V2G Test PKIs for Plug & Charge

TESTIVAL

Technical Support Partner
KEYSIGHT

Offline/Online V2G PKI, Backend Integration and Multi V2G PKI Testing

Overview

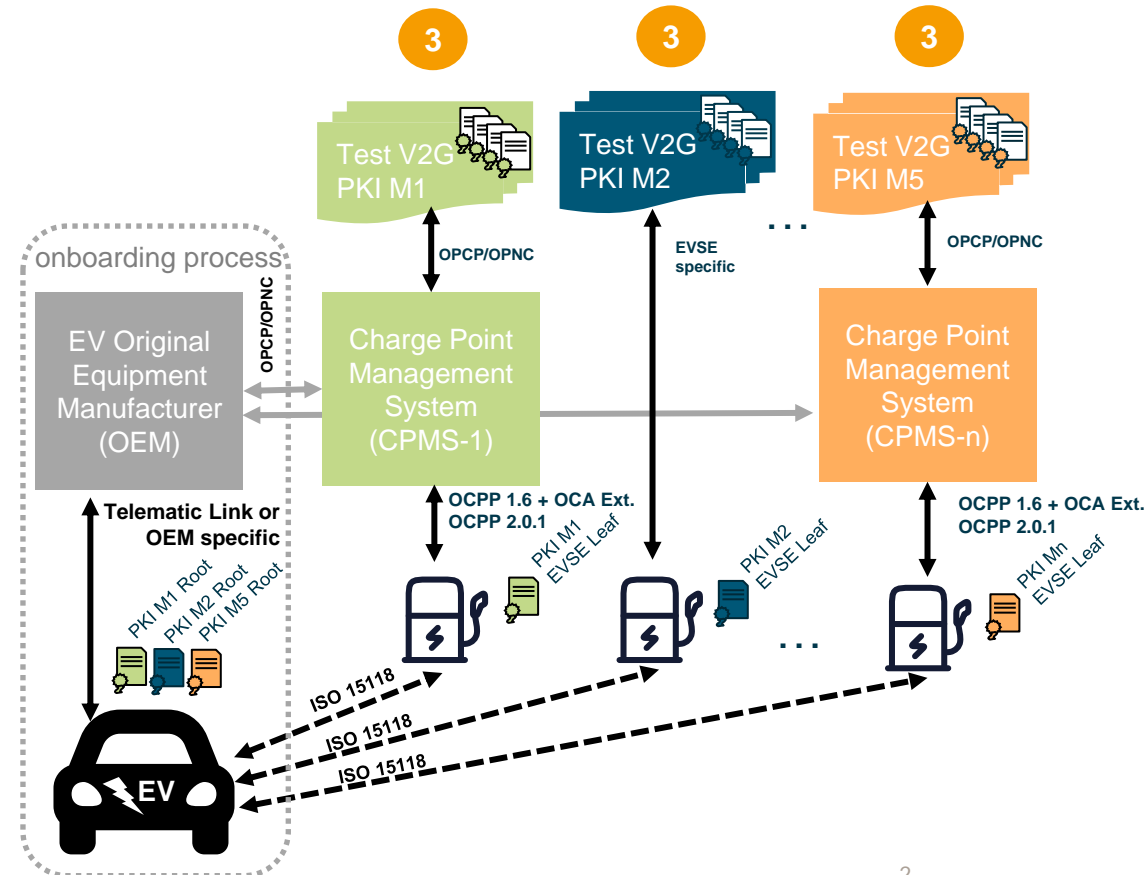**TESTIVAL**
Technical Support Partner
KEYSIGHT

1 **Default**: Testival CPMS will be provided (End2End, PnC)
This shall be used for the round-robin testing by EVSE and EVs
(Requires EV and EVSE onboarding process before the event!)

2 Fallback Option: Offline V2G PKI will be provided via Download
(File based) This can be used if no OCPP or trusted Telematic is available
(PnC only) (Will be checked in onboarding process)

3 **Add-On:** Multiple V2G PKIs can be tested at one
dedicated test location, where separate EVSEs or Test
Systems with different V2G PKIs are prepared.
(Requires EV onboarding process before the event!)
(Multi V2G provider need to provide prepared EVSE or Test System)

Round-Robin Testing

Multi V2G PKI Testing

Testival PnC Ecosystem is provided by **HUBJECT**

CharIN Testival Online V2G Test PKI and Backend Integration

Precondition and Onboarding Process for EVs and EVSEs

For the upcoming CharIN Testival a CPMS Backend, an eMSP service and a Plug & Charge ecosystem will be provided. The CPMS Backend and the eMSP Service are connected by the Plug & Charge Ecosystem. The participating EVSEs can connect to the CPMS Backend via OCPP. The CPMS backend provides an OCPP Server that is OCPP 1.6 + OCA Ext. and OCPP 2.0.1 compliant.

- End-to-End PnC tests can be conducted as part of the Round-Robbin test procedure
- End-to-End PnC Testcases will be supported by PKI experts on site

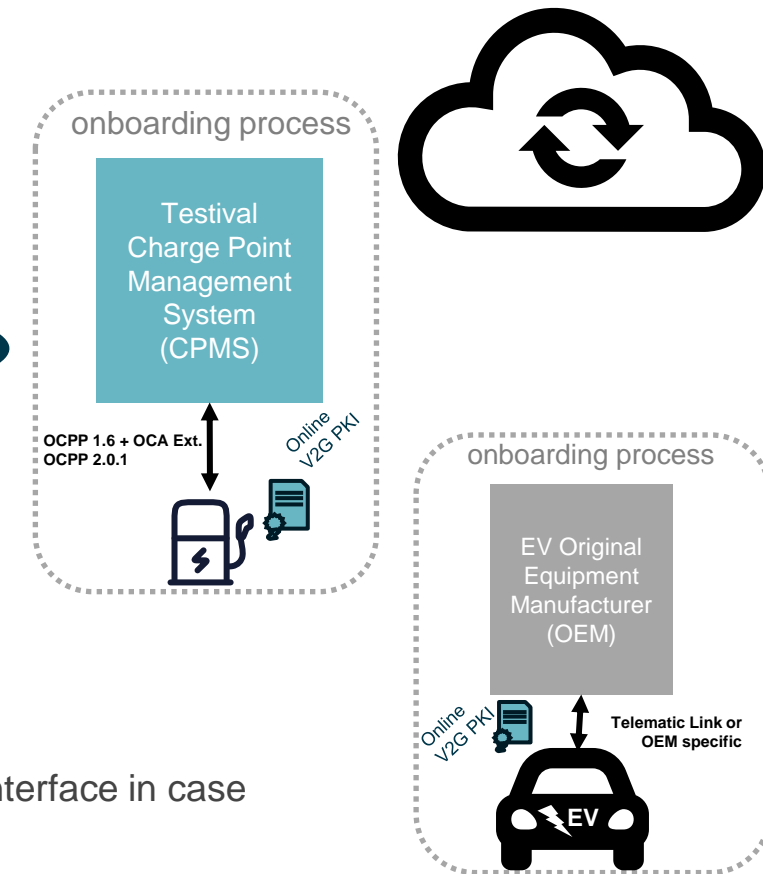Please provide the following information in this technical survey to enable the EV/EVSE onboarding process

Testing OCPP Compliance is not part of the event

EVSE:

- EVSE is compliant to OCPP 1.6 + OCA Ext. and/or OCPP 2.0.1
- EVSEs will be connected beforehand to CPMS Backends (onboarding process EVSE)
- CPMS Backend provides EVSE with EVSE Leaf cert, MO Roots and V2G Roots

EV:

- EV needs to have Online V2G PKI Root CA installed (onboarding process EV).
- EV may need to install Online V2G Contract Certificate through telematic link or OEM-specific interface in case Certificate Installation via ISO 15118-2/-20 is not supported.

onboarding process

Testival Charge Point Management System (CPMS)

OCPP 1.6 + OCA Ext. OCPP 2.0.1

Online V2G PKI

onboarding process

EV Original Equipment Manufacturer (OEM)

Online V2G PKI

Telematic Link or OEM specific

CharIN Testival End-to-End PnC Tests using Online V2G PKI

Overview

|			
TLS connection [Happy Path]	TLS	- EVSE Leaf valid - V2G Root in Vehicle	-TLS handshake successful
Contract Installation [Happy Path]	InstallationReq/Res	- Prov Cert in PCP - Contract Created and Valid in CCP	-ContractInstallation successful
PnC Authorization [Happy Path]	Authorization	- CPMS and MO have a Connection on HBS - EMAID is whitelisted	- Authorization successfull
Installation & Authorization [Happy Path]	TLS & InstallationReq/Res & Authorization	- EVSE Leaf valid - V2G Root in Vehicle - Prov Cert in PCP - Contract Created and Valid in CCP - CPMS and MO have a Connection on HBS - EMAID is whitelisted	-ContractInstallation successful - Authorization successfull
Expired EVSE Leaf Cert	TLS	- EVSE Leaf expired - V2G Root in Vehicle	TLS Fail
EVSE Cert Chain and Root	TLS	- EVSE presents Certificate Chain with Root CA - V2G Root in Vehicle	TLS Fail
V2G Root not in the Vehicle	TLS	- EVSE Leaf valid - V2G Root not in Vehicle	TLS Fail
Contract Certificate expired in CCP	InstallationReq/Res	- EVSE Leaf valid - V2G Root in Vehicle - Prov Cert in PCP - Contract Certificate in CCP expired - CPMS and MO have a Connection on HBS - EMAID is whitelisted	Failed Installation
Contract Data Invalid (encrypted Private Key)	InstallationReq/Res	- EVSE Leaf valid - V2G Root in Vehicle - Prov Cert in PCP - Contract Certificate in CCP invalid encrypted private key - CPMS and MO have a Connection on HBS - EMAID is whitelisted	Failed Installation
Contract Certificate Expired (in Vehicle)	Authorization	- EVSE Leaf valid - V2G Root in Vehicle - Prov Cert in PCP - Contract Certificate in CCP expired - CPMS and MO have a Connection on HBS - EMAID is whitelisted	Failed Authorization
Contract Certificate revoked	Authorization	- EVSE Leaf valid - V2G Root in Vehicle - EVSE checks OCSP or CPMS checks OCSP	Failed Authorization
List other possible 'error' paths	Authorization	Root / Chain / Validity / OCSP / Pvtkey-challenge	Failed Authorization

CharIN Testival Multi V2G PKI Testing

Precondition for M-PKI Provider and Onboarding Process for EVs

For the upcoming Testival multiple V2G PKIs can be tested at one dedicated test location, where separate EVSEs or Test Systems with different V2G PKIs are prepared.

Precondition:

- EVSE or Test System will be provided and prepared by the M-PKI Provider

- If required EVSEs or Test Systems will be connected beforehand to
  CPMS Backends by the M-PKI Provider

  - CPMS Backend provides EVSE with EVSE Leaf cert, MO Roots and V2G Roots

- EV needs to have **ALL** V2G M-PKI Root CAs installed (onboarding process EV)

  - EV participants need to provide the information in the technical survey
    to enable the EV onboarding process

  - Each M-PKI Provider is requested to support the EV onboarding process

- Multi PKI testing needs to be supported by M-PKI provider experts on site
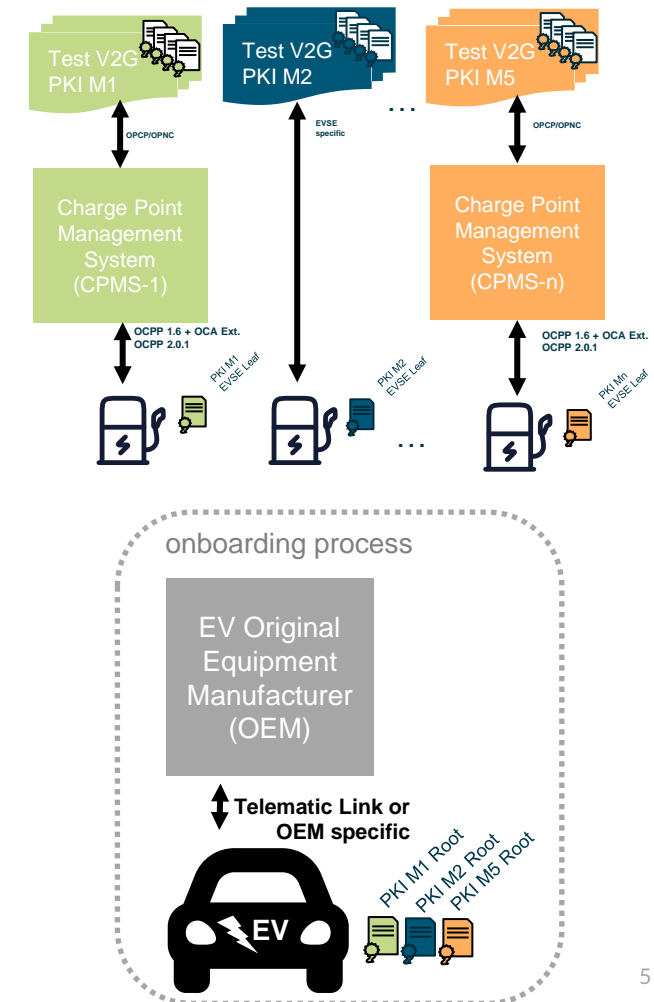
CharIN Testival Offline V2G Test PKI for Plug & Charge Support

V2G Test PKI – Certificate Distribution Process

- V2G test certificates are provided by Hubject and made available ~1 week before the event to all PNC participants during the onboarding process if the online version cannot be used.

- The Offline V2G Test PKI will be compatible with the online PKI

- Each participant is responsible for the provisioning of the V2G Test PKI to their respective ECUs

- The offline PKI is just a fallback option and will be limited in the scope of testing.
  (e.g. Certificate Installation or End-to-End Testing is not available)

Thank you for your kind attention!

Any questions?

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