Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Power Charge Port Door

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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Version Date: Nov 24, 2022

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
11/24/2022	V1.0	Qiyang Li	Initial releasing
11/30/2022	V1.1	Qiyang Li	Add enable/disable PCPD configuration. Delete Speed limit configuration. Replace speed limit condition by gear position.
12/07/2022	V1.2	Qiyang Li	Add IVI toast when soft button precondition is not met. Modify Power Charge Port Door Client Signal Missing Handling. Add IVI should report DCT when lose communication from BCCM.

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1 Architectural Design

1.1 Overview

The feature is developed in line with the user experience initiative of “effortless charging - easy on & off”, allowing a simplified charging workflow where the charge port door is opened/closed automatically when the user needs to charge or is done with charging, skipping the effort needed to manually open/close, lock/unlock the charge port door.

1.2 PCPD-CLD-REQ-xxxx/A-Power Charge Port Door Client

PCPD Client is responsible for sending open/close request to server.

1.3 PCPD-CLD-REQ-xxxx/A- Power Charge Port Door Server

PCPD Server is responsible for transfer request signals and open/close door.

1.4 Physical Mapping of Classes

The table below shows how the logical classes that make up the PCPD feature may be mapped into physical modules. This mapping example is specific to PCPD architecture and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
Power Charge Port Door Client	APIM
Power Charge Port Door Server	BCCM/PCPD

1.5 Logical Signal Mapping

Each logical name used in this document is mapped to its corresponding CAN signal or LIN signal. Please refer to the following mapping:

CAN/ LIN signal name	Description	Network Coding Type	Signal type	Physical Transmitter	Physical Receiver
DrPwChrgPort_No_Falt	CAN signal to report powered charge port door fault status.	UnitlessValue12bit_ET Resoultion = 1 Unit = unitless Offset = 0 Minimum value = 0 maximum value = 4095 0 to 4095	CAN Event-period	SOBDM_BCCM	APIM_CIM
DrPwChrgPort_D_RqMnu	CAN signal designed to transmit powered charge port door open/close request from the HMI.	OpenCloseNoRequest_ET 0x0 = NoRequest 0x1 = Close 0x2 = Open 0x3 = NotUsed_1	CAN Event-period	APIM_CIM	SOBDM_BCCM
DrPwChrgPortPos_Pc_Act	CAN signal designed to provide the real-time position of the powered charge port door.	005829/A;1-Pc7bit_ET Resoultion = 1 Unit = percent Offset = 0 Minimum value = 0 maximum value = 1270 to 100%	CAN Event-period	SOBDM_BCCM	APIM_CIM
DrPwChrgPort_D_Stat	CAN signal broad casted for the powered charge port door status display on the IVI.	DrPwChrgPort_D_Stat_InclFaltET 0x0 = Initializing 0x1 = Closed 0x2 = Closing 0x3 = Opened 0x4 = Opening 0x5 = Stalled 0x6 = Faulty	CAN Event-period	SOBDM_BCCM	APIM_CIM
PlgActv_D_ActlChrgr		0x0 = Off_Plug__Disconnected_ 0x1 = On_Plug__Connected_ 0x2 = NoDataExists 0x3 = Faulty	CAN Event-period		APIM_CIM
TrnRng_D_Rq		0x0 = Park 0x1 = Reverse 0x2 = Neutral 0x3 = Drive 0x4 = Sport_DriveSport_Mposition 0x5 = Low 0x6 = Range2_M2_L1 0x7 = Range3_M3_L2 0x8 = Range3_M3_L3 0x9 = Range4 0xA = Range5 0xB = Range6 0xC = NotUsed_1 0xD = NotUsed_2 0xE = Unknown_Position 0xF = Fault	CAN Event-period	GWM	APIM_CIM

1.6 PCPD-IIR-REQ-xxxx/A-Power Charge Port Door Client _Tx

1.6.1 MD-REQ-xxxx/A- DrPwChrgPort_D_RqMnu

Message Type: Request

CAN signal designed to transmit powered charge port door open/close request from the HMI.

Name	Literals	Value	Description
DrPwChrgPort_D_RqMnu	-	-	
	NoRequest	0x0	
	Close	0x1	
	Open	0x2	
	NotUsed_1	0x3	

1.7 PCPD-IIR-REQ-xxxx/A-Power Charge Port Door Client _Rx

1.7.1 MD-REQ-xxxx/A- DrPwChrgPort_D_Stat

Message Type: Status

CAN signal broad casted for the powered charge port door status display on the IVI.

Name	Literals	Value	Description
DrPwChrgPort_D_Stat	-	-	
	Initializing	0x0	
	Closed	0x1	
	Closing	0x2	
	Opened	0x3	
	Opening	0x4	
	Stalled	0x5	
	Faulty	0x6	

1.7.2 MD-REQ-xxxx/A- DrPwChrgPortPos_Pc_Act

Message Type: Status

CAN signal designed to provide the real-time position of the powered charge port door.

Name	Literals	Value	Description
DrPwChrgPortPos_Pc_Act	Resolution = 1 Unit = percent Offset = 0	0-127 (0-100%)	

1.7.3 MD-REQ-xxxx/A- DrPwChrgPort_No_Falt

Message Type: Status

CAN signal to report powered charge port door fault status.

Name	Literals	Value	Description
DrPwChrgPort_No_Falt	-	-	
	UnitlessValue12bit_ET Resoultion = 1 Unit = unitless Offset = 0	Minimum value = 0 maximum value = 4095 0 to 4095	

1.7.4 MD-REQ-xxxx/A- Delay_Accy

Message Type: Status

Name	Literals	Value	Description
Delay_Accy	-	-	
	Off	0	
	On	1	

1.7.5 MD-REQ-xxxx/A- PlgActv_D_ActlChrgr

Message Type: Status

CAN signal published by the HPCM indicating that the charge port door ajar warning is OK to be displayed to the customer.

Name	Literals	Value	Description
PlgActv_D_ActlChrgr	-	-	
	Off_Plug__Disconnected_	0x0	
	On_Plug__Connected_	0x1	
	NoDataExists	0x2	
	Faulty	0x3	

1.7.6 MD-REQ-xxxx/A- TrnRng_D_Rq

Name	Literals	Value	Description
TrnRng_D_Rq	-	-	
	Park	0x0	
	Reverse	0x1	
	Neutral	0x2	

	Drive	0x3	
	Sport_DriveSport_Mposition	0x4	
	Low	0x5	
	Range1_M1_L1	0x6	
	Range2_M2_L2	0x7	
	Range3_M3_L3	0x8	
	Range4	0x9	
	Range5	0xA	
	Range6	0xB	
	NotUsed_1	0xC	
	NotUsed_2	0xD	
	Unknown_Position	0xE	
	Fault	0xF	

2 General Requirements

2.1 PCPD-GR-REQ-xxxx/A-Power Charge Port Door Client Power Mode

PCPD setting menu and soft button on 3D car mode shall be available on the HMI only when Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.

2.2 PCPD-GR-REQ-xxxx/A-Power Charge Port Door Client Configuration

Power Charge Port Door is a configurable function on infotainment system as below, if it is configurated to disable, all the HMI interface and function will be not visible for the user.

Config Block	Byte	Start Bit	Length	Definition	Default	Operation
DE01	6	6	1	Power Charge Port Door	0	0x0: Disable 0x1: Enable

2.3 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Client Storage

IVI will not memorize vehicle setting and soft button (3D car mode) status, it will update setting status immediately after receiving the door status signal from PCPD server.

2.4 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Vehicle Setting/Soft Button Enable PeCondition

Power Charge Port Door Vehicle Setting/Soft Button will be disabled (grey out) from current status directly (opening/closing, opened/closed, Stalled) if any below precondition is not met:

1. Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.
2. Gear position is on P.
3. PlgActv_D_ActlChrgr= Off_Plug__Disconnected.

IVI will toast setting disable condition based on below priority (pls refer UE):

High: Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.
Middle: Gear position is on P.
Low: PlgActv_D_ActlChrgr= Off_Plug__Disconnected.

2.5 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Client Signal Missing Handling

1. vehicle setting and soft button (3D car mode) should grey out if the receiving signal has missed for 5 frames.
2. All the toast and warning will disappear if the receiving signal has missed for 5 frames.
3. IVI should report DCT when lose communication from BCCM.

3 Functional Definition

3.1 PCPD-FUN-REQ-XXXX/A-Open/Close Power Charge Port Door

3.1.1 Use Cases

3.1.1.1 PCPD-UC-REQ-XXXX/A-User open/close PCPD by vehicle setting menu/soft button on 3D car mode

Actors	User
Pre-conditions	Infotainment System is on. All the Vehicle setting (include soft button on 3D car mode) enabled preconditions are met.
Scenario Description	Users open/close PCPD via setting menu/soft button (press time need to reach 1s).
Post-conditions	PCPD will be opened/close
Interfaces	CAN, HMI, LIN

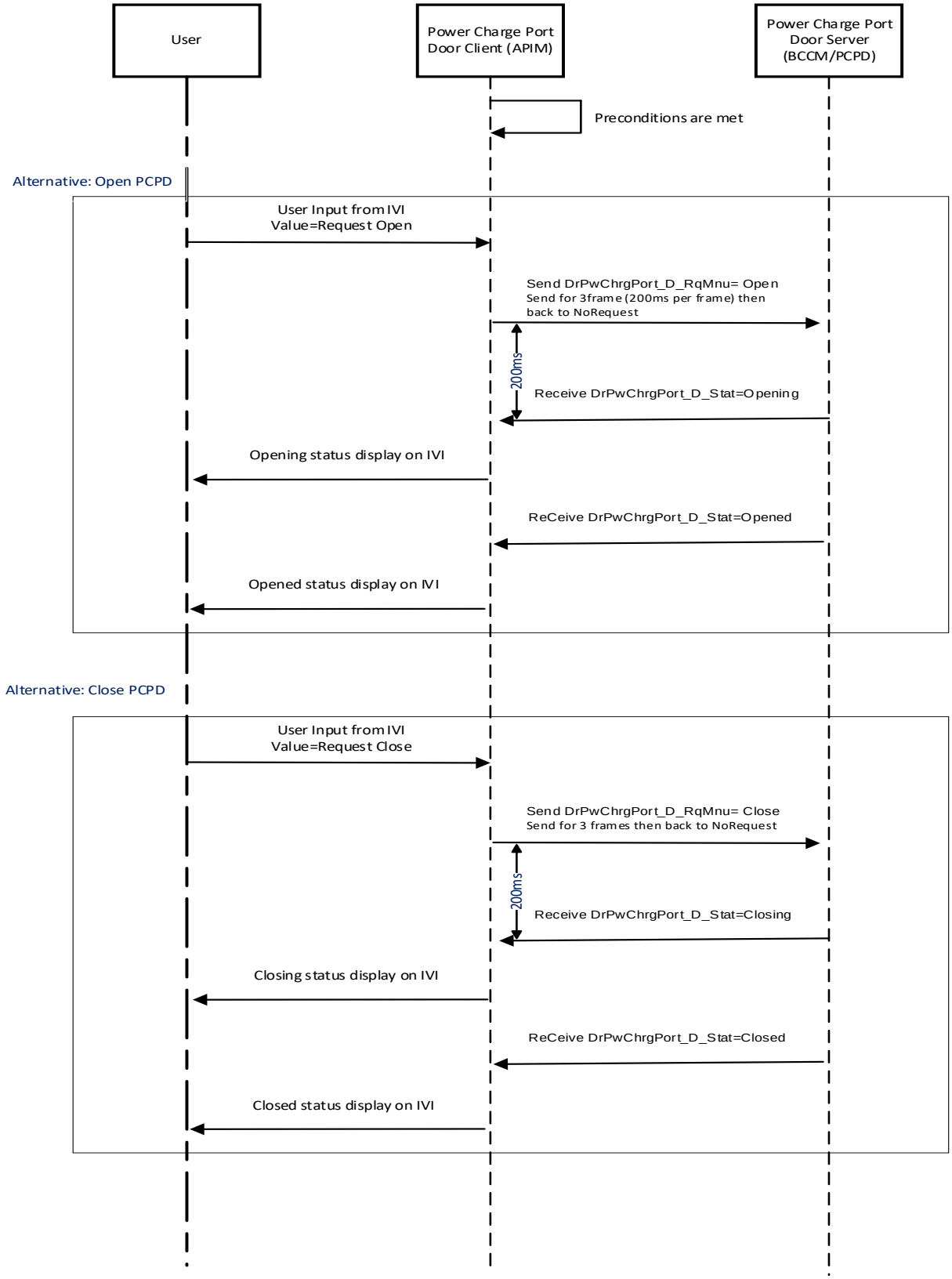
3.1.2 Requirements

3.1.2.1 PCPD-SR-REQ-XXXX/A- T_PCPD Server Rsp

Name	Description	Units	Range	Resolution	Default
T_PCPD Server_Rsp	Maximum time the PCPD Server shall take to respond to the PCPD Setting Client. Maximum time defined as the default value	msec	0-1000	10	200

3.1.3 Sequence Diagrams

3.1.3.1 PCPD-SD-REQ-XXXX/A- Open/Close Power Charge Port Door



Open/Close Power Charge Port Door

3.2 PCPD-FUN-REQ-XXXX/A-Power Charge Port Door Stalled

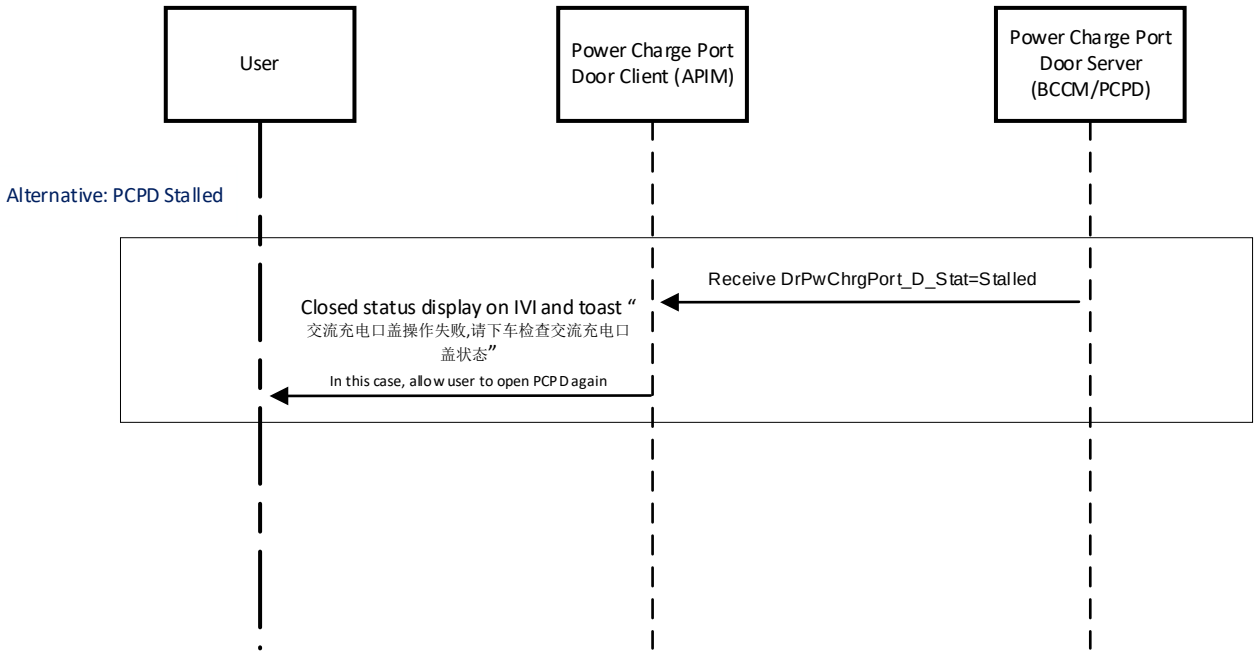
3.2.1 Use Cases

3.2.1.1 PCPD-UC-REQ-376836/A- Power Charge Port Door Stalled

Actors	User
Pre-conditions	Infotainment System is on. All the Vehicle setting (include soft button on 3D car mode) enabled preconditions are met.
Scenario Description	Users open/close PCPD via setting menu/soft button (press time need to reach 1s).
Post-conditions	PCPD is stalled in the progress of opening and closing
Interfaces	CAN, HMI, LIN

3.2.2 Sequence Diagrams

3.2.2.1.1 PCPD-SD-REQ-XXXX/A- Power Charge Port Door Stalled



Power Charge Port Door Stalled

3.3 PCPD-FUN-REQ-XXXX/A-Power Charge Port Door Failure mode

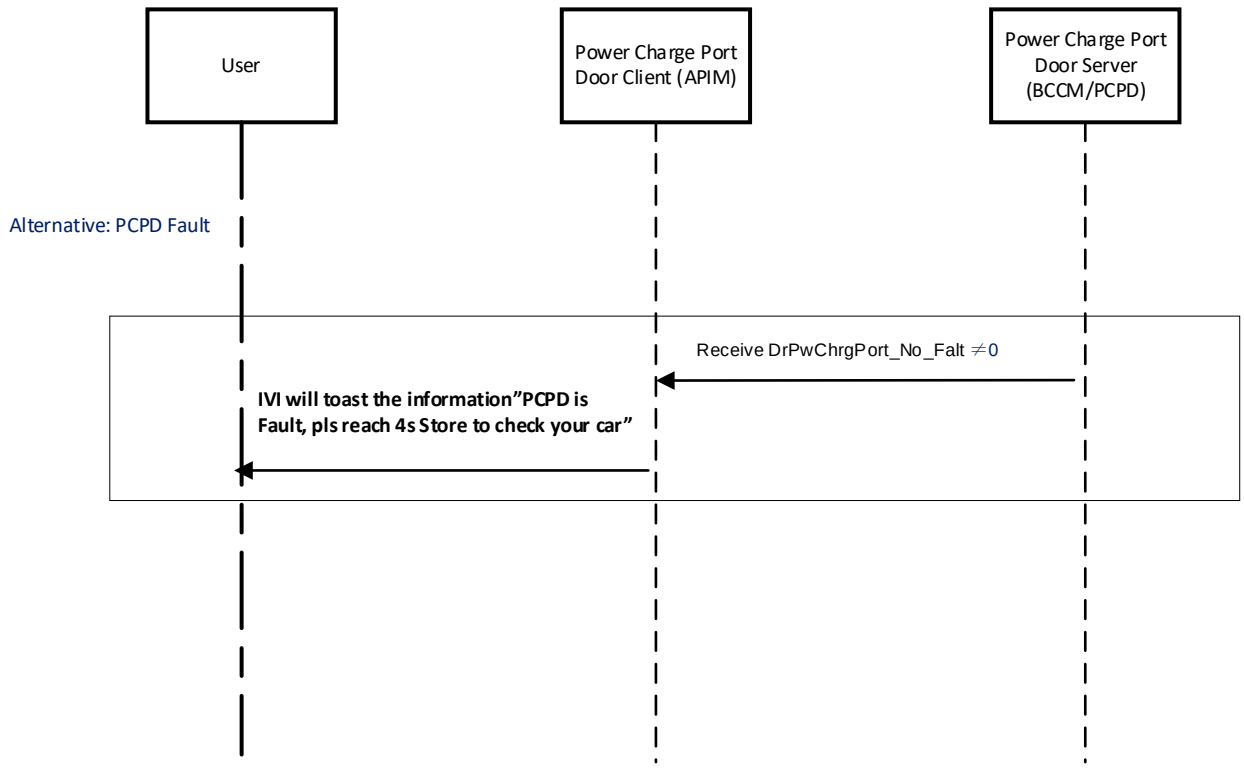
3.3.1 Use Cases

3.3.1.1 PCPD-UC-REQ-XXXX/A- Power Charge Port Door Fault

Actors	User
Pre-conditions	Infotainment System is on.
Scenario Description	PCPD Server is on Failure mode.
Post-conditions	APIM will be toast to infor driver.
Interfaces	CAN, HMI, LIN

3.3.2 Sequence Diagrams

3.3.2.1.1 PCPD-SD-REQ-XXXX/A- Power Charge Port Door Fault



Power Charge Port Door Failure Mode

4 Appendix: Reference Documents

Reference #	Document Title
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