Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Digital Scent

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0
UNCONTROLLED COPY IF PRINTED

Version Date: September 7, 2021

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
September 7, 2021	**1.0**	**Initial Release**	

Table of Contents

1 Architectural Design

1.1 Overview

The Digital Scent feature provides the user the ability to install up to 3 (reserved up to 5) different scents and dispense any one of them on demand or in the future at vehicle start. The user can select the Level (Intensity), Time preset options. The Digital Scent Client stores and automatically reapplies scent settings for last selected scent, level, and time preset selected for the identified user.

1.2 DST-CLD-REQ-376671/A-Digital Scent Client

The Digital Scent Client is responsible to provide the user HMI, to store and apply user settings using the Enhanced Memory feature, to receive OTA updates and to store scent data tables, to conditionally transmit selected subsets of scent data tables to the Digital Scent Server, to prioritize scenting requests from scent related features, to transmit scenting commands to the Digital Scent Server, to receive status information from the Digital Scent Server.

1.3 DST-CLD-REQ-376672/A-Digital Scent Server

The Digital Scent Server is responsible for gatewaying CAN / LIN bidirectionally and dispensing the scent based on the commands sent from the Digital Scent Client. The Digital Scent Server will also report the current state of their module (dispensing or not, temperature related inhibit, etc.) and information about installed scent cartridges when it receives the master signal ID to respond.

1.4 Physical Mapping of Classes

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

Logical Class	Physical Module (ECU)
Digital Scent Client	APIM
Digital Scent Server	RCCM/Digital Scent Module

1.5 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
CabinScent1Type_St	CabnScent1Type_No_Actl
CabinScent2Type_St	CabnScent2Type_No_Actl
CabinScent3Type_St	CabnScent3Type_No_Actl
CabinScent4Type_St	CabnScent4Type_No_Actl
CabinScent5Type_St	CabnScent5Type_No_Actl
CabinScent1Life_St	CabnScent1Life_Pc_Actl
CabinScent2Life_St	CabnScent2Life_Pc_Actl
CabinScent3Life_St	CabnScent3Life_Pc_Actl
CabinScent4Life_St	CabnScent4Life_Pc_Actl
CabinScent5Life_St	CabnScent5Life_Pc_Actl
CabinScentSupplier_St	CabnScentSplr_D_Stat
CabinScentChannel_St	CabnScentChnl_D_Stat
CabinScentIntensity_St	CabnScentIntns_D_Stat
CabinScentMode_St	CabnScentMde_D_Stat

CabinScentTempInhibit_St	CabnScentTeMsgTxt_D_Rq
CabinScentMode_Rq	CabinScentMde_D_Rq
CabinScentChannel_Rq	CabnScentChnl_D_Rq
CabinScentIntensity_Rq	CabnScentIntns_D_Rq
CabinScentFanCalib_Rq	CabnScentFanCalib_No_Rq
CabinScentCalbType_Rq	CabnScentCalbType_No_Rq
CabinScentCalibVal_Rq	CabnScentCalibVal_No_Rq

1.6 DST-IIR-REQ-376675/A-Digital Scent Client _Tx

1.6.1 MD-REQ-377215/A-CabinScentMode_Rq

Message Type: Request

Signal requests scenting to start/continue dispensing or to stop dispensing.

Name	Literals	Value	Description
MasterScentOperation	-	-	
	NoneOrNoneYet	0x0	
	StartOrContinue Scent	0x1	
	StopScent	0x2	
	MasterError	0x3	

1.6.2 MD-REQ-377217/A-CabinScentChannel_Rq

Message Type: Request

Signal requests a scent channel (the position of an installed scent cartridge in the scent module) to which scent related requests / data apply.

Name	Literals	Value	Description
	-	-	Channel Requested
	Off	0x0	
	Channel_1	0x1	
	Channel_2	0x2	
	Channel_3	0x3	
	Channel_4	0x4	
	Channel_5	0x5	
	Channel_6	0x6	
	Channel_7	0x7	

1.6.3 MD-REQ-377218/A-CabinScentIntensity_Rq

Message Type: Request

Signal requests a scent level intensity for the specified scent channel (scent cartridge) requested.

Name	Literals	Value	Description
	-	-	Intensity requested for Scent Chosen
	NotDetermined	0x0	
	Off	0x1	
	NotUsed_1	0x2	
	Low	0x3	
	NotUsed_2	0x4	
	Medium	0x5	
	NotUsed_3	0x6	
	High	0x7	

1.6.4 MD-REQ-377225/A-CabinScentFanCalib_Rq

Message Type: Request

Signal provides the scent fan calibration parameter value for the requested scent channel (scent cartridge).

Name	Literals	Value	Description
Type	-	-	
	Invalid	0x0	
	1	0x1	
	…	…	
	254	0xFE	
	NotDetermined	0xFF	

1.6.5 MD-REQ-377219/A-CabinScentCalibVal_Rq

Message Type: Request

Signal provides the "value" of scent calibration parameter associated with the "type" of scent calibration parameter.

Name	Literals	Value	Description
	-	-	Min =0 Max = 65535 Factor =1 Offset = 0
	Min	0x0000	
	…	…	
	Max	0xFFFF	

1.6.6 MD-REQ-377220/A-CabinScentCalbType_Rq

Message Type: Request

Signal provides the "type" of scent calibration parameter associated with the "value" of scent calibration parameter.

Name	Literals	Value	Description
	-	-	
	GeneralPurpose	0x0	

	LowIntensityBaseFanSpeed	0x1	
	MedIntensityBaseFanSpeed	0x2	
	HighIntensityBaseFanSpeed	0x3	
	RepeatNoseBlindLowIntns	0x4	
	RepeatNoseBlindMedIntns	0x5	
	RepeatNoseBlindHighIntns	0x6	
	DurOfPauseNoseBlndLowInt	0x7	
	DurOfPauseNoseBlndMedInt	0x8	
	DurOfPauseNoseBlndHighInt	0x9	
	MaxHoursRemainChannel1	0xA	
	MaxHoursRemainChannel2	0xB	
	MaxHoursRemainChannel3	0xC	
	MaxShelfLifeChannel 1	0xD	
	MaxShelfLifeChannel 2	0xE	
	MaxShelfLifeChannel 3	0xF	
	YoungAgeCartrFanMultipl	0x10	
	MidAgeCartrFanMultipl	0x11	
	OldAgeCartrFanMultipl	0x12	
	CoolTempFanSpdsMultiplier	0x13	
	WarmTempFanSpdsMultiplier	0x14	
	HotTempFanSpdsMultiplier	0x15	
	VHotTempFanSpdsMultiplier	0x16	
	CoolTempEffectLifeRemain	0x17	
	MIdTempEffectLifeRemain	0x18	
	HotTempEffectLifeRemain	0x19	
	LowIntnsEffectLifeRemain	0x1A	
	MedIntnsEffectLifeRemain	0x1B	
	HighIntnsEffectLifeRemain	0x1C	

1.7 DST-IIR-REQ-376673/A-Digital Scent Client _Rx

1.7.1 MD-REQ-377212/A-CabinScentMode_St

Message Type: Status

Signal provides the scenting operation status of scent module.

Name	Literals	Value	Description
	-	-	
	AwakeNotScenting	0x0	
	AwakeScenting	0x1	

1.7.2 MD-REQ-377213/A-CabinScentChannel_St

Message Type: Status

Signal provides the currently selected scent channel (scent cartridge) status in the scent module.

Name	Literals	Value	Description
	-	-	
	Off	0x0	
	Channel_1	0x1	
	Channel_2	0x2	
	Channel_3	0x3	
	Channel_4	0x4	
	Channel_5	0x5	
	Channel_6	0x6	
	Channel_7	0x7	

1.7.3 MD-REQ-377214/A-CabinScentIntensity_St

Message Type: Status

Signal provides the current status of scent level intensity in the scent module.

Name	Literals	Value	Description
	-	-	
	NotDetermined	0x0	
	Off	0x1	
	NotUsed_1	0x2	
	Low	0x3	
	NotUsed_2	0x4	
	Medium	0x5	
	NotUsed_3	0x6	
	High	0x7	

1.7.4 MD-REQ-377216/A-CabinScentSupplier_St

Message Type: Status

Signal provides the name of the supplier of the scent module.

Name	Literals	Value	Description
	-	-	
	NotDetermined	0x0	
	Supplier_1	0x1	
	Supplier_2	0x2	
	…	…	
	Supplier_15	0xF	

1.7.5 MD-REQ-377221/A-CabinScent1Type_St

Message Type: Status

The signal indicates the scent loaded into slot 1 of the Digital Scent Server.

Name	Literals	Value	Description
Scent Number Slot 1	-	-	
	0	0x0	
	1	0x1	
	…	…	
	253	0xFD	
	None/Not Known/Error	0xFE	
	Not Authentic	0xFF	

1.7.6 MD-REQ-377222/A-CabinScent2Type_St

Message Type: Status

The signal indicates the scent loaded into slot 2 of the Digital Scent Server.

Name	Literals	Value	Description
Scent Number Slot 2	-	-	
	0	0x0	
	1	0x1	
	…	…	
	253	0xFD	
	None/Not Known/Error	0xFE	
	Not Authentic	0xFF	

1.7.7 MD-REQ-377223/A-CabinScent3Type_St

Message Type: Status

The signal indicates the scent loaded into slot 3 of the Digital Scent Server.

Name	Literals	Value	Description
Scent Number Slot 3	-	-	
	0	0x0	
	1	0x1	
	…	…	
	253	0xFD	
	None/Not Known/Error	0xFE	
	Not Authentic	0xFF	

1.7.8 MD-REQ-377224/A-CabinScent4Type_St

Message Type: Status

The signal indicates the scent loaded into slot 4 of the Digital Scent Server.

Name	Literals	Value	Description
Scent Number Slot 4	-	-	
	0	0x0	
	1	0x1	
	…	…	
	253	0xFD	
	None/Not Known/Error	0xFE	
	Not Authentic	0xFF	

1.7.9 MD-REQ-410856/A-CabinScent5Type_St

Message Type: Status

The signal indicates the scent loaded into slot 5 of the Digital Scent Server.

Name	Literals	Value	Description
Scent Number Slot 5	-	-	
	0	0x0	
	1	0x1	
	…	…	
	253	0xFD	
	None/Not Known/Error	0xFE	
	Not Authentic	0xFF	

1.7.10 MD-REQ-377226/A-CabinScent1Life_St

Message Type: Status

The signal indicates the scent loaded into slot 1 of the Digital Scent Server.

Name	Literals	Value	Description
Life Remaining Slot 1	-	-	
	0	0x0	
	1 Percent	0x1	
	…	…	
	100 Percent	0x64	
	Reserved	0x65	
	Reserved	0x7F	

1.7.11 MD-REQ-377227/A-CabinScent2Life_St

Message Type: Status

The signal indicates the scent loaded into slot 2 of the Digital Scent Server.

Name	Literals	Value	Description
Life Remaining Slot 2	-	-	
	0	0x0	
	1 Percent	0x1	
	…	…	
	100 Percent	0x64	
	Reserved	0x65	
	Reserved	0x7F	

1.7.12 MD-REQ-377228/A-CabinScent3Life_St

Message Type: Status

The signal indicates the scent loaded into slot 3 of the Digital Scent Server.

Name	Literals	Value	Description
Life Remaining Slot 3	-	-	
	0	0x0	
	1 Percent	0x1	
	…	…	
	100 Percent	0x64	
	Reserved	0x65	
	Reserved	0x7F	

1.7.13 MD-REQ-377229/A-CabinScent4Life_St

Message Type: Status

The signal indicates the scent loaded into slot 4 of the Digital Scent Server.

Name	Literals	Value	Description
Life Remaining Slot 4	-	-	
	0	0x0	
	1 Percent	0x1	
	…	…	
	100 Percent	0x64	
	Reserved	0x65	
	Reserved	0x7F	

1.7.14 MD-REQ-410869/A-CabinScent5Life_St

Message Type: Status

The signal indicates the scent loaded into slot 5 of the Digital Scent Server.

Name	Literals	Value	Description
Life Remaining Slot 5	-	-	
	0	0x0	
	1 Percent	0x1	
	…	…	
	100 Percent	0x64	
	Reserved	0x65	
	Reserved	0x7F	

1.7.15 MD-REQ-411645/A-CabinScentTempInhibit_Rq

Message Type: Request

Signal provides the current temperature inhibit status of scent module.

Name	Literals	Value	Description
	-	-	
	NormalTemp	0x0	
	OverTemp	0x1	
	UnderTemp	0x2	
	NotUsed	0x3	

2 General Requirements

2.1 DST-REQ-411559/A-Digital Scent Client MVP & Deployment (DS N-C Feature)

Digital Scent Client (Sync) shall be deployed to support the Digital Scent Feature for Non-China markets (VSEM ID = F003130, MFAL = G1VAB).

Digital Scent Client shall deploy HMI (human machine interface), receive / show user selections inputs, and show feature related information / options, including:
- Screens: Scent Home Screen, Scent Settings Screen, Info Book Screen.
- Assets: Banner text, scent names, scent images, % life remaining by scent cartridge, level (intensity) control, time preset controls, at vehicle start option, scent icon, updated names of purchaseable scent cartridges per OTA.
- Notifications: Heads Up Notifications including Scent Icon and button to direct to Scent Settings Screen whenever Digital Scent Client has requested a scent to Start/Continue specifically for the "At Vehicle Start" function for the identified user per Enhanced Memory feature. Allow user option disable / re-enable future notifications via the Notifications Center and personalized setting for that using Enhanced Memory Feature.

Digital Scent Client shall :
- transmit data to HVAC_RCCM for the scent module including requests to start/continue scent, stop scent, request a scent channel, request a level, Scent Data Tables calibration parameters to HVAC_RCCM for the LIN scent module, etc
Note: Scent Data Tables XL file is mastered in VSEM VDOC089060 within VSEM F003130.
- receive data from HVAC_RCCM from the scent module including all scent IDs for installed scent cartridges, temporary inhibits to scenting, scent module status, etc
- communicate with any associated ECU modules (HVAC_RCCM, BCM, ECG2, TCU)
- implement and comply with requirements in the ECU I-O & Signals Reqts XL sheet,
- receive OTA (over the air) updates including Scent Data Tables XL file for the life cycle of the feature
(Data path: "Scent Data Table" XL file --> Ford Server --> TCU --> ECG2 --> Digital Scent Client --> ECG2 --> HVAC_RCCM --> Scent Module.
Note: Digital Scent Client shall be deployed into vehicles with a version of "Scent Data Tables". OTA is used for future updates.),
- prioritize (arbitrate) scenting related requests from this and other scent related features (examples: Rejuvenate & Purify) using Scent Requests Priority Reqts XL sheet,
- store / process / apply various data (including Scent Data Tables XL file, settings by specific users, etc),
- customize / personalize / implement feature settings & screens for the identified user per the Enhanced Memory Feature (including specific requirements for scent cartridge channel, level intensity, duration & pause, "at vehicle start", last scent screen used, permanent notifications disablement, etc per requirements).

2.2 DST-REQ-411560/A-Digital Scent Client Scent Data Tables Reqts (DS N-C Feature)

Digital Scent Client, Scent Module, Scent Cartridges
shall meet requirements in the Scent Data Tables XL file
mastered in VSEM VDOC089060 within VSEM F003130.

Scent Data Tables XL file is mastered and updated by Digital Scent Feature Owners for both Non-China Markets and China market.

Activities affected by and/or shall comply with the Scent Data Tables (design, development, production) include at least the following:
APIM engrs & suppliers (for implementation of Scent Data Table and OTA update),
Application / D&R engrs (for applications, designs & releases),
Scent Related Feature Owners (for other features which may request control of scenting, for prioritization discussion / table update),
Core Feature Owners (for all regions, for updating Scent Data Table, for validation testing),
CIED (for identification & development of types of scents),
Design Studio (for identification & development of scent names & associated scent images for scent types),
FCSD (for scent cartridges supply),
HMI engrs (for assets including revisions to Scent Help Screen as needed),
Scent Module supplier (for calibration factors),

Scent Cartridges supplier,
Scent oils supplier.

2.3 DST-REQ-411561/A-Digital Scent Client Electrical Power Modes (DS N-C Feature)

Digital Scent Client and Scent Module shall allow scent to dispense ONLY while the BCM Tx CAN signal ignition_status state is "Run" or "Start".

HVAC_RCCM shall request scent module to sleep (in accordance with Ford LIN requirements) within 5 seconds after the BCM Tx CAN signal ignition_status state is no longer "Start" or "Run".

Scent module shall proceed to a sleep state with minimal to zero current draw (comply with Ford power supply related requirements for minimal current draw from vehicle battery when vehicle is off) within 10 seconds after it has not received any LIN signal.

2.4 DST-REQ-411570/A-Digital Scent Client Implement Scent Data Tables

Digital Scent Client shall:
Receive revised Scent Data Tables within APIM software via OTA from TCU / ECG2,
Update / Store in internal memory,
Look Up / Use Data to show applicable HMI including names of scents / images for scents / number of scent channel buttons,
Send other CAN signals,
and Satisfy associated requirements.

Digital Scent Client shall be deployed with new built vehicles with the latest version of Scent Data Tables.

Note: OTA is over the air update for revisions to those tables which are certain to be required several times during the life cycle of this feature when scent cartridges including new types are added / revised / deleted.

2.5 DST-REQ-411574/A-Digital Scent Client Use Ignition Status Signal for Scent Requests

Digital Scent Client shall implement requirements using the BCM Tx ignition_status signal
for scent feature requests per Scent Requests Priority requirements and for scent feature requests for the "At Vehicle Start" function based on user settings and the identified user per the Enhanced Memory Feature.

2.6 DST-REQ-411579/A-Digital Scent Client Use Scent Module Supplier Name with Scent Data Tables

Digital Scent Client shall use the state of HVAC_RCCM Tx CAN signal CabnScentSplr_D_Stat which identifies the scent module supplier as part of composite key (along with vehicle destination country DID) to identify specific data in the Scent Data Tables XL file.

Digital Scent Client shall identify and show the appropriate specific HMI screen (for number of scent channel buttons) for each specific built vehicle by using the state of HVAC_RCCM Tx CAN signal CabnScentSplr_D_Stat which identifies the scent module supplier to identify the data in the "Scent Data Tables" XL file for maximum number of scent cartridges in the scent module from this supplier.

Digital Scent Client shall Tx applicable data (which is at least for pairs of calibration parameter types and calibration values) to HVAC_RCCM for Scent Module via other CAN signals in this requirements file.

3 Functional Definition

3.1 DST-FUN-REQ-376862/A-Digital Scent Start/Stop

3.1.1 Use Cases

3.1.1.1 DST-UC-REQ-376836/A-User turns Ignition to Run/Start when AtVehicleStart was Selected for the Identified User

Actors	User
Pre-conditions	Ignition does not equal Run/Start "At Vehicle Start" option was selected ON for a specific scent channel (position in HMI and in scent module) by a user before the ignition was switched off. Scent is not dispensing (including for any scent related feature).
Scenario Description	The user turns ignition to Run/Start
Post-conditions	Based on transition to Run/Start the DS Client will request to start scent dispensing into cabin based on the stored settings for the active person indicated by the Personalization feature. (This function is not dependent on delay for user to see HMI just after vehicle is started).
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.2 DST-UC-REQ-376837/A-User turns Ignition to Off from Run/Start While Scenting active

Actors	User
Pre-conditions	Infotainment System is On Scenting is dispensing
Scenario Description	The user turns ignition to something other than Run/Start.
Post-conditions	Scenting has stopped dispensing
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.3 DST-UC-REQ-376839/A-Duration has Completed

Actors	User
Pre-conditions	Ignition is in Run or Start Scenting is dispensing
Scenario Description	Duration has ended.
Post-conditions	Scenting has stopped dispensing

List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.4 DST-UC-REQ-376838/A-User Tries to Start Scenting when Cabin Temp is Out of Range

Actors	User
Pre-conditions	Ignition is in Run or Start Cabin Temp is out of allowable limit
Scenario Description	The user selects a scent to start dispensing
Post-conditions	Scenting does not start dispensing. HMI indicates Cabin Temp out of limit (High or Low). Scent will start dispensing once cabin temp is within allowable limits per the current user settings.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.5 DST-UC-REQ-376864/A-User Selects a Scent

Actors	User
Pre-conditions	Ignition is in Run or Start
Scenario Description	The user has selected a scent
Post-conditions	Digital Scent Client will send request to scent if not scenting.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.6 DST-UC-REQ-376845/A-User Selects a New Scent While Scenting Already Active

Actors	User
Pre-conditions	Ignition is in Run or Start A Scent is currently dispensing
Scenario Description	The user has selected a different scent
Post-conditions	The newly selected scent will be requested to be dispensed based on last user or default settings.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.7 DST-UC-REQ-416027/A-User Selects the Same Scent While Scenting Already Active to turn off Scenting

Actors	User
Pre-conditions	Ignition is in Run or Start A Scent is currently dispensing
Scenario Description	The user has selected the same scent
Post-conditions	The Digital Scent Client will turn off the scenting
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.8 DST-UC-REQ-416051/A-User Stops Scenting

Actors	User
Pre-conditions	Ignition is in Run or Start The system is scenting
Scenario Description	The user has selected Stop scenting
Post-conditions	The Digital Scent Client will send the request to stop dispensing the scent.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.1.9 DST-UC-REQ-435014/A-User Starts Scenting

Actors	User
Pre-conditions	Ignition is in Run or Start The system is not scenting
Scenario Description	The user has selected to Start scenting
Post-conditions	The Digital Scent Client will send the request to start dispensing the scent last used or default if last used is unknown.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.1.2 Requirements

3.1.2.1 DST-REQ-411567/A-Digital Scent Client Request Scent to Start or Stop

Digital Scent Client shall decide to send CAN signal state for Start/Continue Dispensing Scent or for Stop Dispensing Scent based on Scent Requests Priority Requirements and based on rules in the Digital Scent Client HMI specification and Tx the corresponding state via CAN signal CabnScentMde_D_Rq to ECG2 -> HVAC_RCCM -> Scent Module.

While Digital Scent Client Tx CabnScentMde_D_Rq state 0x1=StartOrContinueScent, Digital Scent Client shall also Tx CAN signal CabnScentChnl_D_Rq to identify the specific scent channel which is NOT Off

and shall Tx CAN signal CabnScentIntns_D_Rq with a level intensity state which is NOT NotDetermined, NOT Off, NOT NotUsed_#.

While Digital Scent Client Tx CabnScentMde_D_Rq with either state 0x0=NoneOrNoneYet or state 0x2=StopScent, Digital Scent Client may Tx any applicable state for CAN signal CabnScentChnl_D_Rq (a specific scent channel or Off) and shall Tx CAN signal CabnScentIntns_D_Rq with a level intensity state 0x1=Off.

Digital Scent Client shall Tx the CAN signal state based on the desired intent at that point in time and continue to Tx that state repeatedly (hold that state) until a different intent is desired (so this is NOT a one-shot pulse type signal).
In other words, when and while a request/function is intended by requirement at any point in time, the corresponding signal state should be repeatedly Tx by Digital Scent Client on CAN.
"Generic" Explanation Example: If user selects scent level intensity 2 in HMI, then the corresponding signal state for level 2 should be Tx by Digital Scent Client continuously until the user has selected a different level in HMI or another condition (such as requesting scent to stop dispensing) applies.

3.1.2.2 DST-REQ-411568/A-Digital Scent Client Request a Scent Channel

Digital Scent Client shall decide the one specific scent channel (button -> cartridge) it will request
and Tx the corresponding state via CAN signal CabnScentChnl_D_Rq to ECG2 -> HVAC_RCCM -> Scent Module based on Scent Requests Priority requirements and based on rules in the Digital Scent Client HMI specification

Digital Scent Client shall Tx the CAN signal state based on the desired intent at that point in time and continue to Tx that state repeatedly (hold that state) until a different intent is desired (so this is NOT a one-shot pulse type signal).
In other words, when and while a request/function is intended by requirement at any point in time, the corresponding signal state should be repeatedly Tx by Digital Scent Client on CAN.
"Generic" Explanation Example: If user selects scent level intensity 2 in HMI, then the corresponding signal state for level 2 should be Tx by Digital Scent Client continuously until the user has selected a different level in HMI or another condition (such as requesting scent to stop dispensing) applies.

3.1.2.3 DST-REQ-411571/A-Digital Scent Client Send Scent Type Fan Calibration Value

1. Digital Scent Client shall access the Scent Data Tables data in memory and shall retrieve the scent type fan calibration parameter value which "corresponds" with the Scent ID for the scent cartridge channel slot (per the corresponding CAN signal CabnScent#Type_No_Actl) it is requesting via CAN signal CabnScentChnl_D_Rq.

2. Digital Scent Client shall Tx the corresponding specific scent type fan cal parameter value (to be applied by scent module for fan speeds for the specific type of scent in the scent cartridge in the requested channel slot) by CAN signal CabnScentFanCalib_No_Rq to ECG2 -> HVAC_RCCM -> Scent Module.

FYI : Realize that signal CabnScentChnl_D_Rq (the scent cartridge channel requested) coordinates with signal CabnScentFanCalib_No_Rq (the scent type fan calibration value). Those signals will be converted from CAN to LIN by HVAC_RCCM which will re-Tx to the LIN scent module. Coordination of these signals is not extremely critical, unlike the other major set of ordered pairs for scent calibration parameter type and scent calibration parameter value (which are not specific to the type of scent but are specific to other factors including supplier of the scent module as well as vehicle destination country).

Digital Scent Client shall Tx the CAN signal state based on the desired intent at that point in time and continue to Tx that state repeatedly (hold that state) until a different intent is desired (so this is NOT a one-shot pulse type signal).
In other words, when and while a request/function is intended by requirement at any point in time, the corresponding signal state should be repeatedly Tx by Digital Scent Client on CAN.
"Generic" Explanation Example: If user selects scent level intensity 2 in HMI, then the corresponding signal state for level 2 should be Tx by Digital Scent Client continuously until the user has selected a different level in HMI or another condition (such as requesting scent to stop dispensing) applies.

3.1.2.4 DST-REQ-411572/A-Digital Scent Client Send TYPE of Scent Calibration Parameter

Just after Digital Scent Client Rx the "Start" or "Run" state for CAN signal ignition_status from BCM
(which means EITHER a TRANSITION INTO the "Start" or "Run" state

OR Digital Scent Client already Rx the "Start" or "Run" state right upon wakeup):

1. If Digital Scent Client is unable to identify the necessary data set to Tx from the "Scent Data Tables",
yet Digital Scent Client is required to Tx CAN signals per Event Periodic requirement, then Digital Scent Client need only Tx quantity one CAN "message" with CAN signal CabnScentCalbType_No_Rq having state 0x00=General purpose and CAN signal CabnScentCalibVal_No_Rq having cal parameter value = 0.

Example: Digital Scent Client Rx state 0x0=Unknown for CAN signal CabnScentSplr_D_Stat (for Scent Module Supplier) from HVAC_RCCM (or Digital Scent Client has not Rx any required signal state yet).
Example: Digital Scent Client CPU is temporarily constrained upon start up.

2. Digital Scent Client identify the vehicle country per applicable DID.

3. Digital Scent Client Rx the scent module supplier ~name per CAN signal CabnScentSplr_D_Stat.

4. Digital Scent Client access the Scent Data Tables data in Digital Scent Client memory and identify the corresponding data fields for the scent calibration parameter values.

5. Digital Scent Client "iteratively" Tx CAN MESSAGE containing CAN signal CabnScentCalbType_No_Rq for scent calibration parameter "type" along with the "associated" CAN signal CabnScentCalibVal_No_Rq for scent calibration parameter "value" until ALL ordered pairs of calibration type & calibration values
for the specific Scent Module for the specific country in the Scent Data Tables have been Tx to HVAC_RCCM.

IMPORTANT: One single CAN "MESSAGE" shall contain
FIRST IN SEQUENCE the scent cal parameter "type" signal CabnScentCalbType_No_Rq and
SECOND IN SEQUENCE the scent cal parameter "value" signal CabnScentCalibVal_No_Rq
to ensure HVAC_RCCM will associate the correct ordered data pair and Tx by LIN to the Scent Module.

6. Repeat previous Step 5 IMMEDIATELY for the FIRST repeat transmission of ALL pairs of cal parms & cal vals without waiting another 10,000ms.

7. Repeat Step 5 for the SECOND repeat transmission of ALL pairs of cal parms & cal vals just after ~10,000ms have elapsed since the first transmission (avoids missing data due to race condition etc).

8. Repeat Step 5 for the THIRD repeat transmission of ALL pairs of cal parms & cal vals just after ~10,000ms have elapsed since the first transmission (avoids missing data due to race condition etc).

9. In order to minimize CAN bandwidth usage, every subsequent 10,000ms AFTER those first FOUR instances, only one CAN "message" needs to be Tx with CAN signal CabnScentSplr_D_Stat having state 0x00=General purpose and CAN signal CabnScentCalibVal_No_Rq having cal parameter value = 0.

Tx of the two CAN signals CabnScentCalbType_No_Rq AND CabnScentCalibVal_No_Rq
via a CAN message is from Digital Scent Client to ECG2 -> HVAC_RCCM -> Scent Module.

FYI These will be applied globally by the scent module, not specific to a specific scent type.

3.1.2.5 DST-REQ-411573/A-Digital Scent Client Send VALUE of Scent Calibration Parameter

Reference Digital Scent Client Send TYPE of Scent Calibration Parameter requirement for how to handle the sending of Value of Scent Calibration Parameter.

3.1.2.6 DST-REQ-411575/A-Digital Scent Client Receive Actual Active Scent Channel # Status

Digital Scent Client shall receive HVAC_RCCM Tx CAN signal CabnScentChnl_D_Stat.

No other requirement.

Explanation:

It is possible a Scent Related Feature may use this signal.
Note: TBD Potential future use of this signal for APIM to modify some function if there is a mismatch (after certain continuous duration such as for 3 seconds) between the request and the status.

3.1.2.7 DST-REQ-411576/A-Digital Scent Client Show Scent Names and Images

Digital Scent Client shall show scent names for each installed scent cartridge (and associated image for the selected scent channel button) based on states of HVAC_RCCM Tx CAN signals of the form CabnScent#Type_No_Actl and based on rules in Digital Scent Client HMI specification.

is the position number of a scent cartridge slot within the scent module as well as the position of the corresponding soft HMI button (asset) which shows the name of scent cartridge installed.

3.1.2.8 DST-REQ-411577/A-Digital Scent Client Show Cartridge Life Remaining

Digital Scent Client shall show percent life remaining for each installed scent cartridge based on states of HVAC_RCCM Tx CAN signals of the form CabnScent#Life_Pc_Actl and based on rules in Digital Scent Client HMI specification.

is the position number of a scent cartridge slot within the scent module
as well as the position of the corresponding soft HMI button (asset) which shows the name of scent cartridge installed.

3.1.2.9 DST-REQ-411578/A-Digital Scent Client Receive Actual Scent Level Status

Digital Scent Client shall receive HVAC_RCCM Tx CAN signal CabnScentIntns_D_Stat.

No other requirement.

Note: TBD possible in future to use this signal to modify some function if there is a mismatch (after certain continuous duration such as for 3 seconds) between the request and the status.

Note: It is possible a Scent Related Feature may use this signal.

3.1.2.10 DST-REQ-411580/A-Digital Scent Client Receive Actual Scent Dispensing Status

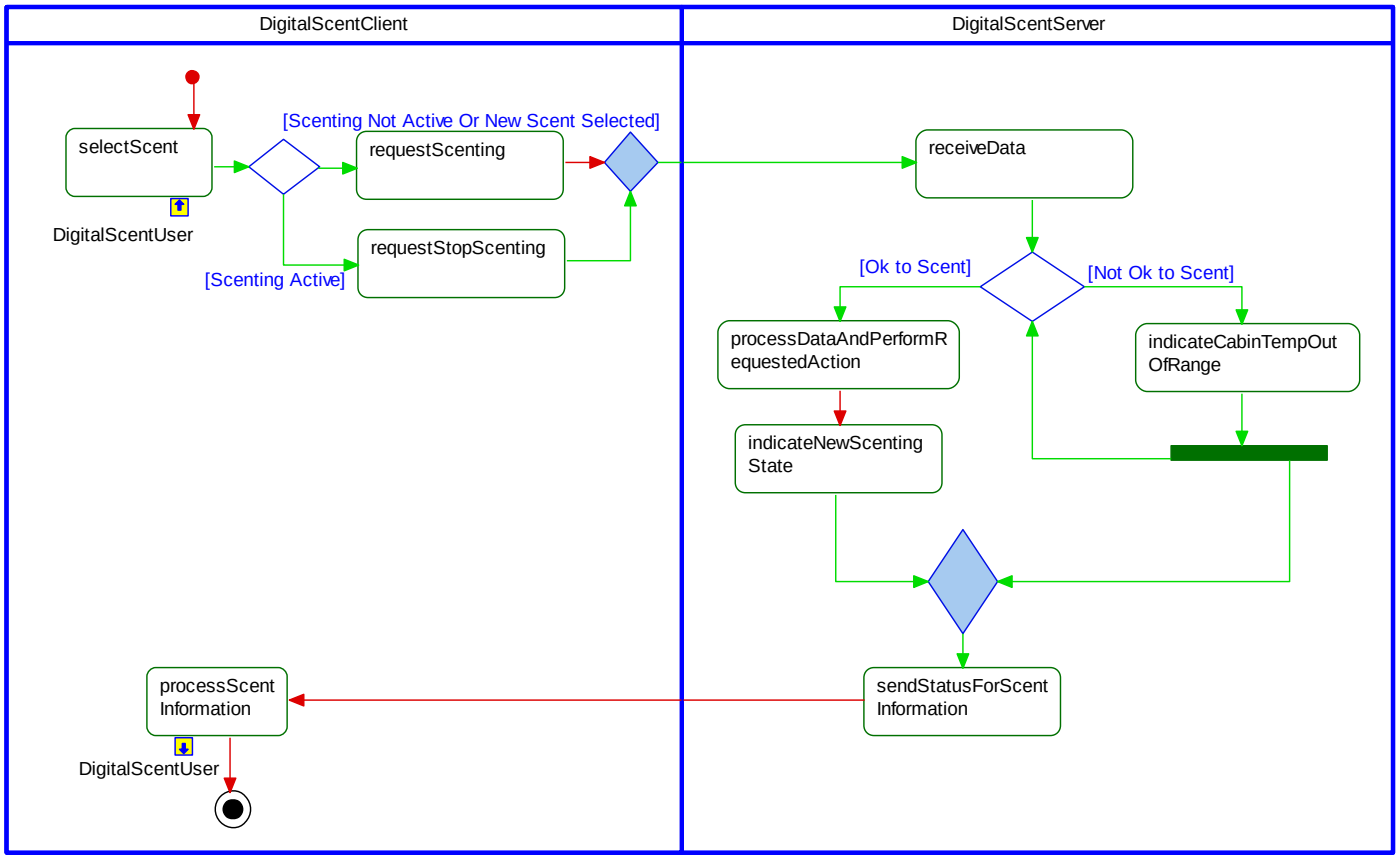
Digital Scent Client shall allow scent related features to use states of HVAC_RCCM Tx CAN signal CabnScentMde_D_Stat to understand the current actual state of scenting by the scent module to potentially modify scent related feature functions.

Author Notes: Scent Related Features may use states of this signal to modify any function
if there is a mismatch (after some delay such as after at least 3 seconds)
between the scent related request and the scent module reported status.

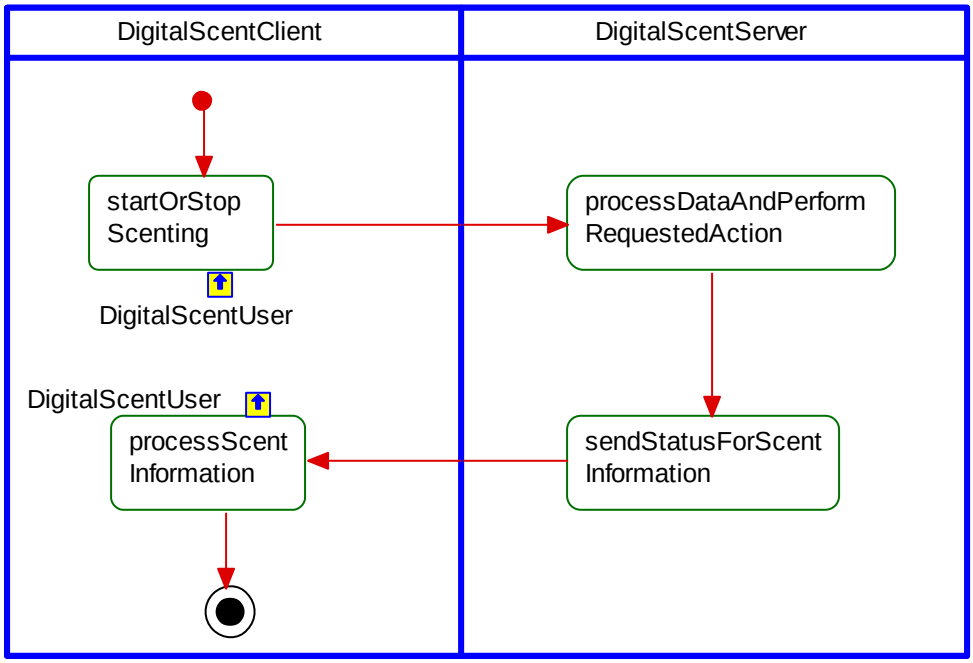
3.1.3 White Box Views

3.1.3.1 Activity Diagrams

3.1.3.1.1 DST-ACT-REQ-377236/A-Selecting a Scent

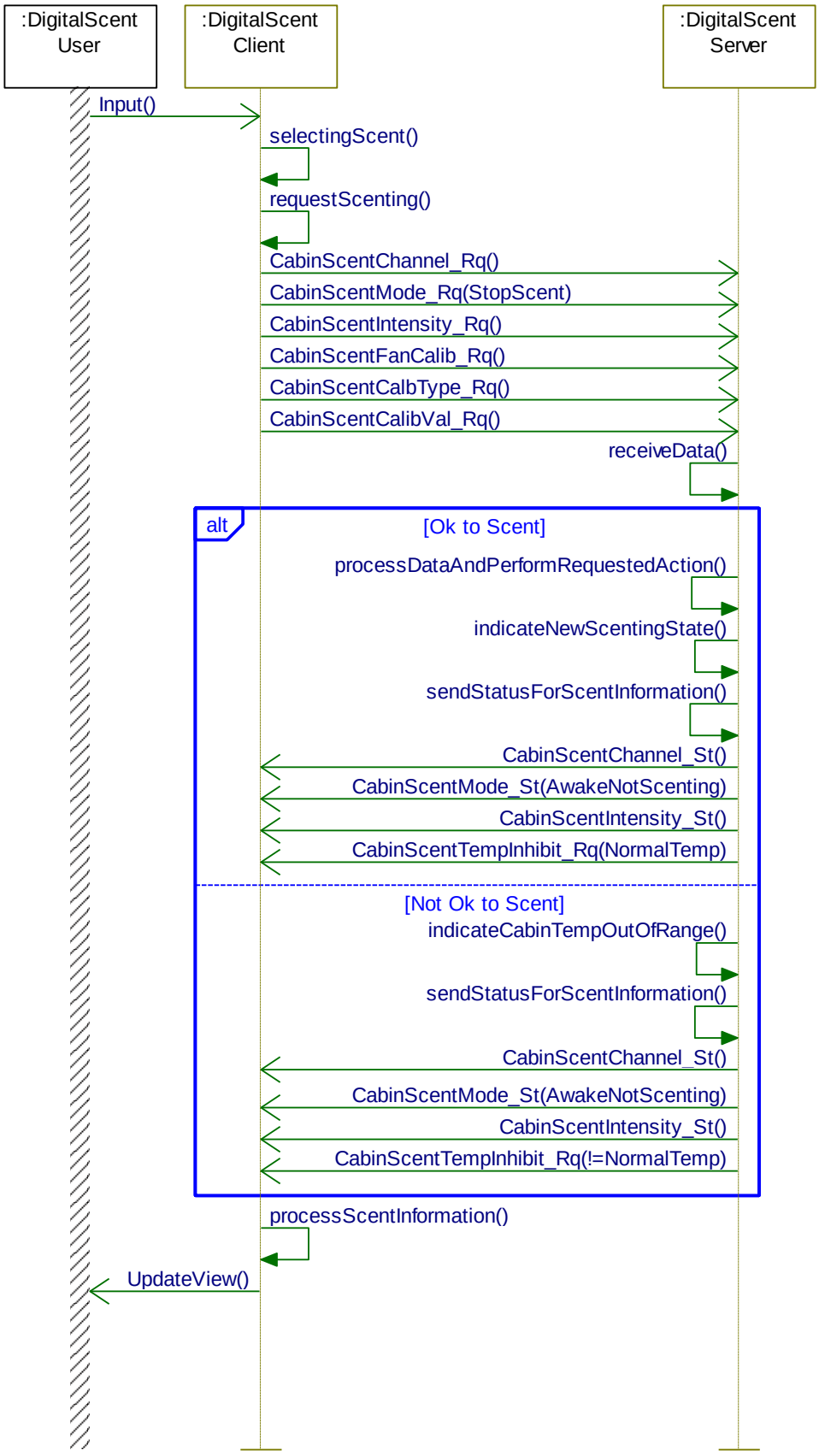


3.1.3.1.2 DST-ACT-REQ-416047/A-Start or Stop Scenting

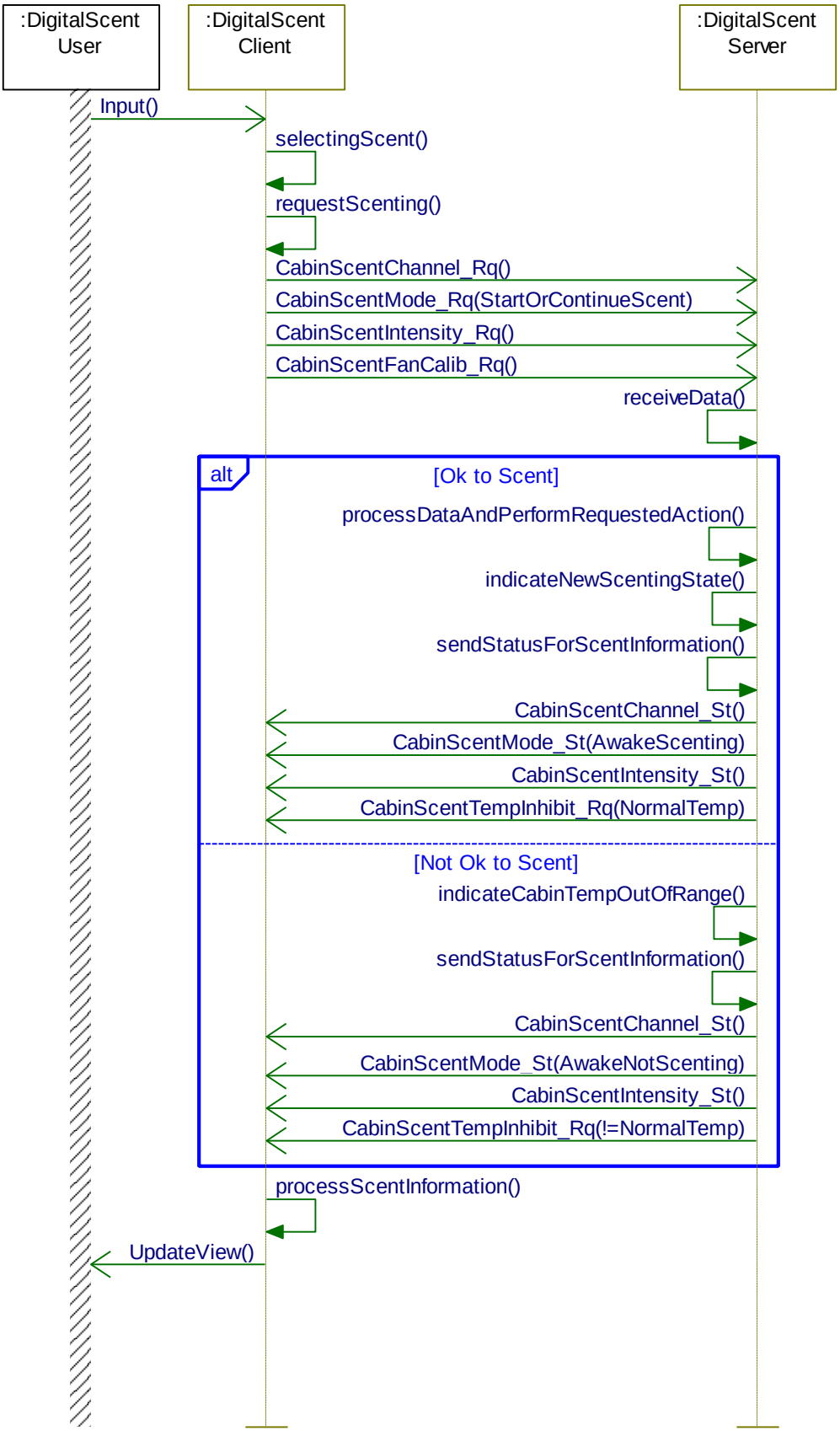


3.1.3.2 Sequence Diagrams

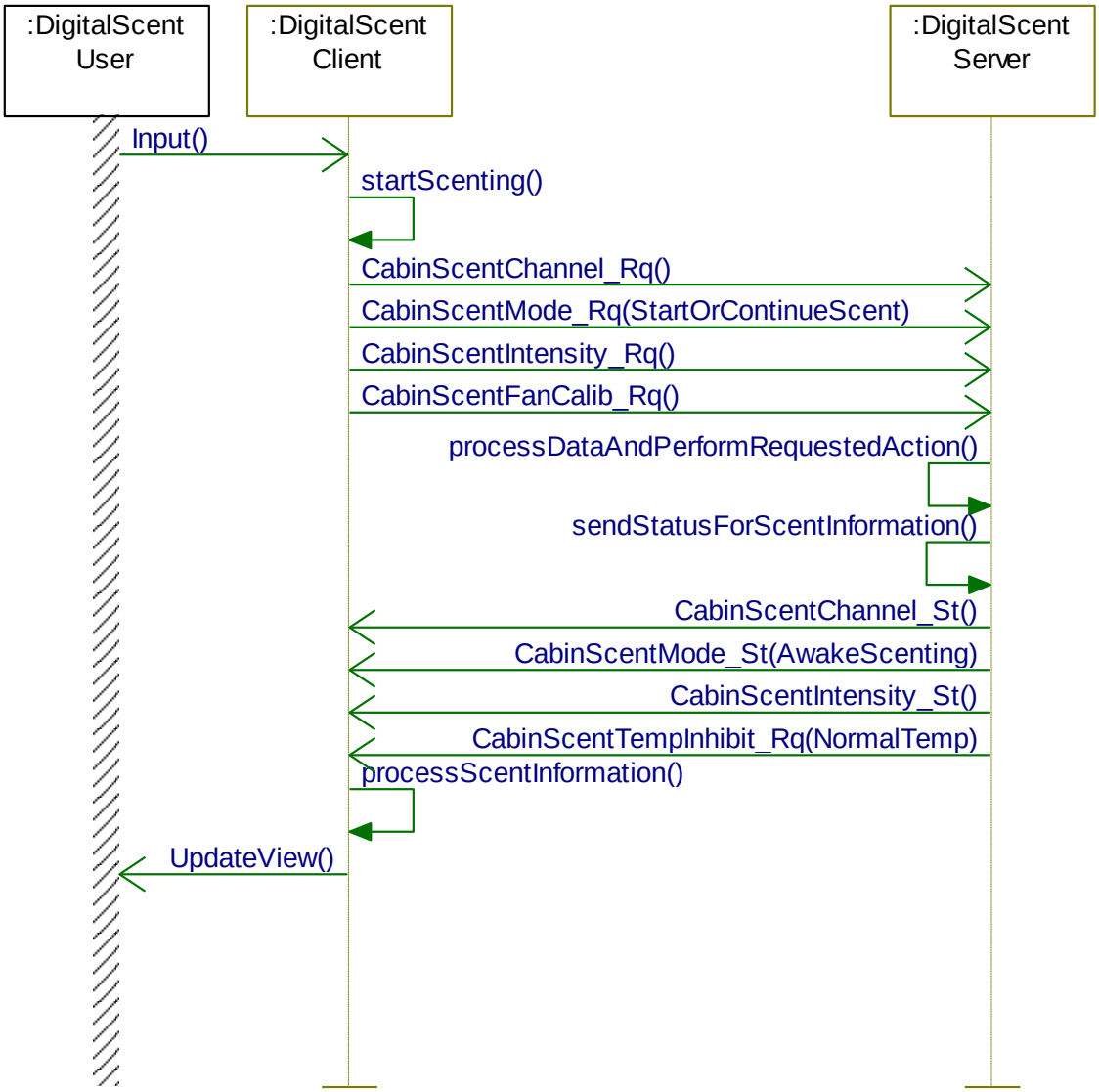
3.1.3.2.1 DST-SD-REQ-377240/A-Select Same Scent while Scenting Active


:DigitalScent User
:DigitalScent Client
:DigitalScent Server
Input()
selectingScent()
requestScenting()
CabinScentChannel_Rq()
CabinScentMode_Rq(StopScent)
CabinScentIntensity_Rq()
CabinScentFanCalib_Rq()
CabinScentCalbType_Rq()
CabinScentCalibVal_Rq()
receiveData()
alt
[Ok to Scent]
processDataAndPerformRequestedAction()
indicateNewScentingState()
sendStatusForScentInformation()
CabinScentChannel_St()
CabinScentMode_St(AwakeNotScenting)
CabinScentIntensity_St()
CabinScentTempInhibit_Rq(NormalTemp)
[Not Ok to Scent]
indicateCabinTempOutOfRange()
sendStatusForScentInformation()
CabinScentChannel_St()
CabinScentMode_St(AwakeNotScenting)
CabinScentIntensity_St()
CabinScentTempInhibit_Rq(!=NormalTemp)
processScentInformation()
UpdateView()

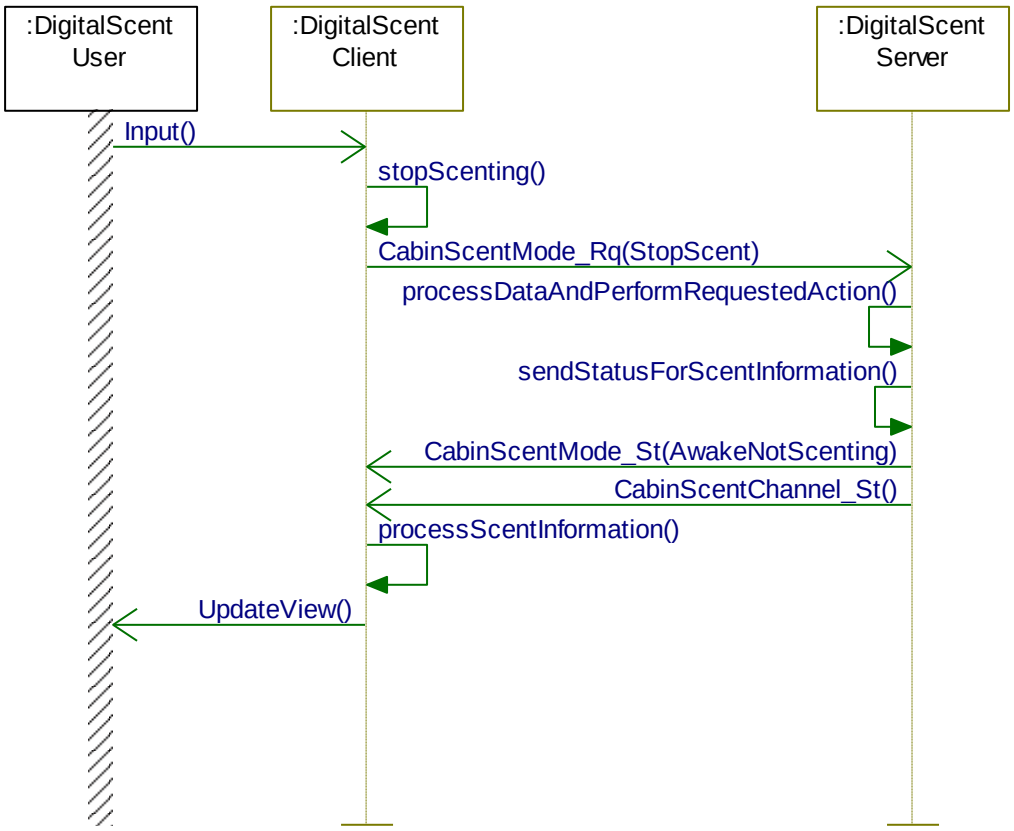
3.1.3.2.2 DST-SD-REQ-377241/A-Select Scent while Scenting Inactive or Select New Scent when another is Active



3.1.3.2.3 DST-SD-REQ-435081/A-Select Start Scenting



3.1.3.2.4 DST-SD-REQ-416048/A-Select Stop Scenting



3.2 DST-FUN-REQ-376677/A-Digital Scent Settings

3.2.1 Use Cases

3.2.1.1 DST-UC-REQ-376602/A-User Adjusts the Intensity

Actors	User
Pre-conditions	Infotainment System is On A scent is selected
Scenario Description	The user increases/decreases the intensity for the selected scent.
Post-conditions	Digital Scent Client stores the new intensity level for the selected scent
List of Exception Use Cases	
Interfaces	CAN, HMI

3.2.1.2 DST-UC-REQ-376679/A-User Selects the Dispense Frequency

Actors	User
Pre-conditions	Infotainment System is On

Scenario Description	The user selects the Dispence Frequency
Post-conditions	The selected dispence value is used when scenting is active.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.2.1.3 DST-UC-REQ-376847/A-User Selects AtVehicleStart On

Actors	User
Pre-conditions	Ign Run Start At Vehicle Start is not selected for any scent channel
Scenario Description	The user selects At Vehicle Start On for a scent channel
Post-conditions	At Vehicle Start is set on for the scent channel selected. Scenting will start per the user settings the next time the ignition status transitions to Run/Start from something other than Run/Start for the same user. Digital Scent Client will store At Vehicle Start setting for selected scent channel and for each Personalization location.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.2.1.4 DST-UC-REQ-376834/A-User Selects AtVehicleStart Off

Actors	User
Pre-conditions	Ign Run Start At Vehicle Start is selected for a scent channel
Scenario Description	The user selects At Vehicle Start Off for the scent channel
Post-conditions	At Vehicle Start is set off for the scent channel selected. Scenting will not start the next time the ignition status transitions to Run/Start from something other than Run/Start for the same user. Digital Scent Client will store At Vehicle Start setting for selected scent channel and for each Personalization location.
List of Exception Use Cases	
Interfaces	CAN, HMI

3.2.1.5 DST-UC-REQ-376844/A-User Selects Info Book Icon

Actors	User
Pre-conditions	Ign Run/Start
Scenario Description	The user has selected Info Book icon

Post-conditions	HMI shows the requested information
List of Exception Use Cases	
Interfaces	CAN, HMI

3.2.2 Requirements

3.2.2.1 DST-REQ-411569/A-Digital Scent Client Request a Scent Level

Digital Scent Client shall decide a specific scent Level intensity (which will be applied by scent module to the current scent cartridge channel slot requested) and Tx the corresponding state via CAN signal CabnScentIntns_D_Rq to ECG2 -> HVAC_RCCM -> Scent Module based on Scent Requests Priority requirements and based on rules in the Digital Scent Client HMI specification.

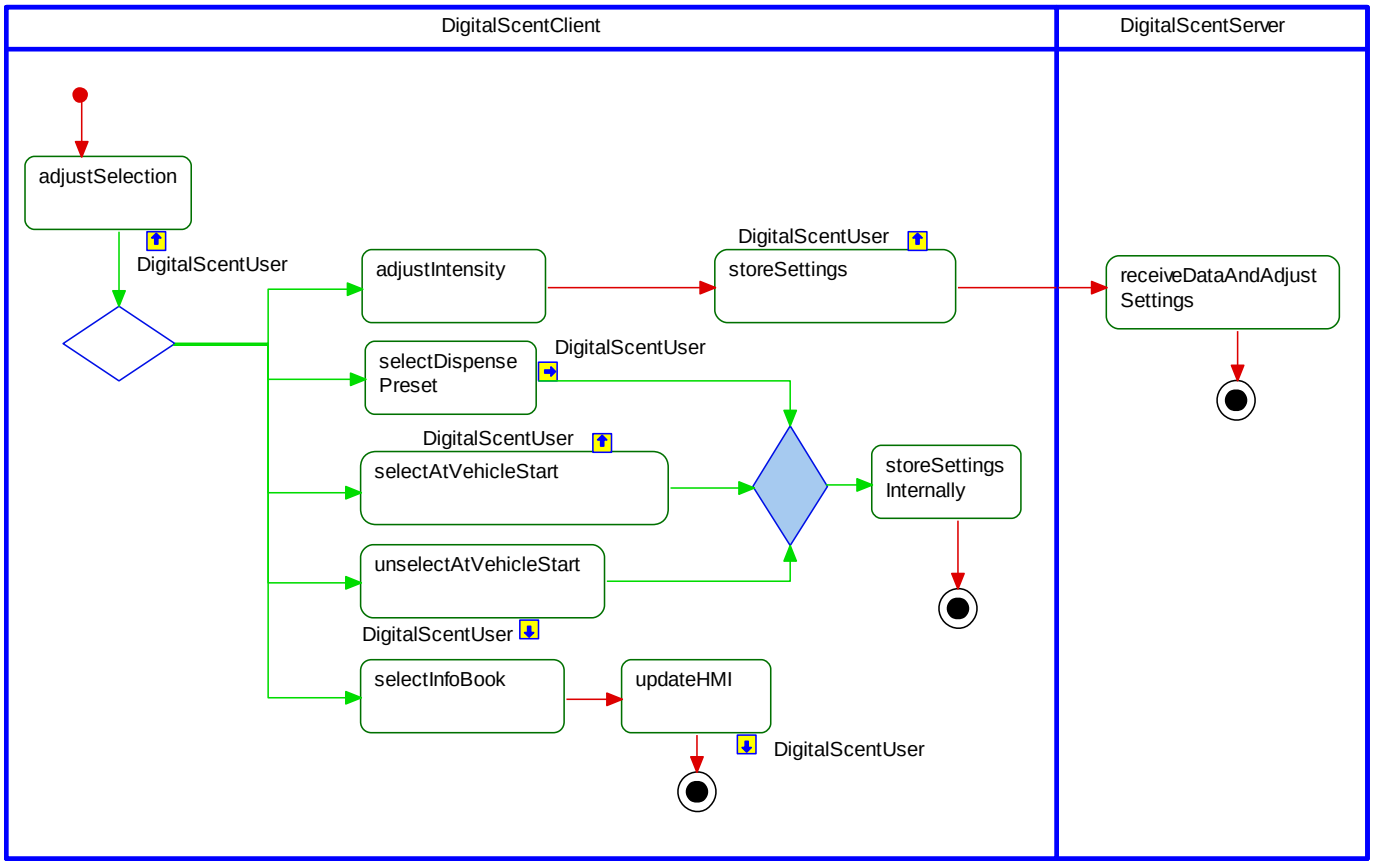
Only the associated states for Not_Determined, Off, Low, Medium, and High are to be used for a design having 3 non-zero level intensity options in feature design.

Digital Scent Client shall Tx the CAN signal state based on the desired intent at that point in time and continue to Tx that state repeatedly (hold that state) until a different intent is desired (so this is NOT a one-shot pulse type signal).
In other words, when and while a request/function is intended by requirement at any point in time, the corresponding signal state should be repeatedly Tx by Digital Scent Client on CAN.
"Generic" Explanation Example: If user selects scent level intensity 2 in HMI, then the corresponding signal state for level 2 should be Tx by Digital Scent Client continuously until the user has selected a different level in HMI or another condition (such as requesting scent to stop dispensing) applies.

3.2.3 White Box Views

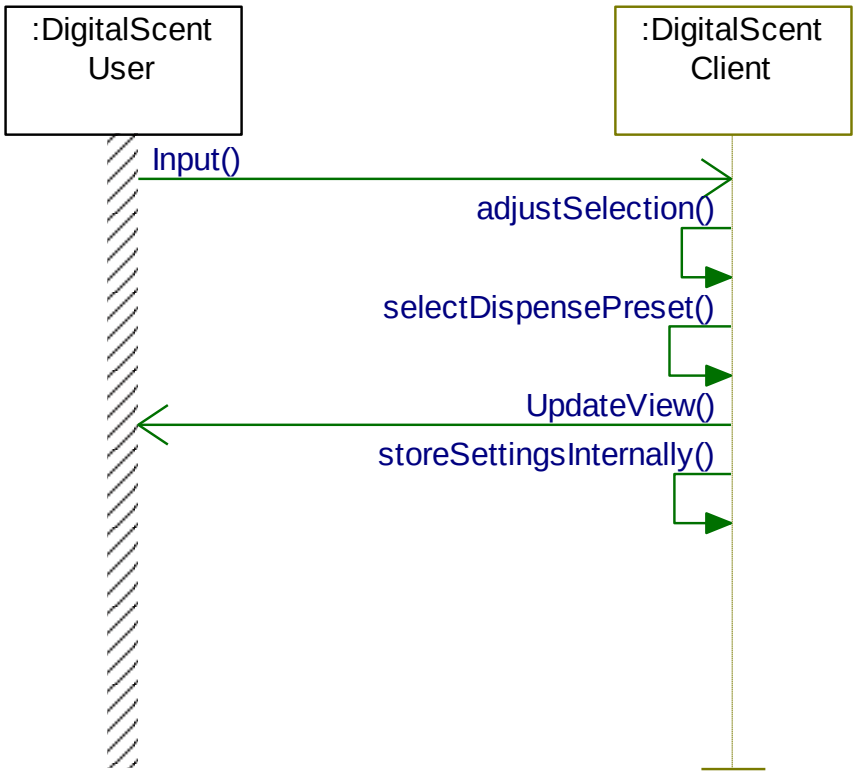
3.2.3.1 Activity Diagrams

3.2.3.1.1 DST-ACT-REQ-377237/A-Digital Scent Settings/Selections

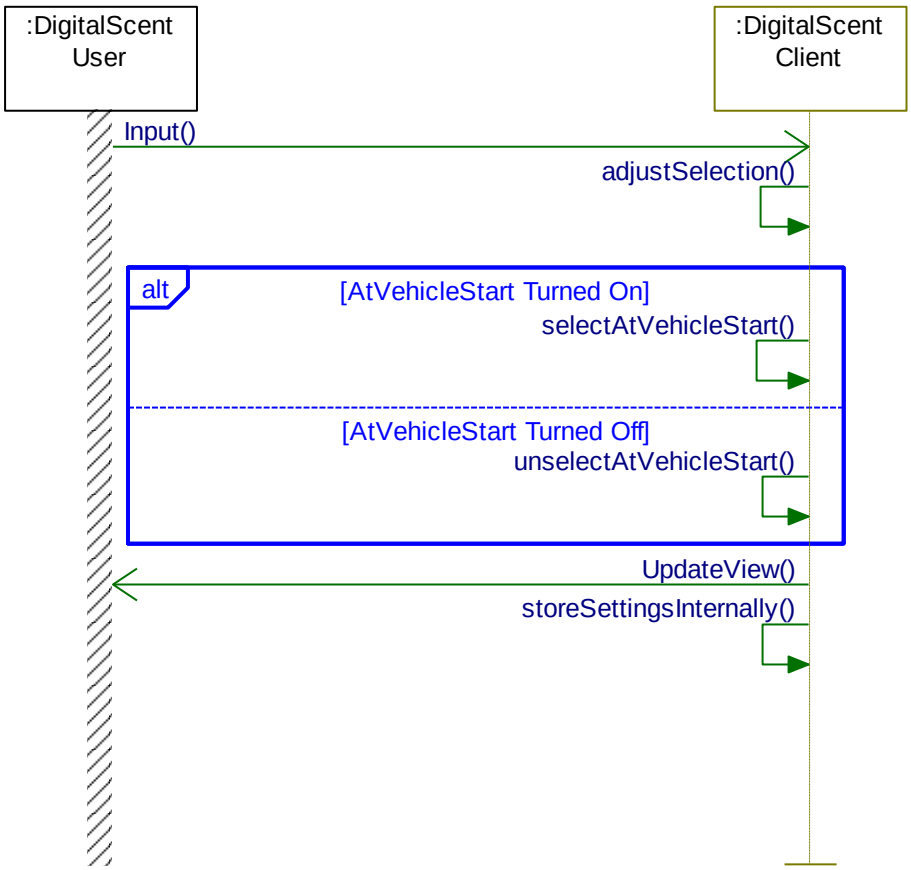


3.2.3.2 Sequence Diagrams

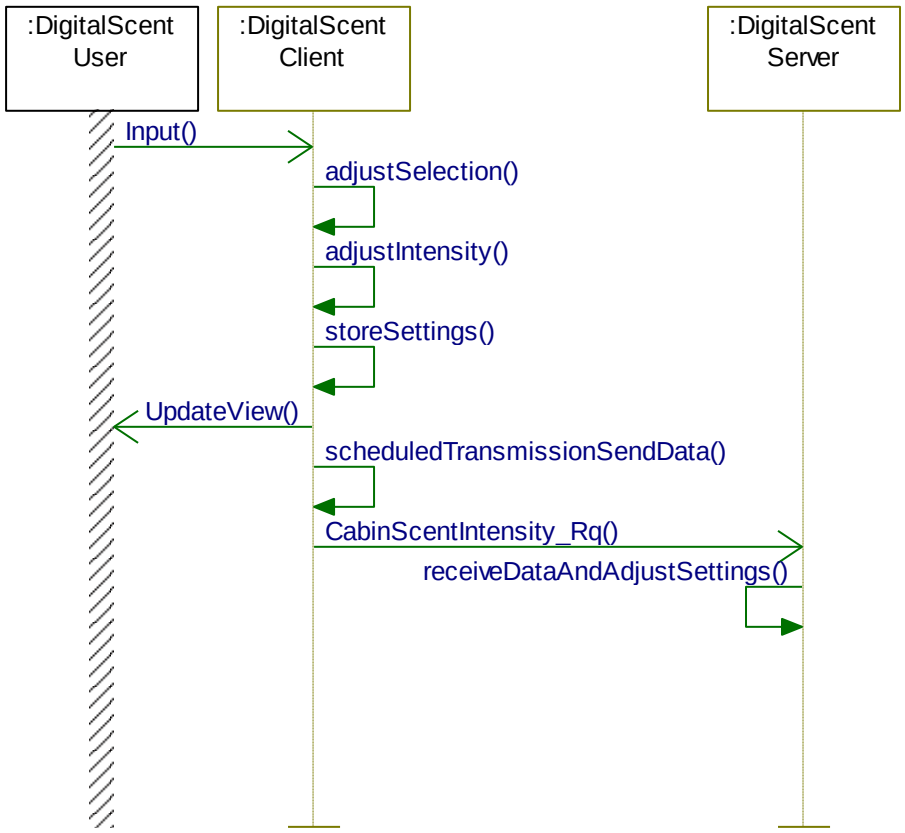
3.2.3.2.1 DST-SD-REQ-377245/A-Select Dispense Preset



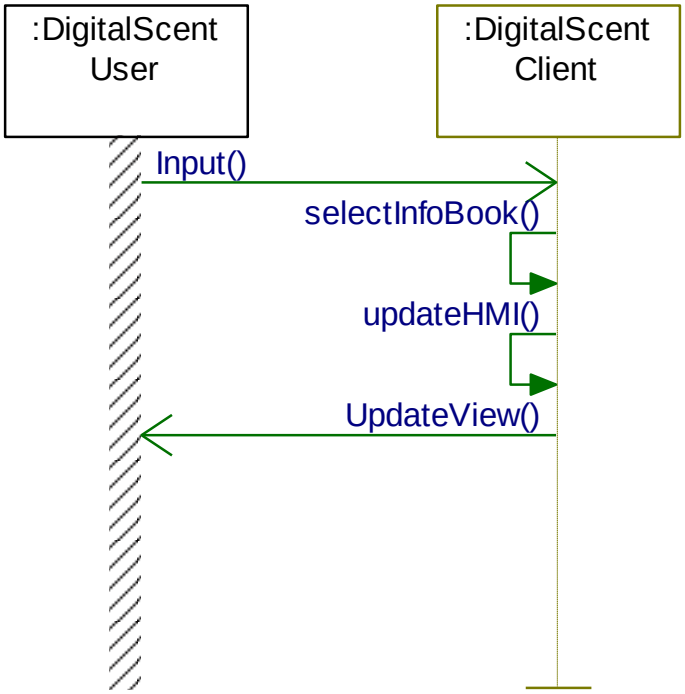
3.2.3.2.2 DST-SD-REQ-377246/A-Select AtVehicleStart Setting



3.2.3.2.3 DST-SD-REQ-377247/A-Adjust Intensity



3.2.3.2.4 DST-SD-REQ-377249/A-Select Info Book



3.3 DST-FUN-REQ-377230/A-Cartridge Install/Removal

3.3.1 Use Cases

3.3.1.1 DST-UC-REQ-376846/A-User Removes Cartridge While Scenting is Active

Actors	User
Pre-conditions	Infotainment System is On Scenting is Active
Scenario Description	The user removes cartridge for active scent.
Post-conditions	Scenting stops and HMI indicates no scent in the removed location
List of Exception Use Cases	
Interfaces	CAN, HMI

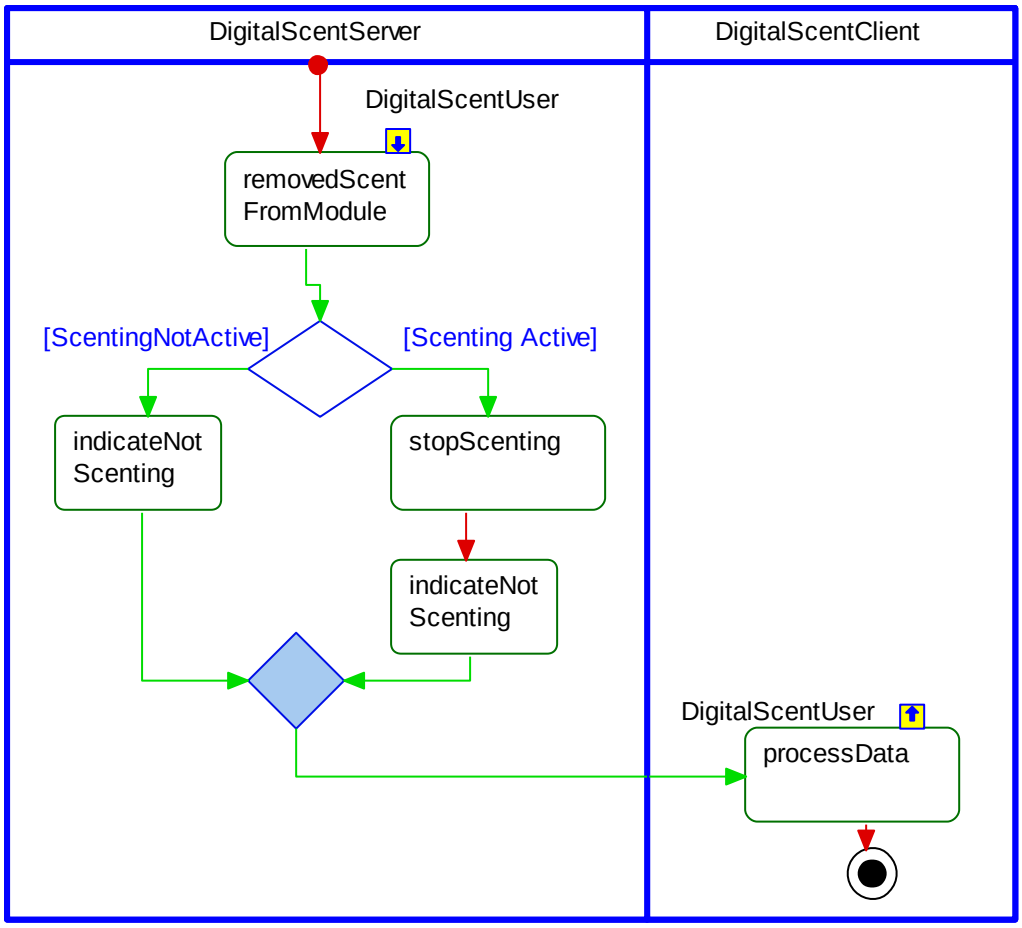
3.3.1.2 DST-UC-REQ-376848/A-User Removes Cartridge While Scenting is Inactive

Actors	User
Pre-conditions	Infotainment System is On Scenting is not active
Scenario Description	The user removes a cartridge.
Post-conditions	HMI indicates no scent in the removed location
List of Exception Use Cases	
Interfaces	CAN, HMI

3.3.2 White Box Views

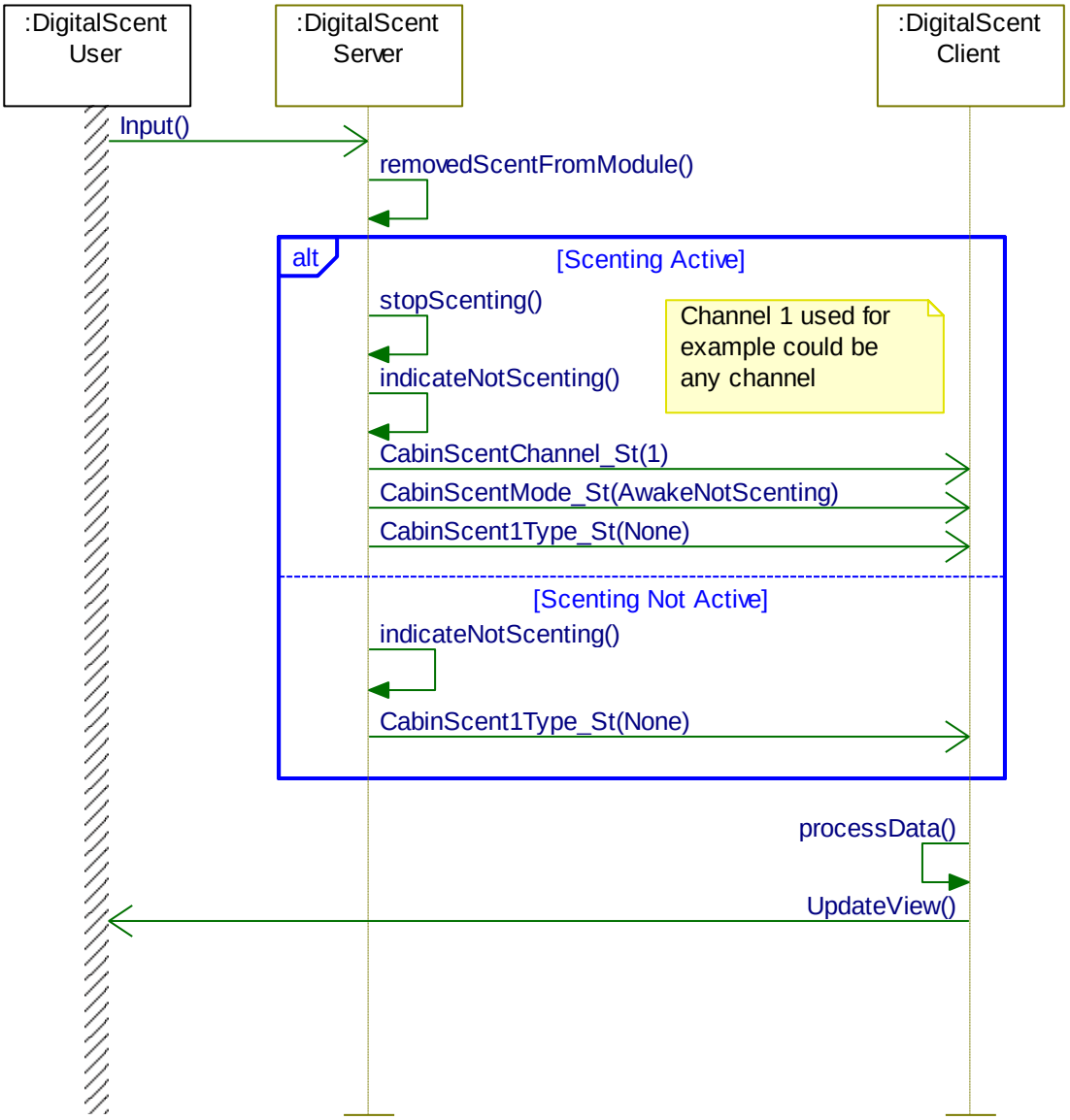
3.3.2.1 Activity Diagrams

3.3.2.1.1 DST-ACT-REQ-377239/A-Removal of Scent Cartridge



3.3.2.2 Sequence Diagrams

3.3.2.2.1 DST-SD-REQ-377243/A-Removal of Scent Cartridge



3.4 DST-FUN-REQ-377232/A-Digital Scent Module Operational Conditions

3.4.1 Use Cases

3.4.1.1 DST-UC-REQ-376840/A-Cabin Temp becomes Out of Range While Scenting is Active

Actors	User
Pre-conditions	Ignition is in Run/Start Scenting is active
Scenario Description	Cabin Temp moves out of allowable limits while Scenting active
Post-conditions	Scenting is commanded off. Scent will restart dispensing once cabin temp is within allowable limits per the current user settings.

List of Exception Use Cases	
Interfaces	CAN, HMI

3.4.2 Requirements

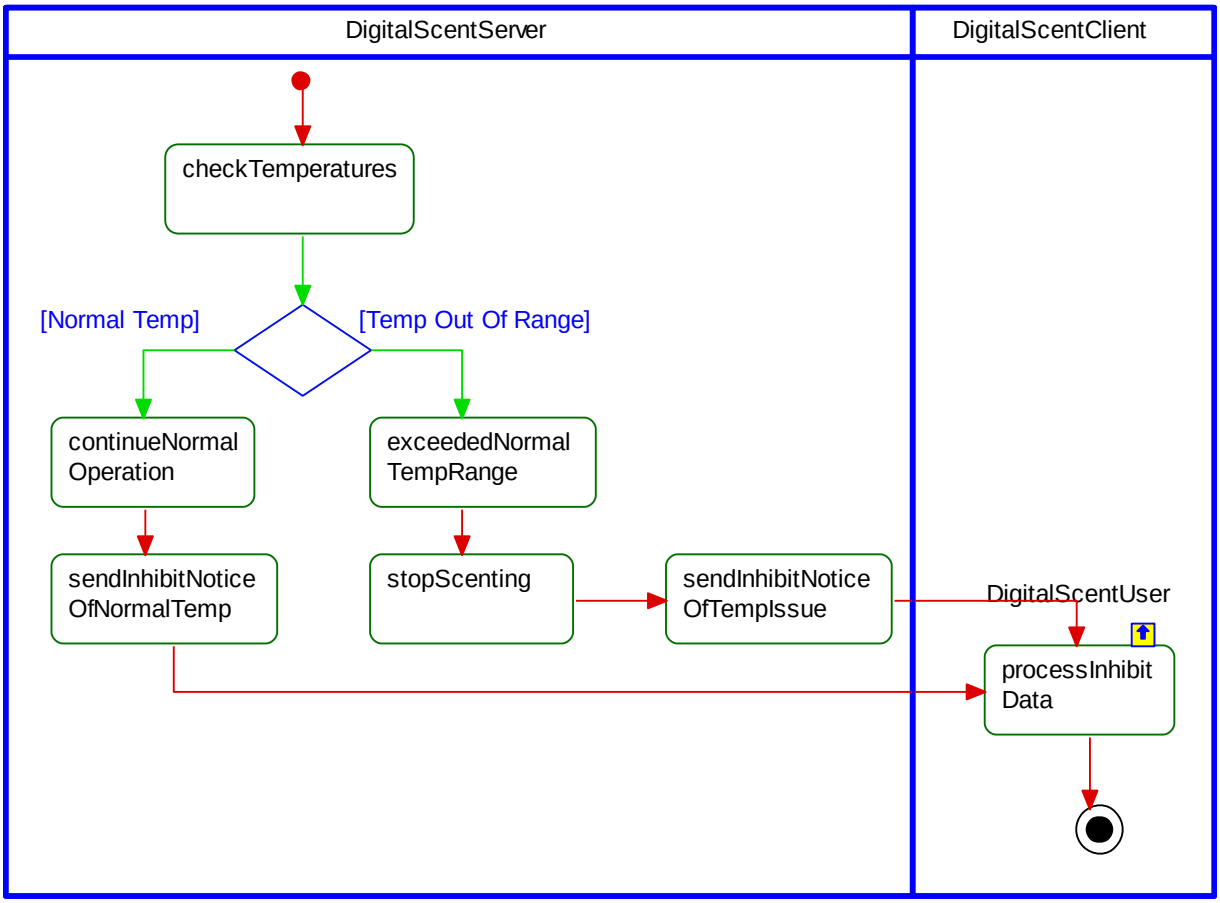
3.4.2.1 *DST-REQ-411581/A-Digital Scent Client Use Temperature Inhibit Status for Scent Status Banner*

While Digital Scent Client receives state 0x01: OverTemp or state 0x02: UnderTemp via CAN signal CabnScentTeMsgTxt_D_Rq Tx by HVAC_RCCM, Digital Scent Client shall show corresponding text / message in HMI that scenting is temporarily inhibited due to temperature out of operational range (too hot or too cold) based on HVAC_RCCM Tc CAN signal CabnScentTeMsgTxt_D_Rq and based on rules in the Digital Scent Client HMI specification.

3.4.3 White Box Views

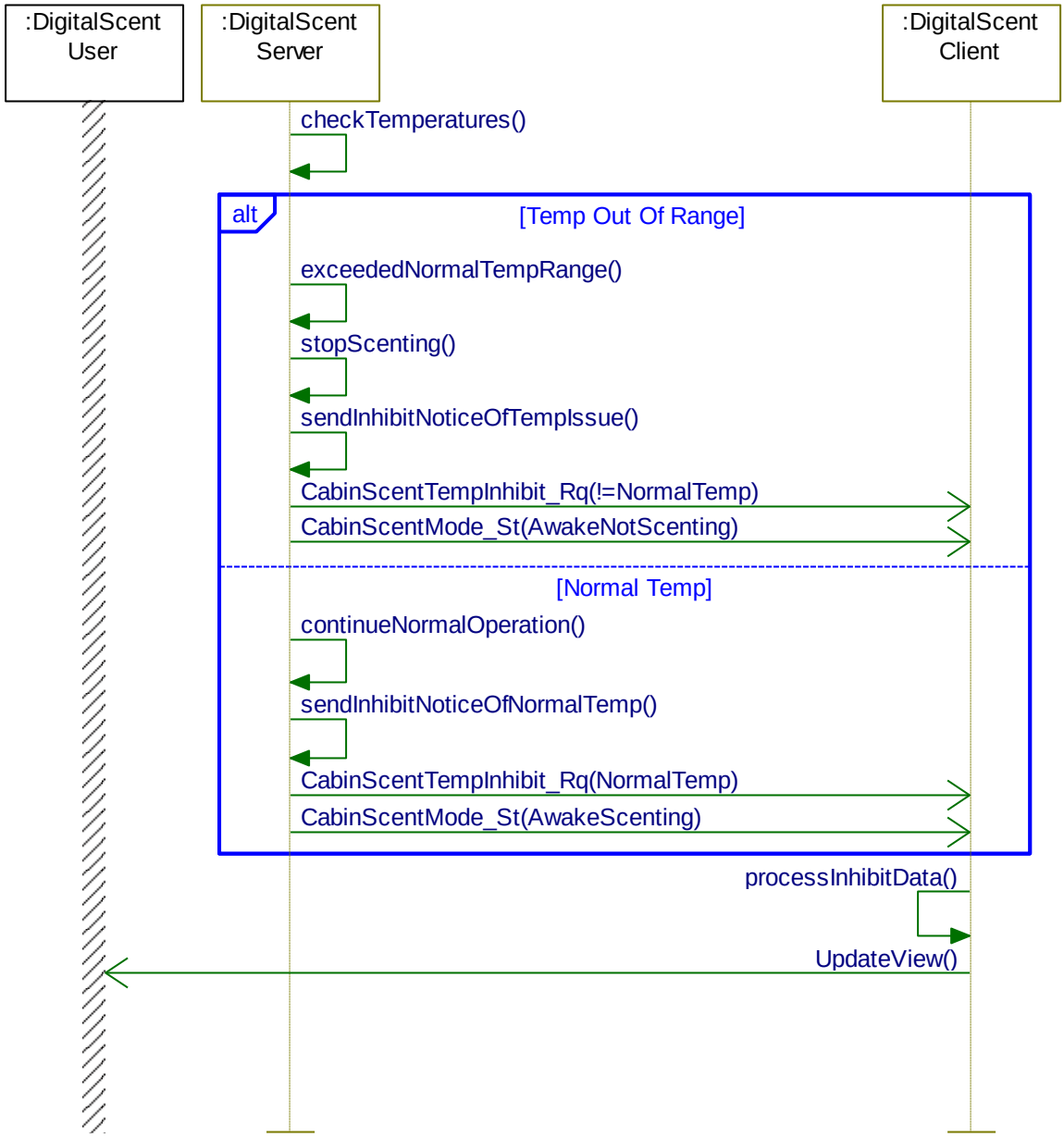
3.4.3.1 Activity Diagrams

3.4.3.1.1 DST-ACT-REQ-377238/A-Cabin Temp Out of Range



3.4.3.2 Sequence Diagrams

3.4.3.2.1 DST-SD-REQ-377242/A-Temp Out of Range When Scenting Active



3.5 DST-FUN-REQ-377234/A-Digital Scent Module Personalization

3.5.1 Use Cases

3.5.1.1 DST-UC-REQ-376841/A-User Changes the Active Person in the Vehicle

Actors	User
Pre-conditions	Infotainment System is On

Scenario Description	The user changes the active personality.
Post-conditions	Digital Scent Client recalls settings for the new active pers. HMI to display those settings.
List of Exception Use Cases	.
Interfaces	CAN, HMI

3.5.2 Requirements

3.5.2.1 DST-REQ-411582/A-Digital Scent Client Personalize Scent Feature to the Identified User

Digital Scent Client shall personalize settings / screens / notifications (show and apply) for this feature per requirements and using the Enhanced Memory Feature (for guest profile and for any driver profiles).

Digital Scent Client shall comply with Digital Scent Client HMI specifications. There are specific requirements for specific types of HMI shown.

3.6 DST-FUN-REQ-411646/A-Scent Request from Other Features

3.6.1 Requirements

3.6.1.1 DST-REQ-411562/A-Digital Scent Client as Arbitrator for Inputs/Requests of Scenting

Digital Scent Client shall arbitrate incoming inputs / requests for scenting from any feature
(whether the request is from this DS feature or any SR feature such as Rejuvenate or Purify)
based on the Scent Request Priority Table to decide which input / request to use at all times.

3.6.1.2 DST-REQ-411563/A-Signals, States, Behaviors for SR Features and Arbitration

SR feature owner shall create any required signals needed for an SR feature ECU (if not already within Digital Scent Client) to interact with the Digital Scent Client.

SR feature owner shall design SR feature
to transmit/receive required signals to interact with the DS feature (which is within Digital Scent Client)
for compatible interaction.
Digital Scent Client shall comply with approach.

Note: If the pertinent logic for the SR feature resides within Digital Scent Client, then those "signals" would be internal to Digital Scent Client only.

3.6.1.3 DST-REQ-411564/A-Scent Request Priority Table

Scent Request Priority #	Priority Topic	Priority Details

1 = Highest Priority	Vehicle state per CAN signal ignition_status is a state OTHER THAN Run or Start	Whenever BCM Tx a state OTHER THAN "Run" or "Start" state via CAN signal ignition_status, APIM shall send state 0x2=StopScent via CAN signal CabnScentMde_D_Rq. Author Note: Intent is to stop scenting and allow CAN and LIN networks to sleep whenever vehicle is no longer intended to be actively used / driven and to reduce the risk of depleting the vehicle battery state of charge.
2	Latest User Request	Subject to priority #, APIM shall transmit requests for the latest request relative to scenting (start/continue, stop, scent channel #, level intensity #) by the identified user/guest (using the Enhanced Memory feature). Examples of user/guest requests can include to stop dispensing a scent by DS feature HMI (even while an SR Feature is Active), to select a different SR feature, or to select a different type of scent to dispense (even while an SR Feature is Active).
3	"Initiate" Scent "At Vehicle Start" Function per Setting and Latest Identified user (using Enhanced Memory feature)	Subject to priority #, APIM shall "initiate" scenting based upon the "At Vehicle Start" option setting for the identified user (or guest user) (using Enhanced Memory feature) and associated requirements. Reference only info below: APIM shall automatically initiate scenting by sending state 0x1=StartOrContinueScent via CAN signal CabnScentMde_D_Rq (subject to other requirements defining the exact conditions required including to evaluate changes to the identified user including only in the "At Vehicle Start Timer" duration) if the "At Vehicle Start" option was selected on for the identified user or for the general user (per Enhanced Memory feature for personalization) for the corresponding Scent Channel, last Non-Zero Level for scent ID installed in scent channel, last Duration setting, last Pause setting. Author Note: This is important to define the event that "At Vehicle Start" was set enabled and SR feature is attempting to scent when the vehicle is transitioning to be enabled per the BCM Tx ignition_status signal transitioning into either "Run" or "Start" state. Real time HMI overrides are always possible at any time as higher priority. **NEED TO THINK RACE CONDITION FOR PURIFY VS AT VEHICLE START! MIGHT BOTH BE IN SAME DS SCREEN IN FUTURE ANYWAY?**
4	SR Feature Requests from **Rejuvenate Feature VSEM Feature ID = F003072**	Subject to priority #, APIM shall request scenting (including start/continue, stop, scent channel #, level intensity #) based upon this SR feature ONLY WHILE ~SR Feature Status signal state = 0x1 "SR Feature Active" or equivalent.
5	SR Feature Requests from **Purify Feature VSEM Feature ID = ??????**	Subject to priority #, APIM shall request scenting (including start/continue, stop, scent channel #, level intensity #) based upon this SR feature ONLY WHILE ~SR Feature Status signal state = 0x1 "SR Feature Active" or equivalent.

3.6.1.4 DST-REQ-411565/A-Each SR feature shall Transmit the following signals & states To Digital Scent Client ("signals" can be internal to Digital Scen

SR Feature Status: (Replace "SR Feature" with name of the feature, unique signal for EACH SR feature)
State 0x0 "SR Feature No Decision" while that feature is unable to make a decision
State 0x1 "SR Feature Active" while that feature is operating to request scenting
State 0x2 "SR Feature Not Active" while that feature is NOT operating to request scenting

The intent of this signal is for an SR feature to "raise hand" to the Digital Scent Client to indicate that it wishes to potentially control scenting (whether to start or stop scenting, etc) while it is Active and to help avoid unintended flips between showing / hiding scent screen(s).

Subject to priority #, Digital Scent Client shall request scenting for an SR feature ONLY WHILE SR Feature Status signal state = 0x1 "SR Feature Active" or equivalent.

SR feature shall manage state 0x1 Active and state 0x2 Not Active to avoid an excessive number of state changes.
Example: While Rejuvenate is running the total experience, even though scent may be requested to start and stop more than once, that feature should maintain state 0x1 Active.

Digital Scent Client shall request 0x2=StopScent via CAN signal CabnScentMde_D_Rq
immediately AFTER an SR feature which is CURRENTLY being HONORED by Digital Scent Client for priority has transitioned from State 0x1 "SR Feature Active" to State 0x2 "SR Feature Not Active".
Clarifying explanation: If more than one SR feature is active, only one 'might' be prioritized and currently honored by Digital Scent Client. So if the other SR feature changes to state 0x2 "SR Feature Not Active" then that will not be a trigger for APIM to request 0x2=StopScent.
(Author Notes: Intent to StopScent is to simplify HMI approach and in order to allow the last scent dispensed by the SR feature to remain / linger in the cabin by default after SR feature has completed.)

For SR feature to consider and decide:

If an SR feature wants to maintain scenting per previous user settings, then do NOT send state 0x1 "SR Feature Active" even if truly active.

If an SR feature wants to control scenting "in a certain continuous window of time", then send state 0x1 "SR Feature Active".

SR Feature Dispensing Request: (Replace "SR Feature" with name of the feature, unique signal for EACH SR feature)

States aligning to those in CAN signal CabnScentMde_D_Rq, except SR feature shall not to use 0x3 MasterError :

0x0=NoneOrNoneYet
0x1=StartOrContinueScent
0x2=StopScent
0x3=MasterError SR FEATURE SHALL NOT USE THIS STATE

SR Feature Scent Channel Request: (Replace "SR Feature" with name of the feature, unique signal for EACH SR feature)

States aligning to those in CAN signal CabnScentChnl_D_Rq :

0x0:Off
0x1:Channel_1
0x2:Channel_2
0x3:Channel_3
0x4:Channel_4
0x5:Channel_5
0x6:Channel_6
0x7:Channel_7

Note: SR feature will need to decide which one of the currently installed scent IDs (type of scent cartridge) it wants (refer to "Scent Data Tables" XL file) and map that to the scent channel (button for position of cartridge within the scent module).

SR Feature Level Intensity Request: (Replace "SR Feature" with name of the feature, unique signal for EACH SR feature)

Align to CAN signal and states:
CabnScentIntns_D_Rq 0x0= NotDetermined
0x1= Off
0x2= NotUsed_1

0x3= Low
0x4= NotUsed_2
0x5= Medium
0x6= NotUsed_3
0x7= High

3.6.1.5 DST-REQ-411566/A-SR Feature Possible Inputs provided by Digital Scent Client

Scent Data Tables XL file either statically during the SR feature design stage or dynamically within Digital Scent Client for flexibility (consider types of scents (scent IDs) will be added / deleted during the DS feature life cycle)
to understand the definition of all scent ID #s for the types of scents.

Scent ID of scent cartridge installed at scent channel # per CAN signals Tx by HVAC_RCCM to Digital Scent Client:

CabnScent1Type_No_Actl	0: NotDetermined 1 to 252: (((Scent ID unique for each scent type))) 253: NotUsed 254: NotAuthenticOrInvalidCartridge 255: NotInstalled
CabnScent2Type_No_Actl	(((same types of states)))
CabnScent3Type_No_Actl	(((same types of states)))
CabnScent4Type_No_Actl	(((same types of states)))
CabnScent5Type_No_Actl	(((same types of states)))

Percent Life remaining of scent cartridge installed at scent channel # per CAN signals Tx by HVAC_RCCM to Digital Scent Client:

CabnScent1Life_Pc_Actl	0 to 100 : (((Use numerical value))) [% Life Remaining] 101 to 127:unknown
CabnScent2Life_Pc_Actl	(((same types of states)))
CabnScent3Life_Pc_Actl	(((same types of states)))
CabnScent4Life_Pc_Actl	(((same types of states)))
CabnScent5Life_Pc_Actl	(((same types of states)))

Status of Scent Module per CAN signal Tx by HVAC_RCCM to Digital Scent Client:

CabnScentMde_D_Stat	0x00=AwakeNotScenting 0x01=AwakeScenting

3.7 DST-FUN-REQ-435629/A-Digital Scent Data Analytics

3.7.1 Requirements

3.7.1.1 DST-REQ-435630/A-Digital Scent Customer Usage Data Capture

Whenever APIM "transitions" (from any other state)
to Tx state 0x1=StartOrContinueScent
on CAN signal CabnScentMde_D_Rq
to HVAC_RCCM,
EXCEPT NOT after Pause phase (for a Non-Zero Pause setting by user) for cyclic scent requests

(((FYI: APIM may request a scent to start dispensing either in the present, in the future (at vehicle start setting), or per a scent related feature request.)))

OR

Whenever APIM "transitions" (from any other state)
to Tx state 0x2=StopScent
on CAN signal CabnScentMde_D_Rq
to HVAC_RCCM,
EXCEPT NOT after Duration phase (for a Non-Zero Pause setting by user) for cyclic scent requests

OR

Whenever APIM Rx state change
FROM 0x0=Awake Not Scenting
TO 0x1=Awake Scenting
for CAN signal CabnScentMde_D_Stat Tx
from HVAC_RCCM,
EXCEPT NOT corresponding to just after Pause phase (for a Non-Zero Pause setting by user) for cyclic scent requests.

OR

Whenever APIM Rx state change
FROM 0x1=Awake Scenting
TO 0x0=Awake Not Scenting
for CAN signal CabnScentMde_D_Stat Tx
from HVAC_RCCM,
EXCEPT NOT corresponding to just after Duration phase (for a Non-Zero Pause setting by user) for cyclic scent requests.

(((FYI: Scent Module may change scenting status by itself due to a limiting condition (mainly temperature too cold or too hot).)))

APIM and ECG2 as applicable shall GROUP and TRANSMIT the following Data to TCU for Ford cloud server
(ONE time Upon Trigger, NOT Repeatedly While the Entire Time the Trigger condition is True) :

- Vehicle local date & time per GlblClkYr_No_Actl, GlblClkDay_No_Actl, and for time of day global clock signals Tx by BCM (OR alternative method).

- Vehicle model year.
- Vehicle model type.
- Vehicle odometer.

- Vehicle destination country market per APIM DID.

- Windows positions.
- Sunroof position.
- Number of occupants in cabin (if an existing method for this).

- Cabin air temperature per CabnAmb_Te_Actl Tx by HVAC_RCCM.

- Front HVAC blower speed (if available...not likely for automatic HVAC mode).
- Front HVAC air inlet mode selected (recirculation etc) (if available...not likely for automatic HVAC mode).
- Front HVAC air outlet mode selected (if available...not likely for automatic HVAC mode).

- Identified user profile # (per Enhanced Memory Feature) (Do NOT Tx the user's name) per APIM.

- Which specific trigger (None, A Scent Button, At Vehicle Start Button, Rejuvenate Experience/Feature, Purify Experience/Feature, etc) caused APIM to presently request scent to dispense

- Scent ID (States 0 to 255) requested to dispense per APIM: APIM identify the state of the applicable one of the signals (CabnScent1Type_No_Actl, CabnScent2Type_No_Actl, CabnScent3Type_No_Actl) from HVAC_RCCM aligned to APIM Tx signal CabnScentChnl_D_Rq which is requesting one of those scent positions to dispense.

- % Life (States 0 to 127) remaining for the specific requested scent cartridge per APIM Rx CabnScent1Life_Pc_Actl, CabnScent2Life_Pc_Actl, CabnScent3Life_Pc_Actl Tx by HVAC_RCCM.

- Scent level intensity (States 0 to 7) requested by APIM Tx "CabnScentIntns_D_Rq".

- Scent module status per APIM Rx CabnScentMde_D_Stat Tx by HVAC_RCCM.

- Scent module temperature status per APIM Rx CabnScentTeMsgTxt_D_Rq Tx by HVAC_RCCM.

- User HMI selection of Preset timing
- User HMI selection of At Vehicle Start per APIM (Define: 0=None selected, 1=1st scent cartridge, 2=2nd scent cartridge, 3=3rd scent cartridge) per APIM.

- Last used (which may be currently shown) scent feature screen:
Placeholders = Scent, Settings, Cycle Time or Frequency, At Vehicle Start, or Info Book.

- Scent module supplier per APIM Rx CabnScentSplr_D_Stat Tx by HVAC_RCCM.

Author Notes:

Regarding Privacy from May 2021 mtg with Elizabeth Kanous:
Do Not Tx VIN.
Do Not Tx Vehicle Speed (since a driver behavior).
Do not Tx GPS location.
To be safe, we do NOT want to ever associate the data Tx off board with the VIN or any other data which identifies a "specific" vehicle (such as an ECU serial #). Decided ok to Tx the identified user profile # per the Enhanced Memory feature.

VIN will not be Tx per discussions & email May 2021 with Jonathon Niemi, Elizabeth Kanous, etc.
Vehicle specific hash allows repeated transmissions to Ford cloud server to be grouped within the cloud.
Broad purposes of this requirement include earlier issue identification/resolution, business case opportunities, future feature improvements.
Considering the purposes, the other functions of this feature will not fail if elements of this requirement are not implemented (core feature owner will work with the implementing activities).

FYI If a user turns off vehicle data or vehicle analytics setting in CCS menu (default is on with delivered vehicle), then FNV analytics is disabled (Ref: Darin Slade & Brian Gallagher)j.

See Cybersecurity Relevancy Assessment XL file. References from April to June 2021 mtgs: Jonathon Niemi for FNV Analytics, Dan Zajac & Nikitha Pilla for Cybersecurity, Elizabeth Kannous for Privacy

3.7.1.2 DST-REQ-435631/A-Digital Scent Feature Screen/Popup/Notification Transitions

Whenever user transitions INTO "OR" OUT OF any scent feature screen/popup for help (info book) or which shows a list of available scent cartidges for purchase per APIM.

APIM (and ECG2 as applicable) shall GROUP and TRANSMIT the following Data to ECG2/TCU for Ford cloud server (ONE time Upon Trigger, NOT Repeatedly While the Entire Time the Trigger condition is True) :

- Vehicle local date & time per GlblClkYr_No_Actl, GlblClkDay_No_Actl, and for time of day global clock signals Tx by BCM (OR alternative method).

- Vehicle model year.
- Vehicle model type.
- Vehicle odometer.

- Vehicle destination country market per APIM DID.

- Which specific screen/popup has been accessed or exited

- Total time user spent within the specific screen/popup by calculating delta time between transition INTO and transition OUT OF screen/popup.

4 Appendix: Reference Documents

Reference #	Document Title
1	Cockpit Illumination System Specification v6.11 or higher
2	VDOC089060-Scent Data Tables
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	