

Smart Tachograph

Analysis of the New Technical Features

IRU Meeting

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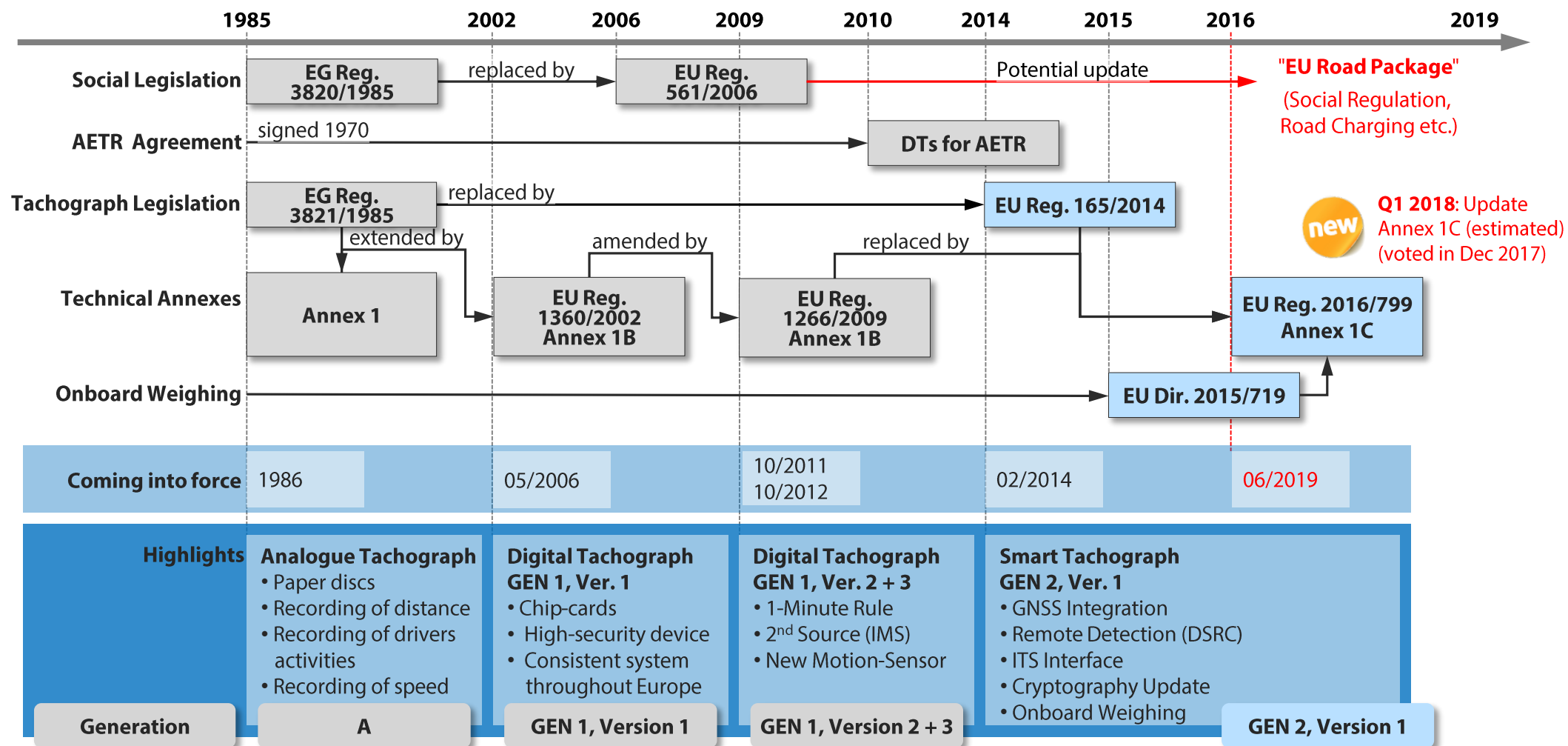
Agenda

1. Overview of EU Tachograph Regulation
2. Positioning
3. Remote Early Detection
4. ITS Interface
5. Security Update / Migration
6. Onboard Weighing

Overview of EU Tachograph Regulation

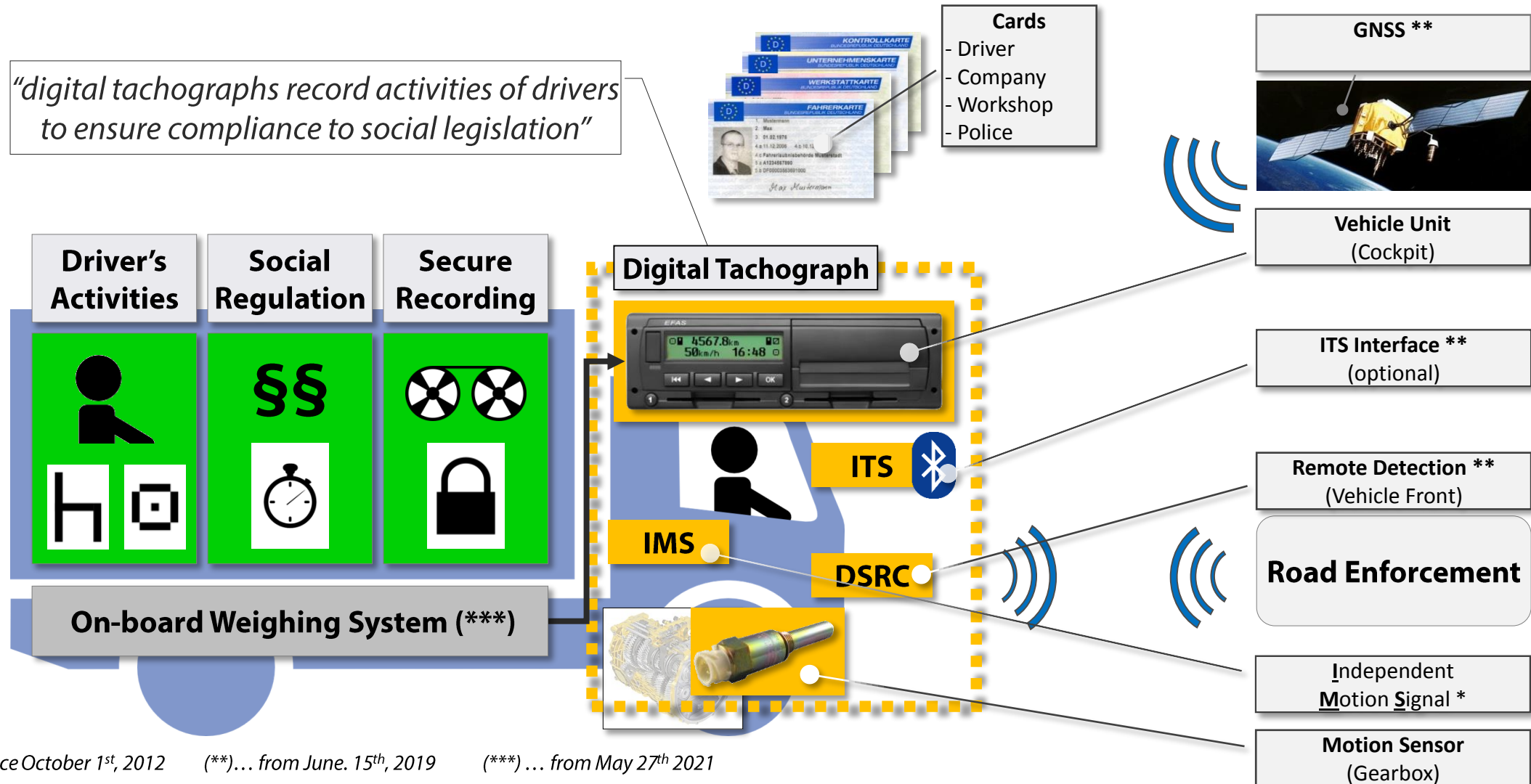


Evolution of EU Tachograph Legislation

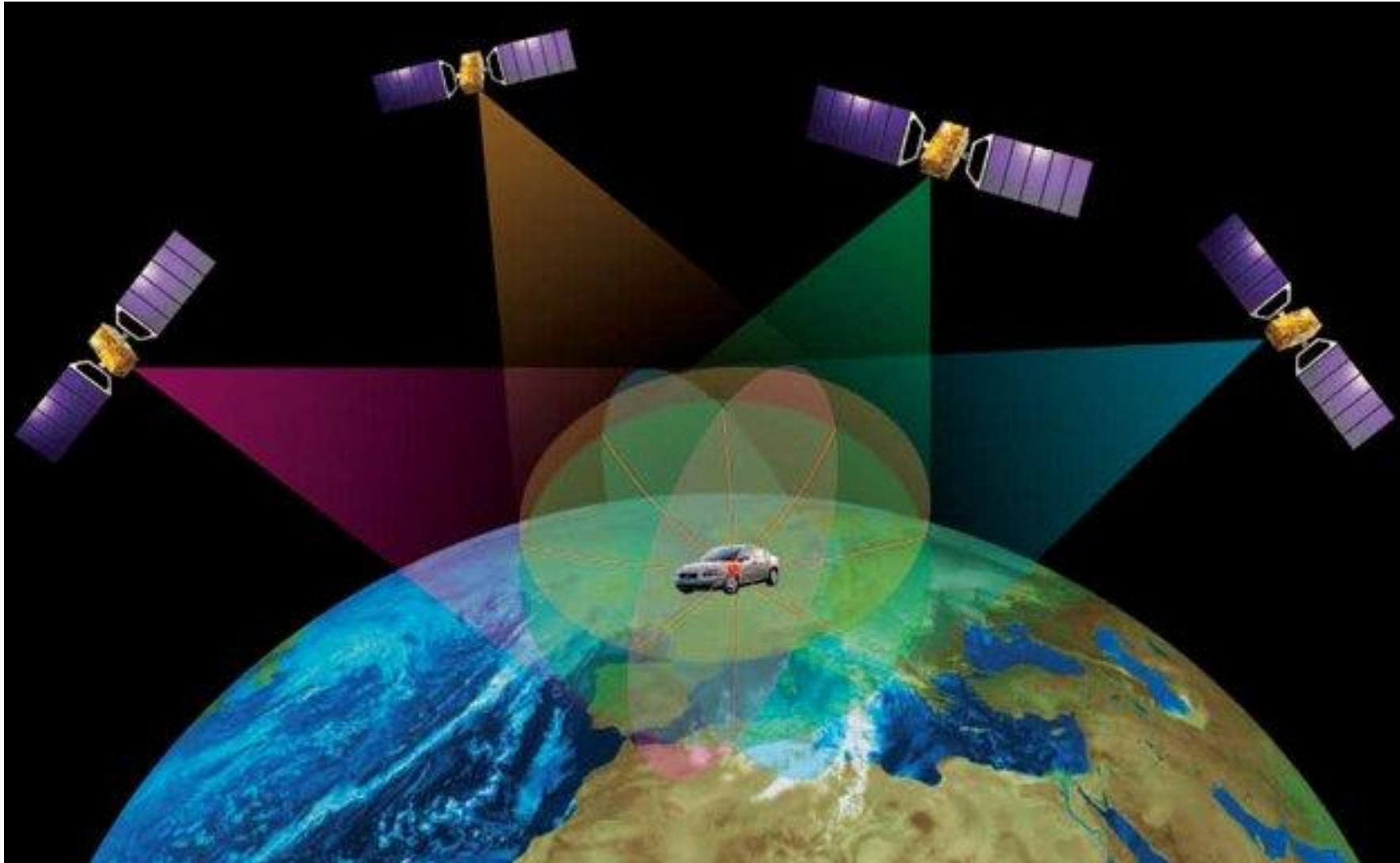


IMS: Independent Motion Source, GNSS: Global Navigation Satellite System, DSRC: Dedicated Short Range Communication, AETR: Accord Européen sur les Transports Routiers, ITS: Intelligent Transport System

Tachograph Eco-System - Smart Tachograph



Positioning



Positioning

► Legal requirement

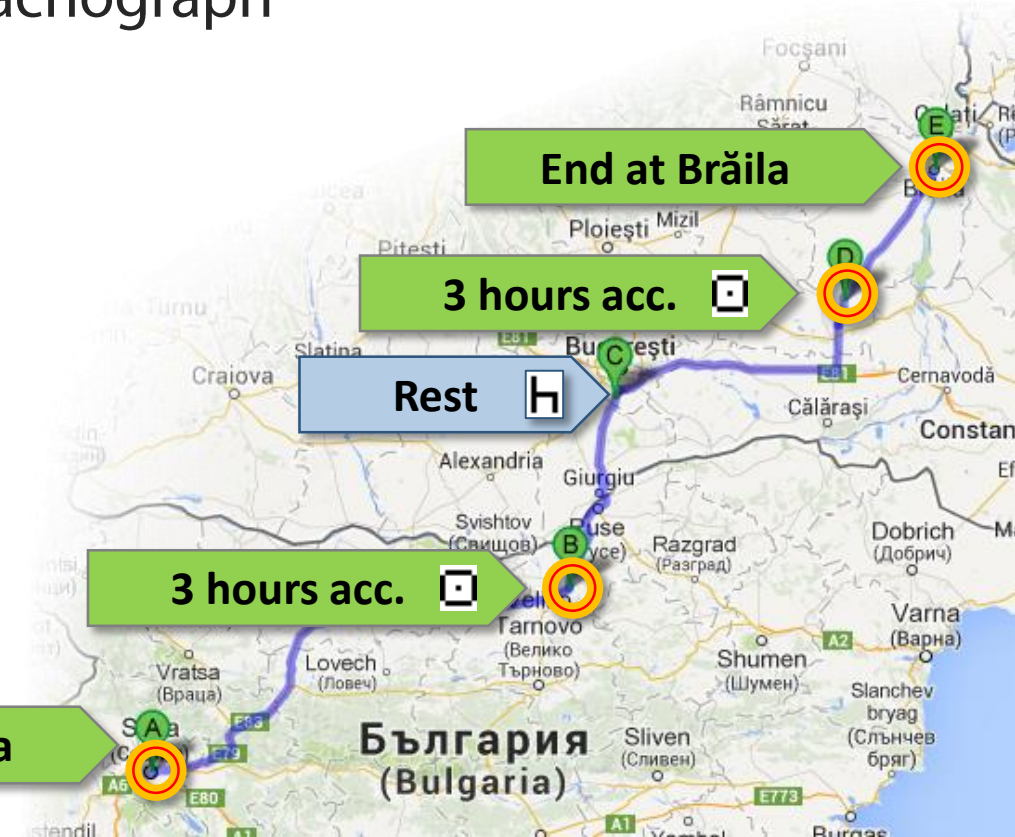
- Regulation 165/2015, Article 8
- Store geographic positions provided by satellite navigation system at specific locations in memory of digital tachograph

► Reason

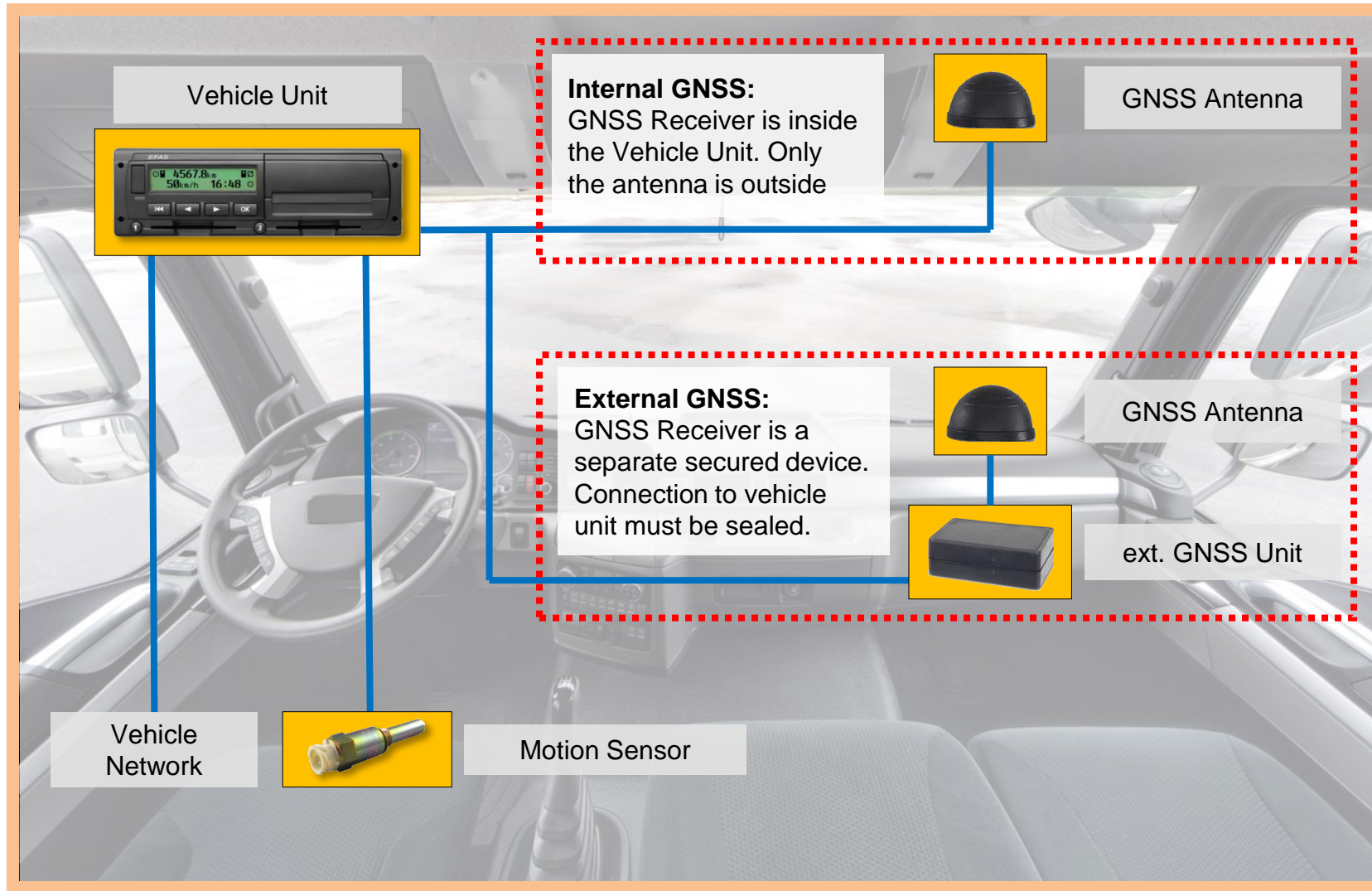
- Verification of compliance with social regulation

► Locations to be recorded

- Position at **start of daily working period**
- Current location after **three hours of accumulated driving**
- Position at **end of daily working period**



GNSS Integration in Vehicle: 2 Concepts



Functions based on GNSS Technology

▶ Storage of particular positions

- Position at start of daily working period
- Current location after three hours of accumulated driving
- Position at end of daily working period

▶ Independent Source of Motion (IMS)

- GNSS required for IMS-function
- Other technologies (e.g. similar as currently used) are optional
- No IMS errors in case of bad GNSS reception

▶ Utilisation for automatic time adjustment

- Since time is provided by a GNSS, the internal clock of the tachograph can be adjusted automatically
- No time-adjustment errors (time-overlap) in case of bad GNSS reception

Remote Detection



Remote Detection

► Legal requirement

- Regulation 165/2015, Article 9
- Digital tachograph shall provide information about potential misuse or manipulation while vehicle is in motion to nearby enforcement facility

► Reason

- Increase efficiency of road-side checks
- Enforcement shall be able to "filter" by-passing vehicles:
"Is it worth to stop the vehicle for more intensive checks?"

► Underlying Technology

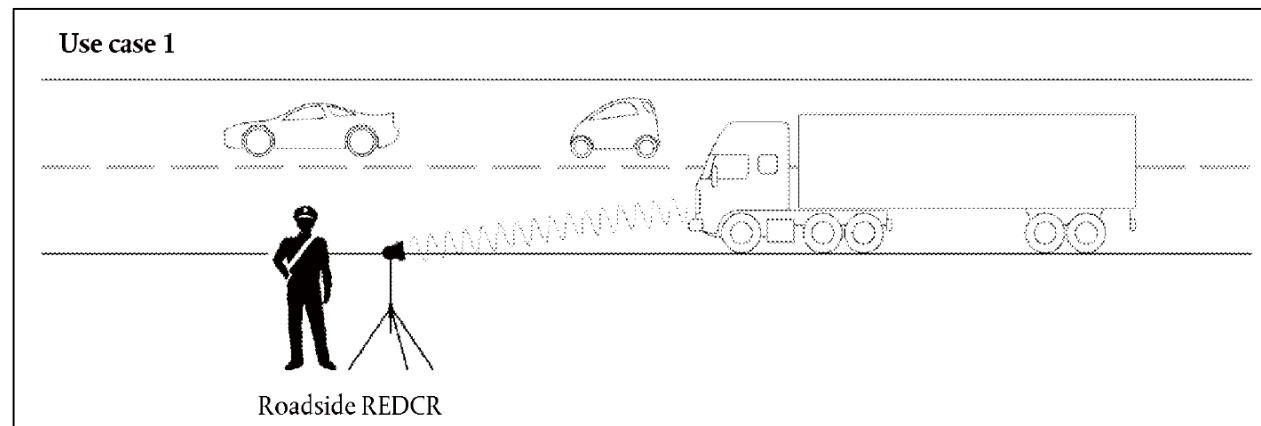
- Data transmission between vehicle and enforcement facility (e.g. driving-by enforcement vehicle or road-side tripod)
- Used technology: **CEN DSRC at 5.8 GHz** ("Microwave")
- DSRC = **D**edicated **S**hort **R**ange **C**ommunication
- Widely used for several purposes:
Tolling, Toll-Enforcement, Parking Access etc.



Use Cases

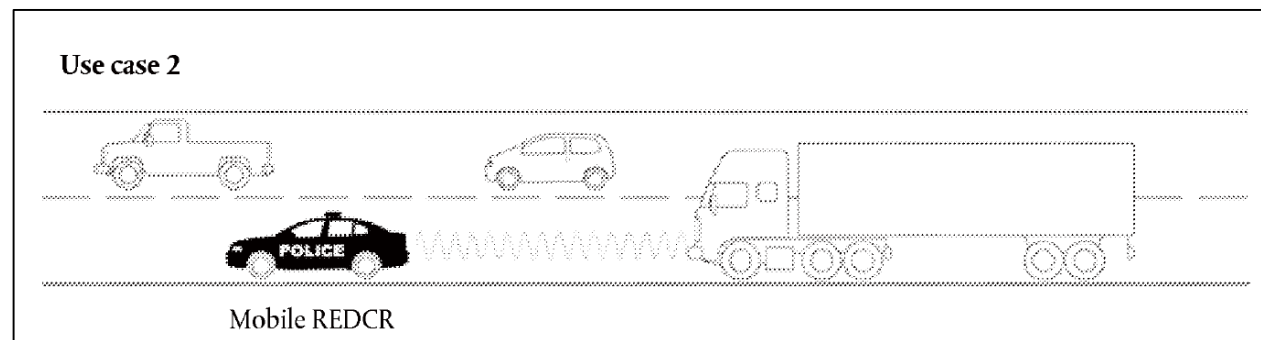
► Use Case 1:

- Portable REDCR
("Remote Early Detection Communication Reader")
- Similar to speed control



► Use Case 2:

- Mobile REDCR
- Similar to mobile tolling enforcement

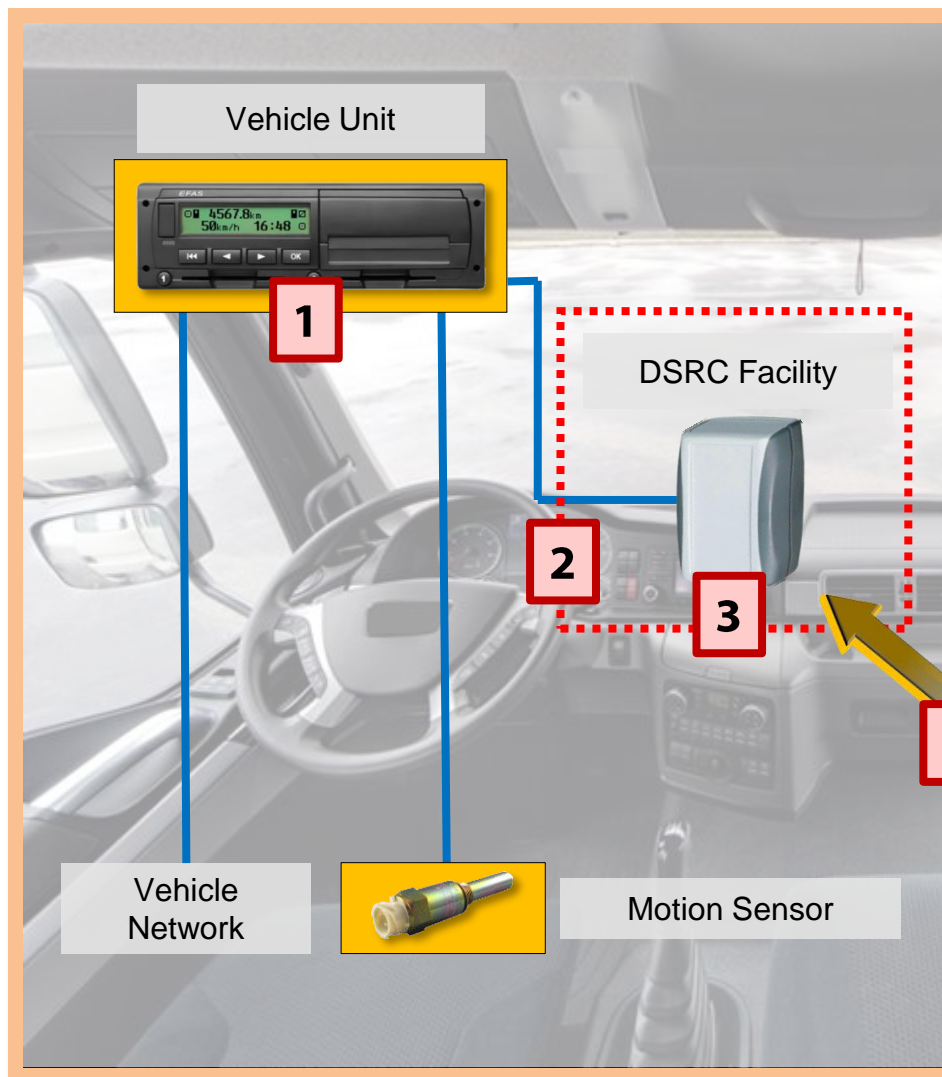


- Fixed installations on gantries (as used in tolling) are not envisaged in Annex 1C, but could work from a technical perspective.

Terminology

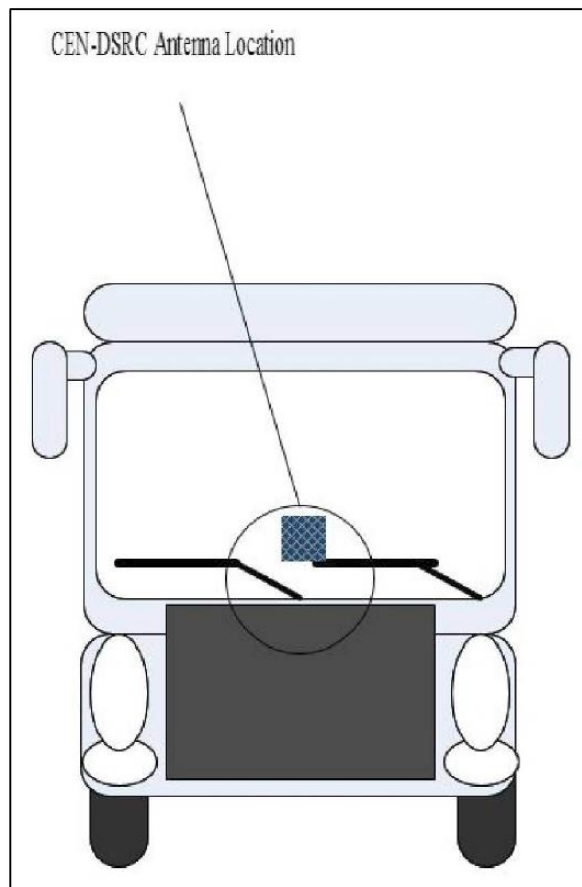
- ▶ The following names are used in Annex 1C and have the same meaning
- ▶ Name of function
 - Remote Early Detection
 - Remote Detection
 - Remote Communication
 - Remote Tachograph Monitoring
- ▶ Name of Facility
 - DSRC Facility
 - Remote Detection Facility
 - Remote Communication Facility

DSRC Integration in Vehicle

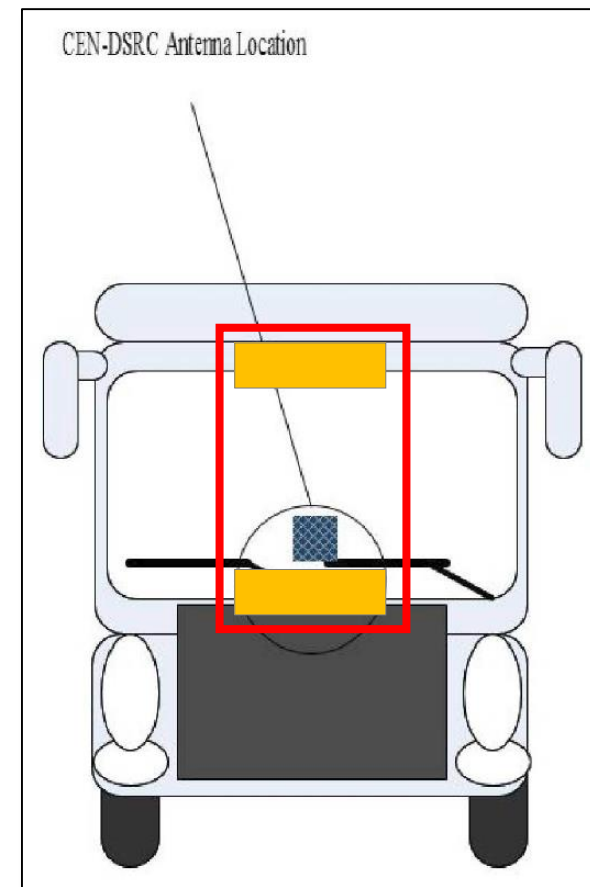


1. The Vehicle Unit prepares a **data package** and encrypts it so that only Control Cards can decrypt it.
2. The data package is **transmitted to** the DSRC Facility every 60 seconds.
3. The **DSRC Facility** stores the received data package. Older data is omitted.
4. Enforcement **requests data from road side** with REDCR
5. REDCR receives data from DSRC Facility for **decryption and further interpretation** by enforcement.

Location of DSRC Facility



Annex 1C



Amendment of Annex 1C
orange: possible locations

Functions based on DSRC Technology

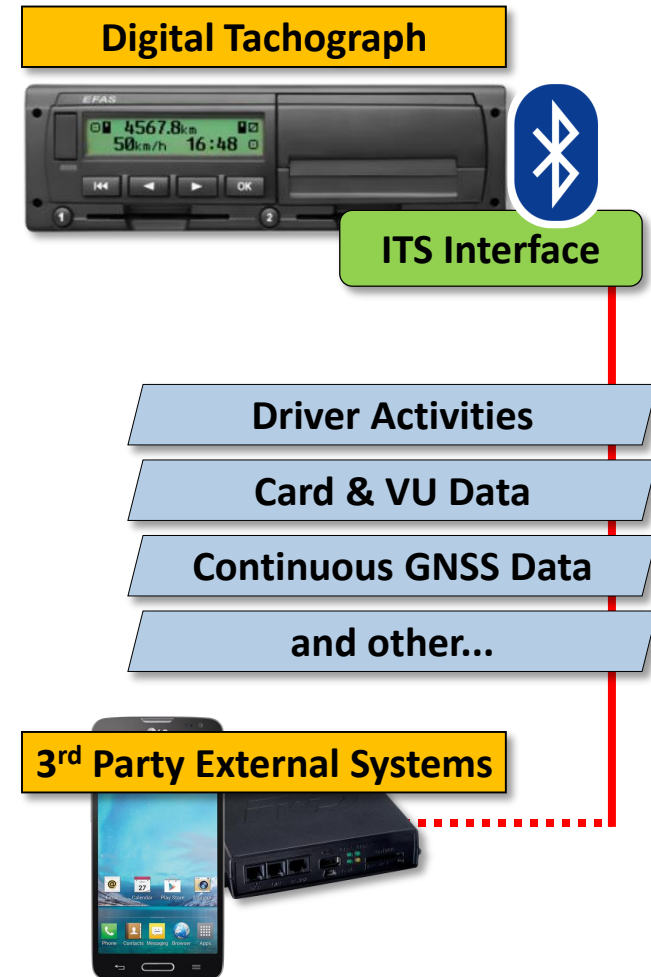
- ▶ Remote Tachograph Monitoring (Annex 1C, Requirement 199)
 - Latest security breach attempt
 - Longest power supply interruption
 - Sensor fault
 - Motion data error
 - Vehicle motion conflict
 - Driving without a card
 - Card insertion while driving
 - Time adjustment data
 - Calibration data incl. dates of the two latest stored calibration records
 - Vehicle registration number
 - Speed recorded by tachograph
 - **NO** Driving & Resting times !
- ▶ Onboard Weighing System (see below) (Directive (EU) 2015/710, inserted "Article 10d")
 - Similar data-transfer mechanism to be used as Remote Tachograph Monitoring
 - Data transfer (including encryption) already defined in Annex 1C, complete technical provisions yet open

ITS Interface



ITS Interface

- ▶ Legal requirement
 - Regulation 165/2015, Article 10
 - Data access for external devices shall be allowed at an optional **standardised interface**
- ▶ Reason
 - Allowing usage of tachograph data for external ITS services respecting data protection rules
- ▶ Technology
 - Bluetooth or others
- ▶ Potential Use-Cases
 - Fleet Management
 - Remote Download of Tachograph Data
 - Integration with ITS services
 - and many others...



Remarks on ITS Interface

- ▶ The ITS Interface is an optional function and is primarily meant as function for drivers and companies (no enforcement function)
- ▶ Technically speaking the ITS Interface is a function that provides several data from the digital tachograph to external systems
- ▶ Technology used (Bluetooth, Vehicle CAN others) is irrelevant
- ▶ Data is differentiated between personal data and non-personal data.
- ▶ Data seen as personal, requires the consent of the driver to leave the vehicle
- ▶ Data required for enforcement purposes does not need a driver consent of course

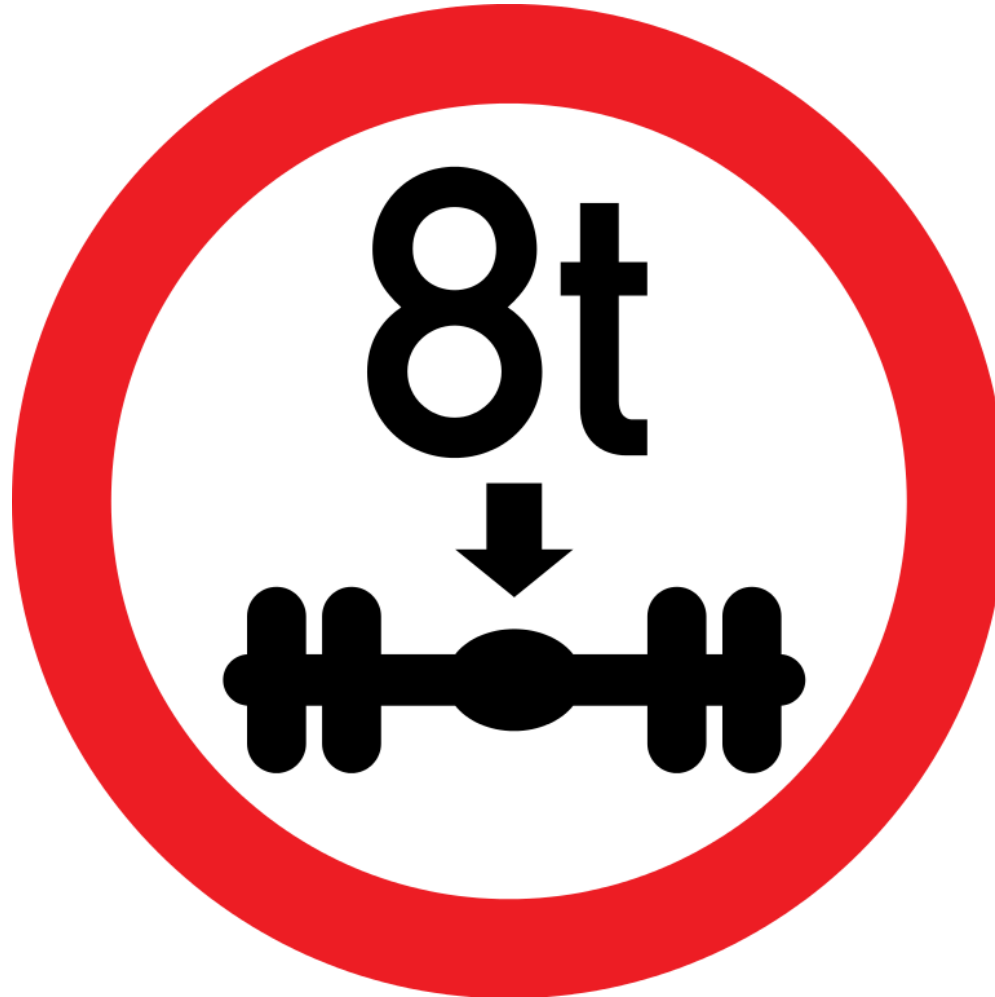
Security Update / Migration



Security Update / Migration (Summary)

- ▶ Security system according Annex 1B is very old and requires an update due to technical progress
- ▶ Annex 1C introduces a more modern security system based on so-called "Elliptic Curves Cryptography" (ECC) and "Advanced Encryption Standard" (AES)
- ▶ Challenge: How to make Generation 1 & Generation 2 interoperable without having the need to exchange equipment?
- ▶ Solution:
 - GEN 2 Tachographs will work with GEN 1 Cards
 - GEN 2 Cards will work with GEN 1 Tachographs
- ▶ Exception:
 - GEN 1 Workshop Cards **will not work** in GEN 2 Tachographs
 - This might be a problem for Non-EU AETR countries if Annex 1C is not adopted there.
 - This might be also a problem for EU transport companies if Annex 1C is not adopted in Non-EU AETR countries (obligation to use a Annex 1B tachograph)

Onboard Weighing (OBW)



Legal Background

- ▶ Automatic Function of the vehicle to determine its own weight
- ▶ Legal Background: Directive (EU) 719/2015 (Adoption of Directive 96/53/EC) and Annex 1C
- ▶ Excerpt of Directive 719/2015 amending 96/53/EC

Article 10d

1. By 27 May 2021, Member States shall take specific measures to identify vehicles or vehicle combinations in circulation that are likely to have exceeded the maximum authorised weight and that should therefore be checked by their competent authorities in order to ensure compliance with the requirements of this Directive. Those measures may be taken with the aid of automatic systems set up on the road infrastructure, or by means of on-board weighing equipment installed in vehicles in accordance with paragraph 4.

4. The on-board weighing equipment referred to in paragraph 1 shall be accurate and reliable, fully interoperable and compatible with all vehicle types.

Onboard Weighing - Purpose

- ▶ Onboard weighing function is again a pre-filter for road-enforcement.
- ▶ Onboard Weighing uses same process as "Remote Detection":
 - Creation of encrypted OBW data package in Tachograph-VU (or another device)
 - Transfer of OBW data package to DSRC Facility
 - Remote communication to REDCR
- ▶ Expert Group by lead by DG MOVE is currently working on detailed provisions (i.e. implementing act) for on-board weighing.
- ▶ However, DSRC Facility from Annex 1C includes already transfer to Onboard Weighing data.
- ▶ Security requirements under discussion.

A long-exposure photograph of a multi-lane highway at night. The image shows bright white and yellow light trails from cars moving in one direction, and red light trails from cars moving in the opposite direction. The highway curves to the right, and there are guardrails and some construction barriers visible. The background shows some structures and trees under a dark sky.

Any Questions?