommendation:</u> Remote driving should not be pursued with passengers and/or on public roads unless clear evidence of safety can be provided by the developer
<p>ADS performs the entire Dynamic Driving Task (DDT)</p>			<p>ADS does not perform those aspects of the DDT that are assumed by the remote driver for a temporary or prolonged period of time</p>	

- NOTE: This is not necessarily an exhaustive overview of remote support applications. These applications are also not mutually exclusive. A remotely located individual could provide various support functions during vehicle operations.

Some potential benefits of remote support:

Remote dispatcher and **remote monitor** applications may help to enhance:

- The efficiency of the automated vehicle's operations
- Passenger safety and security
- Information and service provision to passengers

Remote assistance and **remote driving** applications in turn may enhance safety by helping to overcome current limitations of ADS technologies as they continue to be refined and developed. This could include assistance when the ADS:

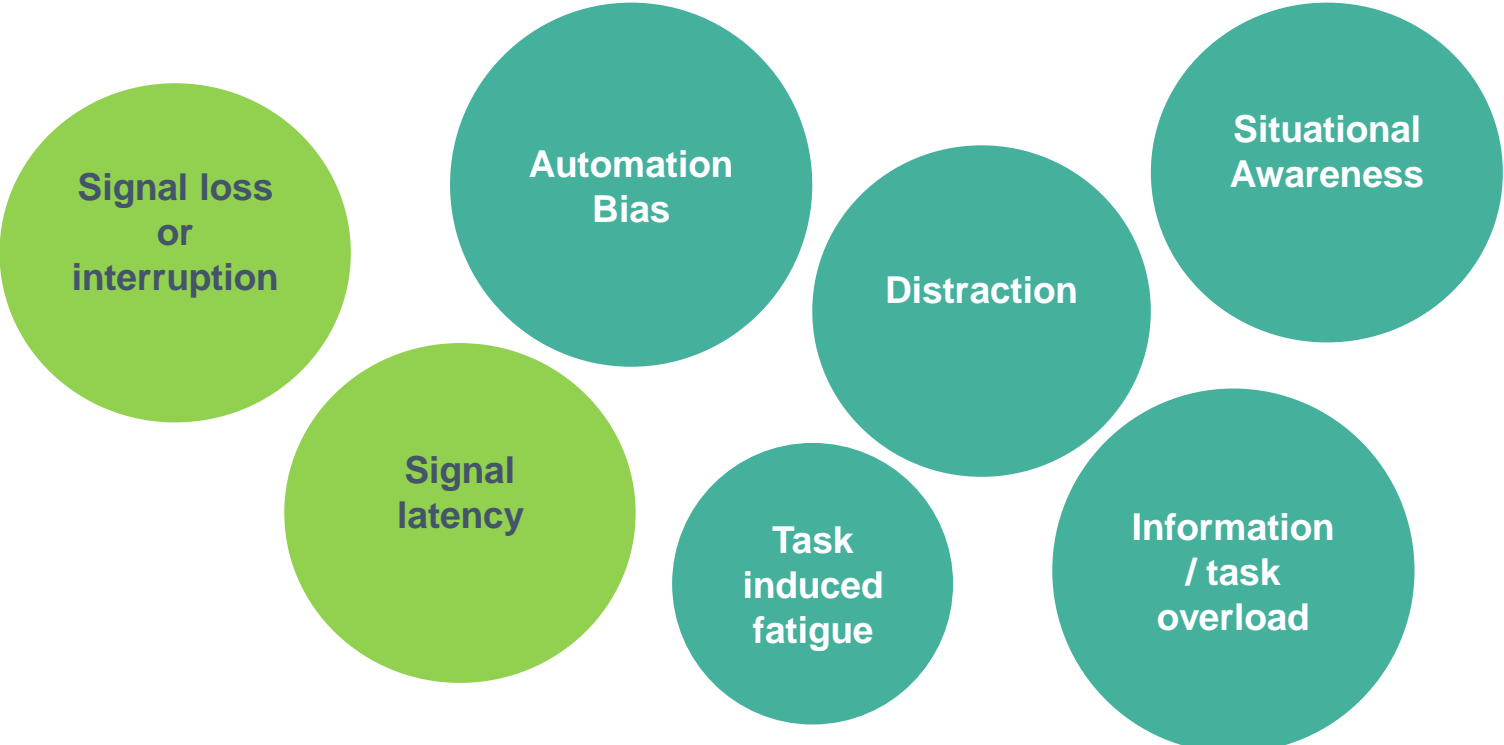
- Exits its operational designed domain (due to a change in weather for example)
- Encounters a rare or particularly complex scenario it has not been designed to navigate (e.g. edge case/corner case)

Remote support may also pose unique safety challenges that could also require management

A non-exhaustive overview of some potential safety challenges associated with remote support applications

Communication Failures

Human Factors Considerations



Thank you!

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