

Lincoln Embrace / Ford Welcome-Farewell Feature Specification

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TABLE OF CONTENTS

1	INTRODUCTION	6
1.1	PURPOSE	6
1.2	SCOPE	6
1.3	REFERENCE SPECIFICATIONS	7
2	FEATURE DESCRIPTION	8
2.1	THEORY OF OPERATION	8
3	FEATURE REQUIREMENTS	9
3.1	FEATURE LEVEL REQUIREMENTS	9
3.1.1	<i>Feature Requirements</i>	9
3.1.1.1	Host Vehicle State required for Feature operation	10
3.2	QUALITY REQUIREMENTS	10
3.2.1	<i>Reliability Requirements</i>	10
3.2.2	<i>Performance Requirements</i>	10
3.2.2.1	Performance Latency Requirements	10
3.2.3	<i>Safety Requirements</i>	10
3.2.3.1	NA FTA Requirements to abide by (or not violate)	11
3.2.3.2	ECE Requirements to abide by (or not violate)	11
3.2.3.3	China Requirements to abide by (or not violate)	12
3.2.4	<i>Security Requirements</i>	13
4	FUNCTIONAL DECOMPOSITION	13
4.1	LIST OF FUNCTIONS	13
5	FUNCTION REQUIREMENT	13
5.1	POWER MODES OF EACH FUNCTION	13
5.2	WELCOME/FAREWELL STATE AND SUB-STATE DETERMINATION	14
5.3	LE_WF_ILLUMINATION REQUESTOR	18
5.3.1	<i>Control Signal Definitions & Configurability</i>	18
5.3.2	<i>Control Signal Value Targets</i>	19
5.3.3	<i>Control Signal response transitions based on changes in Welcome/Farewell state and sub-state transitions to meet call-outs in RQTs</i>	19
5.3.4	<i>Additional requirements</i>	20
5.3.5	<i>Illumination Algorithm inhibits and overrides</i>	20
5.4	LE_WF_ILLUMINATION RESPONSE	20
5.5	LE_WF_WELCOME/FAREWELL DISPLAY	21
6	FEATURE VARIANT DESIGN ARCHITECTURE	22
6.1	ELECTRICAL ARCHITECTURE – CGEA 1.3	22
6.1.1	<i>Electrical Topology</i>	22
6.1.2	<i>Common Requirements</i>	22
6.1.2.1	Participating ECUs	22
6.1.2.2	Signal Requirements	22
6.1.2.2.1	CAN Signal Requirements	22
6.1.2.2.2	Local Sleep Inhibition while Illumination is active	25
6.1.2.2.3	CAN Error Handling for Interior Illumination Specific Signals	26
6.1.2.2.4	CAN Error Handling for remaining (non-Interior Illumination) Signals	26
6.1.2.2.5	CAN Error Handling for Signal Gateway Messages	26
6.1.2.2.6	LIN Signal Requirements	27
6.1.3	<i>CGEA 1.3 Vehicle ECU specific requirements</i>	30
6.1.3.1	Body Control Module (BCM) Requirements	30
6.1.3.1.1	BCM Hardwired Exterior Illumination:	32
6.1.3.1.2	BCM Hardwired Interior Courtesy Lamp Illumination:	32
6.1.3.1.3	BCM Hardwired Switch Backlighting Illumination:	32
6.1.3.1.4	BCM Hardwired Illumination Summary	32
6.1.3.2	LED Driver Module (LDM) requirements	33
6.1.3.3	Rear Fade-Control-Module (R-FCM) requirements	34
6.1.3.4	Overhead Console (OHC) requirements	35

6.1.3.5 Ambient Light Module (ALM) requirements	Error! Bookmark not defined.
6.1.3.6 Headlamp Switch (HDLPSW-LIN) requirements	37
6.1.3.7 Steering Column Control Module (SCCM) requirements	37
6.1.3.8 Instrument Panel Cluster (IPC) requirements	38
6.1.3.8.1 IPC Welcome/Farewell Graphics	39
6.1.3.8.2 IPC Display Intensity and Backlighting	40
6.1.3.9 Accessory Protocol Interface Module (APIM/SYNC) requirements	40
6.1.3.9.1 APIM Welcome/Farewell Graphics	40
6.1.3.9.2 APIM Display Intensity and Backlighting	41
6.1.3.10 Front Control Interface Module (FCIM, FCIMB) requirements	42
6.1.3.10.1 FCIM/FCIMB Display Intensity and Backlighting	42
6.1.3.11 Rear Audio Control Module (RACM) requirements	43
6.1.3.11.1 RACM Welcome/Farewell Graphics	43
6.1.3.11.2 RACM Display Intensity and Backlighting	43
6.1.3.12 Austere Heads-Up Display (aHUD) requirements	44
6.1.3.12.1 aHUD Welcome/Farewell Graphics	44
6.1.3.12.2 aHUD Display Intensity and Backlighting	45
6.1.3.13 Door Control Modules (DDM/PDM) requirements	46
6.1.3.13.1 DDM/PDM Hardwired Exterior Illumination:	46
6.1.3.13.2 DDM/PDM Auto-fold Mirrors Control:	46
6.1.3.13.3 DDM/PDM Hardwired Exterior Illumination/Mirrors Summary:	46
6.1.3.13.4 DDM/PDM Hardwired Interior Switch Backlighting Illumination:	47
6.1.3.14 Rear-HVAC (R-HVAC) requirements	47
6.1.3.14.1 R-HVAC Hardwired Interior Switch Backlighting Illumination:	47
6.1.3.15 All Terrain Control Module (ATCM/SDM) requirements	48
6.1.3.15.1 ATCM/SDM Hardwired Interior Switch Backlighting Illumination:	48
7 DATA DICTIONARY	50
7.1 DICTIONARY	52
8 REVISION HISTORY	56
9 APPENDIX	57
9.1 APPENDIX 1: EXTERIOR LIGHTING PWM SIGNAL SPECIFICATION	57
9.2 APPENDIX 2: INTERIOR LIGHTING PWM SIGNAL SPECIFICATION	57
 LIST OF FIGURES	
Figure 1 : Welcome Farewell Feature Context Diagram	8
Figure 2 : Illumination Control Signal transitions based on ARL requests.	19
 LIST OF TABLES	
Table 1 : Features described in this FD	6
Table 2 : Reference Specification	7

1 INTRODUCTION

1.1 Purpose

This document specifies the electrical system function requirements for the determination of welcome/farewell states and the desired response(s) from different vehicle lighting elements during those states.

1.2 Scope

The following set of features from the Global Feature & Function List is described in this FD.

Feature ID	Feature Name	Owner
F000416/A	Approach Detection	Elton Jamoua (EESE)
F000308/A	Welcome Mat	Ahmet Cinar (EESE)
F000309/A	Illuminated Door Handle Pockets	Elton Jamoua (EESE)
F000148/C	Auto Fold Mirrors	Ahmet Cinar (EESE)
Fn001857/J	Center Stack Animation/Graphic	Nicholar Frazier (SYNC)
Fn00335/C	Instrument Cluster Animation/Graphic - Needle	Scott Watkins (EESE)
F000317/A	Tail Lamp Static Fade	Terrence Wilson (Ext Lighting)
F000317/A	Rear Corner Lamp/Rear Side Marker Fade	Terrence Wilson (Ext Lighting)
F000315/A	Dynamic (Sequential) Signature DRL's	Terrence Wilson (Ext Lighting)
F000315/A	Fog/Fascia Lamp Static Fade	Terrence Wilson (Ext Lighting)
F000061/D	Pulsing Push to Start Switch	TBD
F000063/C	Static Sequential Ambient Lighting	Steven Antilla (Int Lighting)
F000061/D	Door Switch Backlighting	John Ricks (EESE)
F000059/C	Courtesy Lamps	Steven Antilla (Int Lighting)
F000061/D	I/P and Overhead Console Button Backlighting	Steven Antilla (Int Lighting)
F000061/D	Sync & Radio Control Button Backlighting	Dinh Tran (SYNC)
F000061/D	Headlamp Switch Backlighting	Steven Antilla (Int Lighting)
F000061/D	Instrument Cluster Backlighting	Scott Watkins (EESE)
F000059/C	Illuminated Scuff Plates	Steven Antilla (Int Lighting)
Fn003250/B	aHUD Animation	Aneesh Mathai (EESE)
F000315/A	Lit Lincoln Star	Farhan Ehsan (EESE)
F000317/A	Illuminated Deployable Runningboards	Farhan Ehsan (EESE)
F000316/A	Illuminated Seatbelt Buckles	Matt Majkowski (Int Lighting)
Fn000335/C	Instrument Cluster Animation/Graphic - Starfield	Scott Watkins (EESE)
F001002/A	Ford Welcome/Farewell	Farhan Ehsan (EESE)
F001003/A	Lincoln Welcome/Farewell	Farhan Ehsan (EESE)
F001004/A	Ford Signature Light	Frank Aust
F001005/A	Lincoln Signature Light	John Barrs (EESE)
F000052/C	Courtesy Lighting	John Barrs (EESE)
F000053/B	Courtesy Lighting Delay	John Barrs (EESE)
F000054/B	Illuminated Entry/Exit	John Barrs (EESE)

Table 1: Features described in this FD

1.3 Reference Specifications

Sub-system	Specification
aHUD welcome farewell	HUD_Welcome_Goodbye_Strategy_-_CGEA1.3_v1.10
Gen 1M Body Control Module FS	FS-LU5T-14B476-AA*
Gen 2 Body Control Module FS	FS-JU5T-14B476-AA*
cHUD welcome farewell	cHUD_Welcome_Goodbye_Strategy_-_CGEA1.3_v1.2
Cluster welcome farewell	Welcome-Goodbye_Strategy - CGEA1.3_vX.X
Ford Welcome Farewell ARL	RQT-002004-021878 DNA WELCOME-FAREWELL STRATEGY REV. 1
Lincoln Embrace ARL	RQT-002004-022094 LINCOLN EMBRACE WELCOME AND FAREWELL BEHAVIOR REV. 1
SYNC welcome farewell	H22g_SYNC3_Welcome_Power_Modes_RELEASED_v2_20
Auto-fold mirrors	Mirror fold and door lock strategy.pptx
Approach Detection Functional Spec	Approach Detection ReqSTD-2013-04-11-16-09

Table 2: Reference Specification

2 FEATURE DESCRIPTION

2.1 Theory of Operation

Ford Welcome Farewell

The vehicle's Exterior, Interior lights, and Displays shall respond by either fading ON/OFF or turning ON/OFF based on user interaction with the vehicle – Approaching it with a valid PK, locking or unlocking a vehicle, opening or closing vehicle doors, and cycling the ignition between OFF and RUN/Start.

Lincoln Embrace

A variant of Ford Welcome Farewell which was adapted for Lincoln vehicles, with aesthetic level differences and the total number of lighting/display elements being impacted.

Feature Context Diagram

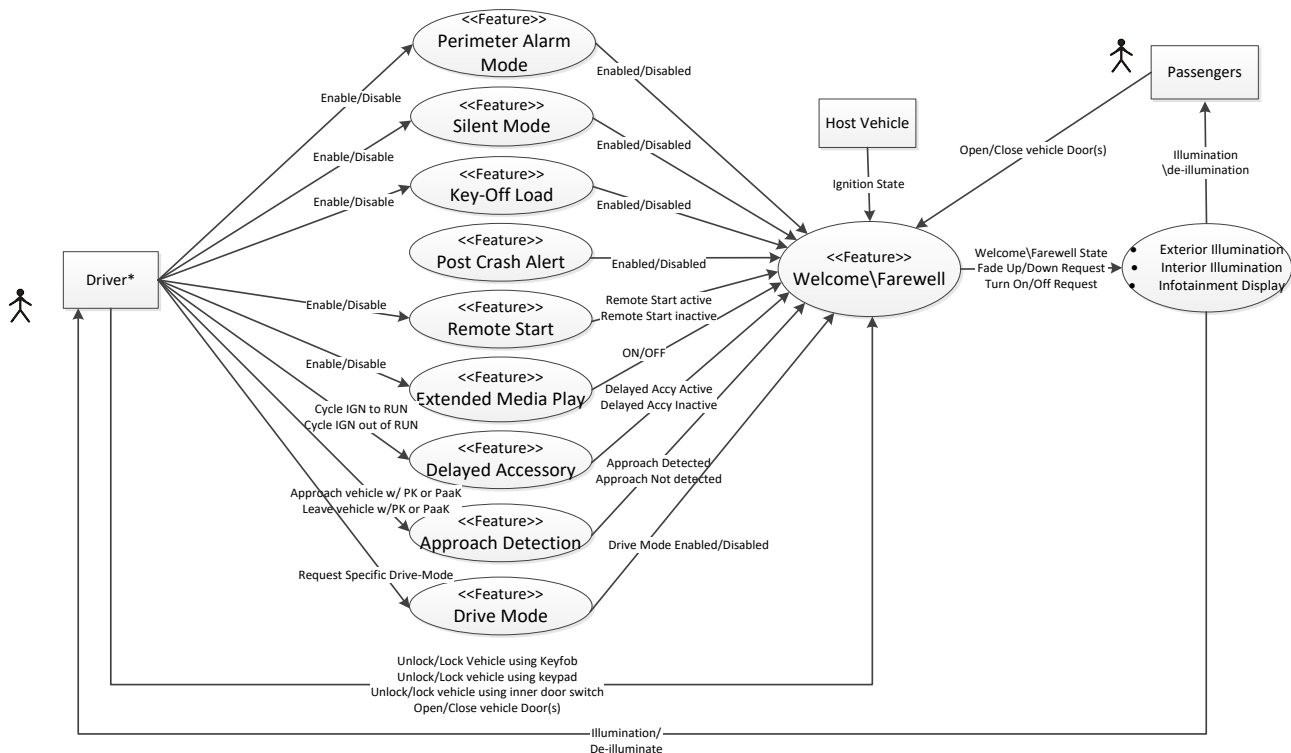


Figure 1: Welcome Farewell Feature Context Diagram

3 FEATURE REQUIREMENTS

3.1 Feature Level Requirements

3.1.1 Feature Requirements

The feature is intended to be able to either “Welcome” or bid “Farewell” to the Driver based off how he/she interacts with the vehicle. The manner in which the vehicle shall interact with the Driver is by controlling the Exterior Lights, Interior Lights, or Vehicle Displays (turn then ON or OFF)

- The feature shall require Exterior Illumination, Interior Illumination and Vehicle Display’s for Ford specific vehicles to Fade ON, Fade OFF, Turn On or Turn OFF based off of the state tables in ARL “RQT-002004-021878 DNA WELCOME-FAREWELL STRATEGY REV. XX”
- The feature shall require Exterior Illumination, Interior Illumination and Vehicle Display’s for Lincoln specific vehicles to Fade ON, Fade OFF, Turn On or Turn OFF based off of the state tables in ARL “RQT-002004-022094 LINCOLN EMBRACE WELCOME AND FAREWELL BEHAVIOR REV. XX”
- The feature shall be partitioned into three specific portions: “Welcome”, “In-Drive”, and “Farewell”; which exhibit unique behaviors for Exterior Illumination, Interior Illumination, and Vehicle Displays as per the previously mentioned ARL documents
- The feature’s “Welcome” portion shall include the following states:
 - Approach Detection (if equipped): Detects if a Keyfob or Phone-as-a-key (PaaK) Device is within a certain distance away from the vehicle while the ignition is OFF
 - Illuminated Entry: The vehicle is 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: A vehicle entry door has transitioned to Ajar while the ignition is OFF
 - Courtesy Lighting Delay: All vehicle entry doors have transitioned to Closed while the ignition is OFF
- During the “In-Drive”, the feature shall not require any unique behavior for Exterior Lighting, Interior Lighting, and In-vehicle displays by allowing them to transition to their legislative/Drive specific behavior.
- The feature’s “Farewell” portion shall include the following states:
 - Illuminated Exit: The vehicle transmission has transitioned from non-OFF to OFF (with all vehicle entry doors closed)
 - Courtesy Lighting: A vehicle entry door has transitioned to Ajar after the ignition transitioned to OFF
 - Courtesy Lighting Delay: All vehicle entry doors have transitioned to Closed after the ignition transitioned to OFF
 - Vehicle Locking: The vehicle is 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
- The feature shall require the Exterior Illumination and Interior Illumination to reverse Fade On or Fade Off illumination behavior instantaneously at the time a new request is received without having to complete the previous Fade request
- The feature shall require all vehicle illumination to not flicker during its “Welcome” and “Farewell” portions.
- The feature shall allow the following features to over-ride or inhibit Exterior Lighting, Interior Lighting, and Vehicle Display behavior if they are active during the “Welcome” or “Farewell” portions:
 - Remote Start (override for specific Exterior Lighting)
 - Delayed Accessory (override for Interior Lighting)
 - Extended Play (override for Vehicle Displays)
 - Perimeter Alarm Mode (override for Exterior Lighting and Interior Lighting)
 - Silent Mode (override for Exterior Lighting, Interior Lighting and Vehicle Displays)
 - Key-Off-Load Mode (override for Exterior Lighting, Interior Lighting and Vehicle Displays)
 - Post-Crash Alert (override for Exterior Lighting, Interior Lighting and Vehicle Displays)
- The feature shall also monitor the vehicle’s driver selected “Drive Mode” and use it as an input to drive unique Exterior Illumination, Interior Illumination and Vehicle Display behavior during the “Welcome” and “Farewell” portions

- Auto Ambient Light (AAL) toggle (ON/OFF) allows the user to manually override the default ambient light colors
 - AAL ON defaults to the standard ambient light conditions
 - AAL OFF defaults to user manual override preference
- BCM will have a mapping for a default ambient light color associated with each Drive Mode. This color mapping should be configurable to retain the flexibility to update the default colors.
- Based on the inputs received, the BCM will decide on the color of the Ambient Lights and output the color to the Ambient Lights
- At all times, Intensity selection will be based on user selection only. Intensities will not change between color changes.

3.1.1.1 **Host Vehicle State required for Feature operation**

The feature is expected to have functionality across all Power Modes and Vehicle Modes that would qualify under “normal” operation of vehicle – Vehicle isn’t in an error, error recovery, diagnostic, or any related state which would inhibit normal function of the vehicle.

3.2 **Quality Requirements**

3.2.1 **Reliability Requirements**

No additional reliability requirements for the intended implementation.

3.2.2 **Performance Requirements**

- The lighting elements controlled by this feature while it is active shall be steady burning (no flickering) when illuminated
- By default, if a lighting element is required to “Fade ON”, it shall take 3 seconds to ramp up its illumination level from “OFF” level to the desired “ON” level – “ON” illumination level shall be specified by Vehicle Harmony group.
- By default, if a lighting element is required to “Fade OFF”, it shall take 4 seconds to complete when starting at “ON” illumination level
- If a lighting element is required to “Fade ON” or “Fade OFF”, it shall continuously ramp ON or OFF to its “ON” level - shall not “flicker” as defined by the Interior Harmony Group, identified during vehicle walk-around
- Exterior Lighting elements required to “Fade ON” or “Fade OFF” shall follow ramp in either direction following Stevens’ Power Law curve until the illumination reaches the desired “ON” or “OFF” level respectively
- Interior Lighting elements required to “Fade ON” or “Fade OFF” shall transition in either direction following “Smooth Dimming” until the illumination reaches the desired “ON” or “OFF” level
- Exterior Lighting elements required to “Snap ON” or “Snap OFF” shall step up or down their illumination level to the desired “ON” or “OFF” level following a step function
- Interior Lighting elements required to “Snap ON” or “Snap OFF” shall step up or down their illumination level to the desired “ON” or “OFF” level following a step function
- Interior Lighting elements required to “Pulse” shall ramp up to their “ON” illumination level and then immediately transition between their “ON” and configurable illumination level (10% of “ON” illumination level by default) at a configurable frequency (set to 1Hz by default) – point back BCM FS

3.2.2.1 **Performance Latency Requirements**

- The feature shall require the system to respond to a user specific interaction within 250ms

3.2.3 **Safety Requirements**

The following requirements refer to the safety requirements as defined and managed by the ASO office. Each requirement points to a specific “Regulation Records” (RRs) as they’re listed in FSMS, which in turn refer to sections from the applicable Regulation.

Links to RRs are used instead of pointing to the specific language that applies within the larger Regulatory document to protect against continual updates/re-interpretations – link to RR won't change, but content within RR shall/might eventually change. It is also strongly advised that the listed "RR" Author" be contacted to assure that the content within the RR is being interpreted correctly.

3.2.3.1 **NAFTA Requirements to abide by (or not violate)**

RR ID/ Revision	Country/ Vehicle area	Regulation Number and Title	RR Author
<u>CAN-004804/1</u>	Canada/ Exterior Lighting	SCHEDULE IV Part II(CMVSS 108 and 108.1)/LIGHTING SYSTEM, RETRO-REFLECTIVE DEVICES and HEADLAMP CONCEALMENT DEVICES	Adams-Campos, Kelley-KADAMSCA (kadamsca)
<u>CAN-004804/3</u>	Canada/ Exterior Lighting	CMVSS 108/LIGHTING SYSTEM, RETRO-REFLECTIVE DEVICES and HEADLAMP CONCEALMENT DEVICES	Adams-Campos, Kelley-KADAMSCA (kadamsca)
<u>CAN-004911/3</u>	Canada/ Interior Lighting	CMVSS 101/SCHEDULE IV PART II 101 (CMVSS 101) Controls and Displays	Laesch,Renu-RLAESCH1 (rlaesch1)
<u>MEX-006134/1</u>	Mexico/ Vehicle Display	MEX SECOFI-25/INSTRUMENT CLUSTER.	Arellano-Belloc,Hector-HARELLAN (harellan)
<u>USA-006741/1</u>	US / Exterior Lighting	USA - STATE - ALL/EXTERIOR LIGHTING - GENERAL	Adams-Campos, Kelley-KADAMSCA (kadamsca)
<u>USA-008716/3</u>	US / Interior Lighting & Vehicle Displays	FMVSS 101/FMVSS 101 Controls and Displays	Laesch,Renu-RLAESCH1 (rlaesch1)
<u>USA-008732/1</u>	US / Interior Lighting & Vehicle Displays	/NHTSA Visual-Manual Guidelines for In-Vehicle Electronic Devices	Leigh,Michael-MLEIGH (mleigh)
<u>USA-009169/2</u>	US / Exterior Lighting	USA - STATE - SEVERAL/HEADLAMPS (LOW-BEAMS)	Adams-Campos, Kelley-KADAMSCA (kadamsca)
<u>USA-011127/2</u>	US / Exterior Lighting, Interior Lighting & Vehicle Display	/2019MY U.S. NHTSA New Car Assessment Program (NCAP)	Buckman, Jennifer-JBARNARD (jbarnard)

3.2.3.2 **ECE Requirements to abide by (or not violate)**

RR ID/ Revision	Country/ Vehicle area	Regulation Number and Title	RR Author
<u>ECE-008757/1</u>	ECE / Vehicle Displays &	RE3 ANNEX 16./ON-BOARD COMMUNICATION AND INFORMATION SYSTEMS.	Abraham,James-JABRAH11 (jabrah11)

	Interi or Lighti ng		
<u>ECE-</u> <u>00495</u> <u>1/10</u>	ECE / Vehicl e Displa y	ECE-39/SPEEDOMETER	Sanchez,Greg-GSANCHE1 (gsanche1)
<u>ECE-</u> <u>00507</u> <u>3/16</u>	ECE / Interi or Lighti ng & Vehicl e Displa ys	ECE-121.01/Identification of Hand Controls, Tell-Tales and Indicators	Mueller,Joachim- JMUELLE6 (jmuelle6)
<u>ECE-</u> <u>00500</u> <u>9/12</u>	ECE / Exteri or Lighti ng	ECE-26.02/Exterior Projections	Mueller,Joachim- JMUELLE6 (jmuelle6)

3.2.3.3 China Requirements to abide by (or not violate)

RR ID/Revision	Country	Regulation Number and Title	RR Author
<u>XCT-011075/1</u>	Cross Country Topics / Vehicle Display	CROSS COUNTRY SPEEDOMETER MATRIX/CROSS COUNTRY MATRIX FOR SPEEDOMETER AND ODOMETER	Laesch,Renu-RLAESCH1 (rlaesch1)
<u>CHN-005444/1</u>	China / Exterior Lighting & Interior Lighting	GB 17509-2008/CHINA: DIRECTION INDOCATORS	Zhang,Yue-YZHAN256 (yzhan256)
<u>CHN-008524/1</u>	China / Exterior Lighting	GB 11566-2009/CHINA: EXTERIOR PROJECTIONS	Zhang,Yue-YZHAN256 (yzhan256)
<u>CHN-004436/16</u>	China / Exterior Lighting, Interior Lighting & Vehicle Display	GB 7258/CHINA: CCC VEHICLE APPROVAL	Zhang,Yue-YZHAN256 (yzhan256)

<u>CHN-004329/5</u>	China / Interior Lighting & Vehicle Displays	GB 4094/CHINA: SYMBOLS FOR CONTROLS, INDICATORS, AND TELL-TALES	Zhang,Yue-YZHAN256 (yzhan256)
<u>CHN-004330/5</u>	China / Interior Lighting & Vehicle Display	GB 15082/CHINA: SPEEDOMETERS FOR MOTOR VEHICLE	Zhang,Yue-YZHAN256 (yzhan256)

***NOTE** – China market regulatory requirements are close to ECE market requirements with very few exceptions.

***NOTE** – Consult ASO team for any markets not specified.

3.2.4 Security Requirements

N/A – No unique security requirements are required by this feature.

4 FUNCTIONAL DECOMPOSITION

4.1 List of Functions

Section #	Function Name	Function Description
5.2.1	Welcome Farewell State and Sub-state Determination	Algorithm within the controlling module which shall accept input signals to then determine the specific state and sub-state of Welcome Farewell
5.2.2	LE_WF_Illumination Requestor	Function that will transmit the expected response (i.e. “Fade On”) to all illumination controlling smart modules, based on the output it receives out of the Welcome Farewell State Determination function.
5.2.3	LE_WF_Illumination Response	Function that will accept the expected response output from the “LE_WF_Illumination Requestor” function to then drive the actual illumination for a given light assembly or display to meet the expected final output as per “RQT-002004-021878 DNA WELCOME-FAREWELL STRATEGY REV. XX” for Ford vehicles or “RQT-002004-022094 LINCOLN EMBRACE WELCOME AND FAREWELL BEHAVIOR REV. XX” for Lincoln vehicles
5.2.4	LE_WF_Welcome/Farewell Display	Function that will accept a combination of outputs from the “Welcome Farewell State Determination” and “LE_WF_Illumination Requestor” functions to then drive the “Welcome” and “Farewell” animations for a given display to meet the expected final output as per “RQT-002004-021878 DNA WELCOME-FAREWELL STRATEGY REV. XX” for Ford vehicles or “RQT-002004-022094 LINCOLN EMBRACE WELCOME AND FAREWELL BEHAVIOR REV. XX” for Lincoln vehicles

5 Function Requirement

5.1 Power Modes of each Function

Function Name	Power Mode
Welcome Farewell State Determination	(Ignition States: OFF, ACCY, RUN and START) OR (Vehicle Bus: Awake) OR (Local Sleep Inhibition: Active)
LE_WF_Illumination Requestor	(Ignition States: OFF, ACCY, RUN and START) OR (Vehicle Bus: Awake) OR (Local Sleep Inhibition: Active)
LE_WF_Illumination Response	(Ignition States: OFF, ACCY, RUN and START) OR (Vehicle Bus: Awake) OR (Local Sleep Inhibition: Active)
LE_WF_Welcome/ Farewell Display	(Ignition States: OFF, ACCY, RUN and START) OR (Vehicle Bus: Awake) OR (Local Sleep Inhibition: Active)

5.2 Welcome/Farewell State and Sub-state determination

Function that the Centralized Welcome/Farewell controlling module will use to determine and transmit the specific Welcome/Farewell State and Welcome/Farewell Sub-state to the receiving modules and systems.

Inputs used for Welcome/Farewell State and Sub-state Determination

The Welcome Farewell State and Sub-state Determination Function requires the following set of inputs:

- Approach Detected/Not-Detected: PK position relative to vehicle, either within or outside “Approach” zone.
- Vehicle Entry Door Ajar Status: Front Driver and Passenger Door, Rear Driver and Passenger Door
- Vehicle Lock vs Unlock Status
- Vehicle Lock vs Unlock Requestor: Key-fob/PK, Door Keypad, or Interior Door Trim switch
- Vehicle Ignition Status: Off, Accessory (if applicable), Run, or Start.

Welcome/Farewell State Determination Definitions

Welcome: State that shall be active as a vehicle user is entering the vehicle **until either the ignition is started** (transition to “Ignition Run/Start” state), vehicle bus goes to sleep (“Null” sub-state) or 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)

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 the ignition is re-started (transitioning back to “Ignition Run/Start” state), vehicle bus goes to sleep (“Null” sub-state) or the vehicle is locked from the exterior (“Vehicle Locking” sub-state).

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/Farewell Sub-State Determination Definitions

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

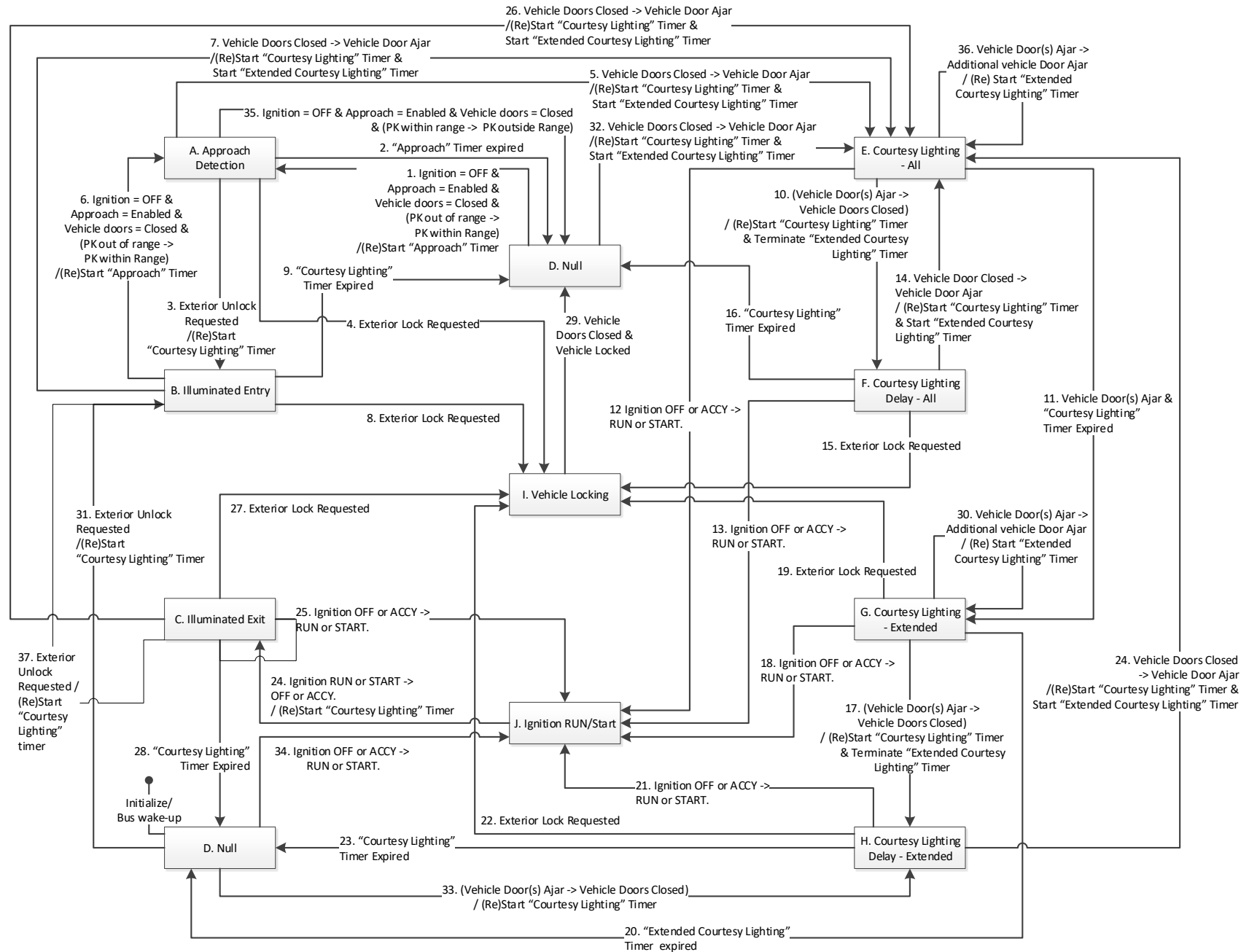
Ignition Run/Start: Vehicle Ignition is in Run or Start state

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

Null: Null state

Welcome/Farewell Sub-State Determination flow diagram



***NOTE** – Even though the diagram above has two separate “Null” states called out, they are referring to the same “Null” state.

	<p>D -> A.1: “Approach” timer initialized. Timer set to 25 seconds by default</p> <p>Transition as written applied to “Unlocked” configurable variant of Approach Detection. For “Locked” variant of Approach Detection, vehicle must have been locked using an exterior means.</p> <p>Welcome/Farewell State: Don’t care -> Welcome</p>
	<p>A -> D.2: “Approach” timer expired. Timer set to 25 seconds by default</p> <p>Welcome/Farewell state: Don’t care -> Null</p>
	<p>A -> B.3: “Courtesy Lighting” timer initialized. Timer set to 25 seconds by default. “Approach” timer terminated.</p> <p>Welcome/Farewell state: Don’t care -> Welcome</p>
	<p>A -> I.4: Terminate any active timers</p> <p>Welcome/Farewell state: Don’t care -> Welcome</p>
	<p>A -> E.5: “Courtesy Lighting” timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter.</p> <p>“Extended Courtesy Lighting” timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter.</p> <p>Welcome/Farewell state: Don’t care -> Welcome</p>
	<p>A -> D.35: “Approach” timer terminated on transition to “Null”. PK range and detection speed varies depending on number of antennas on vehicle and antenna scan sequence/rate</p> <p>Welcome/Farewell state: Don’t care -> Null</p>
	<p>B -> A.6: “Approach” timer re-initialized. “Courtesy Lighting” timer terminated.</p> <p>Transition as written applied to “Unlocked” configurable variant of Approach Detection. Shall not occur for “Locked” variant of Approach Detection</p> <p>Welcome/Farewell state: Don’t care -> Welcome</p>
	<p>B -> E.7: “Courtesy Lighting” timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter.</p> <p>“Extended Courtesy Lighting” timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter.</p> <p>Welcome/Farewell state: Don’t care -> Welcome</p>
	<p>B -> I.8: Terminate any active timers</p> <p>Welcome/Farewell state: Don’t care -> Farewell</p>
	<p>B -> D.9: “Courtesy Lighting” timer expired. Timer set to 25 seconds by default</p> <p>Welcome/Farewell state: Don’t care -> Null</p>
	<p>C -> J.25: Any active timers terminated. Vehicle behavior must follow legislative in-drive requirements.</p> <p>Welcome/Farewell state: Farewell -> Ignition Run/Start</p>
	<p>C -> B.37: “Courtesy Lighting” timer initialized. Timer set to 25 seconds by default. “Approach” timer terminated.</p> <p>Welcome/Farewell state: Farewell -> Welcome</p>
	<p>C -> E.26 “Courtesy Lighting” timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter.</p> <p>“Extended Courtesy Lighting” timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter.</p>

	Welcome/Farewell state: remain in Farewell if interior door handle used to open driver door. Farewell -> Welcome if exterior door handle used to open door
	C -> I.27 Terminate any active timers Welcome/Farewell state: remain in Farewell
	C -> D.28 "Courtesy Lighting" timer expired. Timer set to 25 seconds by default Welcome/Farewell state: Farewell -> Null
	D -> B.31 Courtesy Lighting" timer initialized. Timer set to 25 seconds by default. "Approach" timer terminated. Welcome/Farewell state: Null -> Welcome
	D -> E.32 "Courtesy Lighting" timer started at first door ajar transition. Shall not reset with each additional door ajar thereafter. "Extended Courtesy Lighting" timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter. Welcome/Farewell state: Null -> Welcome
	D -> H.33 "Courtesy Lighting" timer started after all ajar vehicle entry doors transition to closed. Welcome/Farewell state: Null -> Welcome
	D -> J.34 Vehicle behavior must follow legislative in-drive requirements. Welcome/Farewell state: Null -> Ignition Run/Start
	E -> F.10: "Courtesy Lighting" timer restarted after all ajar vehicle entry doors transition to closed. "Extended Courtesy Lighting" timer terminated. Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	E -> G.11: "Courtesy Lighting" timer expired. Timer set to 25 seconds by default Transition has no impact on active "Extended Courtesy Lighting" timer (continue counting down) Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	E -> J.12: Any active timers terminated. Vehicle behavior must follow legislative in-drive requirements. Welcome/Farewell state: Don't care -> Ignition Run/Start
	E -> E.36: "Extended Courtesy Lighting" timer reset with each additional door ajar transition. "Courtesy Lighting" timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter. Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	F -> J.13: Any active timers terminated. Vehicle behavior must follow legislative in-drive requirements. Welcome/Farewell state: Don't care -> Ignition Run/Start
	F -> E.14 "Courtesy Lighting" timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter. "Extended Courtesy Lighting" timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter. Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	F -> I.15 Terminate any active timers Welcome/Farewell state: Don't care -> Farewell
	F -> D.16 "Courtesy Lighting" timer expired. Timer set to 25 seconds by default Welcome/Farewell state: Don't care -> Null
	G -> H.17 "Courtesy Lighting" timer restarted after all ajar vehicle entry doors transition to closed. "Extended Courtesy Lighting" timer terminated.

	Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	G -> J.18 Any active timers terminated. Vehicle behavior must follow legislative in-drive requirements. Welcome/Farewell state: Don't care -> Ignition Run/Start
	G -> I.19 Terminate any active timers Welcome/Farewell state: Don't care -> Farewell
	G -> D.20 "Extended Courtesy Lighting" timer expired. Timer set to 10 minutes by default
	G -> G.30 "Extended Courtesy Lighting" timer reset with each additional door ajar transition
	H -> J.21 Any active timers terminated. Vehicle behavior must follow legislative in-drive requirements. Welcome/Farewell state: Don't care -> Ignition Run/Start
	H -> I.22 Terminate any active timers Welcome/Farewell state: Don't care -> Farewell
	H -> D.23 "Courtesy Lighting" timer expired. Timer set to 25 seconds by default Welcome/Farewell state: Don't care -> Null
	H -> E.24 "Courtesy Lighting" timer restarted at first door ajar transition. Shall not reset with each additional door ajar thereafter. "Extended Courtesy Lighting" timer initialized at first door ajar transition. Timer set to 10 minutes by default. Shall reset with each additional door ajar thereafter. Welcome/Farewell state: Keep previous state (Welcome or Farewell)
	I -> D.29 Transition occurs after vehicle lock is confirmed Welcome/Farewell state: Don't care -> Null
	J -> C.24 "Courtesy Lighting" timer restarted. Timer set to 25 seconds by default. Welcome/Farewell state: Ignition Run/Start -> Farewell

5.3 LE WF Illumination Requestor

Function that will accept outputs from the "Welcome Farewell State and Sub-state Determination" function, to determine the appropriate illumination response and transmit the appropriate control signal i.e. Ramp up, Ramp Down, Snap On, Snap Off etc.; as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

5.3.1 Control Signal Definitions & Configurability

RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, requires the following four categories of responses in order to satisfy their requirements.

- **"Fade On"**: Request that requires the target lighting element to ramp up their illumination level along as perceived linear curve. The default duration shall be 3 seconds, with a minimum configurable value of 40ms, a maximum configurable value of 5 seconds, and configurable over 40ms steps.
- **"Fade Off"**: Request that requires the target lighting element to ramp down their illumination level along as perceived linear curve. The default duration shall be 4 seconds, with a minimum

configurable value of 40ms, a maximum configurable value of 5 seconds, and configurable over 40ms steps.

- **“Snap On”**: Request that requires the target lighting element to step up their illumination level from an OFF level to a non-OFF level. The default duration shall be not exceed than 40ms with no additional configurability.
- **“Snap Off”**: Request that requires the target lighting element to step down their illumination level from a non-OFF level to an OFF level. The default duration shall be not exceed than 40ms with no additional configurability.

5.3.2 Control Signal Value Targets

The Control Signals tied to the target vehicle's illumination element shall ramp or snap along the aforementioned curves until they reach a target value that's defined as either “ON/Embrace” or “OFF” under “RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles.

ARL call-out	Target Control Signal value	Minimum value	Maximum value	Config. Steps
“ON/Embrace”	80% PWM	20% PWM	100% PWM	1%
“OFF”	<= 15% PWM	0% PWM	15% PWM	1%

5.3.3 Control Signal response transitions based on changes in Welcome/Farewell state and sub-state transitions to meet call-outs in RQTs

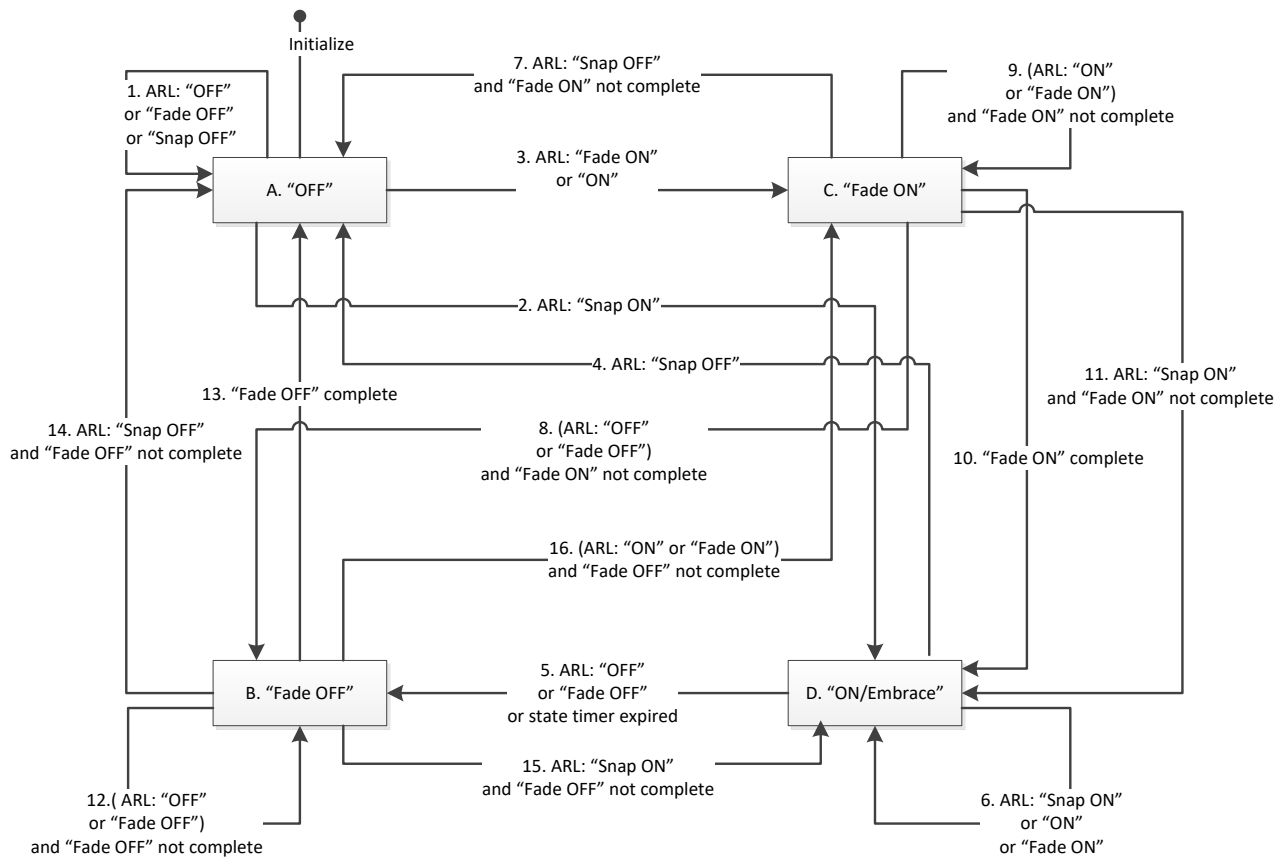


Figure 2: Illumination Control Signal transitions based on ARL requests.

	A.1: No action, remain OFF
	D.2: Illuminate to "ON/Embrace Level", step function
	C.3: Start "Fade ON" sequence (3 seconds by default)
	A.4: De-illuminate to "OFF" level, step function
	B.5: Start "Fade OFF" sequence (4 seconds by default)
	D.6: Remain at "ON/Embrace" level, reset state time-out timer
	A.7: Interrupt "Fade ON" sequence, de-illuminate to "OFF" level, step function
	B.8: Interrupt "Fade ON" sequence, begin "Fade OFF" sequence. Start "Fade OFF" from same point/level "Fade ON" reached at time of interruption. "Fade OFF" time = % Fade ON complete * Fade OFF total time.
	C.9: Start "Fade ON" sequence after first request. Do not reset "Fade ON" sequence with each new request.
	D.10: "Fade ON" complete. Start state time-out timer.
	D.11: Interrupt "Fade ON" sequence, illuminate to "ON/ Embrace" level, step function
	B.12: Start "Fade OFF" sequence after first request. Do not reset "Fade OFF" sequence with each new request.
	A.13: "Fade OFF" complete. Remain OFF for duration of state.
	A.14: Interrupt "Fade OFF" sequence, de-illuminate to "OFF" level, step function
	D.15: Interrupt "Fade OFF" sequence, illuminate to "ON/ Embrace" level, step function
	C.16: Interrupt "Fade OFF" sequence, begin "Fade ON" sequence. Start "Fade ON" from same point/level "Fade OFF" reached at time of interruption. "Fade ON" time = % Fade OFF complete * Fade ON total time.

NOTE: 1. Additional requirements called out under section 5.3.1.2 Control Signal Definitions and Configurability in satisfying behavior listed under "Control signal response"

5.3.4 Additional requirements

- Conflicting requests sent mid illumination ramping (Fade ON -> Fade OFF before Fade ON complete, or Fade OFF -> Fade ON before Fade OFF complete): New Fade request shall be honored starting at illumination level that was reached by previous request while maintaining specified ramp rate (shall complete in lesser time). No time delay required before acting on new Fade request.
- Ignition transitions from OFF to RUN/Start: Front Illumination shall follow legislative requirements on Illumination behavior (can forego "Fade ON" or "Fade OFF" behavior/delays if in conflict legislative requirements)

5.3.5 Illumination Algorithm inhibits and overrides

- LE_WF_ Illumination Requestor shall be given the least priority over competing algorithms that control Illumination
- Activating "Perimeter Alarm Mode" or "Panic Alarm" feature as per BCM FS shall inhibit the LE_WF_ Illumination Requestor while feature is active
- Activating "Silent Mode" feature as per BCM FS shall inhibit LE_WF_ Illumination Requestor while feature is active
- Activating "Key-Off-Load Mode" feature as per BCM FS shall inhibit LE_WF_ Illumination Requestor while feature is active
- Activating "Post-Crash Alert" feature as per BCM FS shall inhibit LE_WF_ Illumination Requestor while feature is active.

5.4 LE_WF Illumination Response

Function that will accept outputs from the "LE_WF_ Illumination Requestor " to then have the lighting element(s) in the vehicle respond by illuminating to satisfy the requirements in RQT-002004-021878

- Vehicle Illumination shall illuminate in response to control signal ramping up
- Vehicle Illumination shall de-illuminate in response to control signal ramping down
- Vehicle Illumination shall consistently illuminate to the same illumination level at a given duty cycle.
- Specific "ON", "ON/Embrace", "Snap ON" illumination level for each individual lighting element shall be specified by Vehicle Harmony Group.
- Vehicle Illumination shall meet the requirements specified in section 3.2.2 "Performance Requirements" unless otherwise specified by SME or Vehicle Harmony Group
- Vehicle Illumination shall meet (or not violate) all applicable requirements in section 3.2 "Quality".
- When the control signal reaches 0% duty cycle the desired Vehicle Illumination element's intensity level shall equal 0 (go to "OFF")
- During control signal "Fade ON" sequence, the Vehicle Illumination element shall Fade ON smoothly – no observable flickering.
- During control signal "Fade OFF" sequence, the Vehicle Illumination element shall Fade OFF smoothly – no observable flickering.
- During control signal "Snap ON" sequence, the Vehicle Illumination element shall Snap ON without flickering.
- During control signal "Snap OFF" sequence, the Vehicle Illumination element shall Snap OFF without flickering.
- Vehicle Illumination response to ramping control signals shall not be inhibited if any of the individual Vehicle Illumination lighting elements are malfunctioning/burnout.
- If the Control Signal, Power, or Ground to a specific Vehicle Illumination element is corrupted/disconnects, that specific lighting element shall default to "OFF" (de-illuminated)

5.5 LE WF Welcome/Farewell Display

Vehicles equipped with customer facing displays or display devices i.e. heads-up-displays, shall be required to display combination of "Welcome" or "Farewell" screens based on the outputs from the Welcome/Farewell State and Sub-state determination function. These displays or display devices include but aren't limited to:

- Center-stack Welcome/Farewell Display (Sync Screen)
- Cluster Welcome/Farewell Display (TFT/Digital portion)
- Heads-up displays (aHUD)

Inputs		Output
Welcome/Farewell State	Welcome/Farewell Sub-state	Welcome/Farewell Animation Request
Don't Care ¹	Approach Detection	Wake-up display
Don't Care ¹	Illumination Entry	Wake-up display (stay awake)
Welcome	Courtesy Lighting – All	Welcome Animation ³
Welcome	Courtesy Lighting Delay – All	Welcome Animation ³
Welcome	Courtesy Lighting – Extended	Off (stay awake)
Welcome	Courtesy Lighting Delay – Extended	Off (stay awake)
Welcome	Null	Off (Sleep)
Ignition Run/Start	Don't Care	Vehicle Start Animation ³ then transition to in-drive display
Don't Care ²	Illuminated Exit	Farewell animation ³
Farewell	Courtesy Lighting – All	Off (stay awake)
Farewell	Courtesy Lighting Delay – All	Off (Sleep)
Farewell	Courtesy Lighting – Extended	Off (Sleep)
Farewell	Courtesy Lighting Delay – Extended	Off (Sleep)
Farewell	Null	Off (Sleep)
Null	Null	Off (Sleep)

Note 1: State is only possible when "Welcome/Farewell State" = Welcome.

Note 2: State is only possible when "Welcome/Farewell State" = Farewell

Note 3: Specific animation owned by HMI and Studio group.

6 FEATURE VARIANT DESIGN ARCHITECTURE

6.1 Electrical Architecture – CGEA 1.3

Please note that the feature does not require specific modules (except the BCM) to be present on a vehicle, and is instead tailored to the content of the vehicle. The following section is a generic starting point to show how functions are allocated based off vehicle content and desired functionality.

6.1.1 Electrical Topology

Applicable for Lincoln and Ford vehicles on the CGEA 1.3 architecture

6.1.2 Common Requirements

6.1.2.1 Participating ECUs

Generic list of participating ECUs provided in table below. Functionality along with Publisher and Subscriber requirements will change based on vehicle content.

ECU	Network	CAN		LIN	
		Publisher	Subscriber	Publisher	Subscriber
BCM	HS-1	X		X	
LDM	HS-1				X
R-FCM	HS-1				X
ALM	HS-1				X
OHC	HS-1				X
LSM (HDLMP SW)	HS-1				X
SCCM	HS-2		X		
GSM	HS-2		X		
APIM	HS-3	X	X		
FCIMB	HS-3		X		
RACM	HS-3		X		
aHUD	HS-3		X		
IPC	HS-3		X		
ACM / ICP	HS-3		X		
DDM	MS-1		X		
PDM	MS-1		X		
RHVAC	MS-1		X		
ATCM (SDM)	MS-1		X		
DCME/F/G/H	MS-1		X	X	
DAS	MS-1				X
ECG	G/W	X	X		

6.1.2.2 Signal Requirements

The following section lists all of the signals required to complete the desired behaviors required by the Feature. It links the logical data-flows used within this document to the actual CAN OR LIN signals which shall actually be used by the modules.

6.1.2.2.1 CAN Signal Requirements

Signal Database Detail	Value
Signal Name	VehWlcmFrwl_D_Stat
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v
Source Network	HS1 CAN
Signal refresh rate	500 ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to Null, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-Null value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS1
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	VehWlcmFrwlMde_D_Stat
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v
Source Network	HS1 CAN
Signal refresh rate	500 ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to Null, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-Null value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS1
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Dimming_Lvl
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v

Source Network	HS1 CAN
Signal refresh rate	500 ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms
	If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to OFF, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-OFF value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS1
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Litval
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v
Source Network	HS1 CAN
Signal refresh rate	500 ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms
	If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to OFF, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-OFF value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS1
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	HMI_HMIMode_St
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v
Source Network	HS3 CAN
Signal refresh rate	500 ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to OFF, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-OFF value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS3
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	APIM

Signal Database Detail	Value
Signal Name	Ignition_Status
Functional Voltage Range (Min,Max)	6-16v
Performance Voltage Range (Min,Max)	9-16v
Source Network	HS1 CAN
Signal refresh rate	500ms
Publishing Interval (ms)	<= 40ms
Publisher Latency Requirements	If microprocessor is awake: <= 51ms If microprocessor is asleep: <=121ms
Publishing Network Sleep Inhibitor	If signal is not equal to OFF, then allow for network sleep but not for local sleep
Updates Signal while asleep	Updates on change
Network Wake Up	Wake up network on signal change to non-OFF value
Max latency before signal is valid on Network wakeup	<= 50ms
Max latency before signal is valid on reset	<= 120ms
CAN Node Type	HS1
Signal Domain	Refer to data dictionary
Signal Transmit Strategy	Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	500 ms
End-to-End Latency Requirements	<=250 ms
Publishing ECU	BCM

6.1.2.2.2 Local Sleep Inhibition while Illumination is active

The illumination master ECU (BCM) might initiate a network sleep in low power modes (Ignition_Status < (Run and Start) to minimize battery drainage. At the same time it might be necessary to keep the illumination active (> OFF) in some cases. All components receiving illumination signals shall maintain

the last valid illumination signal value > OFF if a valid network sleep is initiated and the last received illumination signal is != OFF. The dimming master (BCM) shall wake-up and distribute the illumination signals = OFF if the condition, which requires illumination, does not exist anymore. Otherwise, illumination is required to stay ON indefinitely.

6.1.2.2.3 CAN Error Handling for Interior Illumination Specific Signals

If a Signal gateway message or Frame gateway message containing either Dimming_Lvl, or HMI_HMIMode_St signal has an update bit which shows “not updated” (signal went “missing”) for less than a period of time as per “Diagnostic Fault Coverage and DTC Numbers Design Consideration” (typically 5 seconds). Then the subscriber shall continue using last known value of those signals.

If a Signal gateway message or Frame gateway message containing Dimming_Lvl, or HMI_HMIMode_St signal has an update bit which shows “not updated” (signal went missing) for greater than a period of time as per “Diagnostic Fault Coverage and DTC Numbers Design Consideration” (typically 5 seconds). Then the subscriber shall follow the following logic:

CAN Input Signals		Output for Dimming Algorithm
Dimming_Lvl	Ign_Status	Dimming_Lvl
missing / unused / invalid	F	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	F	Night_1 ... Night_12, Day_1 ... Day_6
missing / unused / invalid / missing (on reset)		OFF
Night_1 ... Night_12, Day_1 ... Day_6		Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing		Keep last valid Dimming_Lvl value > Missing (until “OFF” is received)

CAN Input Signals			Internal Illumination Handling
Ignition_Status	HMI_HMIMode_St	Dimming_Lvl	Dimming_Lvl
Run, Start	Don't care	0x0 to 0x12	0x0 to 0x12
Not (Run, Start)	Don't care	0x1 to 0x12	0x1 to 0x12
Not (Run, Start)	On	0x0 (OFF) / missing / invalid	Last received value in range (0x1 to 0x12) ¹⁾
Not (Run, Start)	OFF	missing / invalid	Last received value in range (0x0 to 0x12) ²⁾
Not (Run, Start)	Off	0x0 (OFF)	OFF

1) 0xC if last received value in range 0x1 to 0x12_{Dimming_Lvl} cannot be retrieved, only on battery re-connect or ECU reset.

2) 0xC if last received value in range 0x1 to 0x12_{Dimming_Lvl} cannot be retrieved (only on battery re-connect or ECU reset).

6.1.2.2.4 CAN Error Handling for remaining (non-Interior Illumination) Signals

- If a Signal gateway or Frame gateway message containing the transmitted signal has an update bit which shows “not updated” for less than as period of time as per “Diagnostic Fault Coverage and DTC Numbers Design Consideration” (typically 5 seconds). Then the subscriber shall continue using last known value of the signal
- If a Signal gateway or Frame gateway message containing the transmitted signal has an update bit which shows “not updated” for greater than as period of time as per “Diagnostic Fault Coverage and DTC Numbers Design Consideration” (typically 5 seconds). Then the subscriber shall use the signal's default value as listed in the data dictionary

6.1.2.2.5 CAN Error Handling for Signal Gateway Messages

- If a Signal gateway message containing the transmitted signal has an update bit which shows “not updated” for less than as period of time as per “Diagnostic Fault Coverage and DTC Numbers Design Consideration” (typically 5 seconds). Then the subscriber shall continue using last known value of the signal
- If a Signal gateway message containing the transmitted signal has an update bit which shows “not updated” for greater than as period of time as per “Diagnostic Fault Coverage and DTC Numbers

Design Consideration” (typically 5 seconds). Then the subscriber shall use the signal’s default value as listed in the data dictionary

6.1.2.2.6 LIN Signal Requirements

It should be noted that the following section does not cover the level of details included under the previous “CAN Signal Requirements”, since that level of details is owned and controlled by the LIN module owner, and contained within the LDFs.

The intention of this section is to list the required LIN signals to ensure that they are not discarded due to any future LDF updates.

Signal Database Detail	Value
Signal Name	Dimming_lvl
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Litval
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Wfsuperstate
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Wfsubstate
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic

Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	WelcomeFarewell_State
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	WelcomeFarewell_Substate
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Customer_Color
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
Signal Name	Customer_Intensity
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

Signal Database Detail	Value
------------------------	-------

Signal Name	Ignition_Status
Source Network	LIN
Signal refresh rate	<=40ms
Signal Domain	Refer to Data Dictionary
Signal Transmit Strategy	<=40ms Event Periodic
Signal Send Type	OnChange
Signal Transmit Cycle Time	<=40ms Event Periodic
Publishing ECU	BCM

6.1.3 CGEA 1.3 Vehicle ECU specific requirements

All illumination-controlling modules are expected to meet or not violate all the applicable requirements listed within section 3.2

6.1.3.1 Body Control Module (BCM) Requirements

The BCM shall meet the requirements listed within section 3.2 "Welcome/Farewell State and Sub-state determination" section/function and transmit the appropriate State and Sub-state over CAN and LIN

Logical Data-flows & Vehicle Harmony RQT call-outs		CAN Signals		LIN Signals				CAN/LIN Signals
Welcome/ Farewell State	Welcome/ Farewell Substate	VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Wfstate	WFsubstate	WelcomeFarewell_State	WelcomeFarewell_SubState	Dimming_Ivl
Welcome	Approach Detection	WELCOME	APPROACH	WELCOME	Approach	WELCOME	APPROACH	Off
Welcome	Illuminated Entry	WELCOME	ILLUMINATEDENTRY	WELCOME	IllumEntry	WELCOME	ENTRY	Off
Welcome	Courtesy Lighting - All	WELCOME	COURTESYLIGHTINGALL	WELCOME	DoorAjar CourtesyLight	WELCOME	DOOR	Non-OFF
Welcome	Courtesy Lighting Delay - All	WELCOME	COURTESYLIGHTINGDELAYALL	WELCOME	CourtesyLightDelay	WELCOME	DELAY	Non-OFF
Welcome	Courtesy Lighting - Extended	WELCOME	COURTESYLIGHTINGEXTENDED	Don't Care	NULL	Don't Care	NULL	Off
Welcome	Courtesy Lighting Delay - Extended	WELCOME	COURTESYLIGHTINGDELAYEXT	Don't Care	NULL	Don't Care	NULL	Off
Welcome	NULL	WELCOME	NULL	WELCOME	NULL	WELCOME	NULL	Off
Ignition Run/Start	Don't care	RUNSTART	Don't care	RUNSTART	Don't care	RUN_START	Don't' Care	Non-OFF
Farewell	Illuminated Exit	FAREWELL	ILLUMINATEDEXIT	FAREWELL	IllumExit	FAREWELL	EXIT	Non-OFF
Farewell	Courtesy Lighting - All	FAREWELL	COURTESYLIGHTINGALL	FAREWELL	DoorAjar CourtesyLight	FAREWELL	DOOR	Non-OFF
Farewell	Courtesy Lighting Delay - All	FAREWELL	COURTESYLIGHTINGDELAYALL	FAREWELL	CourtesyLightDelay	FAREWELL	DELAY	Non-OFF

Farewell	Courtesy Lighting - Extended	FAREWELL	COURTESYLIGHTINGEXT ENDED	Don't Care	NULL	Don't Care	NULL	Off
Farewell	Courtesy Lighting Delay - Extended	FAREWELL	COURTESYLIGHTINGDEL AYEXT	Don't Care	NULL	Don't Care	NULL	Off
Farewell	NULL	FAREWELL	NULL	FAREWELL	NULL	FAREWELL	NULL	Off
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	Off

6.1.3.1.1 BCM Hardwired Exterior Illumination:

The BCM shall utilize the following functions to support illumination control of Exterior Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it (combination of Front, Rear, and Supplementary):

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 700ms (ideal is 3 seconds if possible)
 - Fade Off = 1700ms (ideal is 4 seconds if possible)
- "LE_WF_Illumination Response", section 5.4.

6.1.3.1.2 BCM Hardwired Interior Courtesy Lamp Illumination:

The BCM shall utilize the following functions to support illumination control of Interior Courtesy Lamps, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it (combination of Dome Lamps and Cargo Lamps):

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 700ms (ideal is 3 seconds if possible)
 - Fade Off = 1700ms (ideal is 4 seconds if possible)
 - "LE_WF_Illumination Response", section 5.4.

6.1.3.1.3 BCM Hardwired Switch Backlighting Illumination:

The BCM shall utilize the following functions to support illumination control of Interior Switch Backlighting, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

6.1.3.1.4 BCM Hardwired Illumination Summary

Logical Data-flows & Vehicle Harmony RQT call-outs		Exterior Illumination "LE_WF_Illumination_Requestor" summary ¹	Interior Courtesy Lamp "LE_WF_Illumination_Requestor" summary ¹	Switch Backlighting "LE_WF_Illumination_Requestor" summary ¹
Welcome/ Farewell State	Welcome/ Farewell Substate			
Welcome	Approach Detection	"Fade On"	"Fade On"	"Fade Off" or "Off"
Welcome	Illuminated Entry	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"	"Fade Off" or "Off"
Welcome	Courtesy Lighting - All	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"
Welcome	Courtesy Lighting Delay - All	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"
Welcome	Courtesy Lighting - Extended	"Fade Off" or "Off"	"Fade On" or "On/Embrace"	"Fade Off" or "Off"
Welcome	Courtesy Lighting Delay - Extended	"Fade Off" or "Off"	"Fade Off" or "Off"	"Fade Off" or "Off"
Welcome	NULL	"Fade Off" or "Off"	"Fade Off" or "Off"	"Fade Off" or "Off"

Ignition Run/Start	Don't care	In-drive setting/Legislative mode	In-drive setting/Legislative mode	In-drive setting/Legislative mode
Farewell	Illuminated Exit	"On/Embrace"	"On/Embrace"	"On/Embrace"
Farewell	Courtesy Lighting - All	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"
Farewell	Courtesy Lighting Delay - All	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"	"Fade On" or "On/Embrace"
Farewell	Courtesy Lighting - Extended	"Fade Off" or "Off"	"Fade On" or "On/Embrace"	"Fade Off" or "Off"
Farewell	Courtesy Lighting Delay - Extended	"Fade Off" or "Off"	"Fade Off" or "Off"	"Fade Off" or "Off"
Farewell	NULL	"Fade Off" or "Off"	"Fade Off" or "Off"	"Fade Off" or "Off"
NULL	NULL	"Fade Off" or "Off"	"Fade Off" or "Off"	"Fade Off" or "Off"

Note 1: Summary is a generic response, exact response per each Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

6.1.3.1.5 BCM Ambient Light Module (ALM) requirements

The BCM shall utilize the following functions and signals to support illumination control of Interior Ambient Lighting Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "WelcomeFarewell_State" and "WelcomeFarewell_Substate" published by BCM via LIN as part of "Welcome/Farewell State and Sub-state determination" function in section 5.2.
 - Additionally subscribe to "Customer_Color" and "Customer_Intensity"
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 700ms (ideal is 3 seconds if possible)
 - Fade Off = 1700ms (ideal is 4 seconds if possible)
 - "LE_WF_Illumination Response", section 5.4.

LIN Signals		Interior Ambient Lighting Illumination "LE_WF_Illumination_Requestor" summary ¹
Welcome Farewell_State	Welcome Farewell_Substate	
WELCOME	Approach	"Fade On" ²
WELCOME	Entry	"Fade On" or "On/Embrace" ²
WELCOME	Door	"Fade On" or "On/Embrace" ²
WELCOME	Delay	"Fade On" or "On/Embrace" ²
WELCOME	NULL	"Fade Off" or "Off"
RUNSTART	Don't care	In-drive setting/Legislative mode
FAREWELL	Exit	"On/Embrace" ²
FAREWELL	Door	"Fade On" or "On/Embrace" ²
FAREWELL	Delay	"Fade On" or "On/Embrace" ²
FAREWELL	NULL	"Fade Off" or "Off"
NULL	NULL	"Fade Off" or "Off"

Note 1: Summary is a generic response, exact response per each Interior Ambient Lighting Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall monitor Customer_Color and Customer_Intensity to determine Color and Intensity of ambient lighting while illuminated

6.1.3.2 LED Driver Module (LDM) requirements

The LDM shall utilize the following functions and signals to support illumination control of Front Exterior Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "WFstate" and "WFSubstate" published by BCM via LIN as part of "Welcome/Farewell State and Sub-state determination" function in section 5.2.
- If LDM is connected via LIN to HCM, and not LIN from the BCM:
 - See section 6.1.3.3 Headlamp Control Module (HCM) requirements
 - Subscribe to "WFstate" and "WFSubstate" published by HCM via LIN as part of "Welcome/Farewell State and Sub-state determination" function in section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 3 seconds
 - Fade Off = 4 seconds
- "LE_WF_Illumination Response", section 5.4.

LIN Signals		Front Exterior Illumination "LE_WF_Illumination Requestor" summary ¹
Wfstate	WFsubstate	
WELCOME	Approach	"Fade On"
WELCOME	IllumEntry	"Fade On" or "On/Embrace"
WELCOME	DoorAjarCourtesyLight	"Fade On" or "On/Embrace"
WELCOME	CourtesyLightDelay	"Fade On" or "On/Embrace"
WELCOME	NULL	"Fade Off" or "Off"
RUNSTART	Don't care	In-drive setting/Legislative mode
FAREWELL	IllumExit	"On/Embrace"
FAREWELL	DoorAjarCourtesyLight	"Fade On" or "On/Embrace"
FAREWELL	CourtesyLightDelay	"Fade On" or "On/Embrace"
FAREWELL	NULL	"Fade Off" or "Off"
NULL	NULL	"Fade Off" or "Off"

Note 1: Summary is a generic response, exact response per each Front Exterior Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

6.1.3.3 Headlamp Control Module (HCM) requirements

This section applies only if the LDM is not connected via LIN from the BCM, and the LDM is connected via LIN from the HCM. The HCM shall utilize the following functions and signals to support illumination control of Front Exterior Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "VehWlcmFrwl_D_Stat" and "VehWlcmFrwlMde_D_Stat" published by BCM as part of "Welcome/Farewell State and Sub-state determination" function in section 5.2.
- Convert incoming CAN signals "VehWlcmFrwl_D_Stat" and "VehWlcmFrwlMde_D_Stat" published by BCM into LIN signals "Wfstate" and "WFsubstate" to be received by LDM module.

CAN Signals		LIN Signals	
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Wfstate	WFsubstate
WELCOME	APPROACH	WELCOME	Approach
WELCOME	ILLUMINATEDENTRY	WELCOME	IllumEntry
WELCOME	COURTESYLIGHTINGALL	WELCOME	DoorAjar CourtesyLight
WELCOME	COURTESYLIGHTINGDELAYALL	WELCOME	Courtesy LightDelay
WELCOME	COURTESYLIGHTINGEXTENDED	Don't Care	NULL

WELCOME	COURTESYLIGHTINGDELAYEXT	Don't Care	NULL
WELCOME	NULL	WELCOME	NULL
RUNSTART	Don't care	RUNSTART	Don't care
FAREWELL	ILLUMINATEDEXIT	FAREWELL	IllumExit
FAREWELL	COURTESYLIGHTINGALL	FAREWELL	DoorAjar CourtesyLight
FAREWELL	COURTESYLIGHTINGDELAYALL	FAREWELL	Courtesy LightDelay
FAREWELL	COURTESYLIGHTINGEXTENDED	Don't Care	NULL
FAREWELL	COURTESYLIGHTINGDELAYEXT	Don't Care	NULL
FAREWELL	NULL	FAREWELL	NULL
NULL	NULL	NULL	NULL

Note 1: Summary is a generic response, exact response per each Front Exterior Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

6.1.3.4 **Rear Fade-Control-Module (R-FCM) requirements**

The R-FCM shall utilize the following functions and signals to support illumination control of Rear Exterior Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "WFstate" and "WFSubstate" published by BCM via LIN as part of "Welcome/Farewell State and Sub-state determination" function in section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 3 seconds
 - Fade Off = 4 seconds
- "LE_WF_Illumination Response", section 5.4.

LIN Signals		Rear Exterior Illumination "LE_WF_Illumination_Requestor" summary ¹
Wfstate	WFsubstate	
WELCOME	Approach	"Fade On"
WELCOME	IllumEntry	"Fade On" or "On/Embrace"
WELCOME	DoorAjarCourtesyLight	"Fade On" or "On/Embrace"
WELCOME	CourtesyLightDelay	"Fade On" or "On/Embrace"
WELCOME	NULL	"Fade Off" or "Off"
RUNSTART	Don't care	In-drive setting/Legislative mode
FAREWELL	IllumExit	"On/Embrace"
FAREWELL	DoorAjarCourtesyLight	"Fade On" or "On/Embrace"
FAREWELL	CourtesyLightDelay	"Fade On" or "On/Embrace"
FAREWELL	NULL	"Fade Off" or "Off"
NULL	NULL	"Fade Off" or "Off"

Note 1: Summary is a generic response, exact response per each Rear Exterior Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

6.1.3.5 **Overhead Console (OHC) requirements**

The OHC shall utilize the following functions and signals to support illumination control of Interior Courtesy Lamp Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to “WelcomeFarewell_State” and “WelcomeFarewell_Substate” published by BCM via LIN as part of “Welcome/Farewell State and Sub-state determination” function in section 5.2.
 - Additionally subscribe to Door Ajar Signals (listed below)
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 3 seconds
 - Fade Off = 4 seconds
- “LE_WF_Illumination Response”, section 5.4.

LIN Signals			Interior Courtesy Lamp Illumination “LE_WF_Illumination_Requestor” summary ¹
Welcome Farewell_State	Welcome Farewell_Substate	Door_Ajar_Status	
WELCOME	Approach	Don't Care	“Fade On”
WELCOME	IllumEntry	Don't Care	“Fade On” or “On/Embrace”
WELCOME	Door	Don't Care	“Fade On” or “On/Embrace”
WELCOME	Delay	Don't Care	“Fade On” or “On/Embrace”
WELCOME	NULL	DF_Door_Ajar_Status PF_Door_Ajar_Status DR_Door_Ajar_Status PR_Door_Ajar_Status = Open	“Fade On” or “On/Embrace”
WELCOME	NULL	DF_Door_Ajar_Status & PF_Door_Ajar_Status & DR_Door_Ajar_Status & PR_Door_Ajar_Status = Closed	“Fade Off” or “Off”
RUNSTART	Don't care	Don't Care	In-drive setting/Legislative mode
FAREWELL	IllumExit	Don't Care	“On/Embrace”
FAREWELL	Door	Don't Care	“Fade On” or “On/Embrace”
FAREWELL	Delay	Don't Care	“Fade On” or “On/Embrace”
FAREWELL	NULL	DF_Door_Ajar_Status PF_Door_Ajar_Status DR_Door_Ajar_Status PR_Door_Ajar_Status = Open	“Fade On” or “On/Embrace”
FAREWELL	NULL	DF_Door_Ajar_Status & PF_Door_Ajar_Status & DR_Door_Ajar_Status & PR_Door_Ajar_Status = Closed	“Fade Off” or “Off”
NULL	NULL	DF_Door_Ajar_Status PF_Door_Ajar_Status DR_Door_Ajar_Status PR_Door_Ajar_Status = Open	“Fade On” or “On/Embrace”
NULL	NULL	DF_Door_Ajar_Status & PF_Door_Ajar_Status & DR_Door_Ajar_Status & PR_Door_Ajar_Status = Closed	“Fade Off” or “Off”

Note 1: Summary is a generic response, exact response per each Interior Courtesy Lamp Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: It is acceptable for the BCM to send a PWM directly to the OHC instead of requiring a LIN connection, as long as the above "Fade On / On/Embrace / Fade Off" lighting elements occur at the proper times.

6.1.3.6 **Headlamp Switch (HDLPSW-LIN) / Light Switch Module (LSM) requirements**

The HDLPSW-LIN shall utilize the following functions and signals to support illumination control of Switch-Backlighting Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "Dimming_IV" published by BCM via LIN.
 - Additionally subscribe to "Litval" to meet "Smooth Dimming" requirements
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

LIN Signals		Switch-Backlighting Illumination "LE_WF_Illumination_Req uestor" summary ¹	Illumination Intensity ²
Dimming_IV	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	"Fade On" or "On/Embrace"	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not-OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_IV value > Missing (until "OFF" is received)
Off/ unused / invalid / missing (on reset)	OFF	"Fade Off" or "Off"	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	"Fade On" or "On/Embrace" to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	"Fade On" or "On/Embrace" to intensity	Keep last valid Dimming_IV value > Missing (until "OFF" is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.7 **Steering Column Control Module (SCCM) requirements**

The SCCM shall utilize the following functions and signals to support illumination control of Switch-Backlighting Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it:

- Subscribe to "Dimming_IV" published by BCM via CAN.

- Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Switch-Backlighting Illumination “LE_WF_Illumination_Req uestor” summary ¹	Illumination Intensity ²
Dimming_Ivl	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not-OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_Ivl value > Missing (until “OFF” is received)
Off/ unused / invalid / missing (on reset)	OFF	“Fade Off” or “Off”	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	“Fade On” or “On/Embrace” to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	“Fade On” or “On/Embrace” to intensity	Keep last valid Dimming_Ivl value > Missing (until “OFF” is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet “Cockpit Illumination”/“Smooth Dimming” requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.8 Gear Shift Module (GSM) requirements

6.1.3.8.1 GSM Hardwired Interior Switch Backlighting Illumination:

The GSM shall utilize the following functions to support illumination control of its Switch Backlighting as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles:

- Subscribe to “Dimming_Ivl” published by BCM via CAN.
 - Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Interior Switch Backlighting Illumination “LE_WF_Illumination_Req uestor” summary ¹	Illumination Intensity ²
Dimming_Ivl	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12

Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not-OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_Im value > Missing (until "OFF" is received)
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Off/ unused / invalid / missing (on reset)	OFF	"Fade Off" or "Off"	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_Im value > Missing (until "OFF" is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.9 **Instrument Panel Cluster (IPC) requirements**

6.1.3.9.1 **IPC Welcome/Farewell Graphics**

The IPC shall utilize the following functions to support Welcome/Farewell animation transitions, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, for displays directly connected to it:

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Welcome/Farewell Display", section 5.5

CAN Inputs		LE_WF_Welcome/Farewell Display	
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Welcome/Farewell Animation Request	Odometer display
WELCOME	APPROACH	Wake-up display	Off
WELCOME	ILLUMINATEDENTRY	Wake-up display (stay awake)	Off
WELCOME	COURTESYLIGHTINGALL	Welcome Animation ¹	On ²
WELCOME	COURTESYLIGHTINGDELAYALL	Welcome Animation ¹	Off
WELCOME	COURTESYLIGHTINGEXTENDED	Off (stay awake)	Off
WELCOME	COURTESYLIGHTINGDELAYEXT	Off (stay awake)	Off
WELCOME	NULL	Off (Sleep)	Off
RUNSTART	Don't care	Vehicle Start Animation ¹ then transition to in-drive display	On ²
FAREWELL	ILLUMINATEDEXIT	Farewell animation ¹	On ²
FAREWELL	COURTESYLIGHTINGALL	Off (stay awake)	On ²
FAREWELL	COURTESYLIGHTINGDELAYALL	Off (Sleep)	Off
FAREWELL	COURTESYLIGHTINGEXTENDED	Off (Sleep)	Off
FAREWELL	COURTESYLIGHTINGDELAYEXT	Off (Sleep)	Off
FAREWELL	NULL	Off (Sleep)	Off
NULL	NULL	Off (Sleep)	Off

Note 1: Specific animation owned by HMI and Studio group.

Note 2: Intensity to illuminate to dimming_lvl, refer to section 6.1.2.2.3 “CAN Error Handling for Interior Illumination Specific Signals” for additional details

6.1.3.9.2 IPC Display Intensity and Backlighting

The IPC shall utilize the following functions to support illumination control of its Display and all other lighting emitting sources within it i.e. backlighting, halo rings, gauges etc. as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles:

- Subscribe to “Dimming_lvl” published by BCM via CAN.
 - Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Display and Backlighting Illumination “LE_WF_Illumination_Requestor” summary ¹	Illumination Intensity ²
Dimming_lvl	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not-OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_lvl value > Missing (until “OFF” is received)
Off/ unused / invalid / missing (on reset)	OFF	“Fade Off” or “Off” ³	Off ³
Night_1 ... Night_12, Day_1 ... Day_6	OFF	“Fade On” or “On/Embrace” to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	“Fade On” or “On/Embrace” to intensity	Keep last valid Dimming_lvl value > Missing (until “OFF” is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet “Cockpit Illumination”/“Smooth Dimming” requirements listed in latest version of ES-H1BT-1A278-AA-VXX

Note 3: Illuminate to Night_12 intensity if warnings present, for duration of active warning.

6.1.3.10 Accessory Protocol Interface Module (APIM/SYNC) requirements

6.1.3.10.1 APIM Welcome/Farewell Graphics

The APIM shall utilize the following functions to support Welcome/Farewell animation transitions, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles, for displays directly connected to it:

- “Welcome/Farewell State and Sub-state determination”, section 5.2.
- “LE_WF_Welcome/Farewell Display”, section 5.5

CAN Inputs		LE_WF_Welcome/Farewell Display
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Welcome/Farewell Animation Request
WELCOME	APPROACH	Wake-up display
WELCOME	ILLUMINATEDENTRY	Wake-up display (stay awake)
WELCOME	COURTESYLIGHTINGALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGDELAYALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGEXTENDED	Off (stay awake)
WELCOME	COURTESYLIGHTINGDELAYEXT	Off (stay awake)
WELCOME	NULL	Off (Sleep)
RUNSTART	Don't care	Vehicle Start Animation ³ then transition to in-drive display
FAREWELL	ILLUMINATEDEXIT	Farewell animation ¹
FAREWELL	COURTESYLIGHTINGALL	Off (stay awake)
FAREWELL	COURTESYLIGHTINGDELAYALL	Off (Sleep)
FAREWELL	COURTESYLIGHTINGEXTENDED	Off (Sleep)
FAREWELL	COURTESYLIGHTINGDELAYEXT	Off (Sleep)
FAREWELL	NULL	Off (Sleep)
NULL	NULL	Off (Sleep)

Note 1: Specific animation owned by HMI and Studio group.

6.1.3.10.2 APIM Display Intensity and Backlighting

The APIM shall utilize the following functions to support illumination control of its Display and all other lighting emitting sources within it i.e. switch backlighting etc. as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- Subscribe to "Dimming_Ivl" published by BCM via CAN.
 - Additionally subscribe to "Litval" to meet "Smooth Dimming" requirements
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

CAN Signals			Display and Backlighting Illumination "LE_WF_Illumination_Requestor" summary ¹	Illumination Intensity ²
Dimming_Ivl	Ignition Status	HMI_HMIMode_St (Extended Play)		
Off/ unused / invalid / missing (on reset)	Not- O F F	Don't Care	"Fade On" or "On/Embrace"	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not- O F F	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not- O F F	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²

Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³ (until "OFF" is received)
Off/ unused / invalid / missing (on reset)	OFF	Off	"Fade Off" or "Off"	Off
Off/ unused / invalid / missing (on reset)	OFF	Not-OFF	"Fade On" or "On/Embrace"	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

Note 3: Only applicable to Audio Control switch/knob backlighting. Remaining backlighting can go to OFF. If previous Dimming_Ivl non-OFF value cannot be determined, illuminate to Night_12 intensity

6.1.3.11 **Front Control Interface Module (FCIM, FCIMB) requirements**

6.1.3.11.1 FCIM/FCIMB Display Intensity and Backlighting

The FCIM/FCIMB shall utilize the following functions to support illumination control of its switch backlighting, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- Subscribe to "Dimming_Ivl" published by BCM and "HMI_HMIMode_St published by APIM via CAN.
 - Additionally subscribe to "Litval" to meet "Smooth Dimming" requirements
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

CAN Signals			Backlighting Illumination "LE_WF_Illumination_Requestor" summary ¹	Illumination Intensity ²
Dimming_Ivl	Ignition Status	HMI_HMIMode_St (Extended Play)		
Off/ unused / invalid / missing (on reset)	Not- OFF	Don't Care	"Fade On" or "On/Embrace"	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not- OFF	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not- OFF	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²

Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³ (until "OFF" is received)
Off/ unused / invalid / missing (on reset)	OFF	Off	"Fade Off" or "Off"	Off
Off/ unused / invalid / missing (on reset)	OFF	Not-OFF	"Fade On" or "On/Embrace"	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

Note 3: Only applicable to Audio Control switch/knob backlighting. Remaining backlighting can go to OFF. If previous Dimming_M non-OFF value cannot be determined, illuminate to Night_12 intensity

6.1.3.12 **Rear Audio Control Module (RACM) requirements**

6.1.3.12.1 RACM Welcome/Farewell Graphics

The RACM shall utilize the following functions to support Welcome/Farewell animation transitions, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, for displays directly connected to it:

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Welcome/Farewell Display", section 5.5

CAN Inputs		LE_WF_Welcome/Farewell Display
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Welcome/Farewell Animation Request
WELCOME	APPROACH	Wake-up display
WELCOME	ILLUMINATEDENTRY	Wake-up display (stay awake)
WELCOME	COURTESYLIGHTINGALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGDELAYALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGEXTENDED	Off (stay awake)
WELCOME	COURTESYLIGHTINGDELAYEXT	Off (stay awake)
WELCOME	NULL	Off (Sleep)
RUNSTART	Don't care	Vehicle Start Animation ³ then transition to in-drive display
FAREWELL	ILLUMINATEDEXIT	Farewell animation ¹
FAREWELL	COURTESYLIGHTINGALL	Off (stay awake)
FAREWELL	COURTESYLIGHTINGDELAYALL	Off (Sleep)
FAREWELL	COURTESYLIGHTINGEXTENDED	Off (Sleep)
FAREWELL	COURTESYLIGHTINGDELAYEXT	Off (Sleep)
FAREWELL	NULL	Off (Sleep)
NULL	NULL	Off (Sleep)

Note 1: Specific animation owned by HMI and Studio group.

6.1.3.12.2 RACM Display Intensity and Backlighting

The RACM shall utilize the following functions to support illumination control of its Display and all other lighting emitting sources within it i.e. switch backlighting etc. as per RQT-002004-021878 DNA

Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- Subscribe to "Dimming_Ivl" published by BCM and "HMI_HMIMode_St published by APIM via CAN.
 - Additionally subscribe to "Litval" to meet "Smooth Dimming" requirements
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

CAN Signals			Display and Backlighting Illumination "LE_WF_Illumination_Requestor" summary ¹	Illumination Intensity ²
Dimming_Ivl	Ignition Status	HMI_HMIMode_St (Extended Play)		
Off/ unused / invalid / missing (on reset)	Not-Off	Don't Care	"Fade On" or "On/Embrace"	Night_12
Night_1 ... Night_12, Day_1 ... Day_6	Not-Off	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	Not-Off	Don't Care	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Night_1 ... Night_12, Day_1 ... Day_6	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 -> Missing	OFF	Don't Care	"Fade On" or "On/Embrace" to intensity	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³ (until "OFF" is received)
Off/ unused / invalid / missing (on reset)	OFF	Off	"Fade Off" or "Off"	Off
Off/ unused / invalid / missing (on reset)	OFF	Not-OFF	"Fade On" or "On/Embrace"	Last non-OFF value: Night_1 ... Night_12, Day_1 ... Day_6 ³

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

Note 3: Only applicable to Audio Control switch/knob backlighting. Remaining backlighting can go to OFF. If previous Dimming_Ivl non-OFF value cannot be determined, illuminate to Night_12 intensity

6.1.3.13 **Austere Heads-Up Display (aHUD) requirements**

6.1.3.13.1 aHUD Welcome/Farewell Graphics

The aHUD shall utilize the following functions to support Welcome/Farewell animation transitions, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-

022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles, for displays directly connected to it:

- “Welcome/Farewell State and Sub-state determination”, section 5.2.
- “LE_WF_Welcome/Farewell Display”, section 5.5

CAN Inputs		LE_WF_Welcome/Farewell Display
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	Welcome/Farewell Animation Request
WELCOME	APPROACH	Wake-up display
WELCOME	ILLUMINATEDENTRY	Wake-up display (stay awake)
WELCOME	COURTESYLIGHTINGALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGDELAYALL	Welcome Animation ¹
WELCOME	COURTESYLIGHTINGEXTENDED	Off (stay awake)
WELCOME	COURTESYLIGHTINGDELAYEXT	Off (stay awake)
WELCOME	NULL	Off (Sleep)
RUNSTART	Don't care	Vehicle Start Animation ³ then transition to in-drive display
FAREWELL	ILLUMINATEEXIT	Farewell animation ¹
FAREWELL	COURTESYLIGHTINGALL	Off (stay awake)
FAREWELL	COURTESYLIGHTINGDELAYALL	Off (Sleep)
FAREWELL	COURTESYLIGHTINGEXTENDED	Off (Sleep)
FAREWELL	COURTESYLIGHTINGDELAYEXT	Off (Sleep)
FAREWELL	NULL	Off (Sleep)
NULL	NULL	Off (Sleep)

Note 1: Specific animation owned by HMI and Studio group.

6.1.3.13.2 aHUD Display Intensity and Backlighting

The aHUD shall utilize the following functions to support illumination control of its Display and all other lighting emitting sources as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles:

- Subscribe to “Dimming_IVI” published by BCM via CAN.
 - Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Display and Backlighting Illumination “LE_WF_Illumination_Requestor” summary ¹	Illumination Intensity ²
Dimming_IVI	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	Not-OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_IVI value > Missing (until “OFF” is received)
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6
Off/ unused / invalid / missing (on reset)	OFF	“Fade Off” or “Off” ³	Off ³
Night_1 ... Night_12, Day_1 ... Day_6	OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6 ²

Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_IV value > Missing (until "OFF" is received)
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Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

Note 3: Illuminate to Night_12 intensity if warnings present, for duration of active warning.

6.1.3.14 **Door Control Modules (DDM/PDM) requirements**

6.1.3.14.1 **DDM/PDM Hardwired Exterior Illumination:**

The DDM/PDM shall utilize the following functions to support illumination control of Exterior Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it (combination of Puddle Lamps, Welcome Mats, Door Keypad Illumination):

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
 - "LE_WF_Illumination Response", section 5.4.

6.1.3.14.2 **DDM/PDM Auto-fold Mirrors Control:**

The DDM/PDM shall utilize the following functions to support folding control of Mirrors, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- "Welcome/Farewell State and Sub-state determination", section 5.2.

6.1.3.14.3 **DDM/PDM Hardwired Exterior Illumination/Mirrors Summary:**

CAN Signals		Exterior Illumination "LE_WF_Illumination_ Requestor" summary ¹	
VehWlcmFrwl_ D_Stat	VehWlcmFrwlMde_D_Stat		Autofold Mirrors
WELCOME	APPROACH	"Fade On"	Fold (remain folded)
WELCOME	ILLUMINATEDENTRY	"Fade On" or "On/Embrace"	Fold (remain folded)
WELCOME	COURTESYLIGHTINGALL	"Fade On" or "On/Embrace"	Fold (remain folded)
WELCOME	COURTESYLIGHTINGDEL AYALL	"Fade On" or "On/Embrace"	Fold (remain folded)
WELCOME	COURTESYLIGHTINGEXT ENDED	"Fade Off" or "Off"	Fold (remain folded)
WELCOME	COURTESYLIGHTINGDEL AYEXT	"Fade Off" or "Off"	Fold (remain folded)
WELCOME	NULL	"Fade Off" or "Off"	Fold (remain folded)
RUNSTART	Don't care	In-drive setting/Legislative mode	Unfold (remain unfolded)
FAREWELL	ILLUMINATEDEXIT	"On/Embrace"	Unfold (remain unfolded)
FAREWELL	COURTESYLIGHTINGALL	"Fade On" or "On/Embrace"	Fold

FAREWELL	COURTESYLIGHTINGDEL AYALL	"Fade On" or "On/Embrace"	Fold
FAREWELL	COURTESYLIGHTINGEXT ENDED	"Fade Off" or "Off"	Fold
FAREWELL	COURTESYLIGHTINGDEL AYEXT	"Fade Off" or "Off"	Fold
FAREWELL	NULL	"Fade Off" or "Off"	Fold
NULL	NULL	"Fade Off" or "Off"	Fold

Note 1: Summary is a generic response, exact response per each Illumination element listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

6.1.3.14.4 DDM/PDM Hardwired Interior Switch Backlighting Illumination:

The DDM/PDM shall utilize the following functions to support illumination control of its Interior Trim Switch Backlighting as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- Subscribe to "Dimming_Iv" published by BCM via CAN.
 - Additionally subscribe to "Litval" to meet "Smooth Dimming" requirements
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- "LE_WF_Illumination Response", section 5.4.

CAN Signals		Interior Switch Backlighting Illumination "LE_WF_Illumination _Requestor" summary ¹	Illumination Intensity ²
Dimming_Iv1	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	"Fade On" or "On/Embrace"	Night_12
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	Not-OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_Iv value > Missing (until "OFF" is received)
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6
Off/ unused / invalid / missing (on reset)	OFF	"Fade Off" or "Off"	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_Iv value > Missing (until "OFF" is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.15 **Rear-HVAC (R-HVAC) requirements**

6.1.3.15.1 R-HVAC Hardwired Interior Switch Backlighting Illumination:

The R-HVAC shall utilize the following functions to support illumination control of its Switch Backlighting as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles:

- Subscribe to “Dimming_IV” published by BCM via CAN.
 - Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Interior Switch Backlighting Illumination “LE_WF_Illumination Requestor” summary ¹	Illumination Intensity ²
Dimming_IVl	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	Not-OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_IV value > Missing (until “OFF” is received)
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6
Off/ unused / invalid / missing (on reset)	OFF	“Fade Off” or “Off”	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_IV value > Missing (until “OFF” is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet “Cockpit Illumination”/“Smooth Dimming” requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.16 **All Terrain Control Module (ATCM/SDM) requirements**

6.1.3.16.1 ATCM/SDM Hardwired Interior Switch Backlighting Illumination:

The ATCM/SDM shall utilize the following functions to support illumination control of its Switch Backlighting as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX” for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles:

- Subscribe to “Dimming_IV” published by BCM via CAN.
 - Additionally subscribe to “Litval” to meet “Smooth Dimming” requirements
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 40ms
 - Fade Off = 40ms
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		Interior Switch Backlighting Illumination “LE_WF_Illumination Requestor” summary ¹	Illumination Intensity ²
Dimming_IVl	Ignition_Status		
Off/ unused / invalid / missing (on reset)	Not-OFF	“Fade On” or “On/Embrace”	Night_12
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	Not-OFF	“Fade On” or “On/Embrace”	Keep last valid Dimming_IV value > Missing (until “OFF” is received)
Night_1 ... Night_12, Day_1 ... Day_6	Not-OFF	“Fade On” or “On/Embrace”	Night_1 ... Night_12, Day_1 ... Day_6

Off/ unused / invalid / missing (on reset)	OFF	"Fade Off" or "Off"	Off
Night_1 ... Night_12, Day_1 ... Day_6	OFF	"Fade On" or "On/Embrace"	Night_1 ... Night_12, Day_1 ... Day_6 ²
Night_1 ... Night_12, Day_1 ... Day_6 - > Missing	OFF	"Fade On" or "On/Embrace"	Keep last valid Dimming_IV value > Missing (until "OFF" is received)

Note 1: Summary is a generic response, exact response listed in RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles

Note 2: Shall also monitor and adjust illumination intensity based off of changes in Litval, in order to meet "Cockpit Illumination"/"Smooth Dimming" requirements listed in latest version of ES-H1BT-1A278-AA-VXX

6.1.3.17 **E-latch (DCME / DCMF / DCMG / DCMH) modules**

6.1.3.17.1 **E-latch hardwired Exterior Illumination**

The e-latch modules (DCME/DCMF/DCMG/DCMH) shall utilize the following functions to support illumination control of Exterior Door Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX for Ford vehicles and “RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX” for Lincoln vehicles, directly hardwired to it (including DAS communication)

- “Welcome/Farewell State and Sub-state determination”, section 5.2.
- “LE_WF_Illumination Requestor”, section 5.3, with the following default values:
 - Fade On = 3 seconds
 - Fade Off = 4 seconds
- “LE_WF_Illumination Response”, section 5.4.

CAN Signals		LIN Signals		Exterior Illumination “LE_WF_Illumination_Requestor” summary ¹
VehWlcmFrwl_D_Stat	VehWlcmFrwlMde_D_Stat	WelcomeFarewell_State	WelcomeFarewell_Substate	
WELCOME	APPROACH	WELCOME	Approach	“Fade On”
WELCOME	ILLUMINATEDENTRY	WELCOME	IllumEntry	“Fade On” or “On/Embrace”
WELCOME	COURTESYLIGHTING ALL	WELCOME	Door	“Fade On” or “On/Embrace”
WELCOME	COURTESYLIGHTING DELAYALL	WELCOME	COURTESYLIGHTING DELAYALL	“Fade On” or “On/Embrace”
WELCOME	COURTESYLIGHTING EXTENDED	WELCOME	COURTESYLIGHTING EXTENDED	“Fade Off” or “Off”
WELCOME	COURTESYLIGHTING DELAYEXT	WELCOME	COURTESYLIGHTING DELAYEXT	“Fade Off” or “Off”
WELCOME	NULL	WELCOME	NULL	“Fade Off” or “Off”
RUNSTART	Don’t care	RUNSTART	Don’t care	In-drive setting/Legislative mode
FAREWELL	ILLUMINATEDEXIT	FAREWELL	IllumExit	“On/Embrace”
FAREWELL	COURTESYLIGHTING ALL	FAREWELL	Door	“Fade On” or “On/Embrace”

FAREWELL	COURTESYLIGHTING DELAYALL	FAREWELL	COURTESYLIGHTING DELAYALL	"Fade On" or "On/Embrace"
FAREWELL	COURTESYLIGHTING EXTENDED	FAREWELL	COURTESYLIGHTING EXTENDED	"Fade Off" or "Off"
FAREWELL	COURTESYLIGHTING DELAYEXT	FAREWELL	COURTESYLIGHTING DELAYEXT	"Fade Off" or "Off"
FAREWELL	NULL	FAREWELL	NULL	"Fade Off" or "Off"
NULL	NULL	NULL	NULL	"Fade Off" or "Off"

6.1.3.18 **Door Activation Switch Module (DASM)**

6.1.3.18.1 Door Activation Switch Module (DASM) lighting:

The Door Activation Switch Module (DASM) shall utilize the following functions to support illumination control of Exterior Door Illumination, as per RQT-002004-021878 DNA Welcome-Farewell Strategy Rev. XX" for Ford vehicles and "RQT-002004-022094 Lincoln Embrace Welcome and Farewell Behavior Rev. XX" for Lincoln vehicles, directly hardwired to it (including DCME/F/G/H communication)

- "Welcome/Farewell State and Sub-state determination", section 5.2.
- "LE_WF_Illumination Requestor", section 5.3, with the following default values:
 - Fade On = 3 seconds
 - Fade Off = 4 seconds
- "LE_WF_Illumination Response", section 5.4.

CAN Signals		LIN Signals		Exterior Illumination "LE_WF_ Illumination_ Requestor" summary ¹
VehWlcmFrwl _D_Stat	VehWlcmFrwlMde_D_ Stat	WelcomeFare well_State	WelcomeFarewell_Su bstate	
WELCOME	APPROACH	WELCOME	Approach	"Fade On"
WELCOME	ILLUMINATEDENTRY	WELCOME	IllumEntry	"Fade On" or "On/Embrace"
WELCOME	COURTESYLIGHTING ALL	WELCOME	Door	"Fade On" or "On/Embrace"
WELCOME	COURTESYLIGHTING DELAYALL	WELCOME	COURTESYLIGHTING DELAYALL	"Fade On" or "On/Embrace"
WELCOME	COURTESYLIGHTING EXTENDED	WELCOME	COURTESYLIGHTING EXTENDED	"Fade Off" or "Off"

WELCOME	COURTESYLIGHTING DELAYEXT	WELCOME	COURTESYLIGHTING DELAYEXT	"Fade Off" or "Off"
WELCOME	NULL	WELCOME	NULL	"Fade Off" or "Off"
RUNSTART	Don't care	RUNSTART	Don't care	In-drive setting/Legislative mode
FAREWELL	ILLUMINATEDEXIT	FAREWELL	IllumExit	"On/Embrace"
FAREWELL	COURTESYLIGHTING ALL	FAREWELL	Door	"Fade On" or "On/Embrace"
FAREWELL	COURTESYLIGHTING DELAYALL	FAREWELL	COURTESYLIGHTING DELAYALL	"Fade On" or "On/Embrace"
FAREWELL	COURTESYLIGHTING EXTENDED	FAREWELL	COURTESYLIGHTING EXTENDED	"Fade Off" or "Off"
FAREWELL	COURTESYLIGHTING DELAYEXT	FAREWELL	COURTESYLIGHTING DELAYEXT	"Fade Off" or "Off"
FAREWELL	NULL	FAREWELL	NULL	"Fade Off" or "Off"
NULL	NULL	NULL	NULL	"Fade Off" or "Off"

7 DATA DICTIONARY

7.1 Dictionary

Name: **Customer_Color**

Description: Color X, where X is a value in the range of 0 → 15 and corresponds to the customer's selected color

Type: Discrete

Category: LIN

Initial Value: 0

Storage Class: Non-Volatile – Customer Set

Structure of Data: Scalar

Units: N/A

Resolution: 1

Min Value: 0

Max Value: 15

Name: **Customer_Intensity**

Description: A value in the range of 0 → 0xF and corresponds to the customer's selected intensity.

Type: Discrete

Category: LIN

Initial Value: 1

Storage Class: Non-Volatile – Customer Set

Structure of Data: Scalar

Units: N/A

Resolution: 1

Min Value: 0

Max Value: 15

Name: **Dimming_Lvl**

Description: Intensity level of dimmable backlighting.

Type: Discrete

Category: CAN and LIN

Initial Value: NIGHT_12

Storage Class: Volatile

Structure of Data: Scalar

Domain

DAY_1

DAY_2

DAY_3

DAY_4

DAY_5

DAY_6

INVALID

NIGHT_1

NIGHT_10

NIGHT_11

NIGHT_12

NIGHT_2

NIGHT_3

NIGHT_4

NIGHT_5

NIGHT_6

NIGHT_7

NIGHT_8

NIGHT_9

OFF

UNKNOWN

Domain Element Description

daytime step 1, minimum daytime mode brightness

daytime step 2

daytime step 3

daytime step 4

daytime step 5

daytime step 6, maximum daytime mode brightness

means that the BCM is not configured for Day-time

Dimmable Backlighting

nighttime step 1, minimum nighttime mode brightness

nighttime step 10

nighttime step 11

nighttime step 12, maximum nighttime mode brightness

nighttime step 2

nighttime step 3

nighttime step 4

nighttime step 5

nighttime step 6

nighttime step 7

nighttime step 8

nighttime step 9

backlighting is off

is not used. BCM never sets this to UNKNOWN.

Name: **Litval**

Description: An indication of ambient light level for use by modules implementing non-standard dimmable backlighting.

Type: Discrete

Category: CAN & LIN

Initial Value: NIGHT

Storage Class: Volatile

Structure of Data: Scalar

Domain

DAY

NIGHT

TWILIGHT_1

TWILIGHT_2

TWILIGHT_3

TWILIGHT_4

Domain Element Description

ambient light is at day level

ambient light is at night level

ambient light is at twilight 1 level

ambient light is at twilight 2 level

ambient light is at twilight 3 level

ambient light is at twilight 4 level

Name: **HMI_HMIMode_St**

Description: Multimedia system state

Type: Discrete

Category: CAN

Initial Value: OFF

Storage Class: Volatile

Structure of Data: Scalar

Domain

Invalid

OffMode

Domain Element Description

Invalid state (error)

Sync screen is OFF

On

Sync screen is ON

Name: **Ignition_Status**

Description: The processed value for current Ignition state.

Type: Discrete

Category: CAN

Initial Value: OFF

Storage Class: Volatile

Structure of Data: Scalar

Domain

ACC

OFF

RUN

START

Domain Element Description

ignition is in the ACC position

ignition is in the OFF position

ignition is in the RUN position

ignition is in the START position

Name: **Wfsuperstate**

Description: Indicates the different phases of Courtesy illumination. i.e Welcome/Farewell/Ignition Run.

Used by Exterior Lighting specific modules connected to BCM via LIN

Type: Discrete

Category: LIN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

OFF

WELCOME

RUNSTART

FAREWELL

Domain Element Description

Vehicle is not in any part of Welcome/Farewell

Vehicle is in Welcome State

Vehicle is in Ignition Run/Start State

Vehicle is in Farewell State

Name: **Wfsubstate**

Description: Tell the status of BCM current welcome farewell Substate(i.e. Entry, Door, Delay, Exit, Approach) on LIN. Used by Exterior Lighting specific modules connected to BCM via LIN

Type: Discrete

Category: LIN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

NULL

IllumEntry

IIEXT

DoorAjarCourtesyLight

CourtesyLightDelay

APPROACH

Domain Element Description

Vehicle is either locked or timed out of states

Vehicle was unlocked from outside of vehicle

Vehicle ignition has transitioned to OFF

Vehicle door(s) transitioned to Ajar

Vehicle door(s) transitioned from Ajar to all Closed

Vehicle Approach was detected

Name: **WelcomeFarewell_State**

Description: Indicates the different phases of Courtesy illumination. i.e Welcome/Farewell/Ignition Run.

Used by Interior Lighting specific modules connected to BCM via LIN

Type: Discrete

Category: LIN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

NULL

WELCOME

RUN_START

FAREWELL

Domain Element Description

Vehicle is not in any part of Welcome/Farewell

Vehicle is in Welcome State

Vehicle is in Ignition Run/Start State

Vehicle is in Farewell State

Name: **WelcomeFarewell_Substate**

Description: Tell the status of BCM current welcome farewell Substate(i.e. Entry, Door, Delay, Exit, Approach) on LIN. Used by Interior Lighting specific modules connected to BCM via LIN

Type: Discrete

Category: LIN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

NULL
APPROACH
DELAY
DOOR
ENTRY
EXIT

Domain Element Description

Vehicle is either locked or timed out of states
Vehicle Approach was detected
Vehicle door(s) transitioned from Ajar to all Closed
Vehicle door(s) transitioned to Ajar
Vehicle was unlocked from outside of vehicle
Vehicle ignition has transitioned to OFF

Name: **VehWlcmFrwl_D_Stat**

Description: Indicates the different phases of Welcome/Farewell. i.e Welcome/Farewell/Ignition Run.

Type: Discrete

Category: CAN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

NULL
WELCOME
RUNSTART
FAREWELL

Domain Element Description

Vehicle is not in any part of Welcome/Farewell
Vehicle is in Welcome State
Vehicle is in Ignition Run/Start State
Vehicle is in Farewell State

Name: **VehWlcmFrwlMde_D_Stat**

Description: Tell the status of BCM current welcome farewell Substate on CAN.

Type: Discrete

Category: CAN

Initial Value: NULL

Storage Class: Volatile

Structure of Data: Scalar

Domain

NULL
APPROACH
ILLUMINATEDENTRY
COURTESYLIGHTINGALL
COURTESYLIGHTINGDELAYALL

COURTESYLIGHTINGEXTENDED
COURTESYLIGHTINGDELAYEXT

ILLUMINATEDEXIT

Domain Element Description

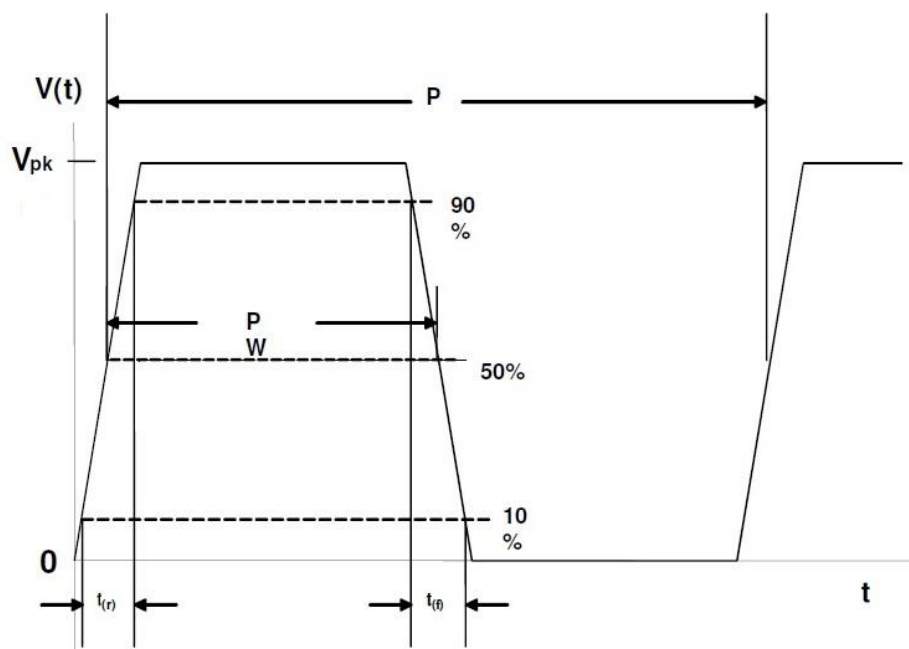
Vehicle is either locked or timed out of states
Vehicle Approach was detected
Vehicle was unlocked from outside of vehicle
Vehicle door(s) transitioned to Ajar – Interior and Exterior
Vehicle door(s) transitioned from Ajar to all Closed – Interior and Exterior
Vehicle door(s) transitioned to Ajar – Interior only
Vehicle door(s) transitioned from Ajar to all Closed – Interior only
Vehicle ignition has transitioned to OFF

8 REVISION HISTORY

Revision L e v el	Name	Change Description	Date
V2.0	FEHSAN2	Initial Release	9/20/2018

9 APPENDIX

9.1 APPENDIX 1: Exterior Lighting PWM Signal Specification



Operating Conditions: "		System Voltage: 9.5 < V _{sys} < 16.0 volts Ambient Temperature: -40oC < T _{amb} < 85oC				
No	Characteristic	Comment	Min	Typ	Max	Unit
1	PWM output frequency 1/P for Incandescent Bulbs	Configurable in the ECU	100	110		Hz
2	PWM output frequency 1/P for LED Bulbs	Configurable in the ECU	100	220		Hz
3	Frequency jitter	Measured via 1 second sliding window			0.1	Δ %
4	PWM rise t(r) / fall time t(f)		8		50	μs
5	PWM output duty cycle P _w /P		0		100	%
6	PWM output duty cycle jitter	Measured via 1 second sliding window			0.1	Δ %
7	PWM output duty cycle tolerance total				0.2	Δ %
8	PWM resolution	8 bit or better			1/255	
9	PWM response time message "				21	ms
10	PWM response time voltage "				18	ms
11	Shortage to GND detection	Duty cycle while error detection active	10		100	%
12	Shortage to Ubat or open line detection	Duty cycle while error detection active	0		90	%
13	PWM output voltage (V _{pk})	Short circuit & reverse battery protected	V _{sys} -1.5			V
14	Ground Offset	See ELCOMP requirement RQT-191001-009976 & 009989				V

Note 1: Specified values are valid for complete range of system voltage and ambient temperature.

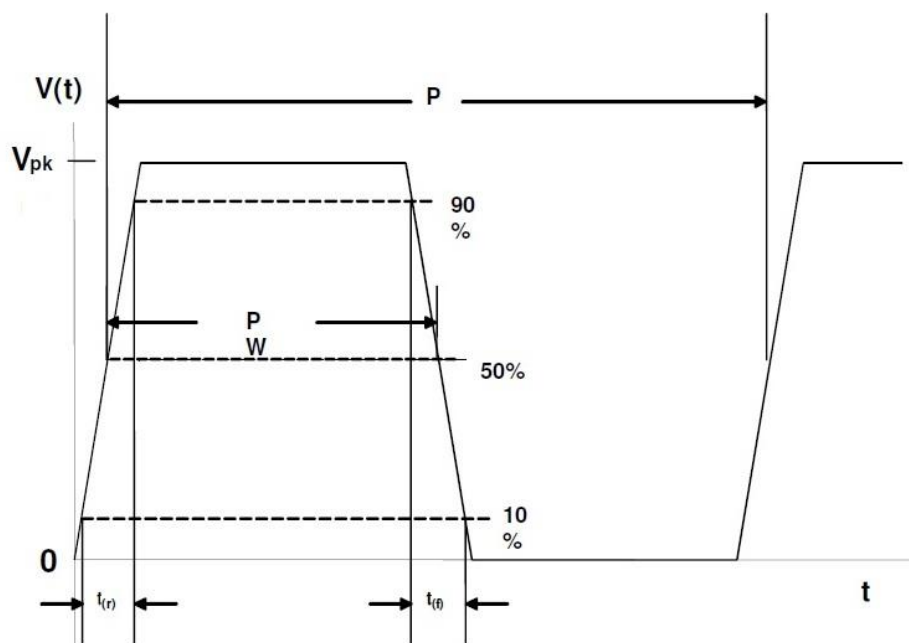
Note 2: Output values are measured at the ECU with the PWM output and related to ECU GND.

Note 4: Time when message is complete at bus to PWM response is measured at ECU PWM output.

Note 5: Time when voltage jump is applied to PWM response is measured at ECU PWM output.

Note 6: Any received PWM duty cycle shall be mapped to the closed available (taking into account resolution) duty cycle in the receiving ECU.

9.2 APPENDIX 2: Interior Lighting PWM Signal Specification



Operating Conditions: ^{1,2} System Voltage: 9.5 < Vsys < 16.0 volts Ambient Temperature: -40oC < Tamb < 85oC						
No	Characteristic	Comment	Min	Typ	Max	Unit
1	PWM output frequency 1/P for Incandescent Bulbs	Configurable in the ECU	100	110		Hz
2	PWM output frequency 1/P for LED Bulbs	Configurable in the ECU	100	220		Hz
3	Frequency jitter	Measured via 1 second sliding window			0.1	Δ %
4	PWM rise t(r) / fall time t(f)		8		50	μs
5	PWM output duty cycle Pw/P*		0		100	%
6	PWM output duty cycle jitter	Measured via 1 second sliding window			0.1	Δ %
7	PWM output duty cycle tolerance total				0.2	Δ %
8	PWM resolution	8 bit or better			1/255	
9	PWM response time message *				21	ms
10	PWM response time voltage *				18	ms
11	Shortage to GND detection	Duty cycle while error detection active	10		100	%
12	Shortage to Ubat or open line detection	Duty cycle while error detection active	0		90	%
13	PWM output voltage (Vpk)	Short circuit & reverse battery protected	Vsys-1.5			V
14	Ground Offset	See ELCOMP requirement RQT-191001-009976 & 009989				V

Note 1: Specified values are valid for complete range of system voltage and ambient temperature.

Note 2: Output values are measured at the ECU with the PWM output and related to ECU GND.

Note 4: Time when message is complete at bus to PWM response is measured at ECU PWM output.

Note 5: Time when voltage jump is applied to PWM response is measured at ECU PWM output.

Note 6: Any received PWM duty cycle shall be mapped to the closed available (taking into account resolution) duty cycle in the receiving ECU.