Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Smart Charging

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.4

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Version Date: December 12, 2019

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
November 9, 2018	**0.1**	**Draft**	
December 13, 2018	**1.0**	**Initial Release**	
February 12, 2019	**1.1**		
	SCG-CLD-REQ-333261/B-SC Client		rpaquet2 - Added functional requirements
	619845/A-Functional Requirements		rpaquet2 - New
	SCG-REQ-343119/A-Invalid Values Associated with Unfilled Smart Charging Locations		rpaquet2 - New
	SCG-REQ-343050/A-Out of Range Values for Invalid Smart Charging Locations		rpaquet2 - New
	SCG-REQ-343727/A-Out of Range Values for Unchanged Minimum SOC		rpaquet2 - New
	SCG-STR-598559/B-Logical Signal Mapping		rpaquet2 - Updated CAn Signal names
	SCG-IIR-REQ-333303/B-SC Client_Tx		rpaquet 2- Added 339246, 343026, 304071, 304072, 342970 removed 333213, 333222
	MD-REQ-333219/B-SCSettings_Rq		rpaquet2 - Update signal name
	MD-REQ-339246/A-setSCLocationNameInfo		rpaquet2- Updated
	MD-REQ-304071/A-getEcgDidData		MBORREL4: New req.
	MD-REQ-304072/A-getEcgDidUpdateData		MBORREL4: New req.
	MD-REQ-342970/A-ClearAllUserSettings_Rq		rpaquet2 - New
	MD-REQ-343026/A-ChargeStationID_Rq		rpaquet2 - new
	SCG-IIR-REQ-333304/B-SC Client_Rx		rpaquet 2- Added 304071, 326679, 343299 removed 333212, 333228
	MD-REQ-337016/B-ChargeStationSchedule_St		rpaquet2 - Update the Time interval size and restructured the vector
	MD-REQ-333227/B-SCMinimumSOC_St		rpaquet2 - Corrected spelling
	MD-REQ-333225/B-SCSettingsUpdate_St		rpaquet2 - changed signal names
	MD-REQ-343299/A-CurntTargetSOC_St		rpaquet2 - New
	SCG-IIR-REQ-333305/B-SC Onboard HMI Client_Tx		rpaquet2 - 333221 was in here two times removed one of them added 304071
	MD-REQ-333221/B-SCMinimumSOC_Rq		rpaquet2 - corrected spelling
	SCG-IIR-REQ-333306/B-SC Onboard HMI Client_Rx		rpaquet2 - Added 339246, 304071, 304072, 343299 removed 333212, 333228
	SCG-STR-597770/B-Requirements		rpaquet2 - removed 335184, 335187, 335209, 335210, 335186, 335217
	SCG-REQ-328705/B-Gateway Module Receives Activation Command from the Cloud		rpaquet2 - Updated text per feature owner
	SCG-REQ-328706/B-Gateway Module sends command response to the cloud (CVFMA) stating it received the updated DID to activate		rpaquet2 - Updated requirement name and text per feature owner
	SCG-REQ-328707/B-Gateway Module alerts the Cloud (CVFMA) Smart Charging DID successfully updated for Activation		rpaquet2 - Updated requirement name and text per feature owner
	SCG-REQ-335185/B-Vehicle HMI Displays SC On/Off Toggle after Activation		rpaquet2 - Updated text per feature owner
	SCG-REQ-335193/B-Cloud to Gateway Module Activation Command Time Out		rpaquet2 - Updated text per feature owner
	SCG-REQ-335194/B-Activation Failure Response to the Cloud		rpaquet2 - Updated text per feature owner
	SCG-REQ-335196/B-Smart Charging is Deactivated by Default		rpaquet2 - Updated text per feature owner
	SCG-REQ-335206/B-Gateway Module receives Deactivation Command from the Cloud		rpaquet2 - Updated text per feature owner

SCG-REQ-335208/B-Gateway Module sends command response to the Cloud (CVFMA) stating it received the updated DID to Deactivate	rpaquet2 - Updated requirement name and text per feature owner
SCG-REQ-335212/B-Vehicle HMI hides the SC On/Off Toggle after Deactivation	rpaquet2 - Updated text per feature owner
SCG-REQ-335218/B-Gateway Module returns Successful Alert of Deactivation	rpaquet2 - Updated requirement name and text per feature owner
SCG-REQ-335220/B-Cloud to Gateway Module DeactivationCommand Time Out	rpaquet2 - Updated text per feature owner
SCG-REQ-335221/B-Deactivation Failure Response to the Cloud	rpaquet2 - Updated text per feature owner
SCG-UC-REQ-333253/B-Cloud Activates Smart Charging	rpaquet2 - Updated post condition and interfaces
SCG-UC-REQ-333254/B-Cloud Deactivates Smart Charging	rpaquet2 - Updated post condition and interfaces
SCG-UC-REQ-333255/B-Activation or Deactivation Failure	rpaquet2 - Updated post condition and interfaces
SCG-UC-REQ-333256/B-Activation or Deactivation Timeout	rpaquet2 - Updated post condition and interfaces
SCG-ACT-REQ-333307/B-Activate Deactivate Smart Charging	rpaquet2 - Updated diagram
SCG-STR-597774/B-Sequence Diagrams	rpaquet2 - Added 342972
SCG-SD-REQ-334521/B-Activate or Deactivate Smart Charging	rpaquet2 - Updated diagram
SCG-SD-REQ-342972/A-Request DID Info on Wake Up	rpaquet2 - New
SCG-STR-584574/B-Requirements	rpaquet2 - Added 342466, 342467, 343290 removes 335253, 335255, 335270, 335273
SCG-REQ-335227/B-Gateway Module requests Charging Module to turn On Smart Charging based On Cloud Command	rpaquet2 - Added content
SCG-REQ-335228/B-Charging Module turns On Smart Charging	rpaquet2 - Update to include VehicleHMI
SCG-REQ-335229/B-Gateway Module responds to Cloud Command that Smart Charging is On	rpaquet2 - Added Fresh data info
SCG-REQ-335230/B-Charging Module sends Smart Charging Status to Vehicle HMI	rpaquet2 - Changed requirement name and content
SCG-REQ-342466/A-UAllow bit updated to reflect Smart Charging state changed via Offboard	rpaquet2 - New
SCG-REQ-342467/A-UAllow bit updated to reflect Smart Charging state changed via Vehicle HMI	rpaquet2 - New
SCG-REQ-335246/B-Vehicle Turns Off Smart Charging from the Cloud	rpaquet2 - Added fresh data info
SCG-REQ-335248/B-Charging Module sends Smart Charging Off Status to Vehicle HMI	rpaquet2 - Updated content and change requirement name
SCG-REQ-335249/B-Gateway Module responds to Cloud Command that Smart Charging is Off	rpaquet2 - Added fresh data info
SCG-REQ-335252/B-Vehicle HMI sends Smart Charging On request to Charging Module	rpaquet2 - updated text
SCG-REQ-343290/A-Charging Module Turns On Smart Charging	rpaquet2 - New
SCG-REQ-335256/B-Vehicle HMI Displays SC On/Off Toggle as On	rpaquet2 - Changed Gateway to Charging
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SCG-REQ-335258/B-Charging Module Reports Smart Charging On Failure to Vehicle HMI	rpaquet2 - Updated content
SCG-REQ-335259/B-Vehicle HMI sends Smart Charging Off request to Charging Module	rpaquet2 - Updated content
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SCG-STR-584575/B-Use Cases	rpaquet2 - removed 329026
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SCG-UC-REQ-329022/B-User Turns On Smart charging via SYNC HMI	rpaquet2 - Updated post condition
SCG-ACT-REQ-329635/B-Turn On or Off Smart Charging From Offboard	rpaquet2 - Updated diagram
SCG-ACT-REQ-329636/B-Turn On or Off Smart Charging From In Vehicle	rpaquet2 - Updated diagram
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SCG-STR-584594/B-Requirements	rpaquet2 - Added 339227, 342471 , 343292, 343878 remove 335297
SCG-REQ-335279/B-Gateway Module receives Updated Smart Charging Settings from the Cloud	rpaquet2 - Updated text per feature owner
SCG-REQ-335290/B-Gateway Module responds to Cloud command to notify that it received the Update SC Settings Command	rpaquet2- Updated text
SCG-REQ-335291/B-Gateway Module sends request to Charging Module with Updated Smart Charging Settings	rpaquet2 - updated text
SCG-REQ-335292/B-Charging Module updates Smart Charging Settings stored in the vehicle	rpaquet2 - Updated to state Save SC settings
SCG-REQ-335293/B-Gateway Module checks the Update Request against the received Settings Payload	rpaquet2- Updated content per feature owner
SCG-REQ-335294/B-Gateway Module sends alert to cloud that Smart Charging Setting were successfully updated	rpaquet2 - Updated text
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SCG-REQ-336982/B-Location Name is Optional to Display on Vehicle HMI	rpaquet2 - correct typo
SCG-REQ-339227/A-Smart Charging Location Label Names	rpaquet2 - New
SCG-REQ-343878/A-Static List Locations	rpaquet2 - New
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SCG-ACT-REQ-329637/B-Smart Charging Learned Settings Update	rpaquet2 - Updated Diagram
SCG-SD-REQ-329957/B-Machine Learning	rpaquet2 - Updated diagram
SCG-STR-584605/B-Requirements	rpaquet2 - Added 342472, 342473 removed 339732, 335340
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SCG-REQ-335309/B-Vehicle is at a location with duration setting ON, target SOC not reached by end of time	rpaquet2 - Update text per feature owner

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SCG-REQ-335339/B-Digital Station Schedule	rpaquet2 - Updated requirement text
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SCG-SD-REQ-330005/B-Plugin	rpaquet2 - Updated alert name
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SCG-REQ-335347/B-Charging Module updates Smart Charging Settings stored in the Vehicle based on the new Minimum SOC	rpaquet2 - Updated text per feature owner
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SCG-REQ-343293/A-User Selects "Auto" Min SOC to allow Cloud to control the minimum SOC on Vehicle HMI	rpaquet2 - new
SCG-REQ-343294/A-Vehicle updates Minimum SOC to zero percent to allow cloud most flexibility	rpaquet2 - new
SCG-REQ-343295/A-Vehicle Displays minimum SOC as "AUTO" when selected	rpaquet2 - new
SCG-REQ-343296/A-Gateway Module sends minimum SOC to the Cloud	rpaquet2 - new
SCG-UC-REQ-329024/B-User wants to Set Minimum SOC in HMI	rpaquet2 - updated post condition
SCG-ACT-REQ-333381/B-Update Minimum SOC	rpaquet2 - Updated diagram
SCG-SD-REQ-334519/B-Update Minimum SOC	rpaquet2 - Updated diagram
SCG-STR-597800/B-Requirements	rpaquet2 - Removed 335367 added 343297
SCG-REQ-335366/B-Vehicle HMI sends request to turn OFF Smart Charging when user turns OFF CCS	rpaquet2 - Changed Gateway to Charging
SCG-REQ-335368/B-Charging Module turns OFF Smart Charging and responds to Vehicle HMI request	rpaquet2 - Updated content
SCG-REQ-343297/A-Gateway Module Alerts the Cloud that Smart Charging was Turned OFF	rpaquet2 - New
SCG-REQ-335370/B-Vehicle HMI displays SC ON/OFF toggle as OFF	rpaquet2 - Updated content
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SCG-STR-584610/B-Requirements	rpaquet2 - removed 335376, 335379 added 343298
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SCG-REQ-335373/B-Charging Module turns OFF Smart Charging and RESETS all Smart Charging Settings from the Vehicle	rpaquet2 - Updated text per feature owner
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	SCG-REQ-335375/B-Gateway Module sends alert to the Cloud that Master Reset was successful	rpaquet2 - Updated content per feature owner
	SCG-REQ-335377/B-Vehicle HMI requests to initiate Brand Reset	rpaquet2 - Updated text per feature owner
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	SCG-ACT-REQ-333380/B-Last User Removed Reset	rpaquet2 - Updated diagram
	SCG-SD-REQ-334554/B-Master Reset Performed In Vehicle	rpaquet2 - Updated diagram
	SCG-SD-REQ-334561/B-Brand Reset Performed In Vehicle	rpaquet2 - Updated diagram
	SCG-SD-REQ-334553/B-Last User Master Reset	rpaquet2 - Updated diagram
	SCG-STR-598332/B-Requirements	rpaquet2 - Updated
	SCG-REQ-335386/B-Gateway Module receives command to delete SC location	rpaquet2 - Updated text per feature owner
	SCG-REQ-343052/A-Gateway Module responds to cloud with in-progress Command Response during after receiving Delete Smart Charging Location Command	rpaquet2 - New
	SCG-REQ-335387/B-Charging Module deletes SC location	rpaquet2 - Updated text per feature owner
	SCG-REQ-335388/B-Gateway Module sends alert to the cloud once successfully deleted location	rpaquet2 - Updated text per feature owner
	SCG-REQ-335392/B-Gateway Module reports Delete SC Location failure to the Cloud	rpaquet2 - Updated text
	SCG-REQ-337298/B-Cloud shall send TurnOFFSmartCharging Command after DeleteSCLocation Command is successful	rpaquet2 - Updated text
	SCG-ACT-REQ-333378/B-Delete Smart Charge Location	rpaquet2 - Updated diagram
	SCG-SD-REQ-334522/B-Delete Smart Charge Location	rpaquet2 - Updated diagram
May 28, 2019	**1.2**	
	SCG-STR-598559/C-Logical Signal Mapping	rpaquet2 - removed and added a couple of signals
	SCG-IIR-REQ-333303/C-SC Client_Tx	rpaquet2 - revised but no change
	SCG-IIR-REQ-333304/C-SC Client_Rx	rpaquet2- removed 333225 and 333235 added 349015, 349014
	MD-REQ-349015/A-Payload_Update_Status	rpaquet2 - New
	MD-REQ-349014/A-Notification_Conflict_Rq	rpaquet2 - New
	SCG-IIR-REQ-333306/C-SC Onboard HMI Client_Rx	rpaquet2 - removed 333225 added 349014
	SCG-ACT-REQ-333307/C-Activate Deactivate Smart Charging	rpaquet2 - Updated diagram
	SCG-SD-REQ-334521/C-Activate or Deactivate Smart Charging	rpaquet2 - Updated diagram
	SCG-STR-584594/C-Requirements	rpaquet2 - removed 335293
	SCG-REQ-335291/C-Gateway Module sends request to Charging Module with Updated Smart Charging Settings	rpaquet 2- deleted SCUpdateSettings_St and replaced with PayloadUpdateStatus
	SCG-REQ-335292/C-Charging Module updates Smart Charging Settings stored in the vehicle	rpaquet2 - added PayloadUpdateStatus
	SCG-REQ-335294/C-Gateway Module sends alert to cloud that Smart Charging Setting were successfully updated	rpaquet2 - Updated with PayloadUpdateStatus

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SCG-REQ-335295/C-Charging Module sends Smart Charging Settings to Vehicle HMI	rpaquet2 - removed ScLocIdCur and CurntTrgtSoc
SCG-REQ-335298/C-Gateway Module sends failure if received Payload does not match the request sent originally	rpaquet2 - Updated content
SCG-REQ-343292/B-Cloud sends Smart Charging Location Names to the Gateway Module	rpaquet2 - Added associated location ID refernce
SCG-REQ-336982/C-Location Name is Optional to Display on Vehicle HMI	rpaquet 2- Updated content
SCG-UC-REQ-329032/C-Update Smart Charging Settings Successful	rpaquet2 - Updated content
SCG-UC-REQ-329033/C-Update Smart Charging Settings Failed	rpaquet2 - update post condition
SCG-ACT-REQ-329637/C-Smart Charging Learned Settings Update	rpaquet2 - Updated diagram
SCG-SD-REQ-329957/C-Machine Learning	rpaquet2 - Updated Diagram
SCG-FUN-REQ-328712/B-Charging & Arriving at a Smart Charging Location	rpaquet2 - Updated function name
SCG-STR-584605/C-Requirements	rpaquet2 - removed 335307 added 349016, 349017, 349018, 349019,349020,349021,349022
SCG-REQ-335303/C-Vehicle is at Smart Charging Location	rpaquet2 - Updated content
SCG-REQ-335304/B-Vehicle is not at a Smart Charging Location	rpaquet 2- Updated content
SCG-REQ-342472/B-Charging Module updates Gateway Module the Vehicle has reached a Smart Charging Saved Location	Added ScLocIdCurnt_No_Stat to definition of bundle
SCG-REQ-349016/A-Charging Module updates Vehicle HMI and Gateway Module when the Vehicle has reached a Smart Charging Location	rpaquet2 - new
SCG-REQ-342473/B-Gateway Module sends Alert when Vehicle has reached a Smart Charging Location	rpaquet2 - Updated Content
SCG-REQ-349017/A-Conflict Notifications - Charging Outside Time Windows	rpaquet2 - new
SCG-REQ-349018/A-Conflict Notifications - Charging Outside Time Windows Vehicle HMI	rpaquet2 - new
SCG-REQ-349019/A-Conflict Notifications - Charging Outside Time Windows Alert to Cloud	rpaquet2 - new
SCG-REQ-349020/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Charging Module Set Signal	rpaquet2 - new
SCG-REQ-349021/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Vehicle HMI	rpaquet2 - new
SCG-REQ-349022/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Alert to Cloud	rpaquet2 - new
SCG-STR-584606/B-Use Cases	rpaquet2 - removed 329037
SCG-UC-REQ-329038/B-User plugs in, SC is Turned On, Location is not a Smart Charging Location	rpaquet2 - revised name and post condition
SCG-STR-584609/B-Sequence Diagrams	rpaquet2 - Added 349023
SCG-SD-REQ-349023/A-Vehicle Arrives at Smart Charging Location	rpaquet2 - New
SCG-FUN-REQ-328711/B-Updating Minimum State Of Charge Settings	rpaquet2 - Updated function name
SCG-STR-584600/C-Requirements	rpaquet2 - Removed 343293, 343294, 343295 and 343296
SCG-REQ-335373/C-Charging Module turns OFF Smart Charging and RESETS all Smart Charging Settings from the Vehicle	rpaquet2 - updated content
SCG-SD-REQ-334554/C-Master Reset Performed In Vehicle	rpaquet2 - Updated diagram
SCG-SD-REQ-334561/C-Brand Reset Performed In Vehicle	rpaquet2 - Updated diagram

	SCG-REQ-343052/B-Gateway Module responds to cloud with in-progress Command Response during after receiving Delete Smart Charging Location Command	rpaquet2 - updated per feature owner
	SCG-REQ-335387/C-Charging Module deletes SC location	rpaquet2- updated per feature owner
	SCG-REQ-335388/C-Gateway Module sends alert to the cloud once successfully deleted location	rpaquet2 - updated per featuer owner
	SCG-REQ-335392/C-Gateway Module reports Delete SC Location failure to the Cloud	rpaquet2 - updated per feature owner
	SCG-ACT-REQ-333378/C-Delete Smart Charge Location	rpaquet2 - Updated diagram
	SCG-SD-REQ-334522/C-Delete Smart Charge Location	rpaquet2 - Updated diagram
August 5, 2019	**1.3**	
	SCG-FRD-REQ-333302/B-Smart Charging	rpaquet2 - Added a General requirements section
	STR-673999/A-General Requirements	rpaquet2 - new
	SCG-REQ-358501/A-HMI Updates to Departure Times and Comfort Settings Tile	rpaquet2 - new
	SCG-REQ-358502/A-HMI Updates to Charge Settings Tile	rpaquet2 - new
	SCG-STR-584594/D-Requirements	rpaquet2 - Added 355860
	SCG-REQ-355860/A-Smart Charging Location Label Synchronization	rpaquet2 - new
December 12, 2019	**1.4**	
	SCG-REQ-335185/C-Vehicle HMI Displays SC On/Off Toggle after Activation	rpaquet2 - removed notification to inform user per feature owner
	SCG-ACT-REQ-333307/D-Activate Deactivate Smart Charging	rpaquet2 - Update a self call from showactivationnotification to show toggle
	SCG-SD-REQ-334521/D-Activate or Deactivate Smart Charging	rpaquet2 - Update a self call from showactivationnotification to show toggle
	SCG-FUN-REQ-333070/B-Update CCS via HMI	rpaquet2 - removed the use case and white box view sections
	SCG-STR-597800/C-Requirements	rpaquet2 - removed 335371 per feature owner
	SCG-REQ-335366/C-User Turns Off CCS	rpaquet2 - Update name and content per feature owner
	SCG-REQ-335368/C-Gateway Module informs Charging Module Smart Charging is OFF	rpaquet2 - Update name and content per feature owner
	SCG-REQ-343297/B-Charging Module turns OFF Smart Charging and responds to Gateway Module and Vehicle HMI	rpaquet2 - Update name and content per feature owner
	SCG-REQ-343052/C-Gateway Module responds to cloud with in-progress Command Response during after receiving Delete Smart Charging Location Command	rpaquet2- changed In progress to Success
	SCG-REQ-335387/D-Charging Module deletes SC location	rpaquet2 - change requests to request

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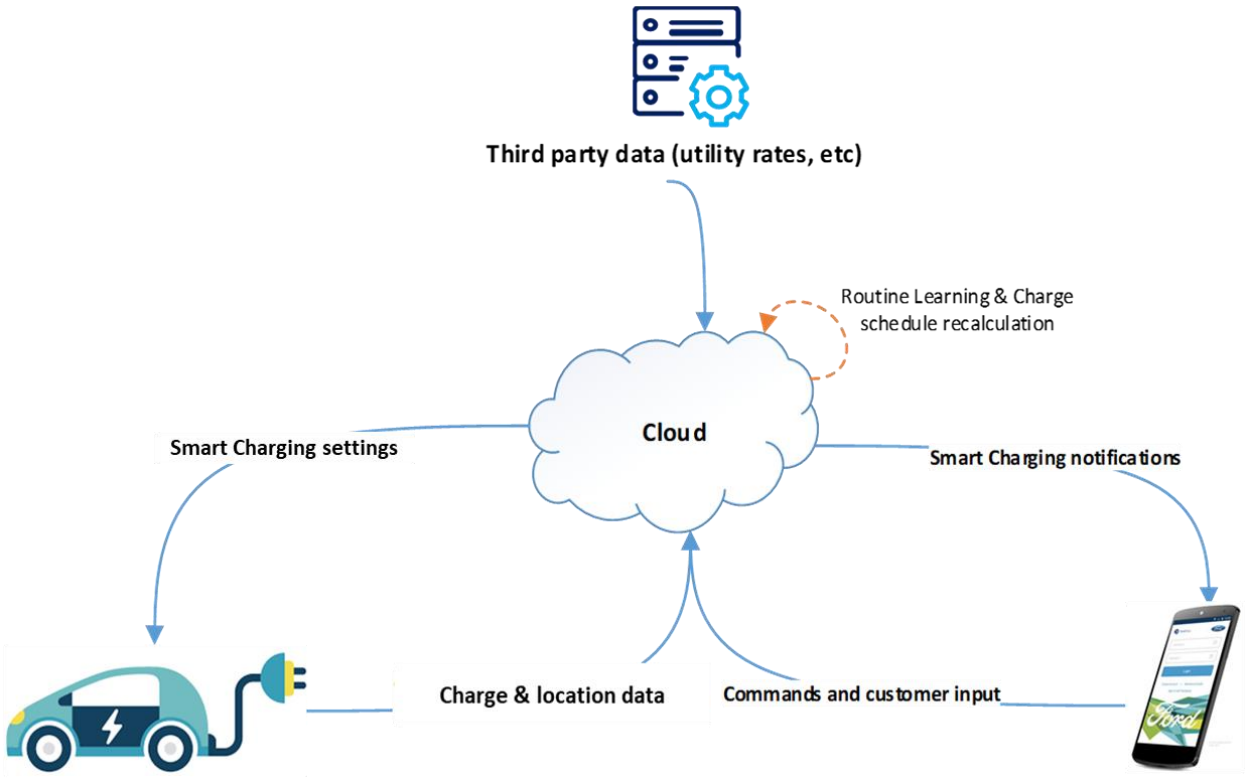
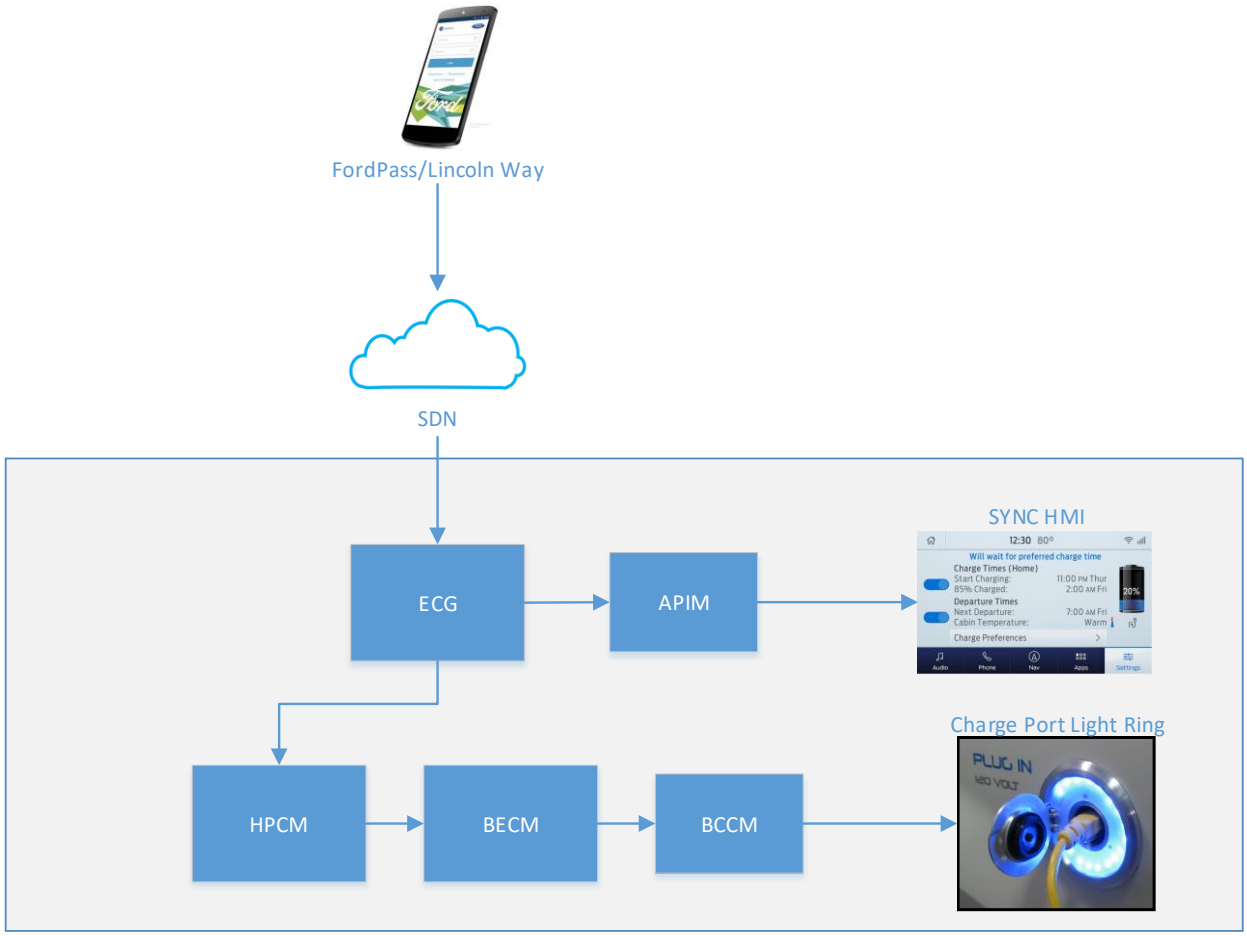
1 Architectural Design

1.1 Overview

The high-level data flow between the vehicle, cloud, and mobile app is shown below. The smart charging algorithm is hosted in the cloud – optimal charging settings will be sent from the cloud to the vehicle. Trip and charge information from the vehicle feeds to the cloud and serve as inputs into the algorithm; the algorithm continually refines smart charge settings to evolve with routine and preference changes over time. The user will have the ability to turn on and turn off Smart Charging via FordPass/Lincolnway or the HMI.



Below is a view of the Smart Charging architecture; the main pieces are the mobile app, the cloud, and the vehicle.



1.2 Physical Mapping of Classes

The table below shows an example of how the logical classes may be mapped into physical modules. This mapping example is specific to FNV2.

Logical Class	Physical Module (ECU)
SC Offboard HMI Client	Ford Pass/Lincoln Way
SC Offboard Server	SDN(Cloud)
SC Offboard Gateway	TCU
SC Server	HPCM(Charging Module)/OBCC
SC Onboard HMI Client	APIM(Vehicle HMI)
SC Client	ECG(Gateway Module)

1.3 SCG-CLD-REQ-333257/A-SC Off Board Gateway

Responsible for providing a modem to transmit data into and out of the vehicle.

1.4 SCG-CLD-REQ-333258/A-SC Off Board HMI Client

Responsible for providing a user interface outside of the Vehicle.

1.5 SCG-CLD-REQ-333259/A-SC Off Board Server

Responsible for handling cloud content and computing smart charging settings to download to the vehicle.

1.6 SCG-CLD-REQ-333260/A-SC On Board HMI Client

Responsible for providing an interface to the in vehicle user.

1.7 SCG-CLD-REQ-333261/B-SC Client

Responsible for providing logical computations within the vehicle and to provide information to the In Vehicle and Off board HMI.

1.7.1 Functional Requirements

1.7.1.1 SCG-REQ-343119/A-Invalid Values Associated with Unfilled Smart Charging Locations

The Gateway Module shall transmit **Smart Charging Location Coordinates** associated with an invalid **Smart Charging Location ID** with the values below when the number of Smart Charging Locations is less than the allocated maximum:

CAN Signal	HEX	DEC
ScOfbLocLattDeg_An_Rq	7F	127
ScOfbLocLattFrct_An_Rq	FFFFF	1048575
ScOfbLocLattPostv_B_Rq	0	0
ScOfbLocLongDeg_An_Rq	FF	255
ScOfbLocLongFrct_An_Rq	FFFFF	1048575

1.7.1.2 SCG-REQ-343050/A-Out of Range Values for Invalid Smart Charging Locations

The Gateway Module shall transmit **Smart Charging Location Coordinates** associated with an invalid **Smart Charging Location ID** with the values below when the number of Smart Charging Locations is less than the allocated maximum:

CAN Signal	HEX	DEC
ScOfbLocLattDeg_An_Rq	7F	127
ScOfbLocLattFrct_An_Rq	FFFFF	1048575
ScOfbLocLattPostv_B_Rq	0	0
ScOfbLocLongDeg_An_Rq	FF	255
ScOfbLocLongFrct_An_Rq	FFFFF	1048575

1.7.1.3 SCG-REQ-343727/A-Out of Range Values for Unchanged Minimum SOC

The Gateway Module shall transmit out of range values associated with Minimum SOC when there is no change in the value received from the cloud.

1.8 SCG-CLD-REQ-333262/A-SC Server

Responsible for providing charge information from within the vehicle.

1.9 Logical Signal Mapping

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

Logical name	CAN signal name
SmartCharging_St	ScEnbl_B_Stat
SmartCharging_Rq	ScEnbl_D_RqCld
SmartChargingInVeh_Rq	ScEnbl_D_RqMnu
SCSettings_Rq	ScLocId_No_RqCld

	ScLocLattDeg_An_RqCld
	ScLocLattPostv_B_RqCld
	ScLocLattFrct_An_RqCld
	ScLocLongDeg_An_RqCld
	ScLocLongPostv_B_RqCld
	ScLocLongFrct_An_RqCld
	ScLocDelete_B_RqCld
	ScLocSetID_No_RqCld
	ScChrgToPc_Pc_RqCld
	ScChrgDurSet_D_RqCld
	ScChrgDur_T_RqCld
	ScLocRdius_L_RqCld
	ScDayOfWeekId_D_RqCld
	ScChrgPrfl_No_RqCld
	ScMnSoc_Pc_RqCld
	ScLocPwID_No_RqCld
	ScChrgrPwMax_Pw_RqCld
Payload_Update_Status	ScPayloadUpdate_B_Stat
SCMinimumSOC_Rq	ScMnSoc_Pc_RqCld ScMnSoc_Pc_RqMnu
SCMinimumSOC_St	ScMnSoc_Pc_Actl
CurntTargetSOC_St	CurntTrgtSoc_Pc_Dsply
SCDeleteLocation_Rq	ScLocDelete_B_RqCld
ScLocIdCurnt_No_Stat	ScLocIdCurnt_No_Stat
ClearAllUserSettings_Rq	OfbChrgClearAll_B_Rq
ChargeStationID_St	TP Method
ChargeStationSchedule_St	TP Method
FactoryReset_Rq	FactoryReset_Rq
FactoryReset_St	FactoryReset_Stat
BrandReset_Rq	EmbeddedModemReset_Rq
BrandReset_St	EmbeddedModemReset_Stat
FreshData_Rq	ScFreshDataEnbl_B_Rq
ChargeInPowerMode_St	ChrgrInPwMde_D_Actl
ChargeStationID_Rq	TP Method
setSCLocationNameInfo	SOA
getEcgDidData	SOA
getEcgDidUpdateData	SOA
Notification_Conflict_Rq	NtfctnConflict1_D_Rq

1.10 SC Client Interface

1.10.1 SCG-IIR-REQ-333303/C-SC Client_Tx

1.10.1.1 MD-REQ-333214/A-SmartCharging_Rq

Message Type: request

Smart Charging enabled via the cloud

Name	Literals	Value	Description
Type	-	-	
	Null	0x0	
	Disable	0x1	

	Enable	0x2	
	Not Used	0x3	

1.10.1.2 MD-REQ-333234/A-SCDeleteLocation_Rq

Message Type: request

Signal used to delete a Smart Charge Location. Signal will coordinate with the Smart Charge Location ID signal to identify whether a Smart Charge Location is to be deleted.

Name	Literals	Value	Description
Type	-	-	
	No request	0x0	
	Request	0x1	

1.10.1.3 MD-REQ-333219/B-SCSettings_Rq

Message Type: request

Request to update Charging Setting and Location Attributes

Name	Literals	Value	Description
ScLocId_No_RqCld	-	-	Smart Charge Location ID
	ID 0	0x0	
	ID 1	0x1	
	ID 2	0x2	
	ID 3	0x3	
	ID 4	0x4	
	ID 5	0x5	
ScLocLattDeg_An_RqCld	-		GPS Degrees Latitude
		DEC 0 - 89	
ScLocLattPostv_B_RqCld	-	-	GPS Latitude Degree Sign
	No	0x0	
	Yes	0x1	
ScLocLattFrct_An_RqCld	-	-	GPS Degrees Decimal Latitude
		DEC 0.000001 - 0.999999	
ScLocLongDeg_An_RqCld	-	-	GPS Degrees Longitude
		DEC 0-179	
ScLocLongPostv_B_RqCld	-	-	GPS Longitude Degree Sign
	No	0x0	
	Yes	0x1	

ScLocLongFrct_An_RqCld	-	-	GPS Degrees Decimal Longitude
		DEC 0.000001 - 0.999999	
ScLocDelete_B_RqCld	-	-	Signal used to delete a Smart Charge Location
	No Request	0x0	
	Request	0x1	
ScLocSetID_No_RqCld			Location Settings ID
	ID 0	0x0	
	ID 1	0x1	
	ID 2	0x2	
	ID 3	0x3	
	ID 4	0x4	
	ID 5	0x5	
ScChrgToPc_Pc_RqCld	-	-	Charge to Percent value stored for a Smart Charge location coordinated by the Smart Charge Location Settings ID signal
		Percent 0-100	
ScChrgDurSet_D_RqCld	-	-	Duration-based Charging setting for a Smart Charge Location
	Null	0x0	
	Off	0x1	
	On	0x2	
ScChrgDur_T_RqCld	-	-	Time value of Duration-based Charging for a Smart Charge location
		0-1440 Min	
ScLocRdius_L_RqCld	-	-	Radial distance from the GPS Coordinates of a Smart Charge Location within which the location is valid. 100 m resolution
		0-12700m	
ScDayOfWeekId_D_RqCld	-	-	Day of the Week ID. This is a cycling (1-7) signal that will be used to update the Charge Profile settings for a

			Smart Charge Location for a given day of the week
	Null	0x0	
	Monday	0x1	
	Tuesday	0x2	
	Wednesday	0x3	
	Thursday	0x4	
	Friday	0x5	
	Saturday	0x6	
	Sunday	0x7	
ScChrgPrfl_No_RqCld	-	-	The Charge Profile for a Smart Charge Location coordinated by the Smart Charging location settings ID signal
		Charge/Value Charge Bits (24 hours) 0 = Charge 1 = Value Charge Bit 23 == 00:00 Bit 22 == 01:00…. Bit 11 = 12:00… Bit 0 == 23:00	
ScMnSoc_Pc_RqCld	-	-	Minimum Charge to Percent "comfort level" value stored for a Smart Charge location
		Percent 0-100	
ScChrgrPwMax_Pw_RqCld	-	-	Power available to the charger from the Electric Vehicle Supply Equipment - the maximum power the charger is allowed to draw from the mains.
		0 – 204700 watts	
ScLocPwID_No_RqCld	-	-	Location Settings ID
	ID_0	0x0	
	ID_1	0x1	
	ID_2	0x2	
	ID_3	0x3	
	ID_4	0x4	

	ID_5	0x5	

1.10.1.4 MD-REQ-213361/C-FactoryReset_Rq

Message Type: Request

Signal sent by the Master Reset Client to initiate a Master Reset

Logical Signal Name	Literals	Value	Description
FactoryReset_Rq	Inactive	0x0	
	ResetFactoryDefaults	0x1	

1.10.1.5 MD-REQ-339246/A-setSCLocationNameInfo

This message is used to transmit the Smart Charging Location Name.

Method Type	On Change
QoS Level	Default
Retained	Yes

R/O	Name	Type	Literals	Value	Description
Request (_St)					
R	SCLocID	Enum	-	-	LocID tied to the Location Name below
			ID 0	0x0	
			ID 1	0x1	
			ID 2	0x2	
			ID 3	0x3	
			ID 4	0x4	
			ID 5	0x5	
R	SCLocationName	String	-	20 chars.	

1.10.1.6 MD-REQ-304071/A-getEcgDidData

This SOA API is used to request DID information from the ECG. The ECG also uses this SOA API for its response.

Method Type	One-Shot (Synch)
QoS Level	Default
Retained	No

R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	RequestEcgDid Address	Int32	-	0x00000000 - 0xFFFFFFFF	Requested DID address
Response (_Rsp)					
O	EcgResponseStatus	Enum	-	-	Response to initial request
			Success	0x00	
			Error-Internal	0x01	

			Error-Access Permissions	0x02	
			Error-Invalid Parameter	0x03	
R	ecgDidAddress	Int32	-	0x00000000 - 0xFFFFFFFF	DID address
R	ecgDidConfigData	Bytes	-	-	DID Data

1.10.1.7 MD-REQ-304072/A-getEcgDidUpdateData

This SOA API is used to receive updated DID information from the ECG. The ECG publishes all updated DID information (OnChange) via this SOA API.

Method Type	OnChange
QoS Level	Default
Retained	Yes

R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
-	-	-	-	-	N/A
Response (_Rsp)					
R	ecgDidAddress	Int32	-	0x0000000 - 0xFFFFFFFF	DID address that was updated
R	ecgDidConfigData	Bytes	-	-	Corresponding updated DID Data

1.10.1.8 MD-REQ-342970/A-ClearAllUserSettings_Rq

Message Type: Request

Signal sent to request to Clear User Settings

Logical Signal Name	Literals	Value	Description
	No Request	0x0	
	Request	0x1	

1.10.1.9 MD-REQ-343026/A-ChargeStationID_Rq

Message Type: request

This signal is used to request the Charge Station information.

Name	Literals	Value	Description
RequestData	-	-	
	No Request	0x00	
	Request Charge Station ID	0x01	

1.10.2 SCG-IIR-REQ-333304/C-SC Client_Rx

1.10.2.1 MD-REQ-333215/A-SmartCharging_St

Message Type: status

Smart Charging Enablement Status

Name	Literals	Value	Description
Type	-	-	
	Disabled	0x0	
	Enabled	0x1	

1.10.2.2 MD-REQ-326502/B-ChargeStationID_St

Message Type: status

This signal is used to provide the Charge Station information.

Name	Literals	Value	Description
TLS Status	-	-	
	No TLS	0x00	
	TLS	0x01	
Charge Station ID	-	-	Max. 37 bytes Variable Raw Data

1.10.2.3 MD-REQ-337016/B-ChargeStationSchedule_St

Message Type: status

This signal is used to provide the schedule for the connected Charge Station

Name	Literals	Value	Description
Schedule ID	-	-	
	ID 1	0x1	
	ID 254	0xFF	
Schedule Index	-	-	This parameter shall increment for every messsage payload sent until all data is transferred. When sending data for new Schedule ID the index shall start at 1 again
	ID 1	0x1	
	ID 254	0xFF	
Number Of Items Transmittied	-	-	Indicates the number of schedule inputs sent in current payload. Max number of items to be sent in a gvien Schedule Index is 800
	1	0x0001	
	…		
	800	0x0320	
	Reserved	0x0321-0xFFFF	
Power Value	-	-	15 bits Fixed Units: Watts Resolution: 50 Watts

Time Interval	-	-	25 bits Fixed Units: Time Resolution: Seconds

1.10.2.4 MD-REQ-333227/B-SCMinimumSOC_St

Message Type: status

Minimum Charge to Percent "comfort level" value status for a Smart Charge location

Name	Literals	Value	Description
Type	-	-	Used to indicate minimum charge level status. Unit:Percent
	0 to 100 Percent		

1.10.2.5 MD-REQ-222036/B-FactoryReset.St

Message Type: Status

Signal sent by the Master Reset Server indicating that the master reset default settings were restored for a master reset event

Logical Signal Name	Literals	Value	Description
FactoryReset.St	Inactive	0x0	
	FactoryDefaultsRestored	0x1	
	Reserved	0x2	
	Reserved	0x3	

1.10.2.6 MD-REQ-246274/B-EmbeddedModemReset_St

Message Type: Status

This signal is used to indicate the status of the factory reset performed for the specified Embedded Modem feature.

Name	Literals	Value	Description
Type	-	-	Embedded Modem feature factory reset status.
	Null	0x0	
	Reset_NotComplete	0x1	
	PaaKReset_Complete	0x2	
	OnlineTrafficReset_Complete	0x3	
	CCSReset_Complete	0x4	
	WifiHotspotReset_Complete	0x5	
	Reserved	0x6-0xF	

1.10.2.7 MD-REQ-304071/A-getEcgDidData

This SOA API is used to request DID information from the ECG. The ECG also uses this SOA API for its response.

Method Type	One-Shot (Synch)
QoS Level	Default
Retained	No

R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	RequestEcgDid Address	Int32	-	0x00000000 - 0xFFFFFFFF	Requested DID address
Response (_Rsp)					
O	EcgResponseStatus	Enum	-	-	Response to initial request
			Success	0x00	
			Error-Internal	0x01	
			Error-Access Permissions	0x02	
			Error-Invalid Parameter	0x03	
R	ecgDidAddress	Int32	-	0x00000000 - 0xFFFFFFFF	DID address
R	ecgDidConfigData	Bytes	-	-	DID Data

1.10.2.8 MD-REQ-326679/A-ChargeInPowerMode_St

Message Type: status

This signal is used to indicate the operational mode of EVSE(Electrical Vehicle Supply Equipment).

Name	Literals	Value	Description
Type	-	-	
	EvseNotDetected	0x0	
	EvsePaused	0x1	
	DigitalCommDetected	0x2	
	AcBasic	0x3	
	AcDigital	0x4	
	DcCharging	0x5	
	IcCharging	0x6	
	EvseNotCompatible	0x7	
	EvseFault	0x8	

1.10.2.9 MD-REQ-343299/A-CurntTargetSOC_St

Message Type: Status

Current Location Target SOC for display to the user.

Name	Literals	Value	Description
Type	-	-	Unit:Percent
	0 to 100 Percent		

1.10.2.10 MD-REQ-349015/A-Payload_Update_Status

Message Type: Status

This signal communicates the HPCM's status in saving a Smart Charging Payload.

Name	Literals	Value	Description
Type	-	-	
	Null	0x0	
	In-Process	0x1	
	Complete	0x2	

1.10.2.11 MD-REQ-349014/A-Notification_Conflict_Rq

Message Type: Request

Signal to track if vehicle must charge outside windows to reach target SOC or if vehicle is unable to reach target SOC by next departure Time

Name	Literals	Value	Description
Type	-	-	Indicates if vehicle detected a charge window conflict
	Null	0x0	
	No_Conflict_Exists	0x1	
	Departure_Time	0x2	
	Charge_Window	0x3	
	Not_Used	0x4	
	Not_Used	0x5	
	Not_Used	0x6	
	Not_Used	0x7	

1.11 SC Onboard HMI Client Interface

1.11.1 SCG-IIR-REQ-333305/B-SC Onboard HMI Client_Tx

1.11.1.1 MD-REQ-337015/A-SmartChargingInVeh_Rq

Message Type: request

Smart Charging enablement via vehicle

Name	Literals	Value	Description
Type	-	-	
	Null	0x0	
	Disable	0x1	
	Enable	0x2	
	Not Used	0x3	

1.11.1.2 MD-REQ-333221/B-SCMinimumSOC_Rq

Message Type: request

Minimum Charge to Percent "comfort level" value stored for a Smart Charge location.

The information contained in this document is Proprietary to Ford Motor Company.

Name	Literals	Value	Description
Type	-	-	Used to set desired charge level. Unit:Percent
	0 to 100 Percent		

1.11.1.3 MD-REQ-213361/C-FactoryReset_Rq

Message Type: Request

Signal sent by the Master Reset Client to initiate a Master Reset

Logical Signal Name	Literals	Value	Description
FactoryReset_Rq	Inactive	0x0	
	ResetFactoryDefaults	0x1	

1.11.1.4 MD-REQ-246273/C-EmbeddedModemReset_Rq

Message Type: Request

This signal is used to perform a factory reset for the specified Embedded Modem feature.

Name	Literals	Value	Description
Type	-	-	Embedded Modem feature to be reset to factory defaults.
	Null	0x0	
	WifiHotspot_Reset	0x1	
	PaaK_Reset	0x2	
	OnlineTraffic_Reset	0x3	
	CCS_Reset	0x4	
	BrandConnect_Reset1	0x5	
	BrandConnect_Reset2	0x6	
	Reserved	0x7 – 0xF	

1.11.1.5 MD-REQ-304071/A-getEcgDidData

This SOA API is used to request DID information from the ECG. The ECG also uses this SOA API for its response.

Method Type	One-Shot (Synch)
QoS Level	Default
Retained	No

R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	RequestEcgDid Address	Int32	-	0x00000000 - 0xFFFFFFFF	Requested DID address
Response (_Rsp)					
O	EcgResponseStatus	Enum	-	-	Response to initial request
			Success	0x00	
			Error-Internal	0x01	

			Error-Access Permissions	0x02	
			Error-Invalid Parameter	0x03	
R	ecgDidAddress	Int32	-	0x00000000 - 0xFFFFFFFF	DID address
R	ecgDidConfigData	Bytes	-	-	DID Data

1.11.2 SCG-IIR-REQ-333306/C-SC Onboard HMI Client_Rx

1.11.2.1 MD-REQ-333215/A-SmartCharging_St

Message Type: status

Smart Charging Enablement Status

Name	Literals	Value	Description
Type	-	-	
	Disabled	0x0	
	Enabled	0x1	

1.11.2.2 MD-REQ-222036/B-FactoryReset.St

Message Type: Status

Signal sent by the Master Reset Server indicating that the master reset default settings were restored for a master reset event

Logical Signal Name	Literals	Value	Description
FactoryReset.St	Inactive	0x0	
	FactoryDefaultsRestored	0x1	
	Reserved	0x2	
	Reserved	0x3	

1.11.2.3 MD-REQ-246274/B-EmbeddedModemReset_St

Message Type: Status

This signal is used to indicate the status of the factory reset performed for the specified Embedded Modem feature.

Name	Literals	Value	Description
Type	-	-	Embedded Modem feature factory reset status.
	Null	0x0	
	Reset_NotComplete	0x1	
	PaaKReset_Complete	0x2	
	OnlineTrafficReset_Complete	0x3	
	CCSReset_Complete	0x4	
	WifiHotspotReset_Complete	0x5	
	Reserved	0x6-0xF	

1.11.2.4 MD-REQ-339246/A-setSCLocationNameInfo

This message is used to transmit the Smart Charging Location Name.

Method Type	On Change
QoS Level	Default
Retained	Yes

R/O	Name	Type	Literals	Value	Description
Request (_St)					
R	SCLocID	Enum	-	-	LocID tied to the Location Name below
			ID 0	0x0	
			ID 1	0x1	
			ID 2	0x2	
			ID 3	0x3	
			ID 4	0x4	
			ID 5	0x5	
R	SCLocationName	String	-	20 chars.	

1.11.2.5 MD-REQ-304071/A-getEcgDidData

This SOA API is used to request DID information from the ECG. The ECG also uses this SOA API for its response.

Method Type	One-Shot (Synch)
QoS Level	Default
Retained	No

R/O	Name	Type	Literals	Value	Description
Request (_Rq)					
R	RequestEcgDid Address	Int32	-	0x00000000 - 0xFFFFFFFF	Requested DID address
Response (_Rsp)					
O	EcgResponseStatus	Enum	-	-	Response to initial request
			Success	0x00	
			Error-Internal	0x01	
			Error-Access Permissions	0x02	
			Error-Invalid Parameter	0x03	
R	ecgDidAddress	Int32	-	0x00000000 - 0xFFFFFFFF	DID address
R	ecgDidConfigData	Bytes	-	-	DID Data

1.11.2.6 MD-REQ-304072/A-getEcgDidUpdateData

This SOA API is used to receive updated DID information from the ECG. The ECG publishes all updated DID information (OnChange) via this SOA API.

Method Type	OnChange
QoS Level	Default
Retained	Yes

R/O	Name	Type	Literals	Value	Description

Request (_Rq)					
-	-	-	-	-	N/A
Response (_Rsp)					
R	ecgDidAddress	Int32	-	0x0000000 - 0xFFFFFFFF	DID address that was updated
R	ecgDidConfigData	Bytes	-	-	Corresponding updated DID Data

1.11.2.7 MD-REQ-343299/A-CurntTargetSOC_St

Message Type: Status

Current Location Target SOC for display to the user.

Name	Literals	Value	Description
Type	-	-	Unit:Percent
	0 to 100 Percent		

1.11.2.8 MD-REQ-349014/A-Notification_Conflict_Rq

Message Type: Request

Signal to track if vehicle must charge outside windows to reach target SOC or if vehicle is unable to reach target SOC by next departure Time

Name	Literals	Value	Description
Type	-	-	Indicates if vehicle detected a charge window conflict
	Null	0x0	
	No_Conflict_Exists	0x1	
	Departure_Time	0x2	
	Charge_Window	0x3	
	Not_Used	0x4	
	Not_Used	0x5	
	Not_Used	0x6	
	Not_Used	0x7	

2 General Requirements

2.1 SCG-REQ-358501/A-HMI Updates to Departure Times and Comfort Settings Tile

When Smart Charging is turned ON, the HMI screen for the new Departure Times and Comfort Settings Tile shall make the following changes.

1. The edit buttons for departure times shall be removed
2. The clear all button for departure times shall be removed
3. The screen shall explain to the user that Departure Times have been automated by the Smart Charging feature.

2.2 SCG-REQ-358502/A-HMI Updates to Charge Settings Tile

When Smart Charging is turned ON, the HMI screen for Charge Settings shall make the following changes.

1. The global ON/OFF and edit line item for Departure Times in the Charge Settings tile shall be removed.

3 Functional Definition

3.1 SCG-FUN-REQ-333036/A-Activate or Deactivate Smart Charging

3.1.1 Requirements

3.1.1.1 SCG-REQ-328705/B-Gateway Module Receives Activation Command from the Cloud

Smart Charging will leverage the existing flow for feature activation by utilizing DID flows. The Gateway Module shall receive the updated DID from the Cloud (CVFMA) and save the value in the Gateway Module.

3.1.1.2 SCG-REQ-328706/B-Gateway Module sends command response to the cloud (CVFMA) stating it received the updated DID to activate

After the Gateway Module receives updated DID for Activation of Smart Charging, it shall send a command response back to the Cloud (CVFMA) to signify that it received the command and is in progress.

3.1.1.3 SCG-REQ-328707/B-Gateway Module alerts the Cloud (CVFMA) Smart Charging DID successfully updated for Activation

After the Gateway Module successfully saves the updated DID for activating Smart Charging, it shall send an alert to the Cloud (CVFMA).

3.1.1.4 SCG-REQ-335185/C-Vehicle HMI Displays SC On/Off Toggle after Activation

After the DID is updated in the Gateway Module, the Vehicle HMI shall receive the status via SOA API and the vehicle HMI shall display the ON/OFF Smart Charging toggle on the Vehicle HMI.

3.1.1.5 SCG-REQ-335193/B-Cloud to Gateway Module Activation Command Time Out

After receiving, the command from the Cloud (CVFMA) to update the DID for Smart Charging, if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.1.1.6 SCG-REQ-335194/B-Activation Failure Response to the Cloud

In the event that Smart Charging Activation fails, the Gateway Module shall report failure back to the cloud. Gateway Module sends an alert with value of failure and description of the error to the cloud (CVFMA).

3.1.1.7 SCG-REQ-335196/B-Smart Charging is Deactivated by Default

Smart Charging DID = DEACTIVATED by default.

3.1.1.8 SCG-REQ-335206/B-Gateway Module receives Deactivation Command from the Cloud

Smart Charging will leverage the existing flow for feature activation by utilizing DID flows. The Gateway Module shall receive the updated DID from the Cloud (CVFMA) and save the value in the Gateway Module

3.1.1.9 SCG-REQ-335208/B-Gateway Module sends command response to the Cloud (CVFMA) stating it received the updated DID to Deactivate

After the Gateway Module receives updated DID for Deactivation of Smart Charging, it shall send a command response back to the Cloud (CVFMA) to signify that it received the command and is in progress.

3.1.1.10 SCG-REQ-335212/B-Vehicle HMI hides the SC On/Off Toggle after Deactivation

After the DID is updated in the Gateway Module, the Vehicle HMI shall receive the updated status via SoA API's and the Vehicle HMI shall hide the ON/OFF Smart Charging toggle on the Vehicle HMI.

3.1.1.11 SCG-REQ-335218/B-Gateway Module returns Successful Alert of Deactivation

After the Gateway Module updates the Smart Charging DID to deactivate the feature, it shall send an alert to the cloud (CVFMA).

3.1.1.12 SCG-REQ-335220/B-Cloud to Gateway Module DeactivationCommand Time Out

After receiving command to deactivate Smart Charging DID from the Cloud (CVFMA), if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.1.1.13 SCG-REQ-335221/B-Deactivation Failure Response to the Cloud

In the event that Smart Charging Deactivation fails, the Gateway Module shall report failure back to the cloud (CVFMA). The Gateway Module sends an alert to the cloud (CVFMA) with a description of the error.

3.1.1.14 SCG-REQ-335222/A-Smart Charging Activation requires Vehicle Lifecycle to be set to Normal mode

Smart Charging shall only be available when the Vehicle Life cycle is set to NORMAL mode. In other modes (TRANSPORT OR MANUFACTURING), Smart Charging shall be deactivated. If Vehicle Life cycle is changed from NORMAL mode to either TRANSPORT or MANUFACTURING Smart Charging shall be deactivated.

3.1.2 Use Cases

3.1.2.1 SCG-UC-REQ-333253/B-Cloud Activates Smart Charging

Actors	Cloud, Vehicle
Pre-conditions	CCS settings are turned ON Smart Charging is DEACTIVATED
Scenario	Cloud needs to activate smart charging for specific VIN Cloud switches DEACTIVATED to ACTIVATED for Smart Charging feature
Post-conditions	CVFMA sends DID to the ECG to activate Smart Charging ECG reads the status of the DID ECG sends activation status to APIM via SoA API's Smart Charging appears on SYNC HMI ECG sends alert to CVFMA CVFMA marks Smart Charging as activated
Interfaces	CVFMA, ECG, APIM
Notes	

3.1.2.2 SCG-UC-REQ-333254/B-Cloud Deactivates Smart Charging

Actors	Cloud, Vehicle
Pre-conditions	CCS settings are turned ON Smart Charging is ACTIVATED
Scenario	Cloud needs to deactivate smart charging for specific VIN Cloud switches ACTIVATED to DEACTIVATED for Smart Charging feature
Post-conditions	CVFMA sends a DID to the ECG to deactivate Smart Charging ECG reads the status of the DID ECG sends deactivation status to APIM via SoA API's Smart Charging is hidden from SYNC HMI ECG sends alert to CVFMA CVFMA marks Smart Charging as deactivated

Interfaces	CVFMA, ECG, APIM,
Notes	

3.1.2.3 SCG-UC-REQ-333255/B-Activation or Deactivation Failure

Actors	Cloud, Vehicle
Pre-conditions	CCS settings are turned ON Smart Charging is ACTIVATED or DEACTIVATED
Scenario	Cloud needs to activate or deactivate smart charging for specific VIN
Post-conditions	CVFMA sends a DID to the ECG to activate or deactivate Smart Charging ECG fails to read the status of the DID ECG sends an alert to CVFMA as failed CVFMA marks the command as failed
Interfaces	CVFMA ECG,
Notes	

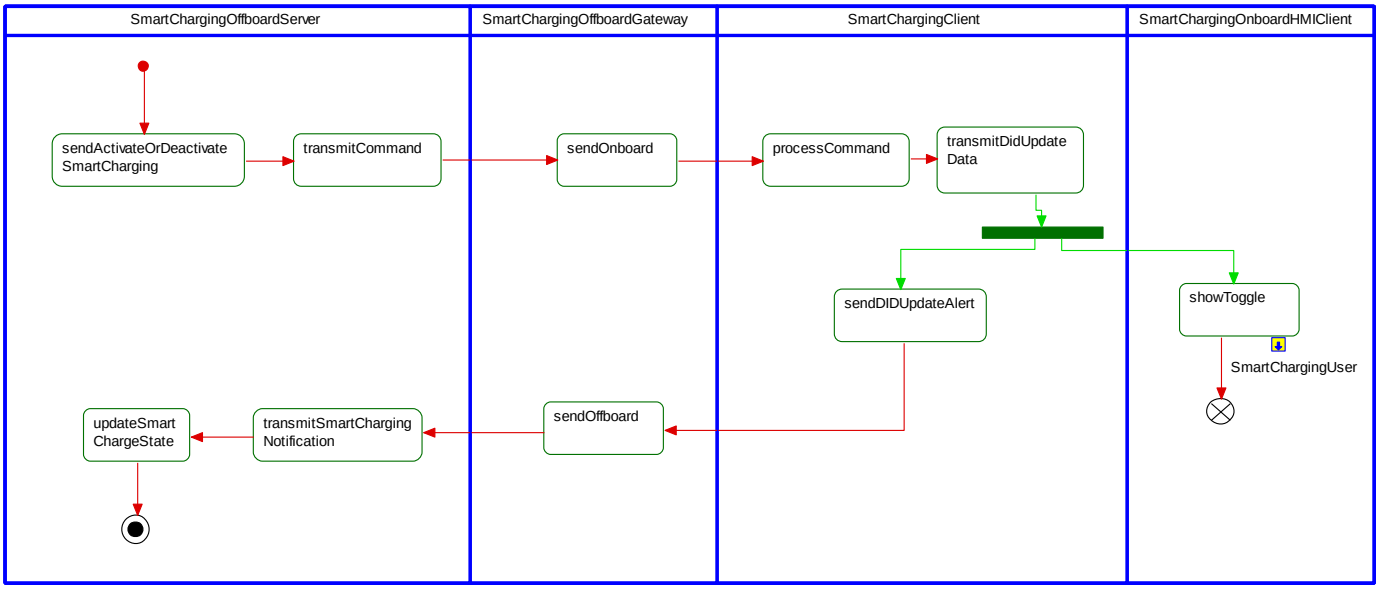
3.1.2.4 SCG-UC-REQ-333256/B-Activation or Deactivation Timeout

Actors	Cloud, Vehicle
Pre-conditions	CCS settings are turned ON Smart Charging is ACTIVATED or DEACTIVATED
Scenario	Cloud needs to activate or deactivate smart charging for specific VIN
Post-conditions	CVFMA sends a DID to the ECG to activate or deactivate Smart Charging ECG does not send response to SDN within 90 seconds CVFMA marks the command as failed
Interfaces	CVFMA, ECG
Notes	

3.1.3 White Box Views

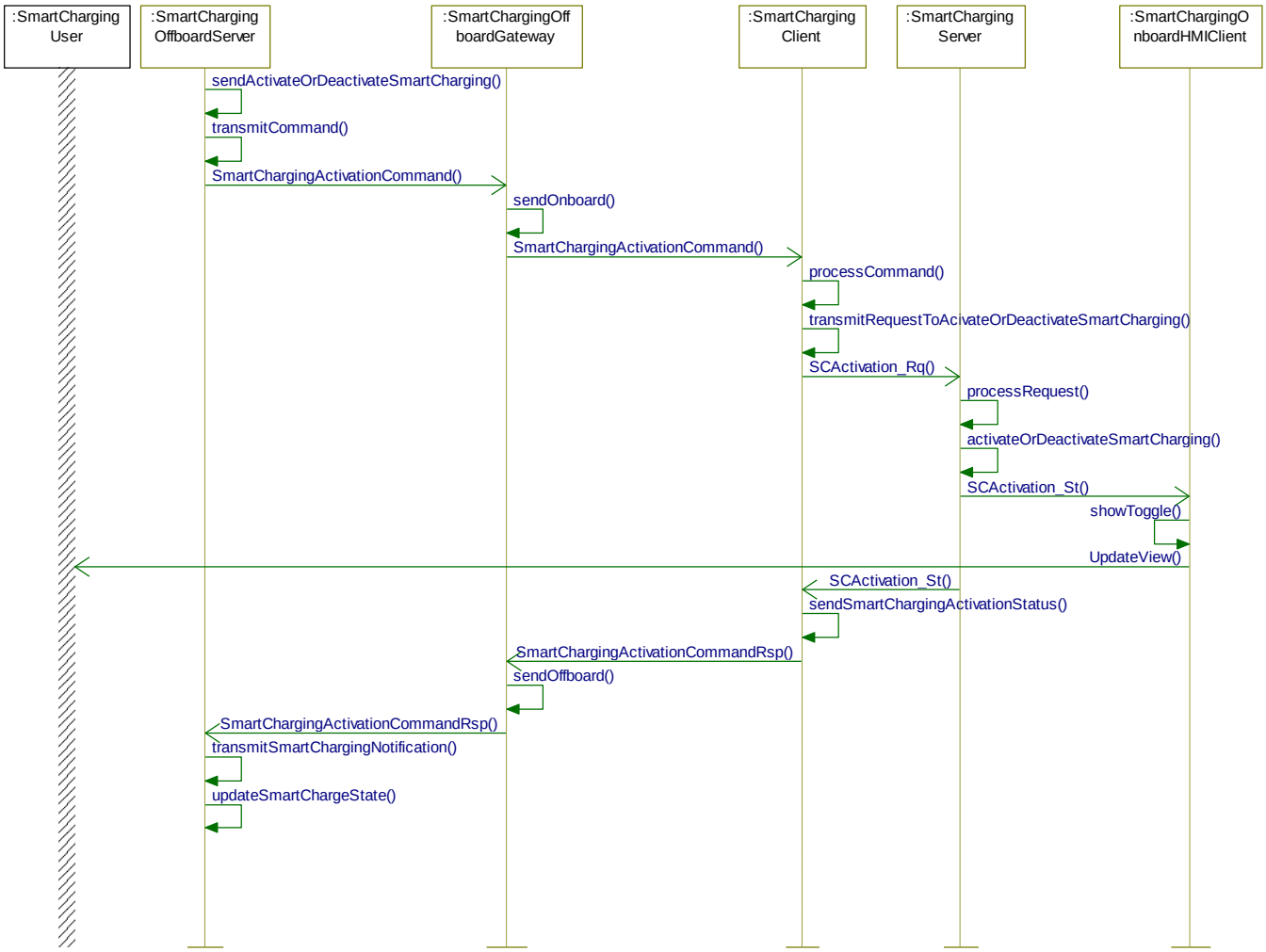
3.1.3.1 Activity Diagrams

3.1.3.1.1 SCG-ACT-REQ-333307/D-Activate Deactivate Smart Charging

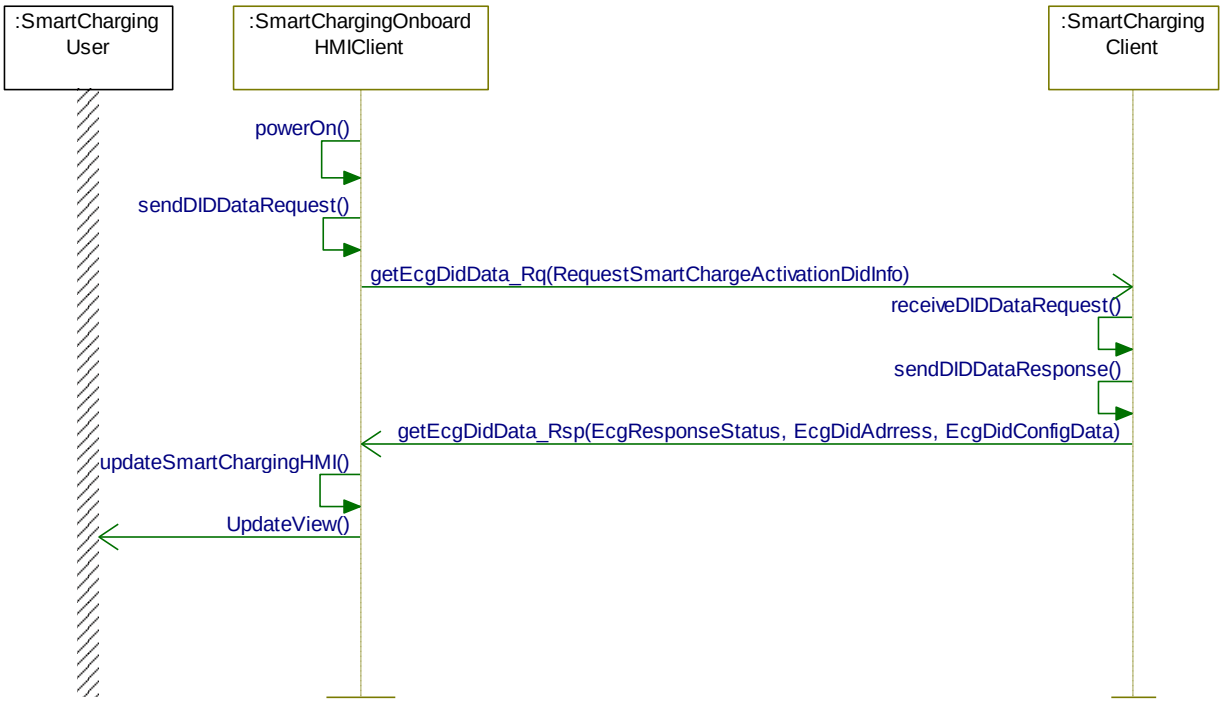


3.1.3.2 Sequence Diagrams

3.1.3.2.1 SCG-SD-REQ-334521/D-Activate or Deactivate Smart Charging



3.1.3.2.2 SCG-SD-REQ-342972/A-Request DID Info on Wake Up



3.2 SCG-FUN-REQ-328704/A-Turning On or Off Smart Charging

3.2.1 Requirements

3.2.1.1 SCG-REQ-335226/A-Gateway Module receives On Command from the Cloud

When the Gateway Module receives the smartChargingONCommand from the Cloud, the Gateway Module shall begin the process to turn ON Smart Charging.

3.2.1.2 SCG-REQ-335227/B-Gateway Module requests Charging Module to turn On Smart Charging based On Cloud Command

After the Gateway Module receives the command to turn ON Smart Charging, the Gateway Module shall send smartChargingONRequest = ON to the Charging Module. The Gateway Module shall raise FreshData_Rq and hold until Gateway Module receives smartChargingONStatus = ON.

3.2.1.3 SCG-REQ-335228/B-Charging Module turns On Smart Charging

After the Charging Module receives smartChargingONRequest to turn Smart Charging ON from the Gateway Module, the Charging Module shall turn ON Smart Charging and return smartChargingONStatus = ON to the Gateway Module and to the Vehicle HMI.

3.2.1.4 SCG-REQ-335229/B-Gateway Module responds to Cloud Command that Smart Charging is On

Once the Gateway Module receives the smartChargingONStatus = ON from the Charging Module, the Gateway Module shall send smartChargingONCommandResponse with value of successful status and smartChargingONStatus = ON to the cloud to recognize Smart Charging feature was successfully turned ON for the Vehicle. Gateway Module return the FreshData_Rq to 0 once SmartChargingONStatus = ON is received.

3.2.1.5 SCG-REQ-335230/B-Charging Module sends Smart Charging Status to Vehicle HMI

After Charging Module sends smartChargingONStatus = ON to the Vehicle HMI, the Vehicle HMI then shall toggle Smart Charging ON.

3.2.1.6 SCG-REQ-335231/A-Cloud to Gateway Module Turn On Command Time Out

After receiving smartChargingONCommand from the Cloud, if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.2.1.7 SCG-REQ-335233/A-Turn On Smart Charging Failure response to the Cloud

In the event that Smart Charging Status fails, the Gateway Module shall report failure back to the cloud. Gateway Module sends smartChargingONCommandResponse with value of failure and description of the error.

3.2.1.8 SCG-REQ-342466/A-UAllow bit updated to reflect Smart Charging state changed via Offboard

If user turns on/off Smart Charging via offboard user interface, then uAllow bit shall be updated – entity type 1, ID 28

3.2.1.9 SCG-REQ-335235/A-Smart Charging is turned Off by Default

SmartChargingONStatus = OFF by default.

3.2.1.10 SCG-REQ-342467/A-UAllow bit updated to reflect Smart Charging state changed via Vehicle HMI

If user turns on/off Smart Charging via vehicle HMI, then uAllow bit shall be updated – entity type 1, ID 28

3.2.1.11 SCG-REQ-335245/A-Gateway Module receives Smart Charging Off Command from the Cloud

When the Gateway Module receives the smartChargingOFFCommand from the Cloud, the Gateway Module shall begin the process to turn OFF Smart Charging

3.2.1.12 SCG-REQ-335246/B-Vehicle Turns Off Smart Charging from the Cloud

After receiving the OFF command from the cloud, the Gateway Module shall send smartChargingONRequest = OFF to the Charging Module. The Gateway Module shall raise FreshData_Rq and hold until Gateway Module receives smartChargingONStatus = OFF.

3.2.1.13 SCG-REQ-335247/A-Charging Module turns Off Smart Charging

Once the Charging Module receives the request from the Gateway Module, the Charging Module shall turn OFF Smart Charging and return smartChargingONStatus = OFF to the Gateway Module.

3.2.1.14 SCG-REQ-335248/B-Charging Module sends Smart Charging Off Status to Vehicle HMI

Charging Module shall send smartChargingONStatus = OFF to the Vehicle HMI. The Vehicle HMI shall toggle OFF Smart Charging.

3.2.1.15 SCG-REQ-335249/B-Gateway Module responds to Cloud Command that Smart Charging is Off

After the Charging Module has successfully turned OFF Smart Charging the Gateway Module shall send smartChargingOFFCommandResponse with successful status and smartChargingONStatus = OFF to the cloud to recognize Smart Charging feature was successfully turned OFF for the Vehicle. Gateway Module return the FreshData_Rq to 0 once SmartChargingONStatus = OFF is received.

3.2.1.16 SCG-REQ-335250/A-Cloud to Gateway Module Turn Off Command Time Out

After receiving smartChargingOFFCommand from the Cloud, if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.2.1.17 SCG-REQ-335251/A-Gateway Module reports Smart Charging Off Failure to the Cloud

In the event that Smart Charging Status fails, the Gateway Module shall report failure back to the cloud. Gateway Module sends smartChargingOFFCommandResponse with a failure value and description of the error

3.2.1.18 SCG-REQ-335252/B-Vehicle HMI sends Smart Charging On request to Charging Module

In order to turn ON Smart Charging through the Vehicle HMI the Vehicle HMI shall send smartChargingONRequest = ON to the Charging Module.

3.2.1.19 SCG-REQ-343290/A-Charging Module Turns On Smart Charging

After the Charging Module receives smartChargingONRequest to turn Smart Charging ON from the Vehicle HMI, the Charging Module shall turn ON Smart Charging and return smartChargingONStatus = ON to the Gateway Module and Vehicle HMI to signify the request was successful.

3.2.1.20 SCG-REQ-335256/B-Vehicle HMI Displays SC On/Off Toggle as On

After the Vehicle HMI receives smartChargingONStatus = ON from the Charging Module, the Vehicle HMI shall display the SC ON/OFF toggled to the ON position.

3.2.1.21 SCG-REQ-335257/B-Gateway Module Alerts the Cloud that Smart Charging was turned On

Upon receiving SmartChargingONStatus from the Charging Module,the Gateway Module shall send smartChargingONAlert = ON to the cloud to recognize Smart Charging was successfully turned ON in the vehicle.

3.2.1.22 SCG-REQ-335258/B-Charging Module Reports Smart Charging On Failure to Vehicle HMI

In the event that Smart Charging ON Request fails, the Charging Module shall report failure back to the Vehicle HMI screen.

3.2.1.23 SCG-REQ-335259/B-Vehicle HMI sends Smart Charging Off request to Charging Module

To turn OFF Smart Charging through the Vehicle HMI the Vehicle HMI shall send smartChargingONRequest = OFF to the Charging Module.

3.2.1.24 SCG-REQ-335274/B-Vehicle HMI displays SC On/Off toggle as Off

After the Vehicle HMI receives smartChargingONStatus = OFF from the Charging Module, the Vehicle HMI shall display the SC ON/OFF toggled to the OFF position.

3.2.1.25 SCG-REQ-335276/B-Gateway Module alerts the Cloud that Smart Charging was turned Off

After the OFF Status is returned to the Vehicle HMI the Gateway Module shall send smartChargingONAlert with value of OFF to the cloud to recognize Smart Charging was successfully turned OFF in the vehicle.

3.2.1.26 SCG-REQ-335277/B-Charging Module reports Smart Charging Off Failure to Vehicle HMI

In the event that Smart Charging OFF fails, the Gateway Module shall report failure back to the HMI screen.

3.2.1.27 SCG-REQ-343291/A-Charging Module turns OFF Smart Charging

After the Vehicle HMI sends the request to turn OFF Smart Charging the Charging Module shall turn OFF Smart Charging and return smartChargingONStatus = OFF to the Gateway Module and Vehicle HMI once successful.

3.2.2 Use Cases

3.2.2.1 SCG-UC-REQ-329021/B-User Turns On Smart charging via FP/LW

Actors	FP/LW User,Cloud, Vehicle
Pre-conditions	User registers for FP/LW app User authorizes vehicle CCS settings are turned ON Smart Charging is ACTIVATED Smart Charging is OFF
Scenario	The user wants to turn on smart charging from FP/LW The user toggles the smart charging feature from OFF > ON
Post-conditions	SDN receives command from FP/LW to turn on smart charging SDN sends a command to the ECG to turn on smart charging ECG sends request to HPCM to turn on Smart Charging HPCM turns on Smart Charging HPCM does NOT delete existing preferred charge times and location if some already exist HPCM sends status to ECG and APIM APIM shows Smart Charging as ON ECG sends command response to SDN that Smart Charging is on SDN notifies FP/LW that Smart Charging is ON
Interfaces	FP/LW, SDN, ECG
Notes	

3.2.2.2 SCG-UC-REQ-329022/B-User Turns On Smart charging via SYNC HMI

Actors	Vehicle
Pre-conditions	User registers to FP/LW app User authorizes vehicle CCS settings are turned ON Smart Charging is ACTIVATED Smart charging is OFF
Scenario	The user wants to turn on smart charging from SYNC HMI The user toggles the smart charging feature from OFF > ON
Post-conditions	APIM sends request to HPCM to turn on smart charging HPCM turns on Smart Charging HPCM does NOT delete existing preferred charge times and location if some already exist HPCM sends status to ECG and APIM APIM shows Smart Charging as ON ECG sends alert to SDN that Smart Charging is on SDN notifies FP/LW that Smart Charging is ON
Interfaces	SYNC HMI, APIM, ECG
Notes	

3.2.2.3 SCG-UC-REQ-329027/A-User turns On Smart charging when CCS settings are OFF (FP/LW request)

Actors	FP/LW user
Pre-conditions	User registers for FP/LW app User authorizes vehicle CCS settings are turned OFF (location sharing or vehicle data or driving characteristics or remote controls or vehicle connectivity) Smart Charging is ACTIVATED Smart charging is OFF
Scenario	The user wants to turn on smart charging from FP/LW
Post-conditions	The user toggles the smart charging feature from OFF > ON SDN informs FP/LW that CCS settings are OFF The user gets an error message informing him/her that CCS settings must be turned on in the vehicle User has the option to see CCS settings user guide to learn about it and know how to turn it ON
Interfaces	FP/LW, SDN
Notes	

3.2.2.4 SCG-UC-REQ-329028/A-User Turns On Smart charging when CCS settings are OFF (SYNC HMI request)

Actors	User, Vehicle
Pre-conditions	User registers for FP/LW app User authorizes vehicle CCS settings are turned OFF (location sharing or vehicle data or driving characteristics or remote controls or vehicle connectivity) Smart Charging is ACTIVATED Smart charging is OFF
Scenario	The user wants to turn on smart charging from SYNC HMI
Post-conditions	The user toggles the smart charging feature from OFF > ON on the SYNC HMI APIM checks CCS settings ECG informs APIM that CCS Settings are OFF The user gets an error message on the SYNC HMI screen informing him/her they must turn on CCS settings User can click on the notification to be redirected to the CCS settings screen to turn on CCS
Interfaces	SYNC HMI, APIM, ECG
Notes	

3.2.2.5 SCG-UC-REQ-329029/A-User Turns On Smart charging via FP/LW - Command Failed

Actors	FP/LW User
Pre-conditions	User registers for FP/LW app User authorizes vehicle CCS settings are turned ON Smart Charging is ACTIVATED Smart Charging is OFF
Scenario	The user wants to turn on smart charging from FP/LW The user toggle the smart charging feature from OFF > ON

Post-conditions	SDN receives request from FP/LW to turn on smart charging SDN sends a command to the ECG to turn on smart charging ECG fails to processes the command ECG sends a command response to the SDN with a failure state SDN marks the command as "FAILED" SDN informs FP/LW command has failed FP/LW user is notified command has failed
Interfaces	FP/LW, SDN, ECG
Notes	

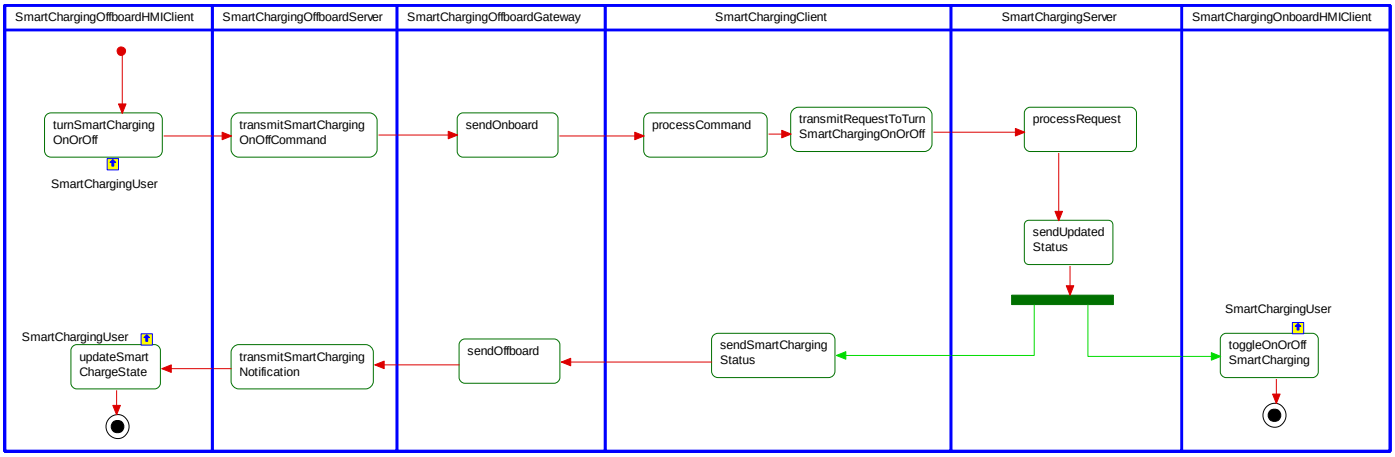
3.2.2.6 SCG-UC-REQ-329030/A-User Turns On Smart charging via FP/LW - Command timeout

Actors	FP/LW User
Pre-conditions	User registers for FP/LW app User authorizes vehicle CCS settings are turned ON Smart Charging is ACTIVATED Smart Charging is OFF
Scenario	The user wants to turn on smart charging from FP/LW The user toggle the smart charging feature from OFF > ON
Post-conditions	SDN receives request from FP/LW to turn on smart charging SDN sends a command to the ECG to turn on smart charging SDN does not get command response within 90sec SDN marks the command as "TIMEOUT" SDN notifies FP/LW command has timed out User is notified command has timed out
Interfaces	FP/LW, SDN
Notes	

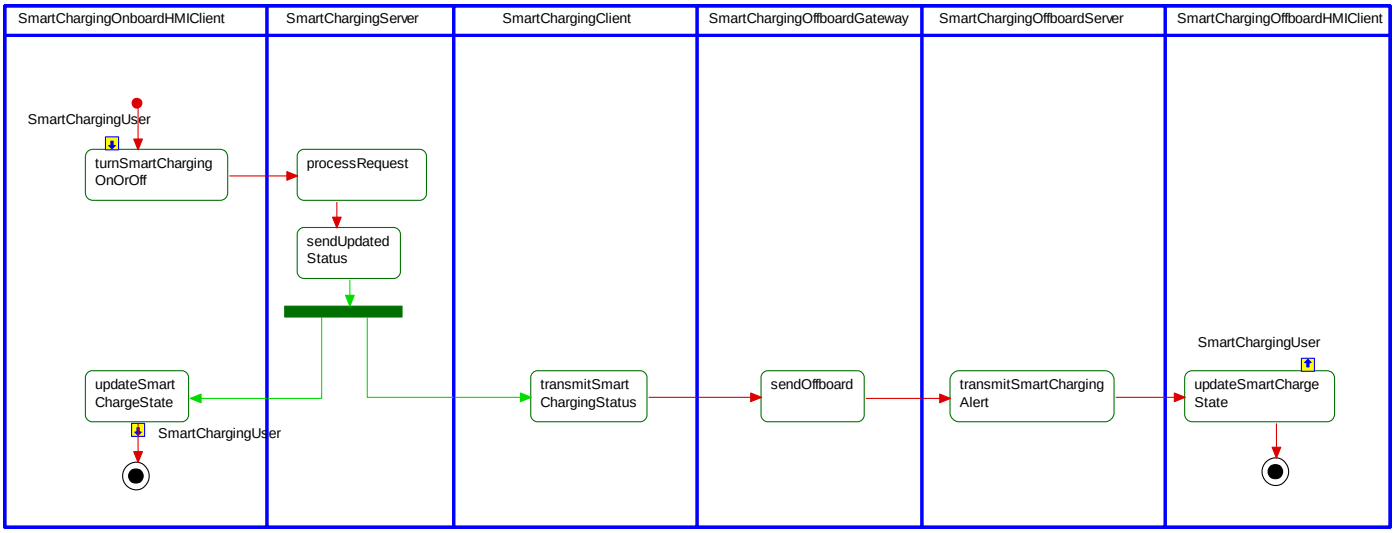
3.2.3 White Box Views

3.2.3.1 Activity Diagrams

3.2.3.1.1 SCG-ACT-REQ-329635/B-Turn On or Off Smart Charging From Offboard

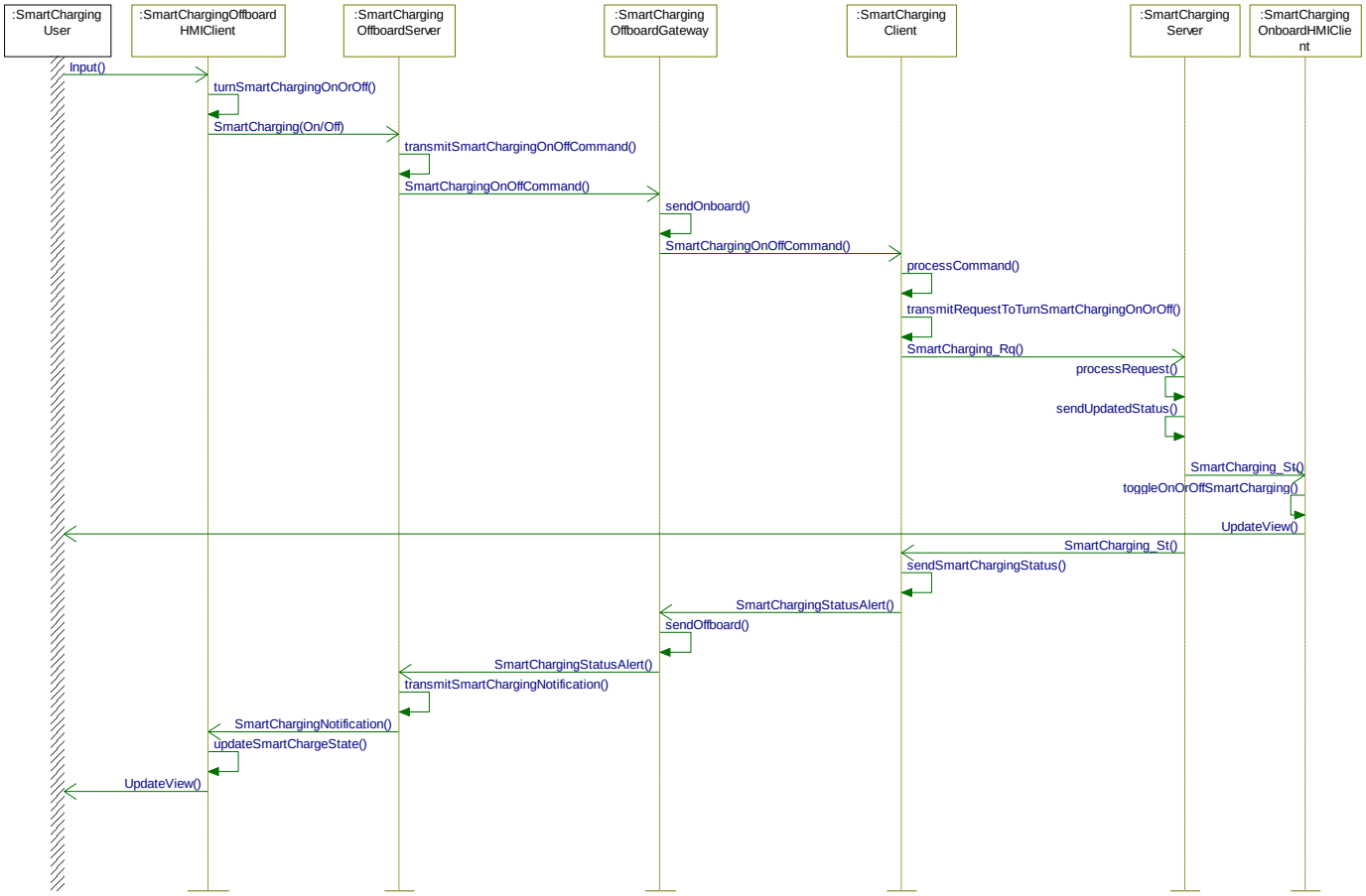


3.2.3.1.2 SCG-ACT-REQ-329636/B-Turn On or Off Smart Charging From In Vehicle

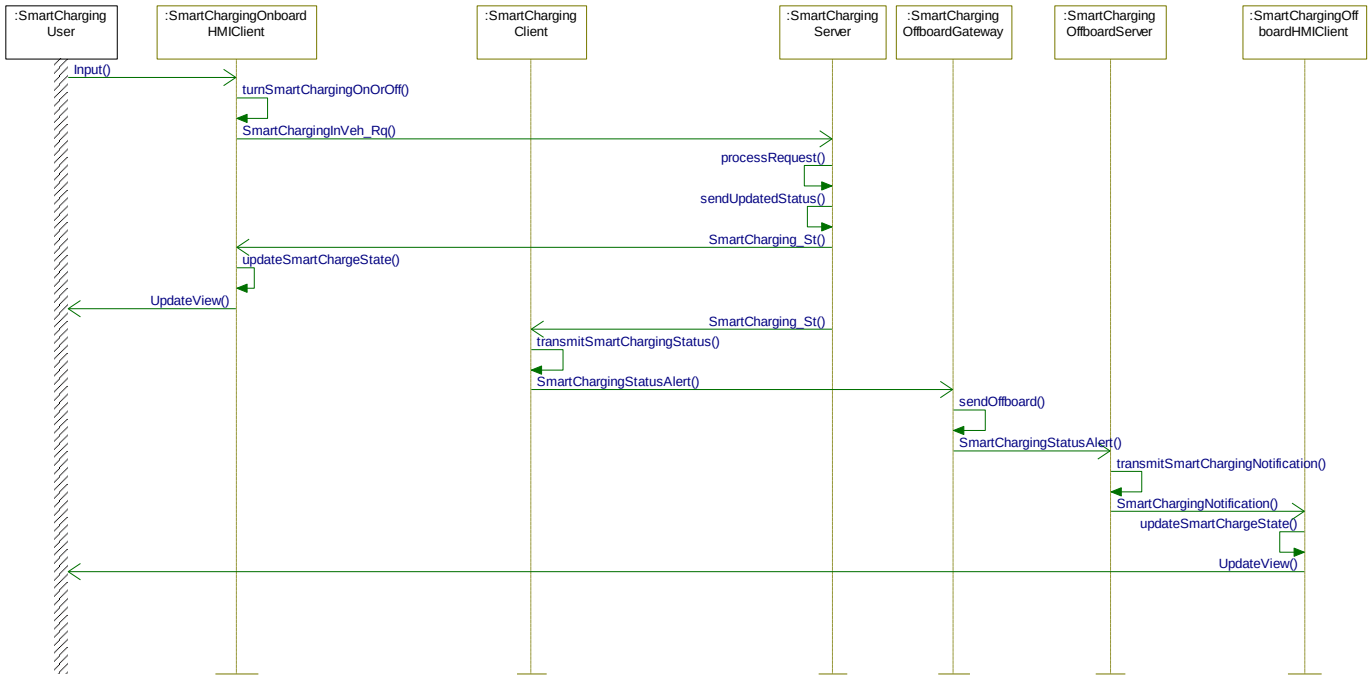


3.2.3.2 Sequence Diagrams

3.2.3.2.1 SCG-SD-REQ-329949/A-Turn On or Off Smart Charge from the Offboard



3.2.3.2.2 SCG-SD-REQ-329950/B-Turn On or Off Smart Charge from Onboard



3.3 SCG-FUN-REQ-328710/A-Update Smart Charge Settings

3.3.1 Requirements

3.3.1.1 SCG-REQ-335279/B-Gateway Module receives Updated Smart Charging Settings from the Cloud

When the Gateway Module receives SCSettingsUpdateCommand with the updated Smart Charging Settings from the Cloud, the Gateway Module shall begin the process to update the Smart Charging Settings. Cloud shall send all Smart Charging Settings for all Smart Charging Locations whenever an update is required.

3.3.1.2 SCG-REQ-335290/B-Gateway Module responds to Cloud command to notify that it received the Update SC Settings Command

After the command is received from the Cloud, the Gateway Module shall return SCSettingsUpdateCommandRepsonse with “in-progress” status to the Cloud to acknowledge that it received the command.

3.3.1.3 SCG-REQ-335291/C-Gateway Module sends request to Charging Module with Updated Smart Charging Settings

The Gateway Module sends SCUpdateSettings_Rq to the Charging Module with the SC Settings Payload for the Charging Module to update Smart Charge Settings. The Gateway Module shall raise FreshData_Rq and hold until Gateway Module receives PayloadUpdateStatus = “Complete”.

3.3.1.4 SCG-REQ-335292/C-Charging Module updates Smart Charging Settings stored in the vehicle

The Charging Module shall update and save SC Settings with the updated SC Settings Payload which contain new values for Target SOC, Charge Windows, Charge Duration, Charge Duration State, and Max Power. The Charging Module then sends the PayloadUpdateStatus = Complete to the Gateway Module.

3.3.1.5 SCG-REQ-335294/C-Gateway Module sends alert to cloud that Smart Charging Setting were successfully updated

After the Gateway Module receives the PayloadUpdateStatus = Complete from the Charging Module and confirms, the Gateway Module shall send SCSettingsUpdateAlert with the successful status to the Cloud to acknowledge the vehicle successfully updated the Smart Charging Settings.Gateway Module return the FreshData_Rq to 0 once it has received PayloadUpdateStatus = “Complete”.

3.3.1.6 SCG-REQ-335295/C-Charging Module sends Smart Charging Settings to Vehicle HMI

After the Charging Module is done updating the Smart Charging Settings Payload, it shall send SC_Minimum_SOC_Actual to the Vehicle HMI to display

3.3.1.7 SCG-REQ-335296/A-Cloud to Gateway Module Update SC Settings command time out

After receiving SCSettingsUpdateCommand from the Cloud, if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.3.1.8 SCG-REQ-335298/C-Gateway Module sends failure if received Payload does not match the request sent originally

If the PayloadUpdateStatus changes from “In-progress” to “Null” the Charging Module failed to save the new Smart Charging payload. The Gateway Modules shall send SCSettingsUpdateAlert with the failure status to the cloud.

3.3.1.9 SCG-REQ-342471/A-Gateway Module Error Codes for Failure to Update

Gateway Module shall have the following error codes for issues with updating the Charging Module and Smart Charging Settings in the vehicle. Failures shall be sent to the cloud.

- EVErrorENUM{
    - //Charging Module did not respond

- NO_RESPONSE_FROM_HPCM = 0;

- //Incomplete charge settings data provided
  - INCOMPLETE_CHARGE_SETTINGS_DATA = 1;
- //Charging Module is busy with another update
  - ANOTHER_UPDATE_IN_PROGRES = 2;

3.3.1.10 SCG-REQ-343292/B-Cloud sends Smart Charging Location Names to the Gateway Module

The Cloud shall send Smart Charging Location Names with associated location ID to the Gateway Module within the SC Settings Payload.

3.3.1.11 SCG-REQ-336982/C-Location Name is Optional to Display on Vehicle HMI

Location Name is optional to display on the Vehicle HMI. If location name contains a null value the Vehicle HMI shall not display a value/name.

3.3.1.12 SCG-REQ-339227/A-Smart Charging Location Label Names

SmartChargingOnBoardHMIClient shall store labels for Smart Charging Location via Service Oriented Architecture (SOA) as sent from SmartChargingClient.

Example:
Smart Charging Location ID 01 == Home
Smart Charging Location ID 02 == Work
Smart Charging Location ID 03 == Gym

3.3.1.13 SCG-REQ-343878/A-Static List Locations

The Charging Module, Vehicle HMI, and Gateway Module shall maintain Smart Charging locations and associated settings in a static position with respect to the other Saved Charge Location IDs.

3.3.1.14 SCG-REQ-355860/A-Smart Charging Location Label Synchronization

Gateway Module (ECG) shall synchronize Smart Charge Location x with the **Vehicle HMI (APIM)** via Service Oriented Architecture(SOA) when there is a mobile account authenticated with the vehicle. Synchronization shall occur when the following changes are made to Smart Charge Location Settings:

- Creation of a Smart Charge Location
- Deletion of a Smart Charge Location
- Modification of the name of a label for a Smart Charge Location

The following steps apply for Label Synchronization when Vehicle is OFF

1. After an Sync Smart Charging Profiles Command is received from SDN, the ECG will store the Smart Charging Location Name in the following cases:
   a. APIM does not respond. ECG will retry 4 times with 15 internal
   b. Vehicle is OFF (APIM is OFF)
2. ECG will keep a cached list of all Smart Charging location names and will add it as part of the correlated Alert payload along with new location name as received in the SDN command.
3. When APIM is awake in the next ignition cycle, the ECG will transmit the updated Smart Charging Location Names to APIM for synchronization
4. ECG will store the updated Smart Charging location name until APIM responds back with the appropriate location names list (per ECG comparison). Once confirmed by APIM, the ECG will retain the Smart Charging location names in the cache and will not need to transmit any names to APIM.

3.3.2 Use Cases

3.3.2.1 SCG-UC-REQ-329031/A-Smart Charging Settings Update Requests (Cloud Initiated)

Actors	Cloud, Vehicle
Pre-conditions	SDN has updated the smart charging settings
Scenario	SDN sends a command to the ECG to update the smart charging settings
Post-conditions	ECG sends an acknowledgment (command response) to the SDN that it was able to process the command SDN processes the command response SDN marks the command as "IN-PROGRESS"
Interfaces	SDN, ECG
Notes	

3.3.2.2 SCG-UC-REQ-329032/C-Update Smart Charging Settings Successful

Actors	Vehicle, Cloud
Pre-conditions	SCG-UC-REQ-329031ECG has received request to update smart charging settings
Scenario	ECG process the SC charge settings payload sent from the SDN ECG sends SC charge settings payload and update request to HPCM
Post-conditions	HPCM overrides previous SC settings HPCM responds to ECG with update status HPCM sends appropriate SC settings to APIM ECG sends an alert to the SDN that SC settings were successfully updated SDN marks the current command from "IN-PROGRESS" to "COMPLETED"
Interfaces	HPCM, ECG, APIM
Notes	

3.3.2.3 SCG-UC-REQ-329033/C-Update Smart Charging Settings Failed

Actors	Vehicle, Cloud
Pre-conditions	SCG-UC-REQ-329031 ECG has received request to update charge settings
Scenario	ECG process the SC charge settings payload sent from the SDN ECG sends SC charge settings payload update to HPCM
Post-conditions	HPCM fails to override previous SC settings HPCM responds to ECG with update status as failure ECG sends an alert to the SDN that SC settings failed to update SDN marks the current command from "IN-PROGRESS" to "FAILED"
Interfaces	HPCM, ECG, SDN
Notes	

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3.3.2.4 SCG-UC-REQ-329034/A-Smart Charging Settings Update Requests Command Failed

Actors	Cloud, Vehicle
Pre-conditions	SDN has updated the Smart charging settings
Scenario	SDN sends a command to the ECG to update the Smart Charging settings
Post-conditions	ECG processes the command ECG sends an acknowledgment (command response) to the SDN that it was NOT able to process the command SDN processes the command response SDN marks the command as "FAILED"
Interfaces	SDN, ECG
Notes	

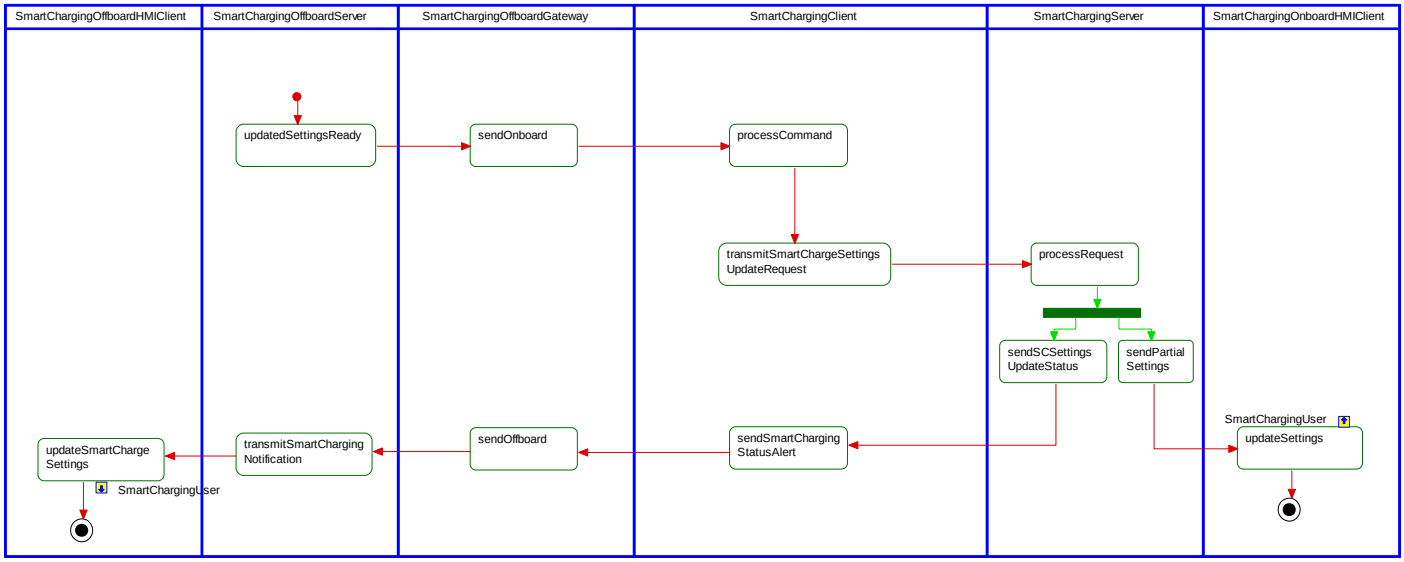
3.3.2.5 SCG-UC-REQ-329035/A-Smart Charging Settings Update Requests Command Timeout

Actors	Cloud, Vehicle
Pre-conditions	SDN has updated the Smart Charging settings
Scenario	SDN sends a command to the ECG to update the Smart Charging settings
Post-conditions	SDN does not get a command response within 90sec SDN marks the command as timeout
Interfaces	SDN
Notes	

3.3.3 White Box Views

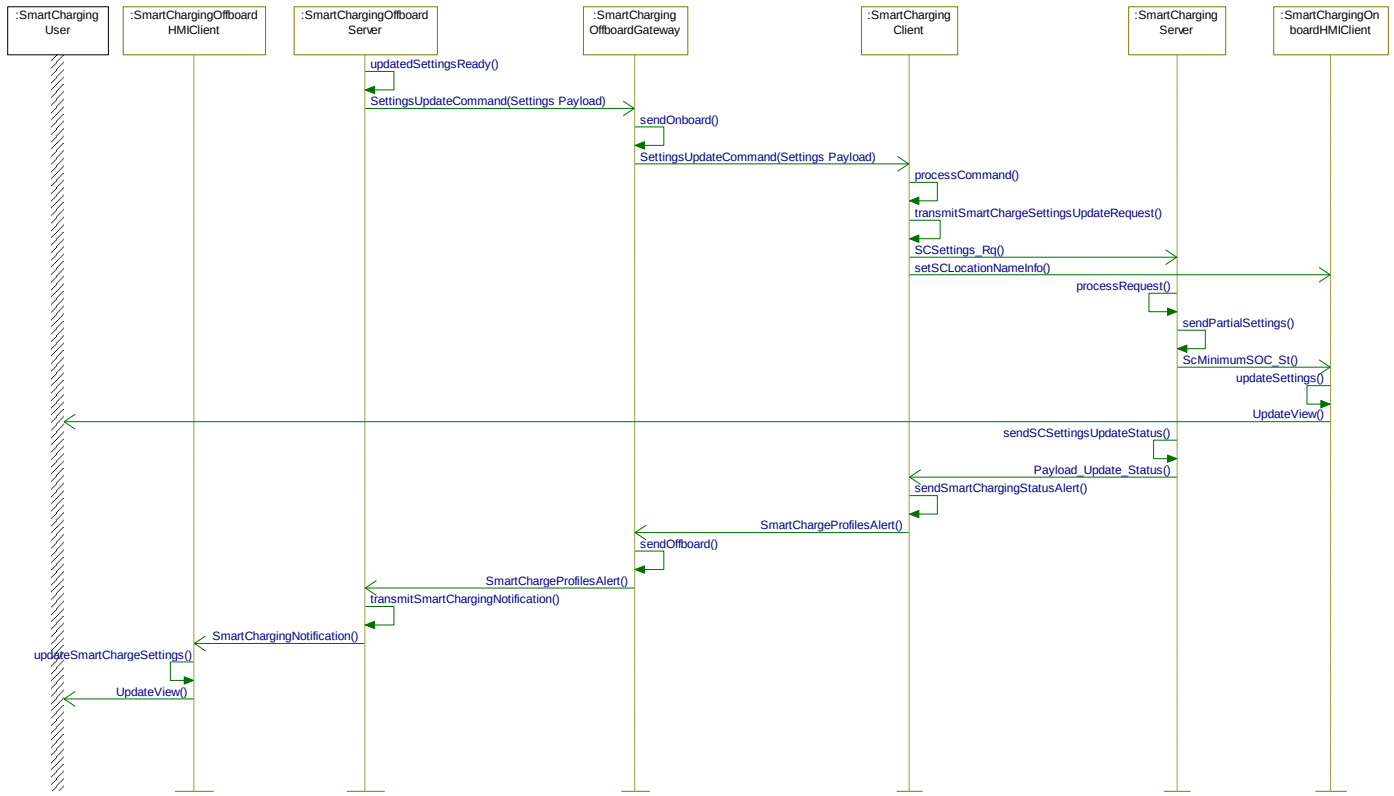
3.3.3.1 Activity Diagrams

3.3.3.1.1 SCG-ACT-REQ-329637/C-Smart Charging Learned Settings Update



3.3.3.2 Sequence Diagrams

3.3.3.2.1 SCG-SD-REQ-329957/C-Machine Learning



3.4 SCG-FUN-REQ-328712/B-Charging & Arriving at a Smart Charging Location

3.4.1 Requirements

3.4.1.1 SCG-REQ-335302/A-Vehicle charges to higher charge between Target and Minimum SOC

The vehicle shall charge according the higher value for state of charge between the target SOC and user set minimum SOC.

3.4.1.2 SCG-REQ-335303/C-Vehicle is at Smart Charging Location

If the vehicle is plugged-in at a Smart Charging location, the Charging Module shall charge according to the SC settings Payload, only if Smart Charging is ON.

3.4.1.3 SCG-REQ-335304/B-Vehicle is not at a Smart Charging Location

If Smart Charging is ON, but vehicle is not at a Smart Charging location, the charging module shall charge immediately upon plugging in.

3.4.1.4 SCG-REQ-335308/A-Vehicle is at location with duration setting ON

If vehicle is at a Smart Charging location with duration state as ON, charging module will charge immediately upon plugging in and duration timer countdown will begin

3.4.1.5 SCG-REQ-335309/B-Vehicle is at a location with duration setting ON, target SOC not reached by end of time

If vehicle does not reach the higher value between target SOC and minimum SOC by the end of the duration timer, the vehicle shall return to previous setting. The vehicle shall charge to the higher value between target SOC and minimum SOC based on Smart Charging settings. If there is a future window before departure time Smart Charging shall charge later to reach the higher value between target SOC and minimum SOC. If no window exists, the vehicle shall charge outside of any window to reach the higher value between target SOC and minimum SOC.

3.4.1.6 SCG-REQ-335310/B-Vehicle is at a location with duration setting ON, target SOC is reached before end of time

If vehicle reaches the higher value between target SOC and minimum before the end of duration timer, the vehicle will continue to charge until duration timer runs out

3.4.1.7 SCG-REQ-335311/A-Vehicle is at a location with duration setting ON, vehicle is unplugged during charging

If duration setting is ON for a location and the vehicle is unplugged during charging, then the duration timer shall reset and the timer will default to its original value upon plug-in

3.4.1.8 SCG-REQ-335338/A-Vehicle is at a location with duration setting ON, cloud smart charging settings updated during charging

If charging setting is ON for a location and the duration timer is running, any new duration times sent as part of the Smart Charging settings payload shall update the time remaining from old duration value. The vehicle shall use the amount of time passed on the Duration_Countdown_Timer and subtract time elapsed from the new duration timer to come up with the updated Duration_Countdown_Timer tunable parameter that is equal to the total duration timer sent from the cloud minus the amount of time the vehicle has already charged. This will insure that the vehicle only charges for a total amount of time equal to the updated duration that was sent from the cloud.

3.4.1.9 SCG-REQ-335339/B-Digital Station Schedule

The OBCC module shall receive a charging schedule - *SAScheduleTuple* – to the vehicle via *ChargeParameterDiscoveryRes* message, which shall include EVSE ID, Time interval points, and max power points per time interval points. This requirement is captured in the PnCChargingStationInfoAlert.

3.4.1.10 SCG-REQ-335341/A-Vehicle HMI displays the higher charge percentage for target SOC

When the vehicle is located at a SC location it shall display the location target SOC as the higher charge percentage value between the Location Target SOC and the Global Minimum SOC set by the user.

3.4.1.11 SCG-REQ-335342/A-Smart Charging Duration State is OFF by default

SC_Duration_ON_OFF_Request = OFF by default.

3.4.1.12 SCG-REQ-335343/A-Duration Timer begins immediately upon plug in

Duration timer shall begin immediately upon plug in.

3.4.1.13 SCG-REQ-335344/B-Duration Timer during lost power incident while charging

If the charging station loses power (*ChrgrInPwMde_D_Actl* = 0x0 (EVSE Not detected) is signal used to indicate loss in power) while charging the vehicle and a duration timer is active, the timer shall be paused until the charge is resumed.

3.4.1.14 SCG-REQ-342472/B-Charging Module updates Gateway Module the Vehicle has reached a Smart Charging Saved Location

When the vehicle arrives at a Smart Charging Location the Charging Module shall update ChrgLocIdCurnt_D_Sav = 0 and send to the Gateway Module along with the ScLocIdCurnt_No_Stat = the current Smart Charging location of the vehicle. ScLocIdCurnt_No_Stat shall also be part of the VSTAT bundle.

3.4.1.15 SCG-REQ-349016/A-Charging Module updates Vehicle HMI and Gateway Module when the Vehicle has reached a Smart Charging Location

When vehicle arrives at a Smart Charging Location, the Charging Module shall send ScLocIdCurnt_No_Stat and CurntTargetSOC_St to vehicle HMI and the Gateway Module.

3.4.1.16 SCG-REQ-342473/B-Gateway Module sends Alert when Vehicle has reached a Smart Charging Location

When the vehicle is keyed off at a Smart Charging Location the Gateway Module shall send xEVSmartChargingLocationReachedAlert to the cloud to alert it that the vehicle has arrived at a Smart Charging Location and at which location ID. The alert shall contain the most recent values for ChrgLocIDCurnt_D_Sav =0 and ScLocIdCurnt_No_Stat = the current Smart Charging Location ID the Gateway Module received from the Charging Module.

3.4.1.17 SCG-REQ-349017/A-Conflict Notifications - Charging Outside Time Windows

The vehicle may need to start charging outside the smart charging windows in order to achieve the desired charge level if a Departure Time is set before the charge end time occurs.In such instances, the charging Module shall set NtfctnConflict1_D_Rq = “Charging outside time window” (state 0x3) and send signal to the Gateway Module and to the Vehicle HMI.

3.4.1.18 SCG-REQ-349018/A-Conflict Notifications - Charging Outside Time Windows Vehicle HMI

Vehicle HMI shall ignore NtfctnConflict1_D_Rq = “Charging outside time window” (state 0x3) when sent by the Charging Module and Smart Charging is turned ON.

3.4.1.19 SCG-REQ-349019/A-Conflict Notifications - Charging Outside Time Windows Alert to Cloud

When Gateway Module receives NtfctnConflict1_D_Rq = “Charging outside time window” (state 0x3) from the Charging Module it shall populate the signal and send XEVChargeScheduleChangeNotificationAlert to the Cloud.

3.4.1.20 SCG-REQ-349020/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Charging Module Set Signal

The vehicle may not reached the desired charge level if a Departure Time is set before the charge end time occurs. In such instances, cabin conditioning may be limited and charging Module shall populate NtfctnConflict1_D_Rq = “Not reaching desired Level” (state 0x2) and send to the Gateway Module and to the Vehicle HMI

3.4.1.21 SCG-REQ-349021/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Vehicle HMI

Vehicle HMI shall ignore NtfctnConflict1_D_Rq = “Not reaching desired level” (state 0x2) when it is sent by the Charging Module while Smart Charging is turned ON.

3.4.1.22 SCG-REQ-349022/A-Conflict Notifications - Cannot Reach Target SOC by Departure Time Alert to Cloud

Upon receiving NtfctnConflict1_D_Rq = “Not reaching desired level” (state 0x2) from the Charging Module, the Gateway Module shall send XEVChargeScheduleChangeNotificationAlert to the Cloud with the signal populated.

3.4.2 Use Cases

3.4.2.1 SCG-UC-REQ-329036/A-User plugs in, Smart Charging (SC) is Turned On, SC location exists

Actors	User, Vehicle
Pre-conditions	Smart charging is activated Smart charging is turned on
Scenario	User plugs a charger into their vehicle

Post-conditions	HPCM checks if Smart Charging is turned on Smart Charging is turned on, HPCM checks if location has SC settings SC settings location exists, HPCM charges based on SC settings for location
Interfaces	HPCM, ECG
Notes	Charge processing is the same as existing, no changes to it

3.4.2.2 SCG-UC-REQ-329038/B-User plugs in, SC is Turned On, Location is not a Smart Charging Location

Actors	User, Vehicle
Pre-conditions	Smart Charging is ACTIVATED Smart charging is turned on
Scenario	User plugs a charger into their vehicle
Post-conditions	HPCM checks if Smart Charging is on Smart Charging is ON, HPCM checks if location has SC settings SC settings for location DOES NOT exist, HPCM “charges immediately” – even if it was a previously saved location with Preferred Charge Times
Interfaces	HPCM
Notes	Charge processing is the same as existing, no changes to it

3.4.2.3 SCG-UC-REQ-329039/A-User plugs in, Smart Charging is Off

Actors	User, Vehicle
Pre-conditions	Smart charging is turned off
Scenario	User plugs a charger into their vehicle
Post-conditions	HPCM checks if Smart Charging is ON Smart Charging is OFF, so HPCM uses standard preferred charge logic for the current location
Interfaces	HPCM
Notes	

3.4.2.4 SCG-UC-REQ-329040/A-EVSE Schedule Sent To Cloud

Actors	EVSE, Vehicle
Pre-conditions	Smart Charging is ACTIVATED Smart Charging is ON
Scenario	User plugs vehicle into EVSE with a digital schedule
Post-conditions	OBCC picks default schedule – *SAScheduleTuple* - provided by EVSE. Schedule includes: - EVSE ID - Time interval points (displayed as seconds from NOW or 0) - Max power points per time interval points OBCC sends default schedule to ECG using TP protocol ECG sends protocol to SDN with default schedule
Interfaces	OBCC, ECG, SDN
Notes	

3.4.3 White Box Views

3.4.3.1 Activity Diagrams

3.4.3.1.1 SCG-ACT-REQ-330006/B-Plugin

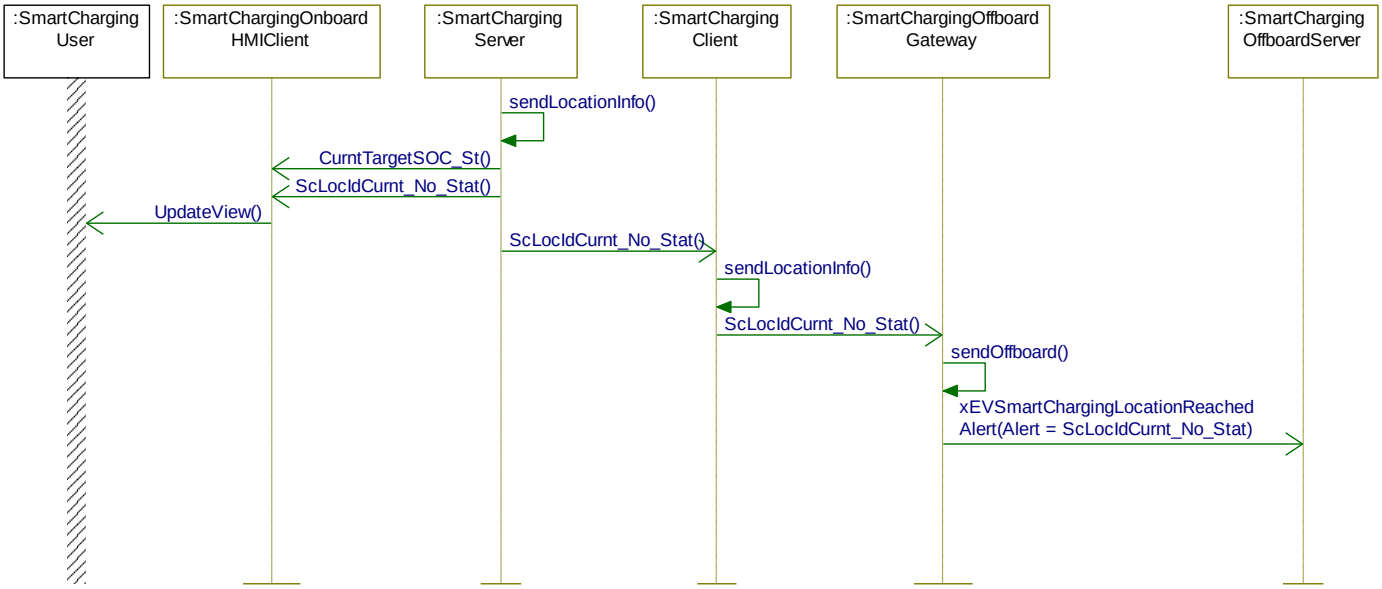
See PNC-ACT-REQ-330594-Plugged In and Charging Has Not Begun Transmit EVSEid

3.4.3.2 Sequence Diagrams

3.4.3.2.1 SCG-SD-REQ-330005/B-Plugin

See PNC-ACT-REQ-330599-Plugged In and Charging Has Not Started Transmit EVSEid

3.4.3.2.2 SCG-SD-REQ-349023/A-Vehicle Arrives at Smart Charging Location



3.5 SCG-FUN-REQ-328711/B-Updating Minimum State Of Charge Settings

3.5.1 Requirements

3.5.1.1 *SCG-REQ-335345/B-Vehicle HMI sends new Minimum SOC to Charging Module*

After the user updates the minimum SOC through the Vehicle HMI, the Vehicle HMI sends the new value for SC_Minimum_SOC_Request to the Charging Module.

3.5.1.2 *SCG-REQ-335347/B-Charging Module updates Smart Charging Settings stored in the Vehicle based on the new Minimum SOC*

The Charging Module processes the new SC Minimum SOC Request from the Vehicle HMI and successfully updates minimum SOC. The Charging Module shall then send back the updated minimum SOC to the Gateway Module and to the Vehicle HMI. The Vehicle HMI shall display the updated Minimum SOC.

3.5.1.3 *SCG-REQ-335350/B-Gateway Module alerts the Cloud that Smart Charging Settings were updated*

After receivin the updated minimum SOC from the Charging Module, the Gateway Module shall send SCSettingsUpdateAlert with the Updated minimum SOC to the cloud to notify the cloud of the new Smart Charging Settings.

3.5.1.4 SCG-REQ-335351/B-Charging Module Reports Smart Charging Settings Update Failure back to User

In the event that SC_Minimum_SOC_Request fails, the Charging Module shall report failure back to the Vehicle HMI.

3.5.2 Use Cases

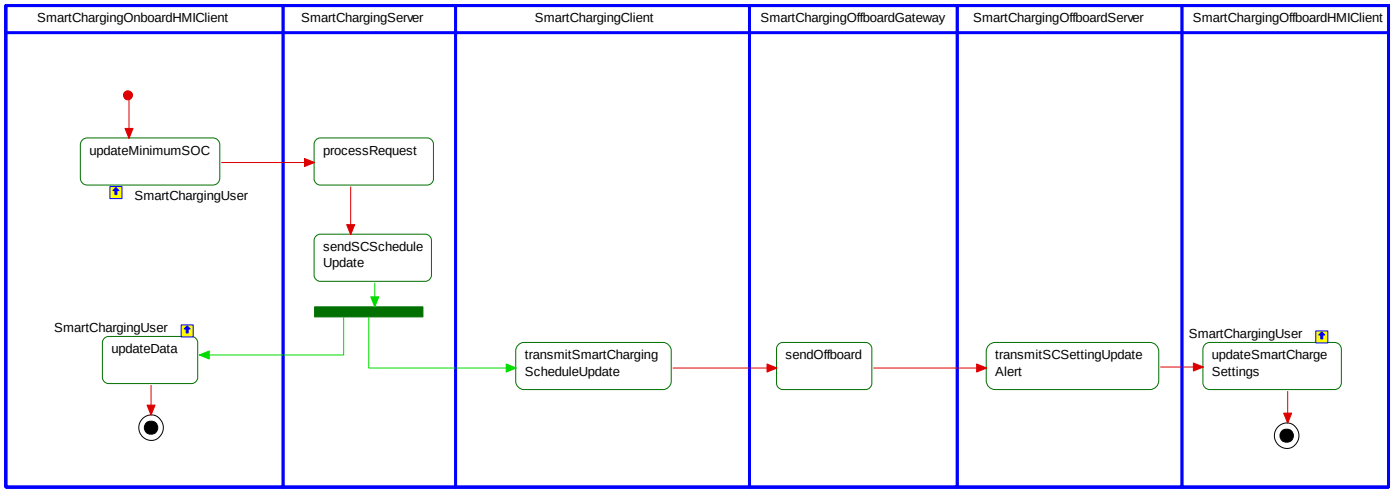
3.5.2.1 SCG-UC-REQ-329024/B-User wants to Set Minimum SOC in HMI

Actors	Cloud, Vehicle
Pre-conditions	Smart Charging is ACTIVATED Smart Charging is ON
Scenario	User wants to set/update minimum SOC for SC
Post-conditions	User selects minimum SOC APIM sends minimum SOC to HPCM HPCM will charge to higher percentage between minimum SOC and target SOC for location HPCM sends status back to APIM and ECG ECG sends an alert to SDN with updated SC settings
Interfaces	SDN, APIM, ECG, HPCM
Notes	

3.5.3 White Box Views

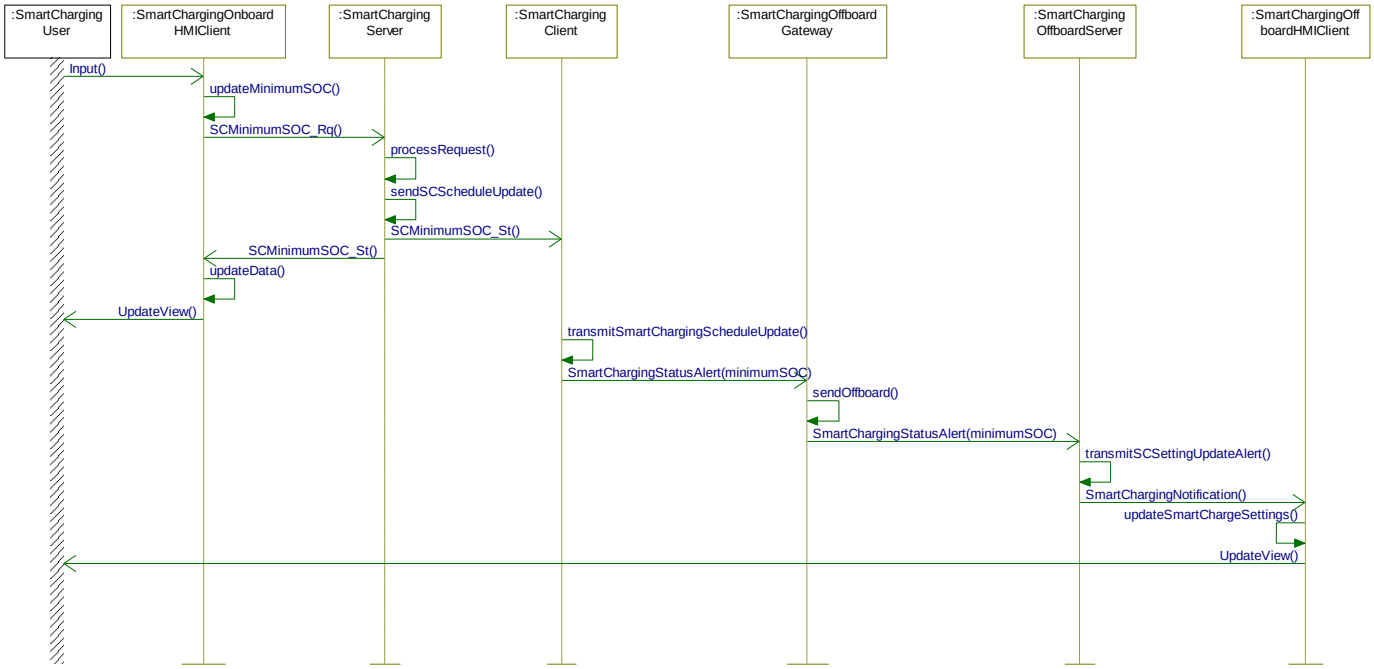
3.5.3.1 Activity Diagrams

3.5.3.1.1 SCG-ACT-REQ-333381/B-Update Minimum SOC



3.5.3.2 Sequence Diagrams

3.5.3.2.1 SCG-SD-REQ-334519/B-Update Minimum SOC



3.6 SCG-FUN-REQ-333070/B-Update CCS via HMI

3.6.1 Requirements

3.6.1.1 SCG-REQ-335366/C-User Turns Off CCS

If the user turns OFF any single or combination of the following CCS – Vehicle Data, Vehicle Connectivity, Location Sharing, Driving Characteristics - while Smart Charging is ON the Gateway Module shall shutdown the Smart Charging app.

3.6.1.2 SCG-REQ-335368/C-Gateway Module informs Charging Module Smart Charging is OFF

Before the Gateway Module shuts down, it sends smartChargingONRequest = OFF to the Charging Module.

3.6.1.3 SCG-REQ-343297/B-Charging Module turns OFF Smart Charging and responds to Gateway Module and Vehicle HMI

The Charging Module shall process the smartChargingONRequest = OFF from the Gateway Module and turn OFF Smart Charging. The Charging Module then returns smartChargingONStatus = OFF to the Gateway Module and to the Vehicle HMI.

3.6.1.4 SCG-REQ-335370/B-Vehicle HMI displays SC ON/OFF toggle as OFF

After receiving smartChargingONStatus = OFF from the Charging Module, the Vehicle HMI shall display Smart Charging toggle as OFF.

3.7 SCG-FUN-REQ-328713/A-Master or Brand Reset

3.7.1 Requirements

3.7.1.1 SCG-REQ-335372/B-Gateway Module receives request to initiate Master Reset

Cloud Initiated:
After receiving the ClearAllUserSettingsCommand from the Cloud, the Gateway Module shall send ClearAllSettings_Rq to the Charging Module to reset all Smart Charging Settings and turn OFF Smart Charging. If a user does not authorize within 48 hours, the Smart Chargign DID shall reset, as well, per current functionality.

3.7.1.2 SCG-REQ-343298/A-Vehicle HMI sends Master Reset to the Charging Module

Vehicle HMI Initiated:
After receiving FactoryReset_Rq from the Vehicle HMI, the Charging Module to reset all Smart Charging Settings and turn OFF Smart Charging. If a user does not authorize within 48 hours, the Smart Chargign DID shall reset, as well, per current functionality.

3.7.1.3 SCG-REQ-335373/C-Charging Module turns OFF Smart Charging and RESETS all Smart Charging Settings from the Vehicle

Cloud Initiated:
After receiving the ClearAllSettings_Rq from the Gateway Module, the Charging Module shall turn OFF Smart Charging and RESET all Smart Charging settings in the vehicle before resetting base PEPC charge settings

Vehicle HMI Initiated:
After receiving the FactoryReset_Rq from the Vehicle HMI, the Charging Module shall turn OFF Smart Charging and RESET all Smart Charging settings in the vehicle before resetting base PEPC charge settings.

3.7.1.4 SCG-REQ-335374/B-Charging Module sends Status to the Vehicle HMI that Smart Charging has been turned OFF

Cloud Initiated:
After resetting Smart Charging Signals, the Charging Module shall send smartChargingONStatus = OFF to the Vehicle HMI

Vehicle HMI Initiated:
After resetting Smart Charging Signals, the Charging Module shall send smartChargingONStatus = OFF to the Vehicle HMI

3.7.1.5 SCG-REQ-335375/B-Gateway Module sends alert to the Cloud that Master Reset was successful

Cloud Initiated:
After Master Reset is complete, the Gateway Module shall send ClearAllUserSettingsCommandResponse to the Cloud to signify that Smart Charging has been turned OFF and Smart Charging Settings were RESET in the Charging Module.

Vehicle HMI Initiated:
After Master Reset is complete the Gateway Module shall send MasterResetAlert = Master Reset to the Cloud to signify that Smart Charging has been turned OFF and Smart Charging Settings were RESET in the Charging Module.

3.7.1.6 SCG-REQ-335377/B-Vehicle HMI requests to initiate Brand Reset

Vehicle HMI triggers a Brand Reset and shall send EmbeddedModemReset _Rq = Save to the Charging Module to SAVE Smart Charging Settings and turn OFF Smart Charging. If EmbeddedModemReset_Rq = Reset than the Charging Module shall Reset Smart Charging Settings and turn OFF Smart Charging.

3.7.1.7 SCG-REQ-335378/B-Charging Module turns OFF Smart Charging and SAVES all Smart Charging Settings on the Vehicle

After receiving EmbeddedModemReset_Rq = Save, the Charging Module shall SAVE Smart Charging Settings and turn OFF Smart Charging. The Charging Module shall respond to the Vehicle HMI with smartChargingONStatus = OFF and EmbeddedModemReset_Status = Saved once complete.

If the Charging Module receives EmbeddedModemReset_Rq = Reset, the Charging Module shall Reset Smart Charging Settings and turn OFF Smart Charging. The Charging Module shall respond to the Gateway Module and Vehicle HMI with smartChargingONStatus = OFF and EmbeddedModemReset_Status = Reset once complete

3.7.1.8 SCG-REQ-335380/B-Gateway Module alerts the Cloud that Brand Reset was successful

Once the Brand Reset is complete the Gateway Module shall send MasterResetAlert = Brand Reset to update the Cloud that Smart Charging was turned OFF and Smart Charging Settings were saved in the Charging Module. During a Brand Reset, If a user does not authorize within 48 hours, the Smart Chargign DID shall reset, as well, per current functionality.

3.7.1.9 SCG-REQ-335381/B-Gateway Module reports failure to turn OFF Smart Charging to Vehicle HMI and the user

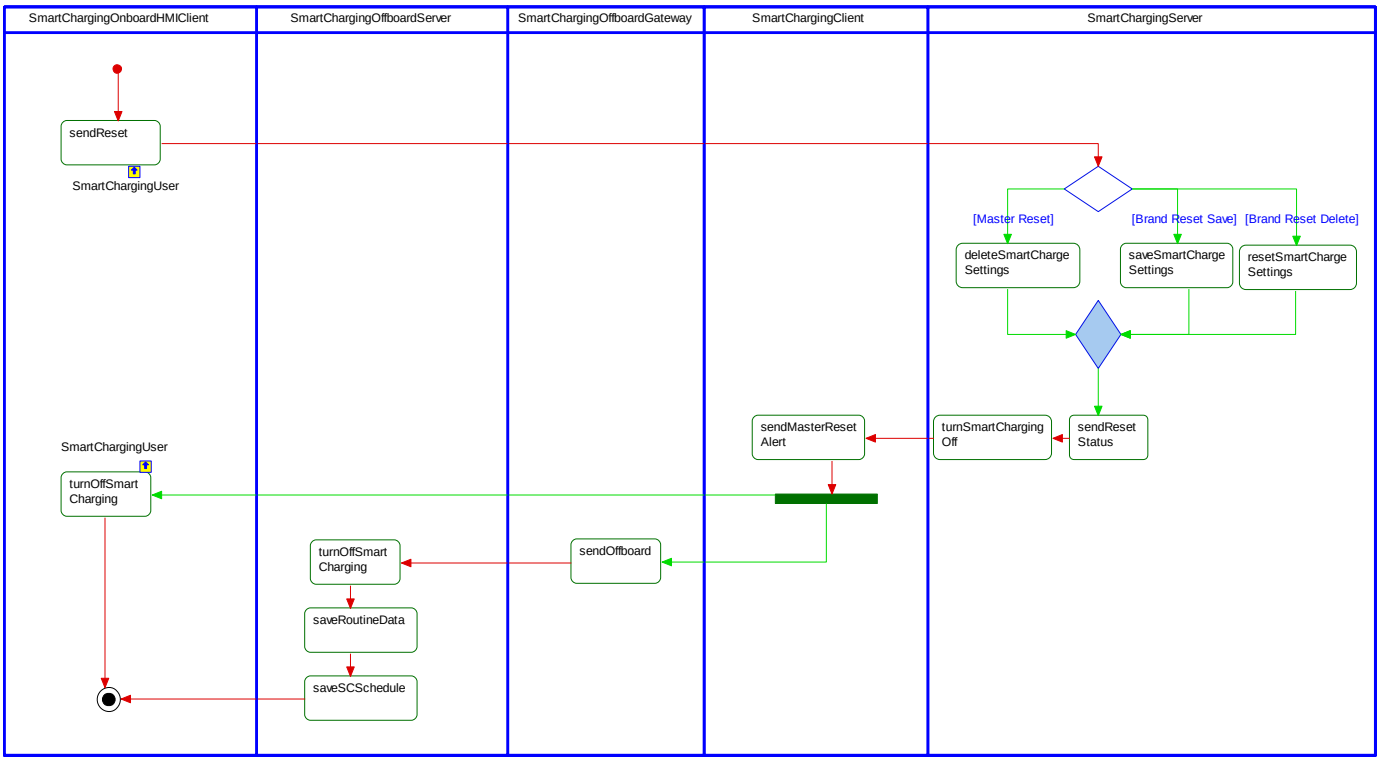
In the event that the Brand Reset fails, the Charging Module shall report failure back to the Vehicle HMI.

3.7.2 Use Cases

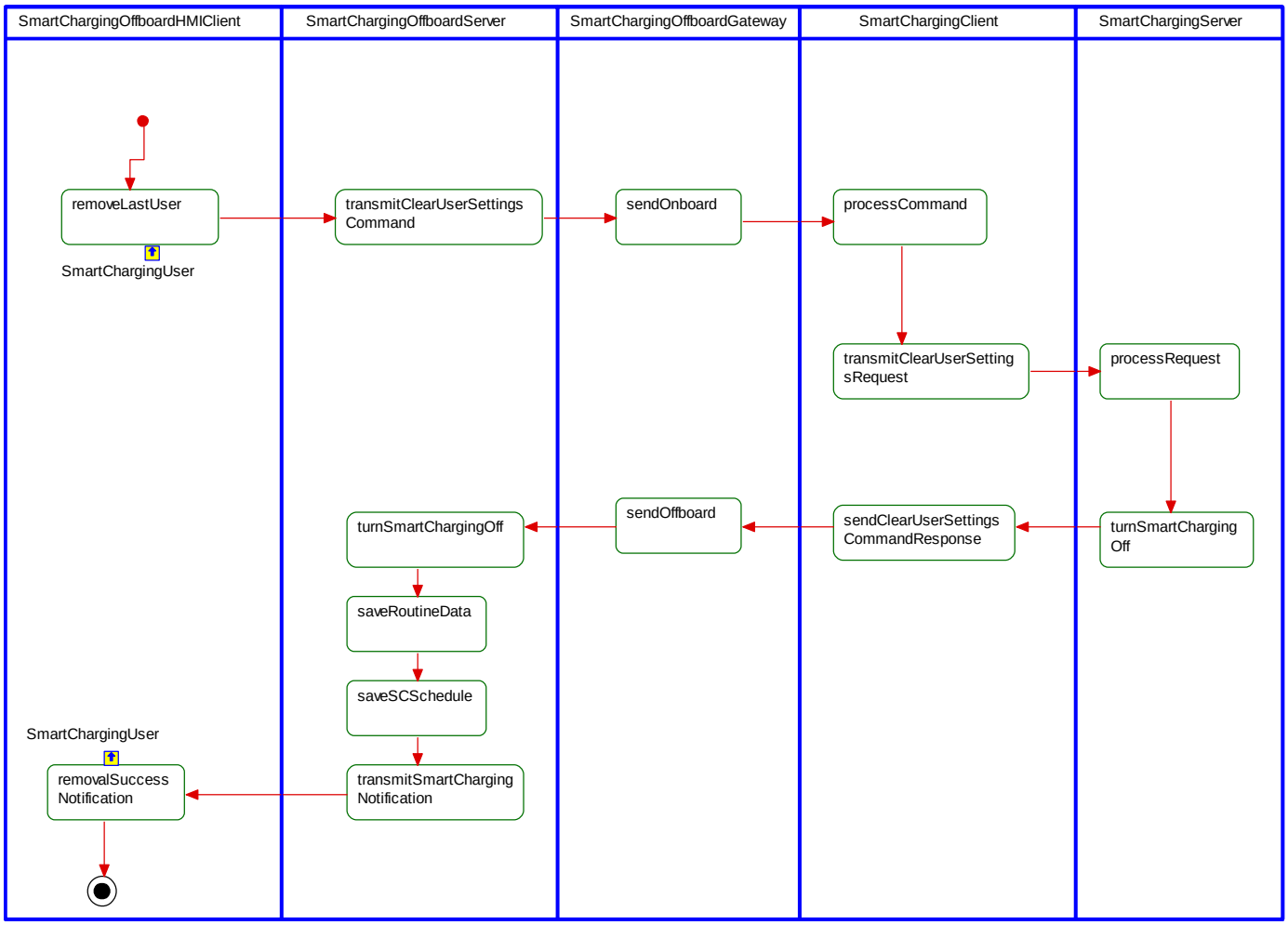
3.7.3 White Box Views

3.7.3.1 Activity Diagrams

3.7.3.1.1 SCG-ACT-REQ-333379/B-Reset Performed In Vehicle

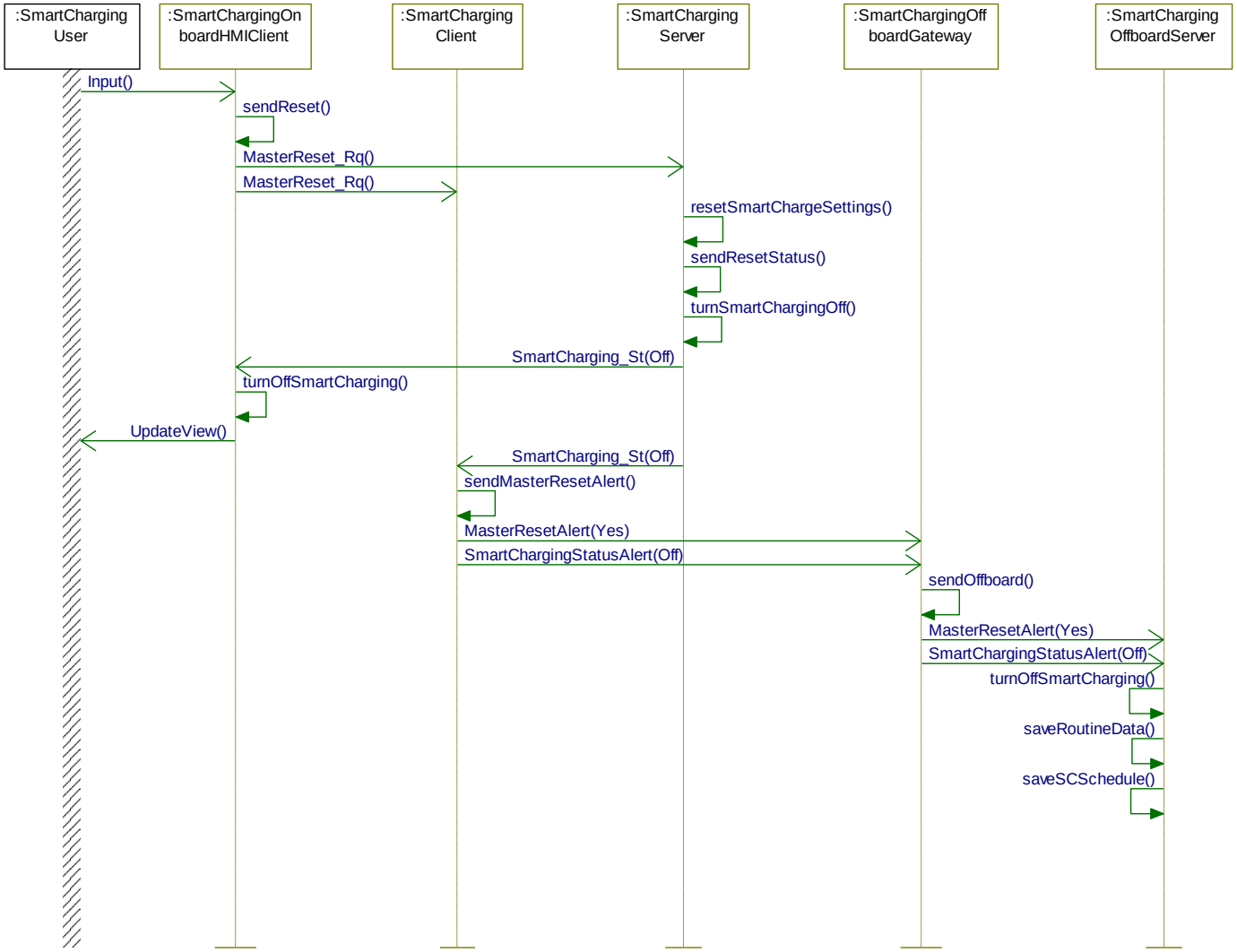


3.7.3.1.2 SCG-ACT-REQ-333380/B-Last User Removed Reset

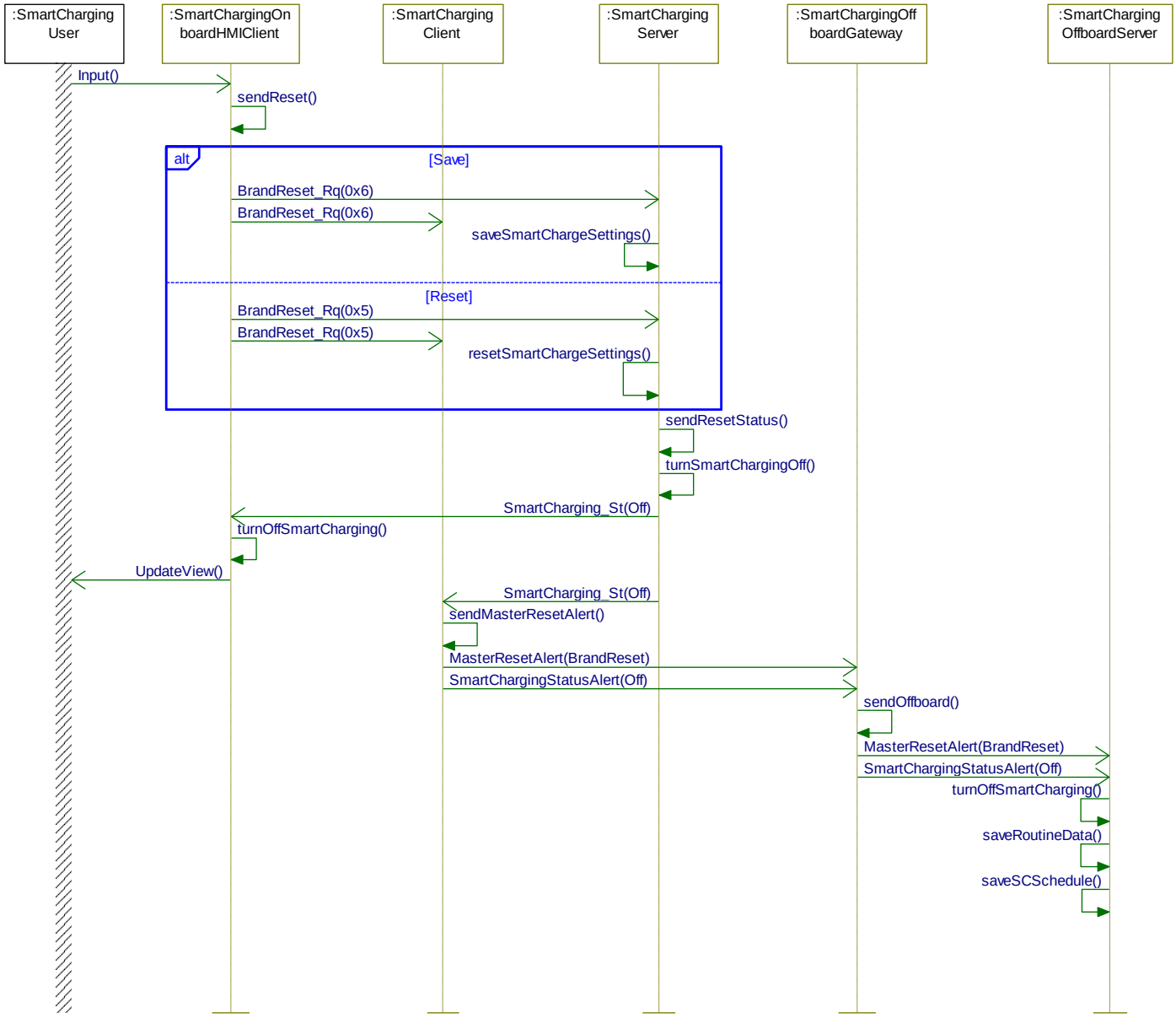


3.7.3.2 Sequence Diagrams

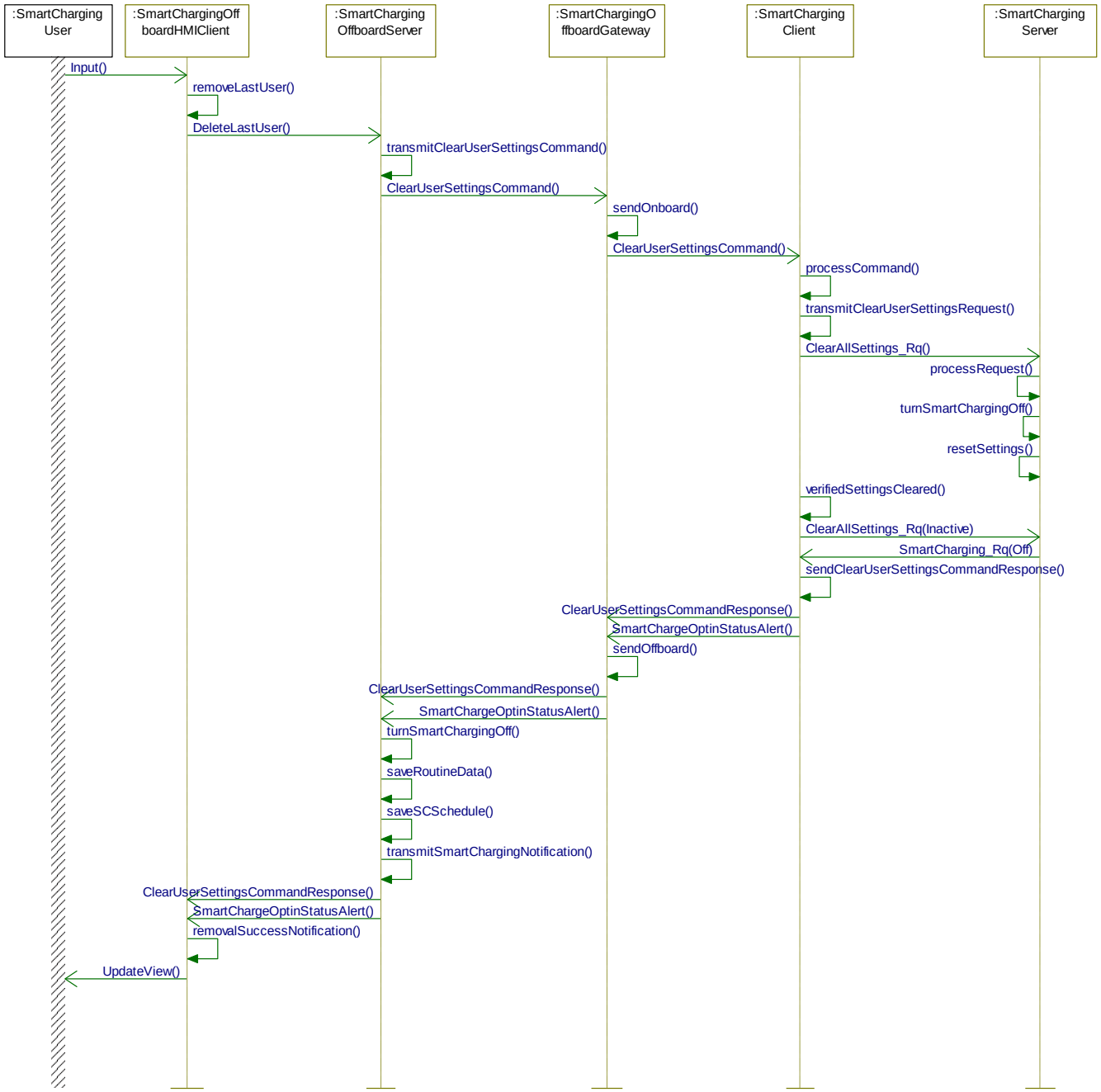
3.7.3.2.1 SCG-SD-REQ-334554/C-Master Reset Performed In Vehicle



3.7.3.2.2 SCG-SD-REQ-334561/C-Brand Reset Performed In Vehicle



3.7.3.2.3 SCG-SD-REQ-334553/B-Last User Master Reset



3.8 SCG-FUN-REQ-333209/A-Delete Smart Charge Location

3.8.1 Requirements

3.8.1.1 SCG-REQ-335386/B-Gateway Module receives command to delete SC location

Gateway Module receives command from the Cloud to delete a Smart Charging Location. The Cloud shall send all Smart Charging Settings for all Smart Charging Locations to the Gateway Module. Within the payload, The DeleteSCLocationRequest shall be flagged as Yes for whatever SC Location needs to be deleted. The Gateway Module shall send the updated Smart Charging Settings payload to the Charging Module.

3.8.1.2 SCG-REQ-343052/C-Gateway Module responds to cloud with in-progress Command Response during after receiving Delete Smart Charging Location Command

After receiving the Delete Smart Charging Location Command from the Cloud, the Gateway Module shall respond with a command response with the status of “Success”. The Gateway Module shall raise the FreshData_Rq and hold until Gateway Module receives PayloadUpdateStatus = “Complete”.

3.8.1.3 SCG-REQ-335387/D-Charging Module deletes SC location

After receiving the request to delete a smart charging location from the Gateway Module, the Charging Module shall delete the Smart Charging Location and all the settings tied to it; the other Smart Charging locations and settings shall be saved with the values in the payload. The Charging module shall then send PayloadUpdateStatus = “Complete” to the Gateway Module.

3.8.1.4 SCG-REQ-335388/C-Gateway Module sends alert to the cloud once successfully deleted location

After receiving the PayloadUpdateStatus = “Complete” from the Charging Module, the Gateway Module shall send SCSettingsUpdateAlert to the cloud with a successful status for Delete SC Location. Gateway Module shall return FreshData_Rq to 0 once it has received PayloadUpdateStatus = “Complete”.

3.8.1.5 SCG-REQ-335390/A-Cloud to Gateway Module Delete SC Location Command Time Out

After receiving DeleteSCLocationCommand from the Cloud, if the Gateway Module does not send a response in 90 seconds then the command shall time out.

3.8.1.6 SCG-REQ-335392/C-Gateway Module reports Delete SC Location failure to the Cloud

In the event that Delete SC Location fails, (PayloadUpdateStatus changes from “In-progress” to “Null” the Charging Module failed to save the new Smart Charging Payload and delete the selected SC Location. The Gateway Module shall send SCSettingsUpdateAlert with a failure value and description of the error.

3.8.1.7 SCG-REQ-337298/B-Cloud shall send TurnOFFSmartCharging Command after DeleteSCLocation Command is successful

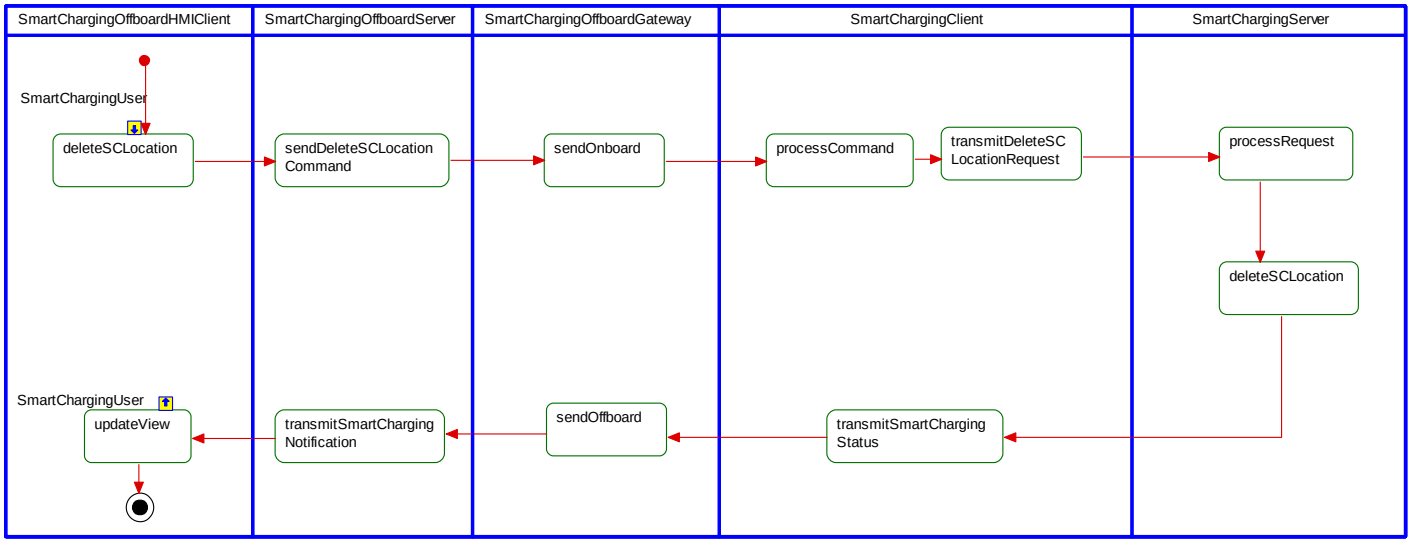
If the user deletes a Smart Charging Location from the cloud, the cloud shall send the Delete Smart Charging Location command to the vehicle. After successful completion, then he cloud shall send another command to turn OFF Smart Charging.

3.8.2 Use Cases

3.8.3 White Box Views

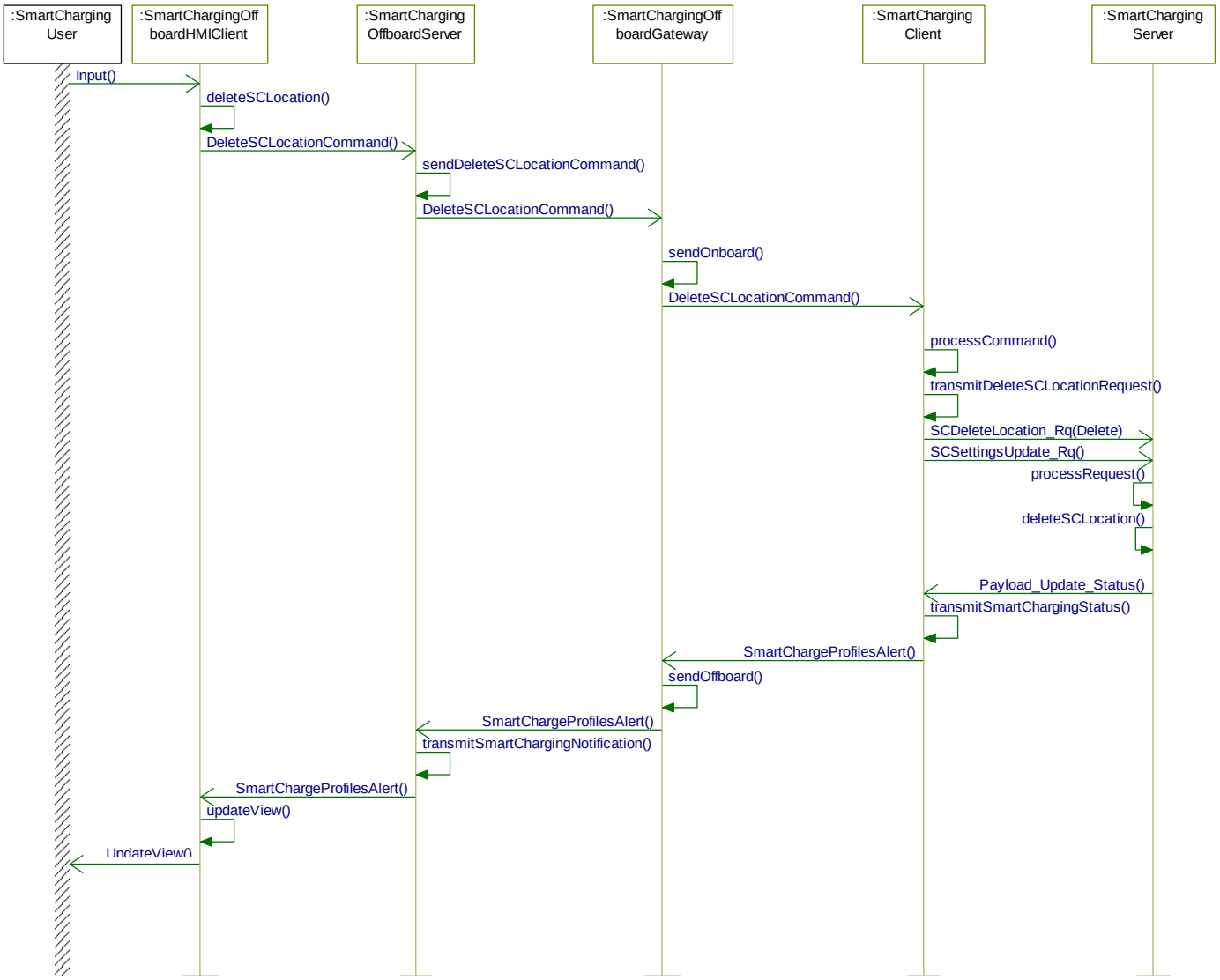
3.8.3.1 Activity Diagrams

3.8.3.1.1 SCG-ACT-REQ-333378/C-Delete Smart Charge Location



3.8.3.2 Sequence Diagrams

3.8.3.2.1 SCG-SD-REQ-334522/C-Delete Smart Charge Location



4 Appendix A: Definitions / Acronyms

Abbr.	Stands for	Description

FORD MOTOR COMPANY CONFIDENTIAL
The information contained in this document is Proprietary to Ford Motor Company.

5 Appendix B: Reference Documents

Reference	Title	Doc. ID	Revision

The requirements of the documents listed in the reference table above, of the latest revision level, form a part of this Engineering Specification