Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Rear Seat Occupant Alert v2

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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Version Date: August 16, 2019

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
August 16, 2019	1.0	Initial Release	

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1 Overview

The purpose of Rear Seat Occupant Alert (RSOA) v2 feature is to monitor rear door status upon entry and remind the driver to check the rear seat prior to exiting in the vehicle.

1.1 Feature Operation

The driver can select to enable or disable the feature from the In-Vehicle HMI. Once the feature is enabled, the driver will receive a visual and audible alert upon turning the ignition off if a rear door was opened prior to entry. This involves monitoring for the presence of a rear door ajar event within a certain amount of time prior to turning the ignition on, and then triggering the notification when the ignition status transitions to off, but prior to the driver door being opened.

1.2 Feature Assumptions

This variant of the feature assumes that the only vehicle conditions to be monitored are any of the rear door status signals, in conjunction with the ignition status signal.

1.3 Logical Block Diagram

1.4 Terminology and Abbreviations

The following table lists terminologies that are used in this document along with a brief description.

Term	Description
RSOA	Rear Seat Occupant Alert
APIM	Accessory Protocol Interface Module
HMI	Human Machine Interface
BCM	Body Control Module
AHU	Audio Head Unit

2 Architectural Design

2.1 RSOAv2-CLD-REQ-360906/A-RearSeatOccupantAlertV2Client

The RearSeatOccupantAlertV2Client is responsible for monitoring the status of all rear door signals, arming/disarming the notification trigger, displaying the visual reminder, and requesting the audible alert to be played via the audio system.

2.2 CLD-REQ-360907/A-VehicleDataServer

The VehicleDataServer is responsible for providing the status of the rear door signals, as well as the ignition status.

2.3 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Rear Seat Occupant Alert feature may be mapped into physical modules. This mapping example is specific to the CGEA1.3C architecture and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
Rear Seat Occupant Alert Interface Client	APIM
Vehicle Data Server	BCM
Audio Server	AHU

2.4 Logical Signal Mapping

The CAN signals mentioned throughout this document shall refer to the CAN signal's logical name. The logical names shall be mapped to their actual CAN signal names. Please use the table below to perform the mapping. The InfoCAN database file is the master file for the actual CAN signal names. Note: There may be cases where the actual CAN signal name is used in this documentation.

Logical Name	CAN Signal Name
RearDriverDoor_St	DrStatRl_B_Actl
RearPassengerDoor_St	DrStatRr_B_Actl
IgnitionStatus_St	Ignition_Status

Table: Logical name/CAN signal mapping

2.5 RSOAv2-IIR-REQ-360908/A-RearSeatOccupantAlertV2Client_Rx

2.5.1 MD-REQ-354734/A-RearDoor_St

Message Type: Status

The method is used to report the status of only the rear doors.

Name	Literals	Value	Description
RearDriverDoor_St	-	-	Rear Driver Side Door Status
	Closed	0x0	
	Ajar	0x1	
RearPassengerDoor_St	-	-	Rear Passenger Side Door Status
	Closed	0x0	
	Ajar	0x1	

2.5.2 MD-REQ-199809/A-IgnitionStatus_St

Message Type: Status

Signal used to indicate ignition state.

Name	Literals	Value	Description
Type	-	-	Indicates ignition state
	Unknown	0x0	
	Off	0x1	
	Accessory	0x2	
	Run	0x4	
	Start	0x8	
	Invalid	0xF	

2.6 RSOAv2-IIR-REQ-360911/A-RearSeatOccupantAlertV2Client _Tx

2.6.1 MD-REQ-360912/A-SYNC_Alerts

Message Type: Request

This signal is used to request a prompt to be played on the Audio Server

SYNC_Alerts	Event-Periodic message from SYNC to the applicable Alert components	
	Alert_ChanX: Method from the SYNC Prompt Generator to the Prompt Audio Source to control the Alert channels	Alert_Chan (Signal) 0x0 OFF_Inactive (prompts OFF) 0x1 Mute 0x2 Initialize for Prompts (keep set while prompts are active)
	Attn_Info_Audio: From the SYNC Prompt Generator to the Prompt Audio Source for attenuating the active audio source.	Attn_Info_Audio (Signal) – Attenuates the Infotainment Audio 0x0 No Attenuation of Audio 0x1 Attenuation_1 0x2 Attenuation_2 cont. 0x6 Attenuation_6 (higher attenuation number indicates a greater increase in audio attenuation) 0x7 Unknown
	New_Attn_Event: From the SYNC Prompt Generator to the Prompt audio source for an attenuation event.	New_Attn_Event (Signal) 0x0 Inactive 0x1 Active
	PromptX_Directionality: From the SYNC Prompt Generator to the Prompt audio source indicating what speaker(s) to play the prompt(s) through.	Prompt_Directionality (Signal) 0x0 Inactive / OFF 0x1 All 0x2 Front 0x3 Rear
	Audible_Beep: Event-Periodic signal from the SYNC Beep Client to the Beep Generator so the Beep Generator can produce an audible beep	Audible_Beep(Signal) 0x0 Inactive 0x1 Active

3 General Requirements

3.1 RSOAv2-REQ-360918/A-Rear Seat Occupant Alert Configuration Parameter

The Rear Seat Occupant Alert Interface Client shall have a configurable parameter to determine whether the Rear Seat Occupant Alert feature is to be supported. Refer to the Infotainment Diagnostic Specification for further details.

3.2 REQ-361692/A-Ignition On and Ignition Off References

For the purposes of this document, references to Ignition ON can be interpreted as Ignition_St = Run/Start. References to Ignition OFF can be interpreted as Ignition_St = Off/Acc.

4 Functional Definition

4.1 RSOAv2-FUN-REQ-360914/A-Arming the Alert

4.1.1 Requirements

4.1.1.1 RSOAv2-REQ-360915/A-Monitoring the Rear Door Status

The Rear Seat Occupant Alert Interface Client shall monitor both of the RearDoor_St signals and arm the Rear Seat Alert system (e.g. internal flag *RearSeatAlertArmed* set to TRUE) if either signal transitions to Ajar. If either of the RearDoor_St signals transition to Ajar while the Ignition Status is OFF, the Rear Seat Occupant Alert Interface Client shall start a timer T_RearSeatAlertTimeout, and if the timer expires prior to the Ignition Status transitioning to ON, the Rear Seat Alert system shall be disarmed (e.g. internal flag *RearSeatAlertArmed* set to FALSE.)

4.1.1.2 RSOAv2-REQ-360916/A-Rear Seat Alert Timeout Period

The Rear Seat Occupant Alert Interface Client shall implement a timeout period with a value as defined in T_RearSeatAlertTimeout. This timer shall be maintained in real-time through key cycles and network sleep/wake cycles.

Note: The second timer (T_RearDoorAjarPostKeyOn) shall not be started if the *RearDoorAjarEventCorrelated* flag is already set to True when the ignition status transitions to ON.

4.1.1.3 RSOAv2-REQ-360917/A-Configurable Parameter for Rear Seat Alert Timeout Period

The value defined in T_RearSeatAlertTimeout shall be adjustable via a configurable parameter. Refer to the Infotainment Diagnostic Specification for further details.

4.1.1.4 RSOAv2-REQ-361693/A-T_RearSeatAlertTimeout

Name	Description	Units	Range	Resolution	Default
T_RearSeatAlertTimeout	Timeout period for how long the alert system should remain armed while the ignition is OFF. Note: Set by configurable parameter, refer to IDS	min	See IDS	See IDS	See IDS

4.1.2 Use Cases

4.1.2.1 RSOAv2-UC-REQ-360919/A-Alert Armed Prior to Ignition On

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Ignition is OFF
Scenario Description	A rear door is opened, and the ignition status transitions to ON before the timeout period
Post-conditions	The Rear Seat Occupant Alert Interface Client has armed the Rear Seat Occupant Alert system
List of Exception Use Cases	Alert Disarmed Prior to Ignition On
Interfaces	

4.1.2.2 RSOAv2-UC-REQ-361780/A-Alert Disarmed Prior to Ignition On

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Ignition is OFF

Scenario Description	A rear door is opened, but the Ignition Status remains OFF until the Timeout Period has expired
Post-conditions	The Rear Seat Occupant Alert Interface Client has disarmed the Rear Seat Occupant Alert system
List of Exception Use Cases	
Interfaces	

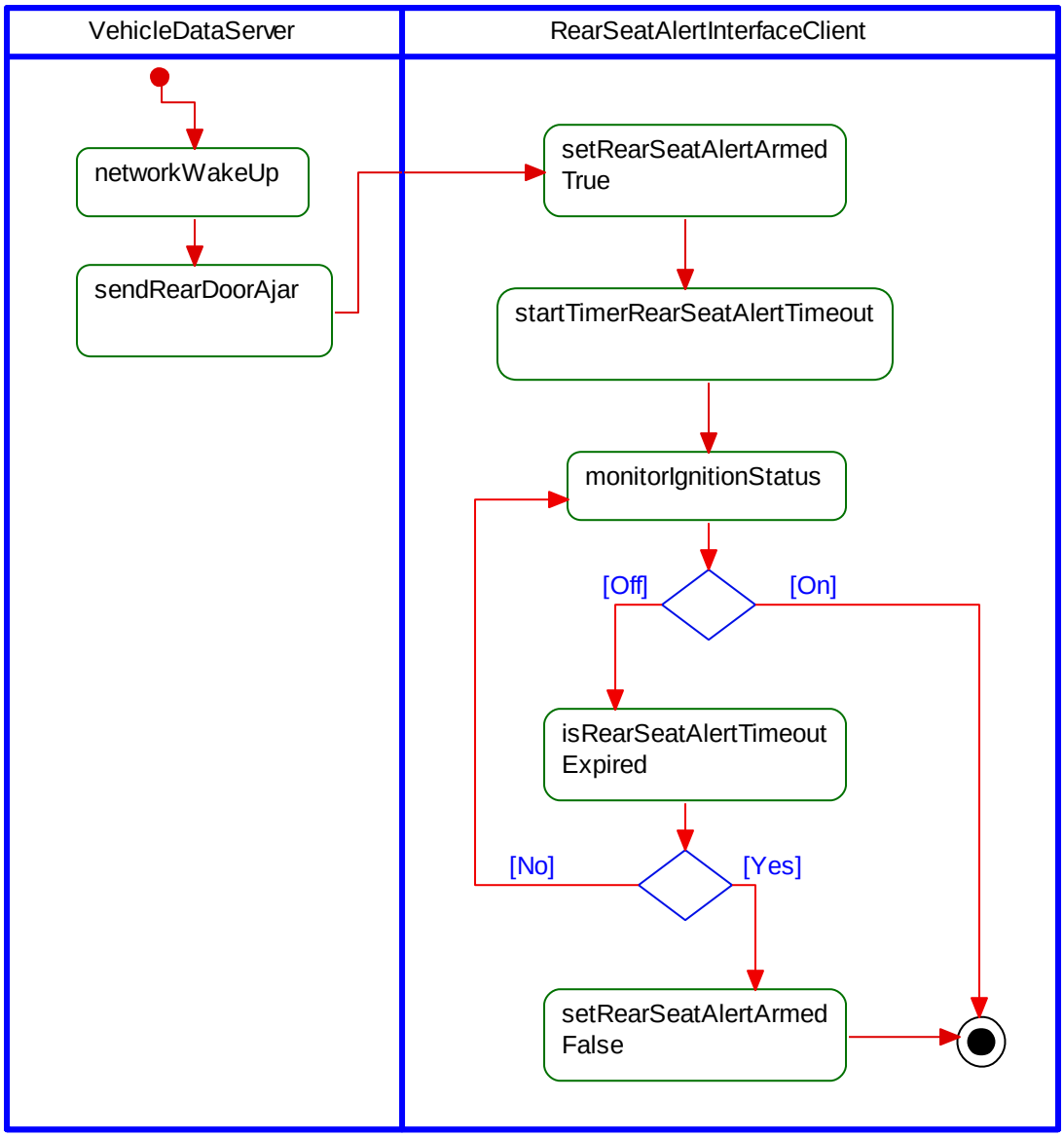
4.1.2.3 RSOAv2-UC-REQ-361781/A-Alert Armed After Ignition On

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Ignition is ON
Scenario Description	A rear door is opened
Post-conditions	The Rear Seat Occupant Alert Interface Client has armed the Rear Seat Occupant Alert system
List of Exception Use Cases	
Interfaces	

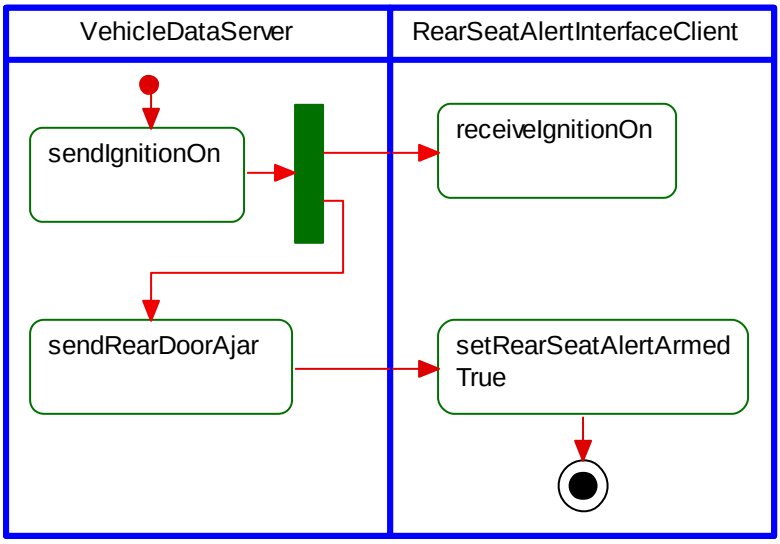
4.1.3 White Box View

4.1.3.1 Activity Diagrams

4.1.3.1.1 RSOAv2-ACT-REQ-360920/A-Arming or Disarming the Alert Prior to Ignition On

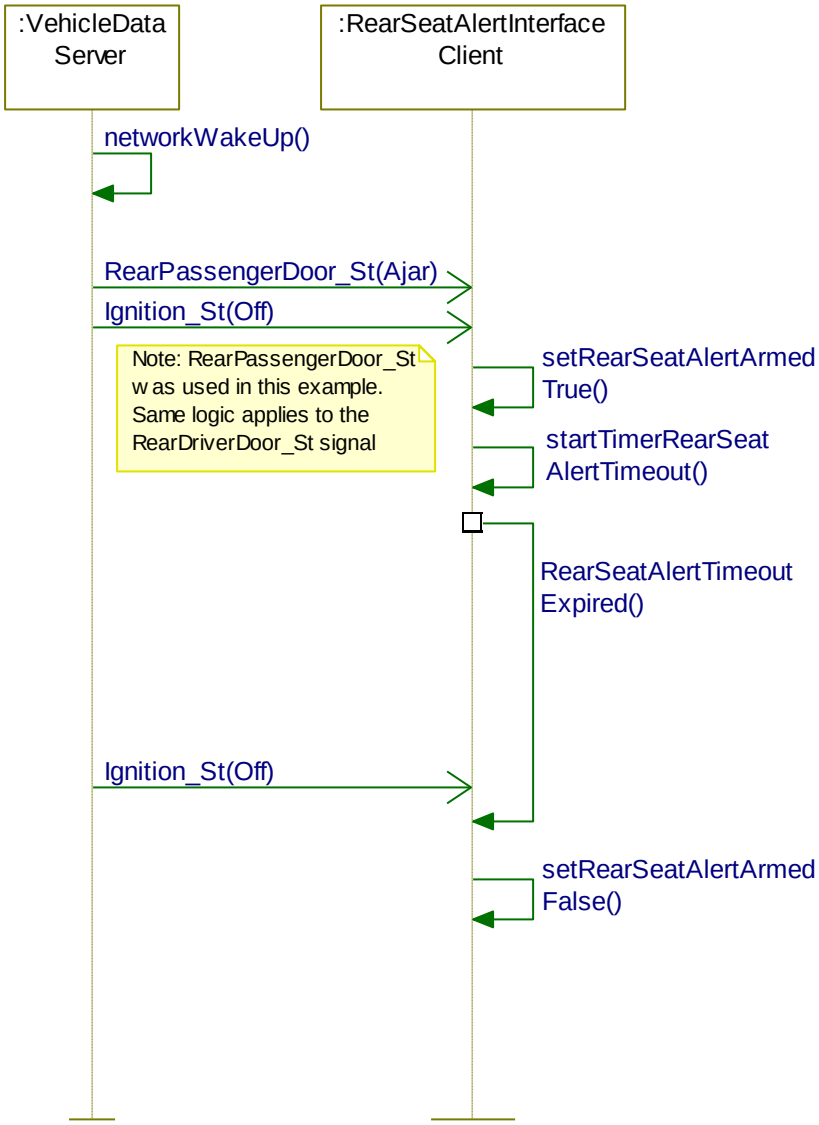


4.1.3.1.2 RSOAv2-ACT-REQ-361695/A-Arming the Alert After Ignition On



4.1.3.2 Sequence Diagrams

4.1.3.2.1 RSOAv2-SD-REQ-360921/A-Alert Disarmed Prior to Ignition On



4.2 RSOAv2-FUN-REQ-361462/A-Triggering and Rearming the Alert

4.2.1 Requirements

4.2.1.1 RSOAv2-REQ-361463/A-Triggering the Alert

The Rear Seat Occupant Alert Interface Client shall trigger the Alert if the system is armed (e.g. internal flag RearSeatAlertArmed is TRUE) when the Ignition Status transitions to OFF. Triggering the Alert consists of displaying a notification to the user via the HMI and also playing an audible alert, with Prompt ID <TBD>, by sending a SYNC_Alert request to the Audio Server to play audio on the Alerts Channel. For more details on this interface, please refer to the Alerts APIM SPSS. For more details on Prompt ID or priority, please refer to the A22C Prompts Specification.

4.2.1.2 RSOAv2-REQ-361464/A-Disarming or Rearming After a Transition Back to Ignition On

After triggering an Alert, the Rear Seat Occupant Alert Interface Client shall start the timer T_RearSeatAlertTimeout and if the timer expires prior to the Ignition Status transitioning back to ON, the Rear Seat Alert system shall be disarmed (e.g. internal flag RearSeatAlertArmed set to FALSE.)

If the Ignition Status transitions back to ON prior to the timer expiring, Rear Seat Occupant Alert Interface Client shall the rearm the Rear Seat Alert system (e.g. internal flag RearSeatAlertArmed set to TRUE), and another Alert shall be triggered upon the next transition to Ignition OFF.

4.2.2 Use Cases

4.2.2.1 RSOAv2-UC-REQ-361467/A-Notification and Alert Triggered

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Ignition is ON, Rear Seat Occupant System is Armed
Scenario Description	The Ignition Status transitions to OFF
Post-conditions	The Rear Seat Occupant Alert Interface Client has displayed a notification to the driver and has requested and Alert to be played via the Audio Server
List of Exception Use Cases	
Interfaces	HMI

4.2.2.2 RSOAv2-UC-REQ-361782/A-Alert Rearmed After Transition to Ignition Off

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	The Ignition Status is OFF The Rear Seat Occupant Alert Interface Client has displayed a notification to the driver and has requested and Alert to be played via the Audio Server
Scenario Description	The Ignition Status transitions to ON prior to the expiration of the Timeout Period
Post-conditions	The Rear Seat Occupant Alert Interface Client has rearmed the Rear Seat Occupant Alert system
List of Exception Use Cases	Alert Disarmed After Transition to Ignition Off
Interfaces	HMI

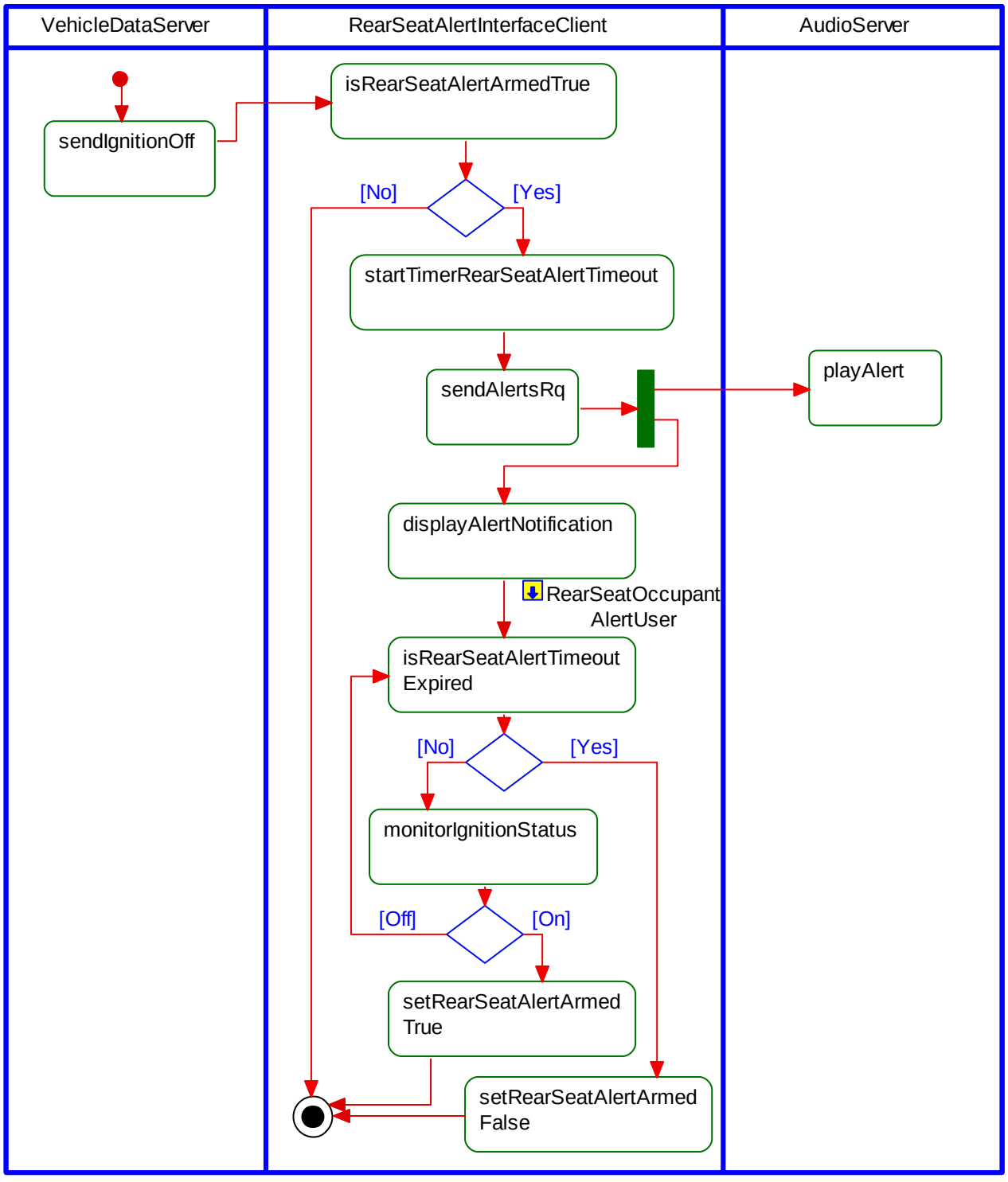
4.2.2.3 RSOAv2-UC-REQ-361783/A-Alert Disarmed After Transition to Ignition Off

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	The Ignition Status is OFF The Rear Seat Occupant Alert Interface Client has displayed a notification to the driver and has requested and Alert to be played via the Audio Server
Scenario Description	The Ignition Status remains OFF until the Timeout Period has expired
Post-conditions	The Rear Seat Occupant Alert Interface Client has disarmed the Rear Seat Occupant Alert system
List of Exception Use Cases	
Interfaces	HMI

4.2.3 White Box View

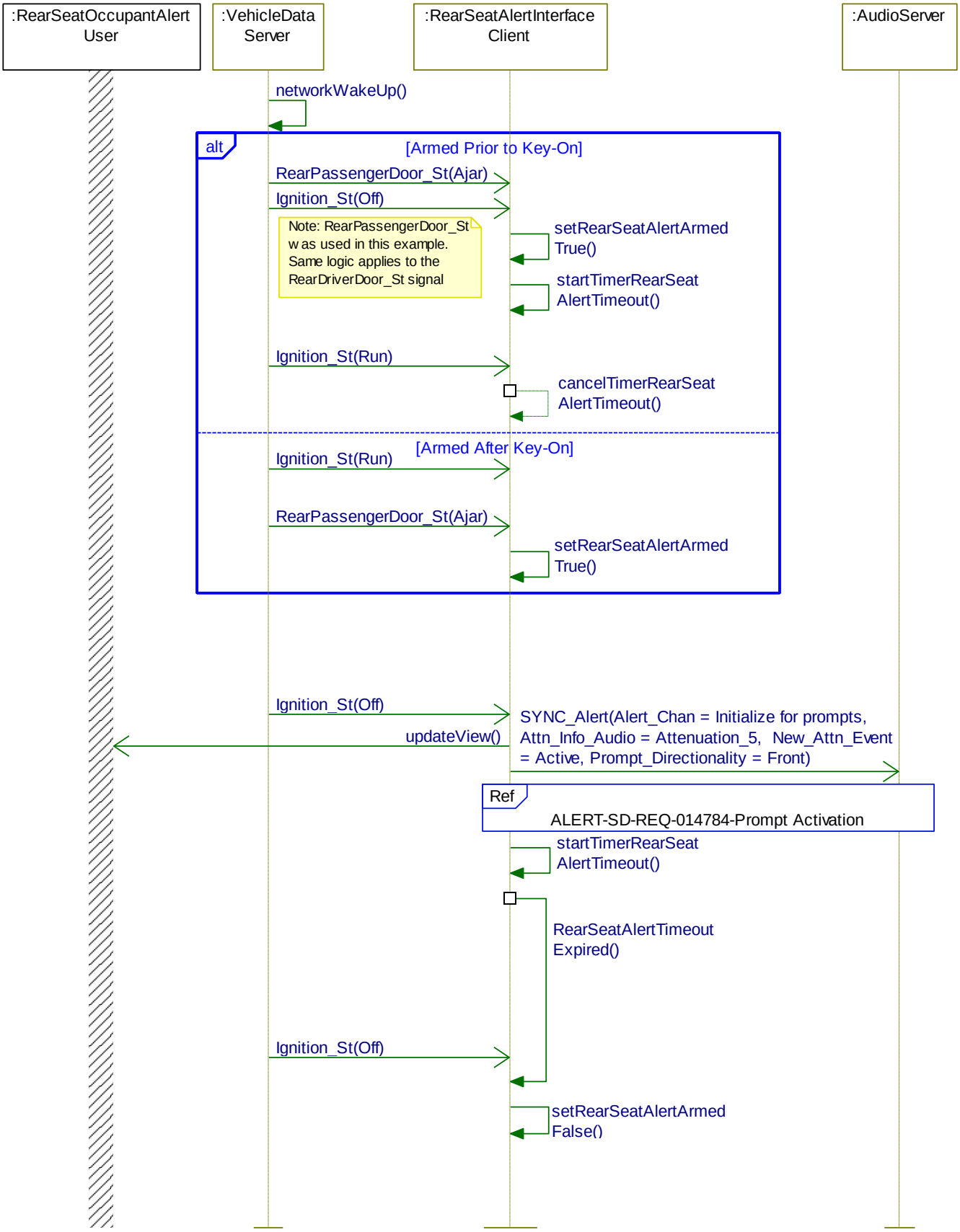
4.2.3.1 Activity Diagrams

4.2.3.1.1 RSOAv2-ACT-REQ-361468/A-Triggering and Rearming the Alert

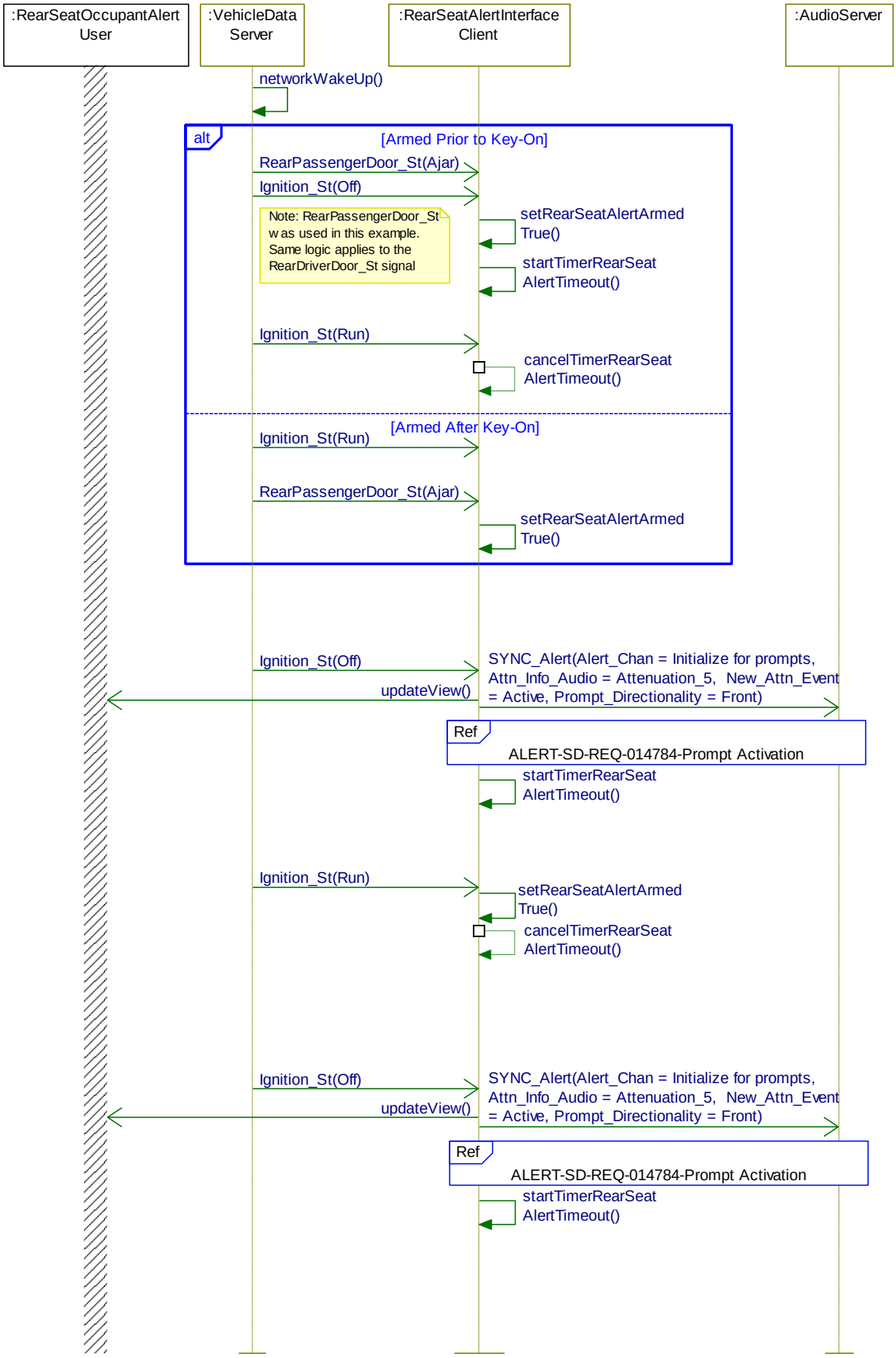


4.2.3.2 Sequence Diagrams

4.2.3.2.1 RSOAv2-SD-REQ-361469/A-Alert Armed, Triggered, and Disarmed After Ignition Off


:RearSeatOccupantAlert User
:VehicleData Server
:RearSeatAlertInterface Client
:AudioServer
networkWakeUp()
alt
[Armed Prior to Key-On]
RearPassengerDoor_St(Ajar)
Ignition_St(Off)
Note: RearPassengerDoor_St w as used in this example. Same logic applies to the RearDriverDoor_St signal
setRearSeatAlertArmed True()
startTimerRearSeat AlertTimeout()
Ignition_St(Run)
cancelTimerRearSeat AlertTimeout()
[Armed After Key-On]
Ignition_St(Run)
RearPassengerDoor_St(Ajar)
setRearSeatAlertArmed True()
Ignition_St(Off)
updateView()
SYNC_Alert(Alert_Chan = Initialize for prompts, Attn_Info_Audio = Attenuation_5, New_Attn_Event = Active, Prompt_Directionality = Front)
Ref
ALERT-SD-REQ-014784-Prompt Activation
startTimerRearSeat AlertTimeout()
RearSeatAlertTimeout Expired()
Ignition_St(Off)
setRearSeatAlertArmed False()

4.2.3.2.2 RSOAv2-SD-REQ-361696/A-Alert Armed, Triggered, and Rearmed After Ignition Off



4.3 RSOAv2-FUN-REQ-361689/A-Feature Menu Setting

4.3.1 Requirements

4.3.1.1 RSOAv2-REQ-361690/A-Feature Menu Setting

The Rear Seat Occupant Alert Interface Client shall implement a feature setting in the HMI to allow the user to enable or disable the Rear Seat Occupant Alert feature. The logic of this feature setting is to be maintained internally to the Rear Seat Occupant Alert Interface Client.

4.3.2 Use Cases

4.3.2.1 RSOAv2-UC-REQ-361694/A-Feature Setting Enabled

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Infotainment System is ON
Scenario Description	The user enables the Rear Seat Occupant Alert feature via the menu setting
Post-conditions	The Rear Seat Occupant Alert Interface Client feature is enabled
List of Exception Use Cases	
Interfaces	HMI

4.3.2.2 RSOAv2-UC-REQ-361784/A-Feature Setting Disabled

Actors	Rear Seat Occupant Alert Interface Client
Pre-conditions	Infotainment System is ON
Scenario Description	The user disables the Rear Seat Occupant Alert feature via the menu setting
Post-conditions	The Rear Seat Occupant Alert Interface Client feature is disabled
List of Exception Use Cases	
Interfaces	HMI

5 Appendix: Reference Documents

Reference #	Document Title
1	Infotainment Diagnostic Specification
2	A22C Prompts Specification
3	Alerts APIM SPSS
4	
5	
6	
7	
8	
9	
10	