Safe & Secure Connectivity
The Extended Vehicle Concept and Standards

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SUMMARY

- **Context**
  - Connected vehicle
  - Safety & Security
  - Responsibility
  - Need for standardization

- **The Extended Vehicle**
  - ISO working structure
  - ExVe Principle
  - The ExVe interfaces for fully connectivity

- **ISO ExVe Standards**
  - ISO 20077 series
  - ISO 20078 series
  - ISO 20080
  - ISO 23132

- **Conclusion**
CONNECTED VEHICLES

Traffic information
Electrification
Mobility services
Insurances
Remote Repair & Maintenance
Automated driving
...

Jean François HUERE Convenor: ISO/TC22/SC31/WG6
Today, a vehicle is no longer only the physical car body

More & more vehicle functionalities rely on offboard resources
SAFETY, SECURITY AND RESPONSIBILITY

A car is not a smartphone

130 km/h and above
Average 1500 kg
Living Passengers
Outside road users
Connectivity involves several actors. Identified interfaces are necessary for:

- Defining design perimeter
- Interactions
- Distributed responsibilities

ACTORS & RESPONSIBILITY

Service operator

Road infrastructure manager

Vehicle Manufacturer

Distributed responsibilities
THE EXTENDED VEHICLE
VEHICLE MANUFACTURER’S RESPONSIBILITY

Definition: « [an] entity, still in accordance with the specifications of the vehicle manufacturer, that extends beyond the physical boundaries of the road vehicle and consists of the road vehicle, off-board systems, external interfaces and the data communication between the road vehicle and the off-board systems »

Excerpt from ISO 20077 series: ExVe Methodology

The ExVe entity remains under the full responsibility of the Vehicle Manufacturer
In order to ensure that connectivity does not jeopardize:

- Safety (people and goods road safety)
- Security (data, privacy, cyber)
- Liability issues
- Compliance (vehicles approval)
- Keep approved specifications along the whole life cycle
- Fair and non-discriminatory competition

An ISO standardization work program was launched in 2015
Interface selected depending on use case type, safety and security

Existing standards are used, whenever possible, when compliant with Safety, Security and Responsibility

- OBD (wired) **Red**
- Time-critical **Yellow**
- Multimedia, others, **Grey**
- Web interface **Blue**
ExVe INTERFACES FOR CONNECTED VEHICLES

**ExVe TIME CRITICAL INTERFACE**
Real time near field over the air communication between:
- Car 2 X (cars, infrastructures)
- For traffic safety/efficiency use cases

**ExVe ON BOARD DIAGNOSTIC INTERFACE (OBD)**
Wired communication with test/inspection equipment
- Used by trained technicians
- For inspection, controls and maintenance

**ExVe WEB SERVER INTERFACE**
Standardized server communication used to enable 3rd parties and neutral servers to access vehicle generated data and predefined in vehicle routines in a SECURE manner

**EXVE OTHER INTERFACES**
ExVe interface for emergency call systems (e.g., UN144)
Far field over the air communication used to send eCall data from an accident involved vehicle to roadside rescue services
ExVe interface for EV charging
Electric vehicles communication to the charging stations
ExVe interface for infotainment
Near field over the air communication between user mobile device and the infotainment vehicle system, i.e. terminal mode to vehicle HMIs, hands free access.
OBD ExVe INTERFACE FOR IN-WORKSHOP REPAIR, CONTROL AND MAINTENANCE BY A TRAINED TECHNICIAN

Workshop, stationary vehicle

Trained technician beside the vehicle to control that the effect of each action is Safe and Secure
ExVe TIME-CRITICAL INTERFACES FOR SAFETY-CRITICAL SITUATIONS

ISO 23132: prioritization of road safety use cases

For safety-critical situations: data volume restricted to safety constraints, stringent authentication processes.
ExVe WEB SERVICES INTERFACE

ISO 20078 series: remote access to vehicle data

Communication via an OEM back-end server enables the OEM to endorse its full responsibility

Data access compliant with Vehicle technological limits and specifications

Need for cars data
ISO 15118: secure digital communication between EV and the charger
Safe: no data modification; Secure: authentication authorization
ISO & ExVe : TC22/SC31

- ISO International Organization for Standardization
- Technical Committee 22 : Road Vehicles
- Sub Committee 31 : Data Communication

- Working Group 6 : Extended vehicle/Remote diagnostics
  - ISO 20077-x : 2017 / 2018
  - ISO 20078-x : 2019
  - ISO 20080 : 2019

- Working Group 10 : ExVe Time-critical applications
  - ISO 23132 : 2020
A set of automotive ISO standards has been developed

- To promote market fluidity for vehicle data access.
- To increase customers confidence that their connected cars remain safe, reliable and of high quality.
- To allow all stakeholders to create services from connected vehicle information.
- To ensure for each usage safety, security and OEM responsibility.
Thank You
EXTENDED VEHICLE (EXVE) METHODOLOGY

- **20077 - 1 : General information**
  - The areas where the extended vehicles are expected to be used
  - The extended vehicle is not a particular technical solution to solve a particular need …
  - It is a technology where the conventional road vehicle has been extended to include off-board systems.
  - It shall be used in all the areas where vehicle connectivity is applied.
  - Remote access shall not jeopardize the basic safety and security of the vehicle during all its life-phases

- **20077 - 2 : Methodology for designing the extended vehicle**
  - Formalized rules and basic principles (BP)
  - Template for requesting cars data based on need description
  - Template to answer : what is feasible
20078 SERIES describe the ExVe Blue Interface

- ISO 20078 - 1  ExVe content
- ISO 20078 - 2  ExVe access
- ISO 20078 - 3  Safety
- ISO TR 20078 - 4  ExVe Control

ExVe Web interface often considered as THE ExVe

It is one ExVe Interface dedicated to providing OTA data for development of connected services.
ISO 23132
TIME-CRITICAL COMMUNICATION

(RExVeS):

General requirements, definitions and classification methodology of time-constrained situations related to Road and ExVe Safety

Defines the classification methodology of time-constrained situations and their requirements, that are to be addressed by the “ExVe time critical interfaces" described in ISO 20077-1

The methodology provides a classification, which determines application priorities for optimal vehicle resources allocation.