DoIP - Diagnostic Communication over Internet Protocol

**Automotive Data and Connectivity**

- Safety
- Accessibility
- Efficiency
- Environment

**Why DoIP**

- Increasing interconnection of vehicles and their environment
- Driving assistance and infotainment systems require huge data volumes
- Increasing time for flash programming at production line and after-sales service
- DoIP as a performing and flexible vehicle access

**DoIP in Combination with other Standards**

- OTX (Open Test sequence exchange)
- ISO 15031-2
- ASAM MCD-3: D-PUA required
- MCD-3 API
- ISO 22900-3
- D-PDU API
- ISO 14229-5 for DoIP
- ISO 13209
- Diagnostic communication based on UDS (Unified Diagnostic Services) to ECUs behind the Gateway (TCP)
- DoIP enables seamless integration into various network structures, even with WLAN

**DoIP Communication Principles**

- Diagnostic tester communicates with vehicle via Gateway ECU
  - IS0 15031-2: Ethernet Activation Port Link
  - Gateway is routing the message to sub-buses CAN / FlexRay / MOST
- Link connection
  - Configuration of the Gateway with valid IP address (DHCP)
  - Gateway responds with Vehicle Announcement Message (UDP)
- Diagnostic commands
  - Reading Activation Request: Command for routing of subsequent diagnostic messages to ECUs behind the Gateway (TCP)
  - Diagnostic communication based on UDS (Unified Diagnostic Services)

**DoIP Communication Sequence**

- Test: Diagnostic Request
- DoIP Gateway: Diagnose Request
- ECU: Diagnose Response

**DoIP at the OSI Reference Model**

- Physical (1)
- Data Link (2)
- Network (3)
- Transport (4)
- Session (5)
- Presentation (6)
- Application (7)

**DoIP Vehicle Access**

- Ethernet pin assignment at OBD connector

**DoIP Message**

- DoIP Payload Data (up to 4 GBytes)

**Message Structure**

- DoIP Message Ethernet Payload Data (up to 4 GBytes)
- DoIP Message Ethernet Payload Data (up to 1500 Bytes)
- DoIP Message / Segment of DoIP Message

**Adantages of DoIP**

- Performance handling of huge data volumes
- Time-saving at ECU Flash Programming
- Cost-efficient because no VCI is necessary
- Simple integration to IT Infrastructure
- Future-proof technology enables various use cases
- Future-proof technology enables various use cases

**The DoIP Standard: ISO 13400**

Part 1 – General information and use case definition

Part 2 – Transport protocol and network layer services
- Assignment of IP address
- Vehicle search
- Link connection
- Status information
- Data routing to sub-buses
- Message types
- Error handling

Part 3 – Wired vehicle interface based on IEEE 802.3

Part 4 – Ethernet based high-speed data link connector

Part 5 – Conformance test specification

**DoIP at D-PDU API Standard**

- Tester Application
- OTX Runtimes
- ISO 22900-3
- ISO 14229-5
- DoIP as specified in amendment
- UDS (Unified Diagnostic Services)
- ISO 10426-9 for DoIP
- WII-OBD
- ISO 13714 for DoIP and CAN

**DoIP Standard Overview**

- Increasing time for flash programming at production line and after-sales service
- Increasing interconnection of vehicles and their environment
- Diagnostic communication based on UDS (Unified Diagnostic Services) to ECUs behind the Gateway (TCP)
- Future-proof technology enables various use cases

**Safety**

- Access to information (security)
- Data protection (encryption)
- Device authentication (key management)
- Application security (control)

**Accessibility**

- Easy access to information
- Simple interaction with vehicles
- Seamless integration into IT infrastructure

**Environment**

- Energy efficiency
- Reduced emissions
- Sustainable vehicle operation

**Efficiency**

- Performance handling of huge data volumes
- Time-saving at ECU Flash Programming
- Cost-efficient because no VCI is necessary
- Simple integration to IT Infrastructure
- Future-proof technology enables various use cases

**Conclusion**

- Future-proof technology enables various use cases
- Future-proof technology enables various use cases

Order additional copies: info.automotive@softing.com / www.automotive.softing.com