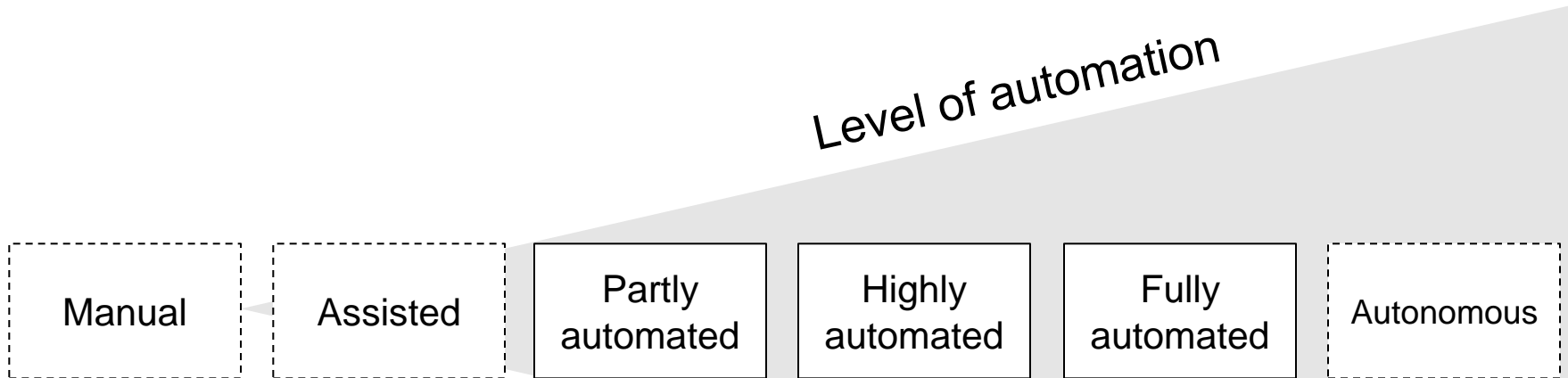Federal Ministry
of Transport and
Digital Infrastructure

Automated and Connected Driving –
The Strategy of the Federal Government -
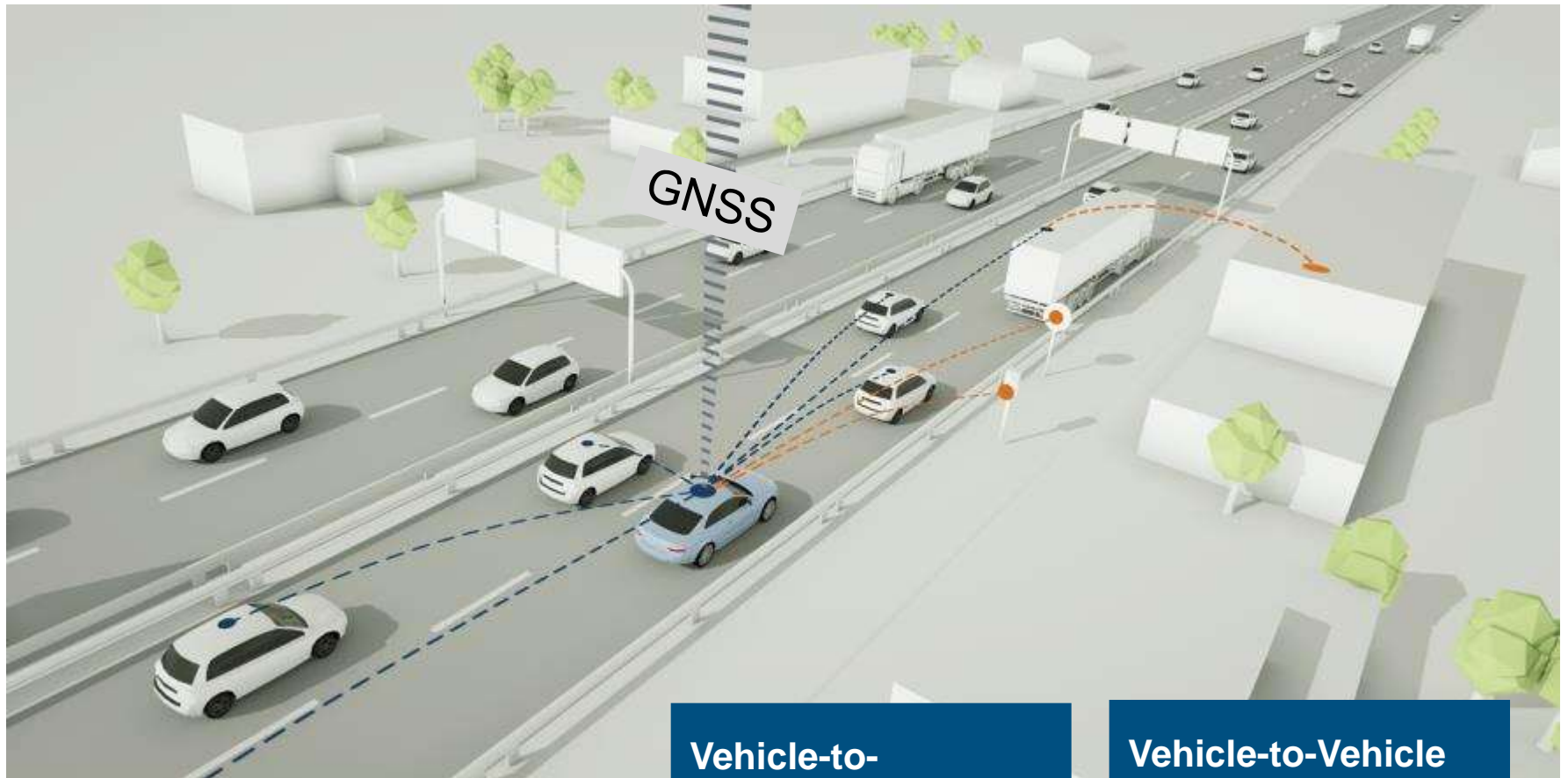# Opportunities and Challenges

November 2016

Norman Pischler
Federal Ministry of Transport and Digital Infrastructure:
Division for Intelligent Transport Systems and Automated Driving

Levels of automation (functionalities)

Level of automation
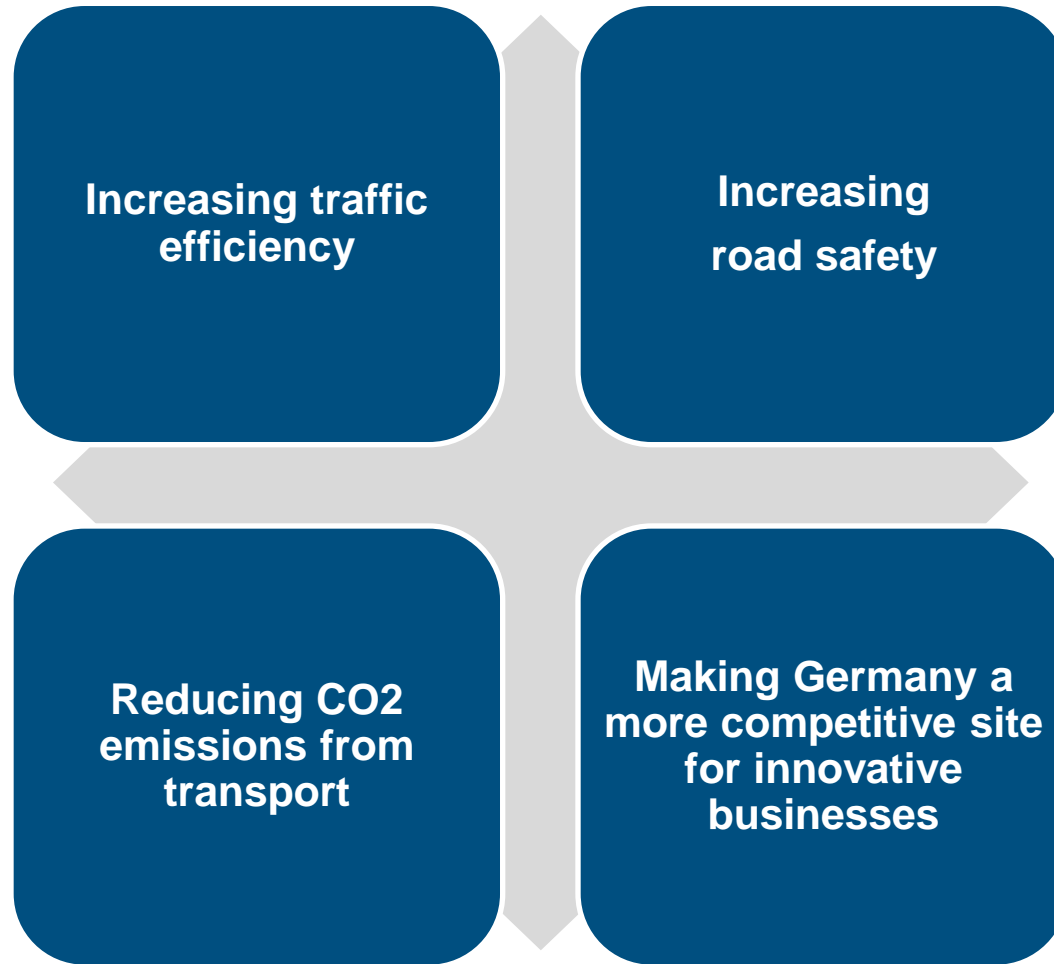
| Manual | Assisted | Partly automated | Highly automated | Fully automated | Autonomous |

Connected driving

GNSS

Vehicle-to-Infrastructure (V2I)

Vehicle-to-Vehicle (V2V)

Federal Ministry
of Transport and
Digital Infrastructure

Potential of automated and connected driving

Increasing traffic efficiency

Increasing road safety

Reducing CO2 emissions from transport

Making Germany a more competitive site for innovative businesses

Federal Ministry
of Transport and
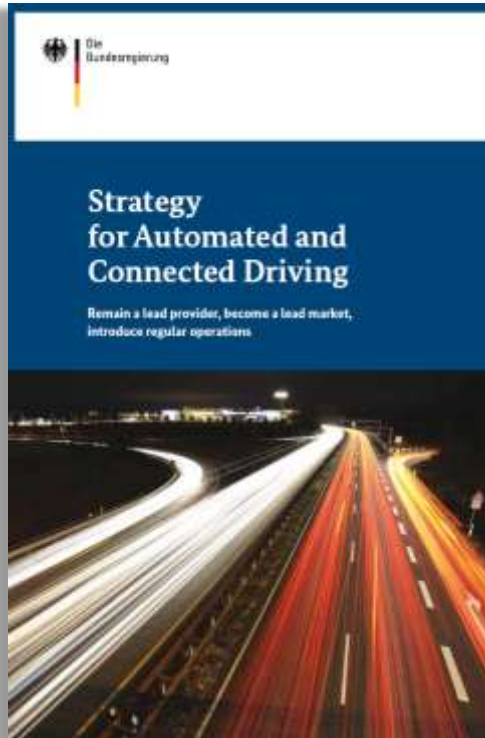Digital Infrastructure

The Strategy for Automated and Connected Driving

Objectives

1   *We want to remain a lead provider.*

2   *We want to become a lead market.*

3   *We want to put automated and connected vehicles on the roads.*

Die Bundesregierung

Strategy for Automated and Connected Driving

Remain a lead provider, become a lead market, introduce regular operations
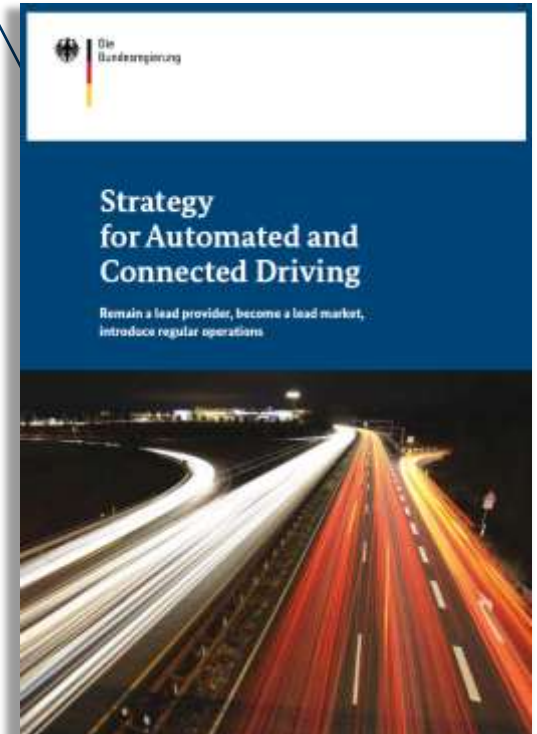
Fields of action/challenges for implementing the strategy

Strategy for Automated and Connected Driving

Remain a lead provider, become a lead market, introduce regular operations

Infrastructure	▪ Digital infrastructure ▪ Standards for intelligent roads
Legislation	▪ Legal framework (national/international) ▪ Driver training ▪ Type approval/technical monitoring
Innovation	▪ Digital Motorway Test Bed ▪ Research funding/framework
Interconnectivity	▪ Mobility data and spatial data ▪ Intelligent transport systems
Cyber security and data protection	▪ Cyber security standards ▪ Need for action in terms of data protection
Societal dialogue	▪ Chances and risks of automated and connected driving ▪ Provision of information

Federal Ministry
of Transport and
Digital Infrastructure

Programme "Implementing the Automated and Connected Driving Strategy"

State Secretaries of BMVI, BMWi, BMBF, BMJV, BMI (BMVI)
strategic political guidance

Steering group (BMVI)
[Ministerial round table on automated driving}

Realization of strategic political targets &
preparation of the subject-matters in the State Secretaries' meeting

Lead responsibility for the programme (BMVI)

Programme office   Public relations

| Infrastructure working group (BMVI) | Legislation working group (BMVI) | Innovation Working group (BMWi) | Inter-connectivity working group (BMVI) | Cyber security and data protection working group (BMVI) | Societal dialogue working group (BMVI) |

Federal Ministry
of Transport and
Digital Infrastructure

Current national activities

- Organization of the programme is established

  – Working/sub-working groups have taken up activities

  – Milestones have been defined

  – First report end of 2016

- Draft ratifying law to transpose the amendment to the 1968 Convention on Road Traffic (Vienna Convention) into national law

- Preparation of a draft to adapt national legal regulations

- Establishment of an enquete commission

Federal Ministry
of Transport and
Digital Infrastructure

Current national activities

- Research programmes/funding guidelines of BMWi, BMBF, BMVI

- Digital Motorway Test Bed – Further work

- Financial support for the development of test fields in urban and suburban areas

Federal Ministry
of Transport and
Digital Infrastructure

Current international activities

- Evolution of the Vienna Convention
- Guidelines to ensure data protection and cyber security
- Technical regulations

- Cooperative ITS platform
- GEAR 2030
- Round table "Automated and connected driving"

- 2015 Declaration of the G7 Transport Ministers
- Working group of the G7 Transport Ministers
- 2016 Declaration of the G7 Transport Ministers

- Bilateral contacts and coordination
  (i. a. China, France, UK)

Federal Ministry
of Transport and
Digital Infrastructure

The "Digital Motorway Test Bed"

Objectives

Promoting innovations

Promoting research

Creating public acceptance

Designing infrastructure

The "Digital Motorway Test Bed"

1. Automated and connected driving

- Testing and further developing new technologies of automotive industry, suppliers, telecommunications companies and research institutes

- Tests carried out in a perfect environment in real traffic on the A9 motorway

2. Intelligent infrastructure

- In order to tap the full potential of the digitalized road, different intelligent infrastructure measures are to be trialled and refined on the Digital Motorway Test Bed.


By combining modern road infrastructure with fast transmission technologies, a unique test facility for automated and connected driving is created on the Digital Test Bed.

The "Digital Motorway Test Bed"

Basic facilities (1 of 2)

In order to ensure ideal conditions on the Digital Test Bed, basic infrastructure facilities are provided for use by all companies and research establishments:

- *Complete high-speed mobile communications coverage:* Short transmission times with high speeds in an infrastructure-based network

- *Communication via vehicle Wi-Fi:* Direct communication between vehicles via Dedicated Short Range Communication (DSRC) networks

- *Fast LAN connection:* Direct transmission of large amounts of user information via a central point of contact at selected locations of the Digital Test Bed

- *Mobility Data Marketplace as standardized interface:* Providing up-to-the-minute and high-precision traffic information via a standardized interface

- *Highly precise map:* Providing a high-precision reference map of the area with an accuracy of +/- 2 cm and, in doing so, supporting users' own quality assurance efforts related to map material

Federal Ministry
of Transport and
Digital Infrastructure
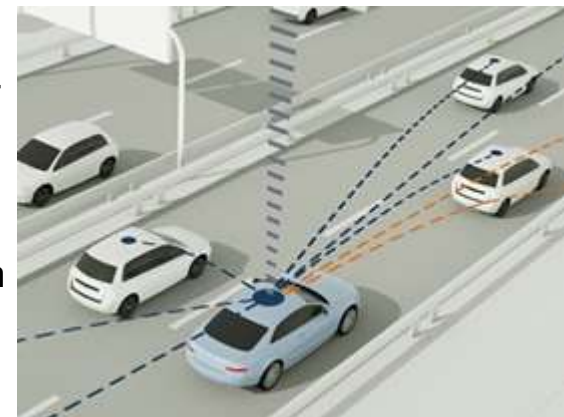
The "Digital Motorway Test Bed"

Basic facilities (2 of 2)

- *Road markings:* Precise positioning of vehicles on the road at any time, e. g. by means of markers on sign gantries and crash barriers

- *Adaptive traffic control systems:* Use of dynamic installations which, for example, warn of danger spots and weather-related restrictions, and, in addition, regulate the flow of traffic

Our Ministry, the VDA and the Free State of Bavaria (as agent for the Federal Government) closely coordinate efforts with regard to both the development of the basic facilities and their constant improvement.

Advanced basic facilities

Further requirements of the actors involved with regard to the infrastructure can be taken into account and made available in some parts of the Test Bed as "advanced basic facilities" for individual projects.

Federal Ministry
of Transport and
Digital Infrastructure

The "Digital Motorway Test Bed"

Examples of such measures on the Digital Motorway Test Bed

"Mobile Edge Computing" (Deutsche Telekom, Nokia, Continental and Fraunhofer ESK)

Trialling of technologies to upgrade the LTE mobile communications network with real-time technology for automated and connected driving

Platooning project (MAN Truck & Bus AG)

Trialling of a platooning system (electronically linked HGVs) under real-life conditions to prepare the European Truck Challenge at the beginning of April 2016

Measures on the Digital Motorway Test Bed contribute substantially to promoting the introduction of automated and connected driving.

Federal Ministry
of Transport and
Digital Infrastructure

The "Digital Motorway Test Bed"
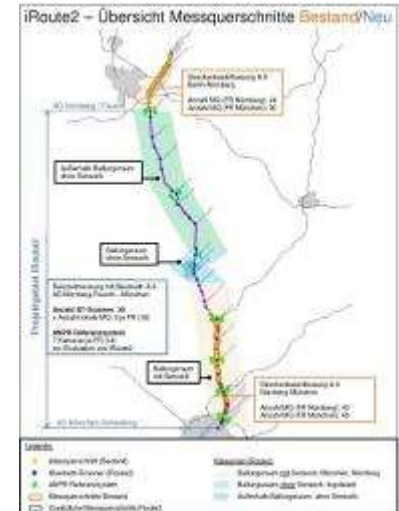
Intelligent infrastructure (1 of 3)

Interconnection and expansion of traffic data collection (iRoute): Installing Bluetooth sensors for the detection of incidents and to calculate journey times

Starting into cooperative systems (C2I): Warning of road works and improved monitoring of the traffic situation by making use of vehicle data

Telematics systems to warn of wrong-way drivers: Automatic and reliable detection of wrong-way drivers as a result of the establishment of telematics systems

Sustainable emergency telephone infrastructure: Integrating traffic data collection prototypes in roadside telephone casings for an optimized collection of traffic data and detection of traffic disruptions

Federal Ministry
of Transport and
Digital Infrastructure

The "Digital Motorway Test Bed"
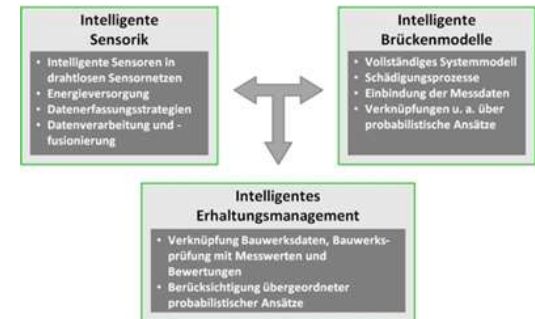
Intelligent infrastructure (2 of 3)

Innovative HGV parking guidance and information system:
Making more efficient use of existing HGV parking capacities by
means of telematics support

Intelligent bridge: Developing an adaptive system to
continuously provide relevant information for the overall
assessment of the condition of structures

Intelligent road ice forecasting: Developing a procedure that
allows section-based road ice forecasts using weather data and
sensors

Road weather online: Supplying and complementing
information on the weather-related condition of roads via the
Mobility Data Marketplace (MDM)

The "Digital Motorway Test Bed"

Intelligent infrastructure (3 of 3)

Internet car parking: Providing free Wi-Fi at parking spaces with toilet facilities

Service stations and rest areas of the future: Introducing innovative elements on rest areas, such as a parking guidance and information system, Wi-Fi, charging stations for electric and refuelling points for hydrogen vehicles as well as modern rest facilites and innovative building services

Optimization of roadworks ("intelligent merge-in-turn"): Trialling and evaluating traffic-based lane arrangements within roadwork areas to optimize traffic flows

Safe pullover for stationary checks: Developing and trialling an automated pullover method with camera technology, LED pullover display and operating station

Federal Ministry
of Transport and
Digital Infrastructure
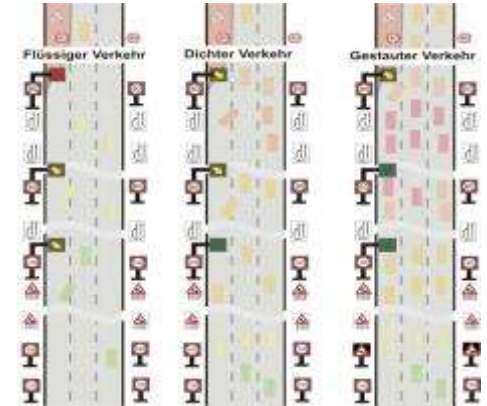
Supporting additional test beds

- Establishing sustainable interaction of motorway, rural and urban traffic

- Insights from complex driving situations, e.g. Traffic lights, crossings, roundabouts, identifying obstacles

- Funding first projects on digital test fields in Berlin, Braunschweig, Dresden, Düsseldorf, Hamburg, Ingolstadt, Munich. More cities may be added.

Federal Ministry
of Transport and
Digital Infrastructure

Thank you!

Contact

Federal Ministry of Transport,
and Digital Infrastructure (BMVI)
Invalidenstr. 44
10115 Berlin
Division DG 24
Intelligent Transport Systems and
Automated Driving

ref-dg24@bmvi.bund.de
www.bmvi.de
Tel. +49 (0) 30 18300 6240
Fax: +49 (0)30 18300 807 6240

Federal Ministry
of Transport and
Digital Infrastructure