In-service safety for automated vehicles

Submission to the National Transport Commission's consultation

26 August 2019

1 Executive Summary

We welcome the opportunity to respond to the National Transport Commission's consultation regulation impact statement on *In-service safety for automated vehicles* (**Consultation**).

Telstra has been developing trial and pre-commercial Cooperative Intelligent Transport Systems (**C-ITS**) for several years now. Recently we completed a Vehicle-to-Infrastructure (**V2I**) trial over 4G with our partner Cohda Wireless for the Department of Planning, Transport and Infrastructure (DPTI) of South Australia and we are currently running Australia's first Cellular Vehicle-to-Everything (**C-V2X**)[1] technology trial with our partner Lexus Australia titled "Advanced Connected Vehicle Victoria" (**ACV**)[2] for the Victorian Government, VicRoads, TAC and Towards Zero initiative. More broadly, Telstra is a participating member for global standards bodies such as the Third Generation Partnership Project (**3GPP**) for developing 5G standards, and industry associations such as the 5G Automotive Association (**5GAA**) which is connecting the telecom industry and vehicle manufacturers to develop end-to-end solutions for future mobility and transportation services. Locally, we are also a member of the Australian & New Zealand Driverless Vehicle Initiative (**ADVI**) which aims to accelerate the safe and successful introduction of driverless vehicles to Australia.

In previous submissions to NTC, we highlighted the human and financial cost of road trauma, and that the goal of automating vehicles should be to substantially outperform current safety performance of human driven vehicles. Flowing from this goal, our submission emphasises the importance of connecting Automated Vehicles (**AVs**) through communications networks providing access to additional information that can greatly enhance the safety of these vehicles. This can be through networks that facilitate communication between vehicles (V2V/V2N2V[2]) or towards other digital infrastructure (V2I/V2N2I[3]).

In the Consultation, Telecommunications service providers have been identified as a party with the potential to influence in-service safety and have been categorised into the "Minor Influence" category. We support this assessment, as communications networks can carry information that can augment ADS decision making, thereby influencing the ability to improve the safety of the Dynamic Driving Task (**DDT**). We do, however, have concerns that there may be a perception that an ADS would rely solely on this information, or they become unsafe in the absence of this information.

Our submission also identifies a new potential party with the potential to influence in-service safety for the NTC's consideration. It's our position that the operator of a V2X Digital Platform(s) (**V2X Platforms**) which ADSs connect to should be considered as an actor in the "Minor Influence" category. We present arguments to support this position.

Furthermore, our submission identifies the timely maintenance of the digital environment for physical road data assets (i.e., the digital replica of the physical world road asset such as speed limit, lane closures, etc) as a crucial role for Road Managers (a Medium Influence actor). We suggest this has been overlooked in the roles identified for this actor.

Finally, the Consultation identifies regulatory models for the DDT and governance arrangements for the ongoing in-service safely and legislative implementation models. As Telstra does not propose to be a developer, supplier or maintainer of AVs, we do not offer a view on the various options.

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[1] Examples of V2X include vehicles talking to infrastructure (such as traffic lights), vehicles talking to other vehicles, and vehicles talking to vulnerable road users such as cyclists and pedestrians.

[2] V2N2V = Vehicle to Network to Vehicle.

[3] V2N2I = Vehicle to Network to Infrastructure.

2 Telecommunications network operators' and platform operators' role in automated vehicle safety

2.1. Communications networks convey information to augment the safety of AVs

AV safety can be enhanced using connectivity to communication networks to send and receive data informing driving systems of other vehicles, road hazards, cyclists or other objects that may be beyond the line-of-sight of the vehicle, for example, a corner in a road obstructed by man-made infrastructure, vegetation or land contours. Without this connectivity, AVs are dependent on line-of-sight cameras and sensors to navigate the world, like human drivers today.

We believe access to additional information of this nature can greatly enhance the safety of vehicles beyond the capability of a vehicle not connected to a communications network. This information can supplement ADS decision making, providing the ability for a connected AV to outperform the safety of a non-connected AV, which in turn should be able to outperform human drivers.

In the Consultation however, in the context of telecommunication services section 4.5.9 states as follows: "[telecommunication services] may have a minor influence on in-service safety, because particular ADS functions may be *reliant* on the services they provide while the automated vehicle is operating." It then goes on to say "the failure of the service could lead to the loss of communications resulting in *unsafe operation* of the ADS." (*Emphasis added to both references in bold*).

We caution against creating a perception or concept of any ADS functions relying solely on information transmitted over a communications networks for the DDT, and/or that loss of access to this information may result in the unsafe operation of the ADS. Automated vehicles need to be exactly that; i.e., automated. This means they must be able to make decisions in the absence of information from communications networks. Communications networks should be viewed as enhancing the safety operation of AVs rather than be considered as a crucial source of data for decision making by an ADS. This is vital as communications networks do not have ubiquitous coverage in Australia, and as such, should not be relied upon, nor should their absence result in the unsafe operation of the ADS.

Instead, AVs could make use of communications services when available to outperform a non-connected vehicle. For example, an automated vehicle may approach a signalled intersection differently if it does not have a communications link to the intersection controller platform but would nevertheless be able to safely navigate using video recognition and other sensors. The loss of communications does not cause unsafe operation: but it might reduce the efficiency of the ADS until communications services are restored.

Finally, we agree with the NTC's identification of Telecommunications Service Providers as an influencer in the safety of AVs given the potential for them to enhance the safety performance beyond the performance that would be possible for an AV isolated from access to a communications network. We also agree with the NTC's categorisation of Telecommunications Service Provider as a minor influencer, as AVs must be able to function reliably and safely in the absence of access to communications networks.

2.2. V2X platforms can play a role in sorting and prioritising safety messages

We believe the operators of V2X Platforms are a party who should be added to the NTC's list of parties with influence on in-service safety of automated vehicles. V2X Platforms will collect information, prioritise it and redistribute it to road participants as it deems appropriate. The volume and types of information passing through V2X Platforms is likely to be vast, as it will be collected from a wide range of sources including vehicles, road infrastructure (e.g., traffic lights, overhead displays), sensors, weather and road condition information, parking, lane and express lane availability, tolling or road-usage information, and more. V2X Platforms will process information gathered into a prioritised list of information curated specifically for any given

individual vehicle. While urgent safety messages such as emergency braking by the vehicle in front will be conveyed directly through V2V messages to nearby vehicles, even these messages are still relevant to more distant vehicles (albeit with less urgency) who may choose to re-route and avoid the incident altogether, or at least approach with increased caution. This dissemination of data over a wider area is facilitated by the logic and applications residing in V2X Platforms, in addition to the underlying communications infrastructure. Other safety relevant information such as a vehicle running a red light, position of cyclists, information about a road hazard such as a pothole or slippery section of road, can all be communicated through V2X platforms.

Information of this nature has the potential to further improve road safety, hence our view that V2X Platforms are a party with the ability to influence the safety of automated vehicles. Like Telecommunications Service Providers, we believe V2X Platforms should not be relied on, and the ADS should be designed to operate safely in the absence of receiving information from the V2X Platform. This would place them as a Minor Influencer in the NTC's categorisation of parties with influence.

For these reasons, we recommend V2X Platform Operators be added to the list of parties on the Minor Influence category.

3 Road managers have a responsibility to ensure the digital environment matches the physical world.

Section 4.4.2 of the Consultation describes the function of Road Managers and their role in the in-service safety of AVs. Road Managers are responsible for the provision and maintenance of road signs and the provision of signage for temporary closure of part of a road (e.g., for maintenance purposes).

We note that connected AVs will also receive digital versions of this road related information through communications networks, most likely from V2X Platforms. We therefore recommend that timely maintenance of the digital environment (i.e., the digital replica of the physical world road asset, such as speed limit, lane closures, etc. that can be conveyed to an ADS) is added to the responsibilities of Road Managers.

Our reason for recommending this is to avoid conflicting information being presented to the ADS. For example, if a digital map file is sent to a vehicle which represents the lanes on approach to an intersection, but it is out of date due to recent line-marking works, then conflicting information could be provided to the ADS, requiring it to resolve the contradictory information. While conflicting information arriving at an ADS is inevitable (e.g., if one sensor on the vehicle is faulty but other sensors are working correctly), and we assume the ADS will correctly resolve any conflicting information it receives, the presentation of conflicting information will nonetheless reduce the performance and efficiency of the ADS. Minimisation of conflicting information presented to an ADS should be part of the goals of the ongoing in-service safety of ADSs.

We recommend timely maintenance of the digital environment be added to the responsibilities of Road Managers.

Appendix A – Answers to selected consultation questions.

In this appendix, we provide answers to two selected question from the consultation.

2. Have we correctly identified the parties with an influence on the in-service safety of automated vehicles and accurately described their role? If you identify additional parties, please explain what their role is.

We have identified an additional party, V2X Platform Operators as a party playing a role in the safe operation of AVs in the Dynamic Driving Task. Section 2.2 of our submission expands on the role this actor plays, and why we recommend they are added to the Minor Influence category.

3. Have we accurately assessed each party's influence on the in-service safety of automated vehicles? If not, please provide details.

We have recommended amendments relevant to two of the parties identified in the consultation.

We recognise the role telecommunications network operators can play in raising the safety performance of automated vehicles in comparison to non-connected AVs. That said, we also raise concerns about the NTC's statements about reliance on communications networks, and/or the ability of the ADS to operator safely in the absence of access to a communications network. Further details are contained in section 2.1 of our submission.

Secondly, we identify an additional role for Road Managers in relation to the maintenance of the digital environment, which is necessary to minimise conflicting information being presented to ADSs. Further details on this aspect can be found in section 3 of our submission.