Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Welcome Farewell

APIM Phoenix Domain Controller Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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Revision History

Date	Version	Notes	
September 30, 2021	**1.0**	**Initial Release**	

Table of Contents

1 Overview

The Welcome Farewell feature responds to the Driver's interaction upon entering or exiting the vehicle via several states and substates of the process. The Driver's interaction involves the opening or closing of the vehicle doors, use of a detected key, and cycling ignition between Off and Run/Start.

1.1 Feature Operation

The feature is intended to be able to either "Welcome" or bid "Farewell" to the Driver based off how they interact with the vehicle. The feature's response to the Driver is through controlling the Exterior Lights, Interior Lights, or Vehicle Displays.

1.2 Feature Assumptions

For the purposes of this document, this feature assumes the use of a Phoenix based Infotainment architecture.

1.3 Terminology and Abbreviations

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

Term	Description
BCM	Body Control Module
PDC	Phoenix Domain Controller
PaaK	Phone as a Key
CAN	Controller Area Network

2 Architectural Design

2.1 WCFW-CLD-REQ-440698/A-Welcome Farewell Interface Client

The Welcome Farewell Interface Client is responsible for receiving the status of the Welcome Farewell states and substates from the Welcome Farewell Server and using them to determine which display states and animations to transition to.

2.2 WCFW-CLD-REQ-440699/A-Welcome Farewell Server

The Welcome Farewell Server is responsible for providing the status of the Welcome Farewell states and substates to the Welcome Farewell Interface Client.

2.3 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Welcome Farewell feature may be mapped into physical modules. This mapping example is specific to the FNV3 architecture and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
Welcome Farewell Interface Client	APIM_AOS (PDC)
Welcome Farewell Server	BCM

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
WelcomeFarewell_St	VehWlcmFrwl_D_Stat
WelcomeFarewellMode_St	VehWlcmFrwlMde_D_Stat
Bonjour_St	BonAur_D_Stat
BonjourMode_St	BonAurMde_D_Stat
IgnitionStatus_St	Ignition_Status
DimmingLevel_St	Dimming_Lvl
HMIAudioMode	HMI_HMIMode_St

Table: Logical name/CAN signal mapping

2.5 WCFW-IIR-REQ-440700/A-WelcomeFarewellInterfaceClient_Rx

2.5.1 MD-REQ-440701/A-WelcomeFarewell_St

Message Type: Status

This signal is used to report the Welcome Farewell superstate

Name	Literals	Value	Description
WelcomeFarewell_St	-	-	The status of the Welcome Farewell superstate

	Null	0x0	
	Welcome	0x1	
	Farewell	0x2	
	RunStart	0x3	

2.5.2 MD-REQ-440702/A-WelcomeFarewellMode_St

Message Type: Status

The signal is used to report the Welcome Farewell substate

Name	Literals	Value	Description
WelcomeFarewellMode_St	-	-	The status of Welcome Farewell substate
	Null	0x0	
	Approach	0x1	
	IlluminatedEntry	0x2	
	CourtesyLightingAll	0x3	
	CourtesyLightingDelayAll	0x4	
	CourtesyLightingExtended	0x5	
	CourtesyLightingDelayExt	0x6	
	IlluminatedExit	0x7	

2.5.3 MD-REQ-440704/A-Bonjour_St

Message Type: Status

This signal is used to report the status of the Bonjour superstate

Name	Literals	Value	Description
Bonjour_St	-	-	The status of the Bonjour superstate
	Null	0x0	
	Bonjour	0x1	
	Motive	0x2	
	Au_Revoir	0x3	
	Reserved	0x4-0x7	

2.5.4 MD-REQ-440705/A-BonjourMode_St

Message Type: Status

The signal is used to report the status of the Bonjour substate

Name	Literals	Value	Description
BonjourMode_St	-	-	The status of the Bonjour substate
	Null	0x0	
	EntranceLightingDelay	0x1	
	PrepareExitLighting	0x2	
	ExitLighting	0x3	
	ExitLightingDelay	0x4	
	Reserved	0x5	

2.5.5 MD-REQ-273358/D-HMIAudioMode

Message Type: Status

Signal sent by the System Master to the Infotainment modules to indicate the power mode status of the infotainment system.

Logical Signal Name	Literals	Value	Description
HMIAudioMode / HMI_HMIMode_St	Inactive	0x0	
	OFF	0x1	
	ON	0x2	
	Reserved	0x3	N/A to Global Infotainment
	Reserved	0x4	N/A to Global Infotainment
	Load Shed Active	0x5	

2.5.6 MD-REQ-447857/A-DimmingLevel_St

Message Type: Status

This signal is used to report the status of the Bonjour superstate

Name	Literals	Value	Description
DimmingLevel_St	-	-	The status of the Bonjour superstate
	Off	0x0	
	Night_1	0x1	
	Night_2	0x2	
	Night_3	0x3	
	Night_4	0x4	
	Night_5	0x5	
	Night_6	0x6	
	Night_7	0x7	
	Night_8	0x8	
	Night_9	0x9	
	Night_10	0xA	
	Night_11	0xB	
	Night_12	0xC	
	Day_1	0xD	
	Day_2	0xE	
	Day_3	0xF	
	Day_4	0x10	
	Day_5	0x11	
	Day_6	0x12	
	Unknown	0xFE	
	Invalid	0xFF	

3 General Requirements

3.1 WCFW-REQ-385688/A-Welcome Farewell Display States

For the purposes of this specification, references to a Display ON state indicate a state of which the Centerstack display is backlit and displaying an image according to the HMI specification. Likewise, references to a Display OFF state indicate a state of which the Centerstack display is not backlit and no image is being displayed.

A Sleep state is when the Welcome Farewell Interface Client is ready to go to Sleep and has powered down the Display.
A Wake state is when the Welcome Farewell Interface Client is not ready to go to Sleep and has woken up the Display.

3.2 WCFW-REQ-385689/A-Configurable Parameter for Welcome Farewell

For any unique Welcome Farewell behavior based on vehicle program, the Welcome Farewell Interface Client shall have a configurable parameter to determine the vehicle program to be supported.

3.3 WCFW-REQ-385703/A-Welcome Farewell Animation Synchronization

PLACEHOLDER: Further details TBD

The Welcome Farewell Interface Client shall internally synchronize any Welcome Farewell animations across any displays it controls according to the HMI specifications.

3.4 WCFW-REQ-443637/A-Welcome Farewell Feature State Definitions

The Welcome Farewell feature can transition between four main states which are defined as the following:

- **Null:** Null state from where the Welcome/Farewell State Determination initialize and transition to due to time-outs or when the state determination function is no longer active.
- **Welcome:** State that shall be active as a vehicle user is entering the vehicle until either 1) the ignition is started (transition to “Ignition Run/Start” state), 2) vehicle bus goes to sleep (“Null” sub-state) or 3) the vehicle is locked from the exterior (“Vehicle Locking” sub-state).
- **Farewell:** State that shall be active as the vehicle user is leaving the vehicle after transitioning the ignition to OFF (“Illuminated Exit” sub-state) until either 1) the ignition is re-started (transitioning back to “Ignition Run/Start” state), 2) vehicle bus goes to sleep (“Null” sub-state) or 3) the vehicle is locked from the exterior (“Vehicle Locking” sub-state).
- **Ignition Run/Start:** State that shall be active from the time ignition is in Run/Start (includes accessory) until the ignition transitions to OFF (“Illuminated Exit” sub-state)

3.5 WCFW-REQ-443638/A-Welcome Farewell Sub State Definitions

The Welcome Farewell feature can transition between ten sub-state modes which are defined as the following:

- **Null:** Null state
- **Approach Detection:** Keyfob or Phone-as-a-key (PaaK) Device is within detection zone around vehicle (currently set to 2.5m)
- **Illuminated Entry:** Vehicle unlocked using either a Key-Fob, PaaK. Door Keypad code or any other means from the exterior of the vehicle while the ignition is OFF
- **Courtesy Lighting - All:** A vehicle entry door transitioning to Ajar while the ignition is OFF, applicable to both Exterior and Interior lighting elements
- **Courtesy Lighting Delay- All:** All vehicle entry door equaling closed after an ajar door(s) transitioned to closed, applicable to both Exterior and Interior lighting elements
- **Courtesy Lighting - Extended:** A vehicle entry door transitioning to Ajar while the ignition is OFF, applicable to just Interior lighting elements
- **Courtesy Lighting Delay- Extended: All:** All vehicle entry door equaling closed after an ajar door(s) transitioned to closed, applicable to just Interior lighting elements
- **Ignition Run/Start:** Vehicle Ignition is in Run or Start state
- **Illuminated Exit:** The vehicle transmission has transitioned from non-OFF to OFF
- **Vehicle Locking:** The vehicle was locked using either a Key-Fob, PaaK. Door Keypad code or any other means from the exterior of the vehicle while the ignition is OFF

4 Functional Definition

4.1 WCFW-FUN-REQ-440706/A-Transitioning to the Welcome State

4.1.1 Requirements

4.1.1.1 WCFW-REQ-440707/A-Display Off Sleep State Prior to Wake Up

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Sleep state (or stay in that state if already there) when all of the following signal conditions are true:

- WelcomeFarewell_St = Null
- WelcomeFarewellMode_St = Null
- Bonjour_St = Null
- BonjourMode_St = Null

4.1.1.2 WCFW-REQ-440708/A-Display Off Wake State on Approach

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Wake state when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = Approach

4.1.1.3 WCFW-REQ-440709/A-Display Off Wake State on Illuminated Entry

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Wake state (or stay in that state if already there) when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = IlluminatedEntry

4.1.1.4 WCFW-REQ-440710/A-Displaying the Welcome Animation

The Welcome Farewell Interface Client shall transition the Display to a Display On state and begin displaying the Welcome Animation when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = CourtesyLightingAll
- Bonjour_St = Bonjour

Note: If the Welcome Farewell Interface Client is already in Infotainment Mode (e.g. initiated from Extended Play Mode) then it shall suppress the Welcome Animation.

4.1.1.5 WCFW-REQ-440715/A-Display Off Wake State when Courtesy Lighting Extended

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Wake state when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = CourtesyLightingExtended
- Bonjour_St = Bonjour

4.1.1.6 WCFW-REQ-440716/A-Continue Displaying the Welcome Animation for Non-DCO Vehicles

When configured for a non-DCO vehicle, the Welcome Farewell Interface Client shall transition the Display to a Display On state and continue displaying the previously started Welcome Animation when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = CourtesyLightingDelayAll

- Bonjour_St = Bonjour
- BonjourMode_St = EntranceLightingDelay

Note: If the Welcome Farewell Interface Client is already in Infotainment Mode (e.g. initiated from Extended Play Mode) then it shall suppress the Welcome Animation.

4.1.1.7 WCFW-REQ-440717/A-Continue Displaying the Welcome Animation for DCO Vehicles

When configured for a DCO vehicle, the Welcome Farewell Interface Client shall transition the Display to a Display On state and continue displaying the previously started Welcome Animation when all of the following signal conditions are true:

- Bonjour_St = Bonjour
- BonjourMode_St = EntranceLightingDelay

Note: If the Welcome Farewell Interface Client is already in Infotainment Mode (e.g. initiated from Extended Play Mode) then it shall suppress the Welcome Animation.

4.1.1.8 WCFW-REQ-447837/A-Display Off Wake State when Courtesy Lighting Delay Extended

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Wake state when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = CourtesyLightingDelayAll
- Bonjour_St = Bonjour
- BonjourMode_St = EntranceLightingDelay

Note: If the Welcome Farewell Interface Client is already in Infotainment Mode (e.g. initiated from Extended Play Mode) then it shall suppress the Welcome Animation.

4.1.1.9 WCFW-REQ-440718/A-Display Off Wake State when in Welcome Null Substate

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Sleep state when all of the following signal conditions are true:

- WelcomeFarewell_St = Welcome
- WelcomeFarewellMode_St = Null

4.1.1.10 WCFW-REQ-353589/A-Welcome Animation Configurable Parameter

The Welcome Farewell Interface Client shall have a configurable parameter to allow for configuration of the type of Welcome Animation.

4.1.1.11 WCFW-REQ-353590/A-Key Animation Configurable Minimum Timer

The Welcome Farewell Interface Client shall display the Key Animation for a minimum period of time prior to revealing the HMI. This minimum period of time shall be independently configurable for each vehicle variant (up to 32 variants.)

4.1.1.12 WCFW-REQ-353596/A-Display Welcome Animation Timing

The Welcome Farewell Interface Client shall display the Welcome Animation within 1200ms of a wakeup event.

4.1.1.13 WCFW-REQ-353597/A-Display Key Animation Timing

The Welcome Farewell Interface Client shall display the Key Animation within 250ms of detecting a transition of IgnitinoStatus set to Run/Acc, except when that transition is the vehicle's wakeup event.

4.1.1.14 WCFW-REQ-389202/A-Cancel Greeting Timer

The Welcome Farewell Interface Client shall cancel the Greeting Timer when detecting a transition of IgnitinoStatus set to Run/Acc. The Greeting Timer shall only apply to the Door Animation.

4.1.2 Use Cases

4.1.2.1 WCFW-UC-REQ-440711/A-Displaying the Welcome Animation

Actors	Welcome Farewell Interface Client, Welcome Farewell Server
Pre-conditions	The Display is in an Off State
Scenario Description	The Welcome Farewell Server reports that the vehicle is in a Welcome State via the WelcomeFarewell_St and Bonjour_St signals
Post-conditions	The Welcome Farewell Interface Client displays the Welcome Animation
List of Exception Use Cases	
Interfaces	

4.2 WCFW-FUN-REQ-440714/A-Transitioning to the Run/Start State

4.2.1 Requirements

4.2.1.1 WCFW-REQ-385704/A-HMI Ready State in Bonjour Entrance Lighting Delay

The Welcome Farewell Interface Client shall transition the Display to a Display On state and make the interface usable to the User immediately when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Bonjour
- BonjourMode_St = EntranceLightingDelay

Note: The Welcome Farewell Interface Client shall transition from a looping animation to an HMI Ready state immediately.

4.2.1.2 WCFW-REQ-385705/A-Continue HMI Ready State in Bonjour Null

The Welcome Farewell Interface Client shall continue to remain in a Display On state and continue to make the interface usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Bonjour
- BonjourMode_St = Null

Note: This is the regular HMI state.

4.2.1.3 WCFW-REQ-386351/A-Continue HMI Ready State in Motive Null

The Welcome Farewell Interface Client shall continue to remain in a Display On state and continue to make the interface usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Motive
- BonjourMode_St = Null

Note: This is the regular HMI state.

4.2.1.4 WCFW-REQ-386352/A-Continue HMI Ready State in Au Revoir Prepare Exit Lighting

The Welcome Farewell Interface Client shall continue to remain in a Display On state and make the Drive Mode Based interface (if applicable) usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart

- Bonjour_St = Au_Revoir
- BonjourMode_St = PrepareExitLighting

Note: This is the regular HMI state.

4.2.1.5 WCFW-REQ-389194/A-Continue HMI Ready State in Au Revoir Exit Lighting

The Welcome Farewell Interface Client shall continue to remain in a Display On state and make the Drive Mode Based interface (if applicable) usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Au_Revoir
- BonjourMode_St = ExitLighting

Note: This is the regular HMI state.

4.2.1.6 WCFW-REQ-389195/A-Begin Displaying Farewell Fade Animation

The Welcome Farewell Interface Client shall continue to remain in a Display On state and begin displaying the Farewell Fade Animation (if applicable) when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Au_Revoir
- BonjourMode_St = ExitLightingDelay

Note: The Farewell Fade Animation shall continue until it ends

4.2.1.7 WCFW-REQ-393728/A-Continue HMI Ready State in Au Revoir Null

The Welcome Farewell Interface Client shall continue to remain in a Display On state and make the Drive Mode Based interface (if applicable) usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = RunStart
- Bonjour_St = Au_Revoir
- BonjourMode_St = Null

Note: This is the regular HMI state.

4.3 WCFW-FUN-REQ-443677/A-Transitioning to the Farewell State

4.3.1 Requirements

4.3.1.1 WCFW-REQ-393730/A-Continue HMI Ready State in Illuminated Exit

The Welcome Farewell Interface Client shall continue to remain in a Display On state and make the Drive Mode Based interface (if applicable) usable to the User when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = IlluminatedExit

Note: This is the regular HMI state.

4.3.1.2 WCFW-REQ-393732/A-Begin Displaying Farewell Animation

The Welcome Farewell Interface Client shall continue to remain in a Display On state and begin displaying the Farewell Screen / Animation when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = CourtesyLightingAll
- HMIAudioMode = Off

Note: The EV Information Screens shall be displayed before the Farewell Animation

4.3.1.3 WCFW-REQ-393747/A-Continue Farewell Animation in Courtesy Lighting Extended

The Welcome Farewell Interface Client shall transition the Display to a Display Off state and continue displaying the Farewell Screen / Animation until it ends when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = CourtesyLightingExtended

4.3.1.4 WCFW-REQ-393748/A-Display Off Sleep State in Courtesy Lighting Delay All

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Sleep state when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = CourtesyLightingDelayAll

4.3.1.5 WCFW-REQ-419772/A-Display Off Sleep State in Courtesy Lighting Delay Extended

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Sleep state (or stay in that state if already there) when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = CourtesyLightingDelayExt

4.3.1.6 WCFW-REQ-419773/A-Display Off Sleep State in Farewell Null

The Welcome Farewell Interface Client shall transition the Display to a Display Off / Sleep state (or stay in that state if already there) when all of the following signal conditions are true:

- WelcomeFarewell_St = Farewell
- WelcomeFarewellMode_St = Null

Note: This is the Vehicle Shutdown state

4.3.1.7 WCFW-REQ-389203/A-Displaying Farewell Animation when Extended Play Mode Ends

The Welcome Farewell Interface Client shall begin displaying the Farewell Screen / Animation when Extended Phone Mode ends.

4.3.1.8 WCFW-REQ-447823/A-Displaying Farewell Animation when Extended Play Mode Ends

The Welcome Farewell Interface Client shall begin displaying the Farewell Screen / Animation when Extended Play Mode ends.

4.3.1.9 WCFW-REQ-447824/A-Displaying Farewell Animation when Power Button is Pressed during Phone Mode from Extended Play

The Welcome Farewell Interface Client shall begin displaying the Farewell Screen / Animation when the Power Button is pressed during Phone Mode from within Extended Play.

4.3.2 Use Cases

4.3.2.1 WCFW-UC-REQ-440719/A-Displaying Farewell Animation

Actors	Welcome Farewell Interface Client, Welcome Farewell Server
Pre-conditions	The Display is On and in the regular HMI state
Scenario Description	The Welcome Farewell Server reports that the vehicle is in a Farewell State
Post-conditions	The Welcome Farewell Interface Client displays the Farewell Animation

List of Exception Use Cases	
Interfaces	

4.4 WCFW-FUN-REQ-447817/A-Adjusting Illumination Intensity

4.4.1 Requirements

4.4.1.1 WCFW-REQ-447818/A-Night 12 Intensity when Dimming Level Off in Key On

The Welcome Farewell Interface Client shall adjust the display illumination intensity to a level of Night_12 when all of the following signal conditions are true:

- DimmingLevel_St = Off || unused || invalid
- IgnitinoStatus_St = Run || Start || Accessory

4.4.1.2 WCFW-REQ-447819/A-Follow Dimming Level in Key On

The Welcome Farewell Interface Client shall adjust the display illumination intensity to the value set in the DimmingLevel_St signal when all of the following signal conditions are true:

- DimmingLevel_St = Night or Day level value
- IgnitinoStatus_St = Run || Start || Accessory

4.4.1.3 WCFW-REQ-447820/A-Follow Last Known Value When Dimming Level Missing

The Welcome Farewell Interface Client shall adjust the display illumination intensity to the last known valid value set in the DimmingLevel_St signal when the following signal condition is true:

- DimmingLevel_St signal is missing

4.4.1.4 WCFW-REQ-447821/A-Illumination Off When Dimming Level Off in Key Off While HMI Mode Off

The Welcome Farewell Interface Client shall adjust the display illumination intensity to a level of Off when all of the following signal conditions are true:

- DimmingLevel_St = Off || unused || invalid
- IgnitinoStatus_St = Off
- HMIAudioMode = Off

4.4.1.5 WCFW-REQ-447822/A-Follow Last Known Value When Dimming Level Off in Key On While HMI Mode On

The Welcome Farewell Interface Client shall adjust the display illumination intensity to the last known valid value set in the DimmingLevel_St signal when the following signal condition is true:

- DimmingLevel_St = Off || unused || invalid
- IgnitinoStatus_St = Off
- HMIAudioMode = On

5 Appendix: Reference Documents

Reference #	Document Title
1	x22g Welcome Farewell Mode Specification
2	
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