Federal Ministry
for Digital
and Transport

Remote driving and remote support

Introduction and German perspective

What is remote driving?

- Remote driving: use case of direct execution of the driving task from a location other than the driver's seat

- „Real-time performance of part or all of the Dynamic Driving Task (DDT) and/or DDT fallback (including braking, steering, acceleration, and transmission shifting), by a remote driver. This can also be referred to as full tactical control. “ (SAE-J3016)

- The remote driver guides a driverless vehicle continuously and directly from a driver’s control desk

Extended use cases for vehicles with non-autonomous functions

- As the driver is decoupled from the vehicle fleet efficiency of the personnel deployed can be increased

- This creates a use case for the delivery of goods, especially over longer distances and for rental cars and car-sharing vehicles

What is remote support/assistance?

- „Event-driven provision, by a remotely located human […] of information or advice to an ADS-equipped vehicle in driverless operation in order to facilitate trip continuation when the ADS encounters a situation it cannot manage” (SAE-J3016)

- For example a remote support/assistance agent may confirm a driving manoeuvre proposed by an ADS from a remote location other than the driver's seat

Limitations to autonomous driving

- Complex infrastructures, surroundings and traffic scenarios
- Bad weather and/or bad lighting conditions
- Situations which demand communication between drivers or a high level of situational awareness and forecasting (e.g. the infamous unprotected left turn)

Support of ADS

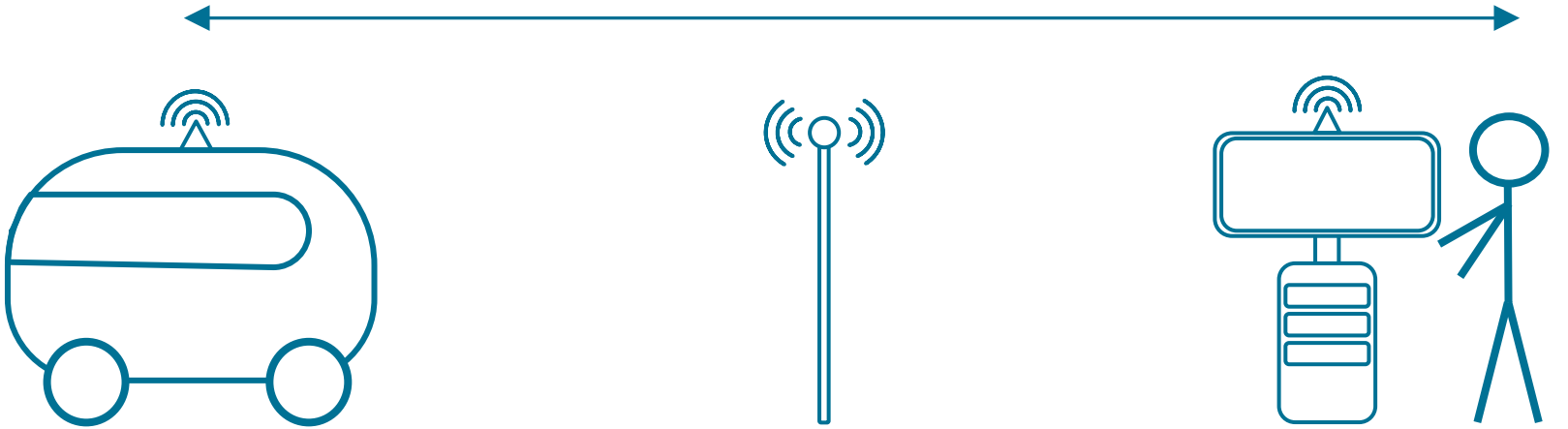
- In the mobility of the near future, autonomous and connected vehicles will already be able to handle most tasks independently. However, they are not yet able to master all traffic scenarios safely

- If the ADS encounters problems (e.g. due to insufficient sensor performance or faulty interpretation of sensor data), safety comes first and the ADS performs a minimum risk manoeuvre. Generally, the autonomous vehicle pulls over to the side of the road and stops. To solve such situations safely and quickly, remote support/assistance could be a solution

Potential support for new mobility concepts

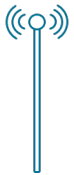
- Extend ADS' operational design domain (combination of Level 4 + remote driving)
- Shuttle services from A to B, and buses that travel on a fixed route
- Hub2Hub transports (e.g. between two distribution centers, 24/7h)
- Demand-responsive services during off-peak hours
- First-mile or last-mile transportation of people and/or goods

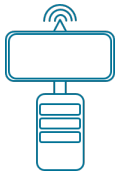
Why in the WP.1 – remote driving control process



Why in the WP.1 – remote driving control

Signal latency and transmission bandwidth are dependent on each component and influence the drivers performance





Remotely driven vehicle

WP.29: – In-vehicle technology
WP.1: – Safe traffic integration
– Legal framework

Wireless infrastructure

WP.29: – Not in scope
WP.1: – Not in scope

Control station

WP.29: – Not in scope
WP.1: – Human factors
– Risk mitigation

Remote driver

WP.29: – Not in scope
WP.1: – Education/training
– Aptitude/permits

Sender

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