

DEFINING A “REMOTE DRIVER”

Q1: Do you agree with the following tentative definitions?

(1) A driver is an individual who performs all or any of the following tasks:

- (a) steering (lateral control);
- (b) braking, removing a brake, or accelerating (longitudinal control); or
- (c) monitoring the driving environment with a view to responding to objects or events by exercising lateral or longitudinal control (provided that this activity is safety critical). (

2) A remote assistant is not a driver if they do not exercise direct longitudinal or lateral control, but only advise an automated driving system to undertake a manoeuvre.

(3) For the purposes of this project, a “remote driver” is a driver who is outside the vehicle and who uses some form of wireless connectivity to control the vehicle (covering both in or beyond line of sight).

Answer: PACTS agree with these definitions of a driver. The person is a driver if they perform all or part of dynamic driving tasks, regardless of whether they are inside or outside of the vehicle. A person who is not present physically in the vehicle and can exercise braking, accelerating, steering, and transmission gear selection (is able to operate the vehicle) is a driver.

We also agree that a remote assistant is not a driver if they do not exercise direct longitudinal and lateral control of the vehicle, but only assists the automated driving system of the vehicle to make its own decision under a given circumstance in line with the SAE's definition of remote assistance.

Finally, we agree that a remote driver is outside the vehicle and uses some form of wireless connectivity to control the vehicle, to ensure that vehicles that are operated using hands-on controls that are attached to the vehicle, such as those used for highway maintenance. However, PACTS does have concerns that remote driving poses considerable safety challenges. Just one example of a challenge that would need to be overcome would be how the remote driver can regain situational awareness and react to an emergency or obstruction when they are not in the vehicle, particularly if they are viewing the surroundings of the vehicle on a screen. Remote control and operation are complex. It should not be assumed that remote handling constitutes a viable backup for problems encountered by vehicles under the control of an automated driving system, or that remotely controlled driving of a vehicle is feasible in busy environments or on high-speed roads.

CONSTRUCTION AND USE REGULATIONS

Q2: Do uncertainties surrounding construction and use provisions cause difficulties in practice? We are particularly interested in whether uncertainties over regulations 104, 107 or 110 are delaying trials or making it more difficult to obtain insurance.

Answer: Uncertainties can lead to unintended and undesirable outcomes. If remote driving is allowed, then rules must be set out to deal with not having a full line-of-sight vehicle. Therefore, PACTS would suggest amending having a special provision for remote supervision of vehicles to allow this to happen.

Q3: Are the various exemptions easy to navigate, or do they put any unnecessary obstacles in the way of trialling new forms of vehicle?

Answer: There should be a distinction between trialling and real-world use, if some exemptions are put in place for the purpose of trials then it would be under defined circumstances and will be different from the regular operation.

Q4: We seek views on whether any particular construction and use provisions should be maintained in the interests of safety, even for trials and demonstrations.

Answer: PACTS strongly suggests that all the basic type approval standards should be maintained for remote-driven vehicles and the highest standards of safety systems available in the market should be mandated on the base vehicle to be used for remote driving. The vehicle used for remote driving should have at least SAE level 3 autonomy. Depending on the Operational Design Domain (ODD), the remotely driven vehicles should have appropriate features of Autonomous Driving Systems to perform minimal risk manoeuvres in case of any anomaly to ensure the safety of the vehicle, passenger, and other road users.

The construction and use provisions will depend on the use case of the remotely driven vehicles and just having level 3 autonomy would not be enough in some cases. These provisions will be different for the safe operation of the vehicle in various domains it is used in. For example, the provisions for remotely driven vehicles designed to provide the shuttle service within the campus will be different from the vehicles intended to be remotely driven on motorways. Therefore, all remotely driven vehicles should have the ability to perform minimal-risk manoeuvres to avoid any unacceptable incident in case of loss of connectivity or any other system/s failure. The requirements for the vehicle to be able to perform the appropriate minimal risk manoeuvres will depend on the respective Operational Design Domain and this should be mandated by the regulator.

CIVIL LIABILITY

Q5: Is remote driving likely to cause victims undue delay and expense in claiming compensation; or could it defeat claims altogether?

Answer: We agree with the points made in the 'Summary of issues' paper (B7 to B9), which are particularly true if remote driving is permitted with manually controlled vehicles i.e., the challenge of having to show the negligence of the 'driver' or his employer. With vehicles subject to the Automated and Electric Vehicles Act 2018 the insurer is liable if an accident is 'caused by' the automated vehicle while driving itself – this puts in place a more straightforward route to compensation for victims. However, it highlights the need for insurers to access data in order to determine whether the vehicle was 'driving itself'. At present, it is not clear if and how that data will be made available.

THE SAFETY CHALLENGES OF REMOTE DRIVING

Q6: We have identified that any system to regulate beyond line-of-sight driving needs to consider the following:

- (1) the adequacy of the communication network;
- (2) cybersecurity;
- (3) workstation layouts;
- (4) staff training;
- (5) staff health, fitness and vetting;
- (6) staff attention and rest periods; and
- (7) incident protocols.

Apart from the above, are there any additional challenges to consider?

Answer: Apart from the challenges identified above, PACTS would suggest mandating additional training for remote drivers. Just having a license to drive a vehicle conventionally on the road will not be an adequate level of qualification for remote driving. Not all driving certifications, rules of the road and infrastructure are identical around the world, and in case vehicles are allowed to be driven remotely from abroad on UK roads then it could be catastrophic from a safety point of view.

In addition to this focus should also be given to the psychological aspects of remote driving, such as situational awareness and threat perception of the remote driver who is not present

in the car themselves and is effectively away from the possibility of causing personal physical harm, which is normally a real possibility in case of conventional driving. The design of the interface used for the remote operation to gain situational awareness when dropping into the vehicle needs to be designed well to facilitate situational awareness when the remote driver is called upon to help the vehicle out in the case of emergency, we don't know how well humans can do that and further research is required in this area.

Q7: If remote driving fails (through loss of connectivity, for example), how sophisticated would a risk mitigation system need to be? Would it effectively need to be an automated driving system, and regulated as such?

Answer: As stated above in reply to question 4, PACTS believes it is important for a remotely driven vehicle to have at least SAE level 3 autonomy and to be able to mitigate any risk in the case where the remote driver is no longer able to control the vehicle due to failure of connectivity or any other systems. It would be ideal to only use remote driving to support autonomous vehicles during their initial phase of development, as the technology becomes more sophisticated, to provide an additional layer of reliability in case something goes wrong with onboard ADS (Automated Driving System). Relying only on remote driving which is completely dependent on connectivity without any ADS features should not be permitted. Especially given that ensuring proper connectivity for just an hour-long online meeting is not guaranteed with current communication standards.

REMOTE DRIVING FROM ABROAD

Q8: We welcome views on how the problems raised by remote driving from outside the jurisdiction can be addressed.

Answer: There are various concerns associated with remote driving from abroad, such as the qualification of drivers, variable driving regimes, reliable connectivity, ensuring accountability and liability in case of an incident etc.

PACTS suggests limiting the control of the remotely driven vehicle from within the jurisdiction where the vehicle is operating, which in this case will be the UK.

Q9: Should remote driving on roads in Great Britain from outside the UK be prohibited?

Answer: Yes, remote driving from outside the jurisdiction of the UK should be prohibited at least for the duration of trials. This can be reassessed once the technology has matured, and adequate operational data is available.

INTERNATIONAL PERSPECTIVES

Q10: We would be grateful if stakeholders could inform us about their experience of how remote driving is regulated abroad.

Answer: This is outside the scope of PACTS.

SHORT-TERM REFORM

Q11: Should the Road Vehicles (Authorisation of Special Types) (General) Order 2003 be amended? In particular, we welcome views on whether amendments should:

- (1) specify that regulation 104 is satisfied if the driver of a special vehicle has a view of the road ahead through a screen, provided that appropriate steps have been taken to ensure safety;
- (2) specify that regulation 107 is satisfied by remote supervision, provided that the user has taken appropriate steps to prevent interference with the vehicle;
- (3) make any exemptions contingent on the user obtaining written consent from the road authority to use the vehicle on a particular road; and
- (4) permit trials and demonstrations with a commercial element to them?

Answer: With respect to point (1) concerning regulation 104, PACTS recommends that the regulation should be amended to require a remote driver to have an all-around 360° view of the vehicle. Just having a view of the road ahead will not be enough to safely manoeuvre a vehicle, for example, in the cases of changing lanes, turning or reversing the vehicle.

Regulation 107 requires a careful assessment. The statement ‘appropriate steps to prevent interference’ will need to consider and provide satisfactory answers to mitigating the risk of people inside and outside of the vehicle inappropriately affecting its movement. For example, there are new contexts associated with remotely supervised vehicles that were previously not possible, such as passengers’ access to press an emergency stop button, or school children seeking to ‘experiment with controls’ when there is no on-board supervision. This will require an in-depth review to ensure the different use-cases are captured and appropriate definitions of ‘appropriate steps to prevent interference’ documented, including cyber-attack. The hackers who meddled with ride-hailing service Yandex Taxi to create a two-hour-long traffic jam in the Russian capital on 1st September 2022 ([Yandex Taxi hack creates](#)

[huge traffic jam in Moscow | Cybernews](#)) is an interesting example of how the nature and characteristics of 'vehicle interference' risks have changed since the 1986 regulations were enacted. Wireless remote supervision and control of vehicles necessitates a fresh evaluation of 107.

Making exemptions contingent on the user obtaining written consent from the road authority to use the vehicle on a particular road carries the risk of establishing different safety standards on different roads in the UK. PACTS would support a best practice approach where all are required to operate at the highest standards.

PACTS is supportive of trials, including those with a commercial element, so long as the safety cases are published and approved by independent safety experts. There is much that can be learnt through trials, and it will be important to share this knowledge to inform whether remote supervision is a viable and practicable approach to improve the mobility of goods and people. We recommend that all trials should be required to disseminate their safety learnings and recommendations.

Q12: Should any provisions of the CCAV Code of Practice relating to remote driving be added to the Highway Code?

Answer: Whether someone is driving remotely or from inside the vehicle, everyone should be expected to follow the Highway Code. The behaviour of the driver and the way the vehicle is remotely driven should be no different than what is expected out of conventionally driven vehicles. To ensure harmonisation, it is important to provide the necessary rules and standards to all drivers, whether inside or outside of the vehicle. If it is the case that specific CCAV Code of Practice provisions are required to ensure adherence of remote driving standards, then these must be added to the Highway Code once the technologies progress beyond trials.

Q13: Are changes needed to construction and use regulations to enable the safe introduction of remote driving?

Answer: It is expected that remote-driven vehicles and automated vehicles will have higher regulatory standards of safety as compared to conventional vehicles. For the vehicles that do not have autonomous driving capability, PACTS would suggest that basic safety systems that are part of ADAS and General Safety Regulations that came into force in the EU in July 2022 must be mandated as a minimum and be part of the construction and use regulation. The regulations need to reflect an engineering system approach where clear fail-safe modes of operation are mandated. For example, advanced automated braking systems would be required to prevent remote operators from inadvertently piloting the vehicle in such a way that preventable collisions with pedestrians or cyclists were possible.

REGULATION IN THE LONGER TERM

Q14: To distinguish clearly between organisational and individual responsibilities, should the organisation behind remote driving be referred to with new terminology, as an Entity for Remote Driving Operation (or ERDO)?

Answer: Yes, PACTS agree that to ensure proper accountability the organisation behind remote driving be referred to as Entity for Remote Driving Operation (ERDO).

Q15(1): Should primary legislation make it an offence to drive (or cause or permit a person to drive) a vehicle beyond line of sight unless the vehicle is overseen by a licensed ERDO?

Answer: Yes, primary legislation should make it an offence to drive a vehicle remotely beyond the line of sight without a legally authorised ERDO license. The vehicle should only be driven either conventionally by the qualified human driver present within the vehicle, or in the case of remote driving, it must be operated by a licensed ERDO located within the UK. Furthermore, there should be a regulation that ERDO cannot intervene once the vehicle is taken over to be driven conventionally by a human driver present in the vehicle.

Q15(2): For these purposes, is it appropriate to define a “beyond line-of-sight” driver as one who relies on connectivity to see all or part of the driving environment?

Answer: Yes, it would be appropriate to define a beyond line-of-sight driver or remote driver as one who relies on connectivity to see all or part of the driving environment.

Q16: To obtain a licence, should an ERDO be required to show that it:

- (1) is of good repute;
- (2) has appropriate financial standing;
- (3) conducts its operation within Great Britain; and
- (4) is professionally competent to run the service?

Answer: PACTS agree that to obtain an ERDO license the operator needs to fulfil all the four criteria outlined above. However, the definition of having a ‘*good repute*’ needs to be clarified.

Q17: Should an ERDO be required to submit a safety case to show how it will operate remotely driven vehicles safely?

Answer: Yes, an ERDO should be required to submit a comprehensive safety case to the regulator as part of the assurance process to obtain an ERDO licence. Only if the safety case meets the required standards of the regulator, the ERDO should be authorised to operate within the UK.

Q18: Should an ERDO face criminal offences where misrepresentations and non-disclosure in the safety case have implications for safety?

Answer: Yes, PACTS believes that an ERDO should face criminal offence if they have deliberately misrepresented their safety case or have failed to disclose any threat to the safety of vehicles, passengers, or to other road users. Doing this they will be knowingly introducing risk to the road users and be putting them in danger therefore, it should be treated as a criminal offence. This should be at least as robust as that of the disclosure requirements for black cab drivers in London.

Q19: Should an ERDO be under a duty:

(1) to ensure that the driver is able to drive safely by:

- (a) taking reasonable care that connectivity is suitable;
- (b) ensuring that in the absence of connectivity or driver input, the vehicle comes to a safe stop;
- (c) providing suitable work-stations; and
- (d) maintaining suitable training, vetting, health checks, working hours and breaks;

(2) to maintain the vehicle (including software updates and cybersecurity);

(3) to check that any load is safe and secure before that journey starts, and ensure that the number of passengers does not overload the vehicle;

(4) to insure the vehicle;

(5) following an incident, to provide information to other road users, the police and the regulator;

(6) not to impede traffic flow by (for example) ensuring that vehicles are not left in inappropriate places;

(7) to check the route and pay any tolls and/or charges;

(8) to respond to the regulator's requests for information about the safety of remote driving; and

(9) any other duties not mentioned above?

Answer: PACTS agrees with all the duties outlined above that an ERDO would be responsible for. Apart from the 8 points mentioned, an ERDO should also be responsible for ensuring proper connectivity required for remote driving throughout the journey. Having adequate connectivity is the most important aspect of remote driving to ensure safety and proper operation of the vehicle. Further, the statement 'ensuring that in the absence of connectivity or driver input, the vehicle comes to a safe stop' may need further clarification as fail-safe systems will be necessary to ensure this happens in every case. A safe stop needs to consider the vehicle dynamics and the environmental circumstances, for example stopping in a live traffic lane or across a junction may not be safe.

Q20: To claim compensation should a person:

(1) have a right to claim compensation from the ERDO for injuries caused by a breach of the first three ERDO duties outlined above, subject to the normal law of contributory negligence?

(2) Alternatively, should an insurer be liable irrespective of where the fault lies (in a similar way to the Automated and Electric Vehicles Act 2018)?

Answer: This is outside the scope of PACTS.

Q21: Should the regulator have power to impose a range of sanctions on an ERDO, including improvement notices, civil penalties and (in serious cases) withdrawal of licence?

Answer: Yes, PACTS would suggest that the regulator should have the power to impose sanctions, penalties, and withdrawal of licences if an ERDO is in breach of regulations or operational requirements that may put the vehicle, passenger, and other road users at risk.

Q22: Should the regulator have powers to inspect remote operation centres, both in the event of a problem and more generally?

Answer: Yes, the regulator should have the power to inspect remote operation centres to ensure the safe and reliable operation of the remote vehicles by the ERDO in adherence with the rules and regulations that apply to them.

Q23: Should the law provide individuals who drive beyond the line of sight with:

(1) an immunity from being prosecuted for any issues concerned with roadworthiness, loading and seat-belts which are beyond the driver's knowledge and control; and

(2) a defence to a driving charge if a competent and careful driver in the same circumstances could not have avoided the offence?

Answer: It should be the responsibility of the ERDO to ensure that the vehicle is roadworthy, does not exceed the safe and legal capacity and to also monitor the use of seatbelts when the vehicle is being driven remotely. However, after the vehicle is handed over in roadworthy condition to the driver present in the vehicle to be driven conventionally then the accountability of using the seatbelt and complying with all the rules of the road should fall on the person driving the vehicle as it does currently for the conventionally driven vehicles.

If a competent and careful driver commits an offence in a conventionally driven vehicle today, then they are liable for the offence and the penalty as prescribed in the law. An ERDO should have the same parameters and should adhere to the same rules of the road as any driver of a conventionally driven vehicle. Therefore, in case of an incident, an ERDO should be treated in the same manner and must face equal consequences as any conventional driver.