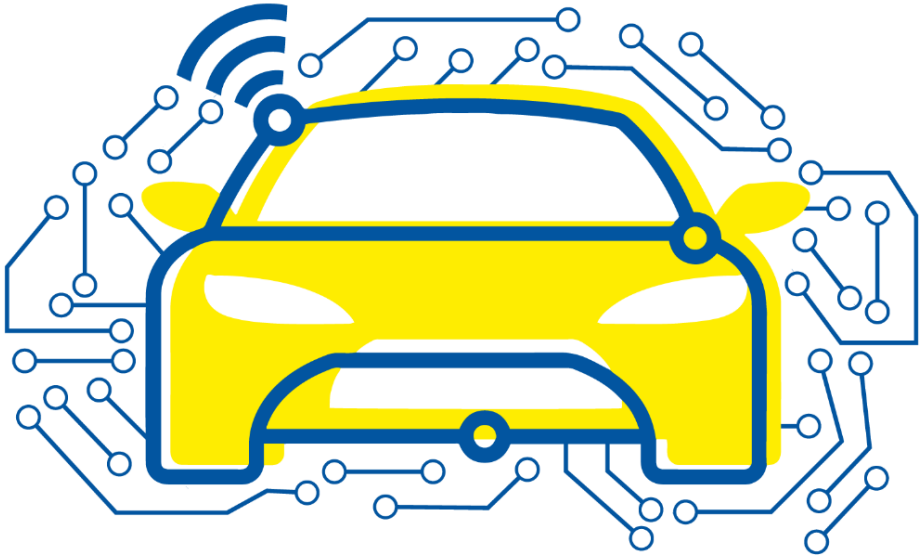
Automated and Connected Driving Challenges

Section 5 – Connected Driving

Infrastructure to Vehicle Communication

Introduction



Bastian Lampe

Institute for Automotive Engineering

I2V-Communication – Introduction

Supportive functions – I2V-Communication

- Connected infrastructure can **support** vehicles and other road users by providing relevant data
- Provided data can be:
  - current and future **states of traffic control systems**
  - road and lane **topology**
  - Speed limit and other **road signs**
  - **Warnings** of accidents or traffic jams

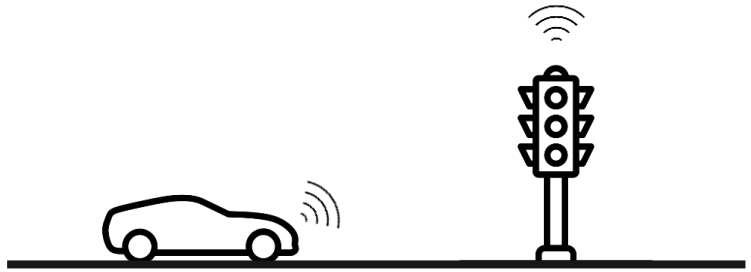


Image: ika

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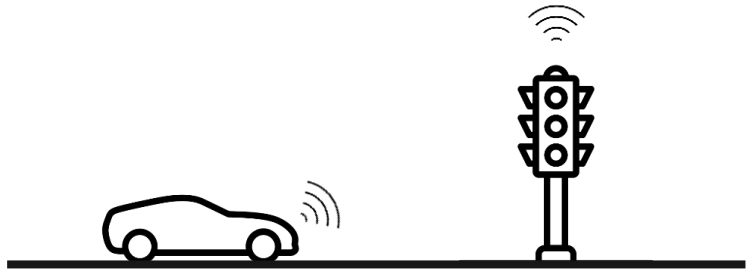

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- These infrastructure data provides **redundancy** → increase **safety** and **efficiency**
  - If reliable enough, some information no longer needs to be provided by vehicle sensors in the future.

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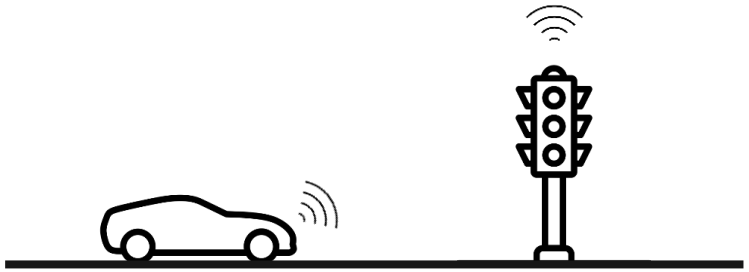

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- To realize V2X communication, a **standardized message protocol** is necessary
  - Widely used is the standard according to **ETSI EN 302-637**

Image: ETSI

I2V-Communication – Introduction

Example ETSI Message standards

- Cooperative Awareness Message (**CAM**)
  - Position and other state information of a road user

- Decentralized Environmental Notification Message (**DENM**)
  - Position and type of an event, like traffic jam or roadworks

- Infrastructure to Vehicle Information Message (**IVIM**)
  - Content of road signs

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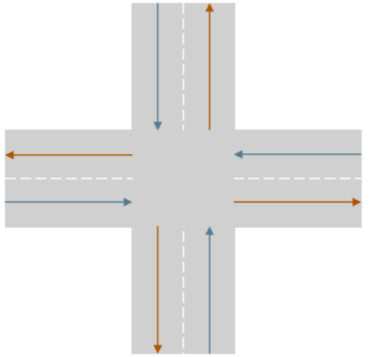
- MAP (topology) Extended Message (**MAPEM**)
  - Road and lane topology of a certain area, e.g. an intersection



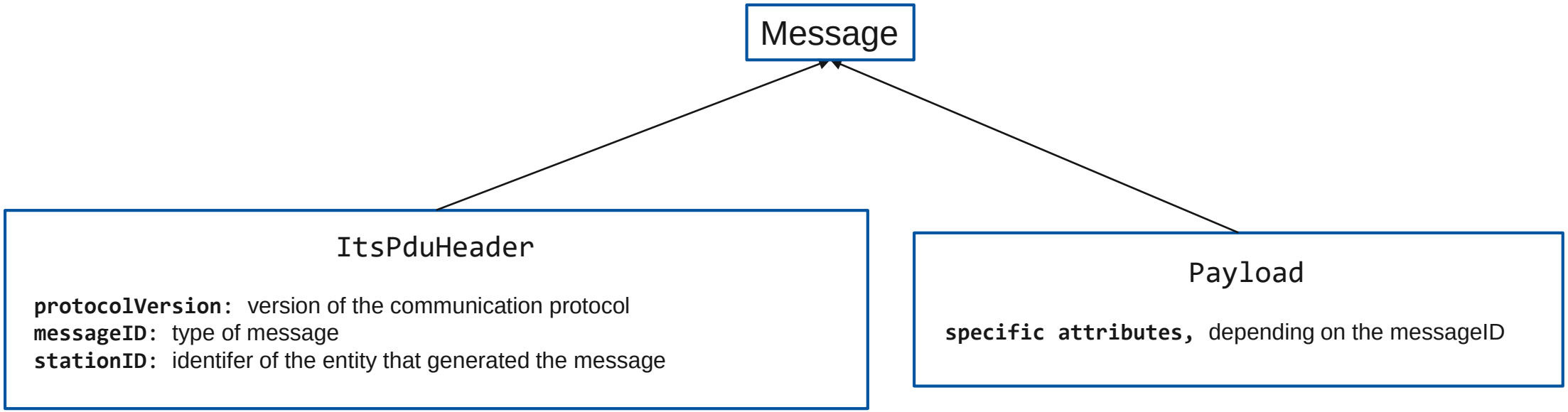
- Signal Phase And Timing Extended Message (**SPATEM**)
  - State and prediction of traffic light signals

- …

I2V-Communication – Introduction

ETSI Message Standard

- All messages consist of a **general header** and the **specific payload**



- usually encoded into an **ASN.1 bitstring**